SPECIFICATIONS

Southampton Township
5 Retreat Road
Southampton, New Jersey 08088

Southampton Township
2026 Municipal Building Renovations
5 Retreat Road
Southampton, New Jersey 08088

Architect:
Garrison Architects
713 Creek Road
Bellmawr, NJ 08031
(856) 396-6200

Site Engineer/Environmental Engineer:
Environmental Resolutions, Inc.
815 East Gate Drive
Suite 103
Mount Laurel, NJ 08054
(856) 235-7170

Structural Engineer:
Orndorf and Associates
8600 West Chester Pike
Suite 201
Upper Darby, PA 19082
(610) 896-4500

Mechanical, Electrical & Plumbing Engineer:
Mulhern Consulting Engineers
321 South York Road
Hatboro, PA 19040
(215) 293-9900

ISSUED FOR BID: October 1, 2026
GA# 26-42

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BIDDER'S CHECKLIST

FAILURE TO SUBMIT THE FOLLOWING FORMS WITH THE BID SHALL BE CAUSE FOR AUTOMATIC REJECTION OF THE BID

☐ Bidder's Checklist (This Form) – Please include this form in the bid submission with each item included in the bid submission checked off within the square for that item. Please note that the first two lists are the requirements for the Bidder.

☐ Bid Form which includes Named Prime Subcontractors (All blank spaces are required to be filled out)

☐ Acknowledgment of Receipt of Addenda / Clarifications. If no Addenda / Clarifications are issued, form shall still be submitted, with the applicable box checked on the form

☐ Statement of Ownership

☐ Bid Bond

☐ Consent of Surety

BIDDER'S CHECKLIST

THE FOLLOWING FORMS ARE REQUESTED TO BE SUBMITTED WITH THE BID
AND MUST BE SUBMITTED PRIOR TO THE AWARD OF THE CONTRACT

FAILURE TO SUBMIT THE FOLLOWING FORMS PRIOR TO AWARD SHALL BE CAUSE FOR AUTOMATIC REFUSAL TO AWARD AND REJECTION OF THE BID

☐ Hold Harmless Agreement

☐ Certification of Non-Debarment for Federal Government Contracts

☐ Affirmative Action Requirements

☐ Non-Collusion Affidavit

☐ Equipment Certification

☐ Combined Certification: Prohibited Activities in Russia and Belarus & Investment Activities in Iran

☐ Disclosure of Contributions to NJ Election Law Enforcement Commission

☐ Public Works Contractor Registration Certificate

☐ Business Registration Certificate or Proof of Business Registration

By signing below, bidder acknowledges that he/she has read the AMERICANS WITH DISABILITIES ACT OF 1990 which has been included in the Specifications in the Instructions to Bidders.

I acknowledge that the above information is included with my Bid Package.

Acknowledged for: _____
(Name of Bidder)

By: _____
(Signature of Authorized Representative)

Name: _____

Title: _____

SOUTHAMPTON TOWNSHIP
NEW JERSEY

NOTICE TO BIDDERS

Bids may be sent, or hand delivered by the bidder or their agent to Southampton Township, 5 Retreat Road, Southampton, New Jersey 08088 until 3:00 pm on Tuesday, November 10, 2026, and will be opened immediately thereafter and read publicly for One Lump Sum Contract for the **Southampton Township 2026 Municipal Building Renovations**. Bids will not be received or accepted later than time designated aforesaid for their receipt.

Bidding shall be in conformance with the applicable requirements of the "Local Public Contracts Law," N.J.S.A. 40A:11-1 et seq.

Electronic Copies of the Bid Documents may be obtained by contacting Garrison Architects via email at jminniti@garrisonarch.com, Phone number (856) 396-6200. There is no charge for obtaining an electronic copy of the Bid Documents.

Proposals must be accompanied by a certified check, bank cashier's check, or Bid Bond in the form provided in the Contract Documents, with corporate surety satisfactory to the Owner, in an amount not less than 10% of the Base Bid (but in no case in excess of $20,000.00, pursuant to N.J.S.A. 40A:11-21), naming as payee or obligee, as applicable, **Southampton Township**, to be retained and applied by the undersigned as provided in Contract Documents in case bidder would default in executing the Agreement or furnishing the required bonds and insurance certificates as required by Contract Documents.

Prospective bidders are advised that this Project is one which will be subject and will be governed by the following provisions of New Jersey State Law (a) Prevailing Wage Act, N.J.S.A. 34:11-56.25 et seq., as amended; (b) N.J.S.A. 40A:11-18, which provides that only manufactured and farm products of the United States wherever available, shall be used in the execution of the work or supply of goods as specified in the Contract Documents; (c) Ownership Disclosure Certification, N.J.S.A. 52:25-24.2 and 40A:11-23.2(c) (d) Prohibited Activities In Russia And Belarus & Investment Activities in Iran.; (e) the Public Works Contractor Registration Act, N.J.S.A. 34:11-56.48 et seq., which requires that contractors and subcontractors must be registered at the time of bid.; and (f) N.J.S.A. 52:32-44, which requires that all business organizations that do business with a local contracting agency are required to be registered with the State and provide proof of their registration with the New Jersey Department of Treasury, Division of Revenue before the contracting agency may enter into a contract with the business.

Each bidder shall also include with their bid, a Certificate letter from a Surety Company authorized to transact business in the State of New Jersey, stating that it will provide the Contractor with a Performance Bond in the sum required by N.J.S.A. 40A:11-22.

The successful bidder shall be required to execute a Contract for the performance of the said work or the furnishing of said material or both, as the case may be, and a Surety Bond to be executed by a reliable Surety Company in a sum equal to the amount of the contract price for said work and/or material, guaranteeing the performance of the Contract, which Surety bond and Contract shall be approved as to form and execution by the Solicitor.

Bidders are required to comply with the provisions of N.J.S.A. 10:5-32 et seq. and N.J.A.C. 17:27 et seq.

The right is reserved to reject all bids or to waive minor informalities or non-material exceptions.

SOUTHAMPTON TOWNSHIP
NEW JERSEY

NOTICE TO BIDDERS

The Time Schedule for the project is as follows:

Thursday	**10/01/26**	Bid packages available via Electronic Delivery
Tuesday	**10/06/26**	Pre-bid meeting at **3:00 P.M.** at Southampton Township, 5 Retreat Road, Southampton, New Jersey 08088. Attendance at the Pre-Bid meeting is not mandatory but strongly recommended.
Tuesday	**10/27/26**	Deadline for Questions at 5:00 P.M. (email to jminniti@garrisonarch.com)
Thursday	**10/29/26**	Deadline for Addendum Issued to Bidders, if necessary
Tuesday	**11/10/26**	Bids Due at **3:00 P.M.** at Southampton Township, 5 Retreat Road, Southampton, New Jersey 08088.

Brandon E. Umba
Township Administrator

INSTRUCTIONS TO BIDDERS

(The following instructions shall be adhered to in the preparation of this Bid by the Bidder.)

1. DEFINITIONS

a. Owner: The term "Owner" as used in the Contract Documents refers to Southampton Township, 5 Retreat Road, Southampton, New Jersey 08088.
b. Architect: The term "Architect" refers to Garrison Architects, 713 Creek Road, Bellmawr, New Jersey 08031, Telephone (856) 396-6200.
c. Site Engineer: The term "Site Engineer" refers to Environmental Resolutions, Inc., 815 East Gate Drive Suite 103, Mount Laurel, New Jersey 08054, Telephone (856) 235-7170.
d. Contractor: The term "Contractor" refers to the Contractor to whom an award is made to perform the work under Contracts enumerated in the Notice to Bidders.
e. Prime Subcontractor: The term "Prime Subcontractor" means a subcontractor performing work in any of the branches of work listed in N.J.S.A. 40A:11-16 and all work kindred thereto.

2. PREPARATION OF BIDS

a. Bids shall be submitted on Form of Bid, hereto attached, or on an exact copy thereof which contains identical language. All blank spaces of the form shall be fully completed in accordance with these instructions, without variation, and there shall be no interlineations, deletions or additions. Base Bid Sum shall be stated both in writing and in figures; and, in case of discrepancy, written words shall be considered as being Bid Price.

Submit bid in duplicate (1 original and 1 copy).

b. Bid shall not contain recapitulations of the work to be done. No oral, telegraphic or telephonic communications or modifications shall be considered.
c. Bids shall be addressed to the Owner whose name appears in Paragraph 1a; it shall be mailed or delivered to the address stated in the Notice to Bidders, enclosed in an opaque sealed envelope, marked with the name of the Project and Bidders names; and must be received on or before the time designated in the Notice to Bidders. No responsibility will be attached to Architect or Owner for premature opening of a bid which is not properly identified. Southampton Township assumes no responsibility for bids mailed or misdirected in delivery.

3. TRUTH IN CONTRACTING:

a. Bidder should be aware of the following statutes that represent "Truth in Contracting" laws:

- N.J.S.A. 2C:21-34, et seq. governs false claims and representations by bidders. It is a serious crime for the bidder to knowingly submit a false claim and/or knowingly make material misrepresentation.
- N.J.S.A. 2C:27-10, provides that a person commits a crime if said person offers a benefit to a public servant for an official act performed or to be performed by a public servant, which is a violation of official duty

- N.J.S.A. 2C:27-11, provides that a bidder commits a crime if said person, directly or indirectly, confers or agrees to confer any benefit not allowed by law to a public servant.
- Bidder should consult the statutes or legal counsel for further information.

4. DISCREPANCIES OR OMISSIONS: BIDDER'S RESPONSIBILITY

a. The bidders understand and agree that its bid is submitted on the basis of the specifications prepared by Garrison Architects, 713 Creek Road, Bellmawr, New Jersey 08031 (856) 396-6200. The bidder accepts the obligation to become familiar with these specifications.

b. Bidders are expected to examine the specifications and related bid documents with care and observe all their requirements. Ambiguities, errors or omissions noted by bidders should be promptly reported in writing to the Architect. Any prospective bidder who wishes to challenge a bid specification shall file such challenges in writing with Garrison Architects via email to jminniti@garrisonarch.com in accordance with the schedule set forth in the Notice to Bidders. Challenges filed after that time shall be considered void and having no impact on the contracting unit for the award of a contract pursuant to N.J.S.A. 40A:11-13. In the event the bidder fails to notify the Architect of such ambiguities, errors or omissions, the bidder shall be bound by the requirements of the specifications and the bidder's submitted bid.

c. No oral interpretation and or clarification of the meaning of the specifications for any goods and services will be made to any bidder. Such request shall be in writing, addressed to Garrison Architects via email to jminniti@garrisonarch.com, in accordance with the schedule set forth in the Notice to Bidders. All interpretations, clarifications and any supplemental instructions will be in the form of a written addendum / clarification to the specifications, and will be distributed to all prospective bidders in a manner consistent with N.J.S.A 40A:11-23.c.2. All addenda / clarifications so issued shall become part of the specification and bid documents, and shall be acknowledged by the bidder in the bid. Garrison Architects' interpretations or corrections thereof shall be final. When issuing addenda / clarifications, the Architect shall provide required notice prior to the official receipt of bids to any person who has submitted a bid, or who has received a bid package pursuant to N.J.S.A. 40A:11-23c.2.

d. Discrepancies in Bids: If the amount shown in words and its equivalent in figures do not agree, the written words shall be binding. Ditto marks are not considered writing or printing and shall not be used.

e. It will be assumed with the submission of the proposal that the Bidder has fully examined the site, the Drawings and the Specifications, and has made provisions for construction under the conditions as set forth and is responsible for seeing that his proposed Subcontractors are familiar with requirements of Contract Documents so far as applicable to their work.

f. Bids shall be based upon Drawings, Specifications and other documents constituting the Contract Documents referred to in the Notice to Bidders, bound herewith, including related Addenda / Clarification issued by Garrison Architects and may not be withdrawn for a period of 60 days after date set for receiving bids. Any proposal which has been opened by the Owner may not be withdrawn during the period specified in the Notice to Bidders, bound herewith, as the period during which proposals may not be withdrawn by Bidders, except as specifically permitted by law.

5. BID SECURITY AND BONDING REQUIREMENTS

a. BID GUARANTEE: Bidder shall submit with the bid a certified check, cashier's check or bid bond in the amount of ten percent (10%) of the total price bid, but not in excess of $20,000.00, payable unconditionally to Southampton Township. When submitting a Bid Bond, it shall contain Power of Attorney for full amount of bid Bond from a surety company authorized to do business in the State of New Jersey and acceptable to Southampton Township. The check or bond of the unsuccessful bidder(s) shall be returned pursuant to N.J.S.A. 40A:11-24a. The check or bond of the bidder to whom the contract is awarded shall be retained until a contract is executed and the required performance bond or other security is submitted. The check or bond of the successful bidder shall be forfeited if the bidder fails to enter into a contract pursuant to N.J.S.A. 40A:11-21. Failure to submit a bid guarantee shall result in rejection of the bid.

b. CONSENT OF SURETY: In addition, and pursuant to N.J.S.A. 40A:11-22, each bid shall be accompanied by a Consent of Surety assuring that satisfactory arrangements have been made between the Surety and the Bidder, by which the Surety agrees to furnish the Bidder with a Performance Bond, a Payment Bond, and a Maintenance Bond, substantially in accordance with the forms attached hereto, each in the stated amount of one hundred percent of the Contract amount. The Consent of Surety shall be executed by an approved Surety Company authorized to do business in the State of New Jersey. The Surety's consent and guarantee to issue the Performance and Payment Bonds must be unconditional. **Submission of a Consent of Surety which contains any prior conditions upon the Surety's issuance of the required Bonds shall be cause for rejection of the Bid. Failure to submit a Consent of Surety form shall result in rejection of the Bid.**

c. If a Bidder to whom five (5) days' notice of intention to accept his Bid has been made by or in behalf of the Owner fails to furnish a Performance and Payment Bond in form furnished herewith, as required by the law of the State where the work is to be performed, to the Owner, as a condition precedent to formal award of the Contract, or fails to execute the Agreement or to furnish the required insurance certificates, or fails to furnish the required form in compliance with N.J.S.A. 10:5-31, et seq. within ten (10) days after notice that an award has been made to him, the Owner may, at his sole discretion, award the Contract to the next lowest responsible Bidder or readvertise for bids, and the defaulting Bidder shall pay to the Owner the difference between the amount of his bid and any higher amount for which the Owner may contract for the required work, plus any advertising, Architect's, legal or other expenses incurred by reason of the default.

The security check of such defaulting Bidder or, as the case may be, the amount recovered from the surety of such Bidder on his Bid Bond shall be applied on account of such damages; and, if the amount of said difference, plus such expense, shall exceed the amount of such check or recovery, the defaulting bidder shall pay to the Owner the full amount of the excess.

6. CONTRACT BONDS

a. PERFORMANCE BOND: Bidder shall simultaneously with the delivery of the executed contract, submit an executed bond in the amount of one hundred (100%) of the acceptable bid as security for the faithful performance of this contract. The performance bond provided shall not be released until final acceptance of the whole work and then only if any liens or claims have been satisfied. The surety on such bond or bonds shall be a duly authorized surety company authorized to do business in the State of New Jersey pursuant to N.J.S.A. 17:31-5. Failure to submit this with the executed contract shall be cause for declaring the contract null and void pursuant to N.J.S.A. 40A:11-22.

b. LABOR AND MATERIAL (PAYMENT) BOND: The Bidder shall with the delivery of the performance bond submit an executed payment bond in the amount of one hundred percent (100 %) of the acceptable bid to guarantee payment to laborers and suppliers for the labor and materials used in the work performed under the Contract. Failure to submit a labor and material bond with the performance bond shall be a cause for declaring the Contract null and void. The labor and material bond provided shall not be released until final acceptance of the whole work and then only if any liens or claims have been satisfied. The surety on such bond or bonds shall be a duly authorized surety company authorized to do business in the State of New Jersey pursuant to N.J.S.A. 17:31-5.

c. MAINTENANCE BOND: Upon acceptance of the work by the owner, the contractor shall submit a Maintenance Bond (N.J.S.A. 40A:11-16.3b) in the total amount of the project guaranteeing against defective quality of work or materials for the period of two (2) years.

7. WITHDRAWAL OF BIDS (N.J.S.A. 40A:11-23.3)

Permission for Bidder to Withdraw a Bid Due to a Mistake in Certain Circumstances

N.J.S.A. 40A:11-23.3 authorizes a bidder to request withdrawal of a public works bid due to a mistake on the part of the bidder. A mistake is defined by N.J.S.A. 40A:11-2(42) as a clerical error that is an unintentional and substantial computational error or an unintentional omission of a substantial quantity of labor, material, or both, from the final bid computation.

A bidder claiming a mistake under N.J.S.A. 40A:11-23.3 must submit a request for withdrawal, in writing, by certified or registered mail to Brandon E. Umba, Township Administrator, Southampton Township, 5 Retreat Road, Southampton, New Jersey 08088. The bidder must request withdrawal of a bid due to a mistake, as defined by the law, within five business days after the receipt and opening of the bids. Since the bid withdrawal request shall be effective as of the postmark of the certified or registered mailing, the purchasing agent or designee may contact all bidders, after bids are opened, to ascertain if any bidders wish to, or already have exercised a request to withdraw their bid pursuant to N.J.S.A. 40A:11-23.3.

A bidder's request to withdraw the bid shall contain evidence, including any pertinent documents, demonstrating that a mistake was made. Such documents and relevant written information shall be reviewed and evaluated by the public owner's designated staff pursuant to the statutory criteria of N.J.S.A. 40A:11-23.3.

The public owner will not consider any written request for a bid withdrawal for a mistake, as defined by N.J.S.A. 40A:11-2(42), by a bidder in the preparation of a bid proposal unless the postmark of the certified or registered mailing is within the five business days following the opening of bids.

8. AWARD OF CONTRACT

a. Bidder responsibility including ability to complete the Project within the time specified, will be considered in making award. The Owner reserves the right to reject all bids and to waive minor informalities or non-material exceptions in the bid. Bids may be rejected if they show any omissions, alterations of form, additions or deductions not called for, conditional or uninvited alternate bids, or irregularities of any kind. Bids in which the prices are unbalanced may be rejected. Claims on account of mistakes in or omissions in bids will not be considered, except as specifically permitted by law.
b. If awards are made, the Owner will execute the Agreement within twenty-one (21) days after the Contractor executes and delivers same to Owner, accompanied by insurance certificates.
c. The award of Contract or rejection of bids will be made within sixty (60) days of the Bid Opening. The Owner can extend this period if both parties agree to such an extension.
d. Copies of the Performance and Payment Bond forms included with these Specifications exemplify type of Contract forms that the successful Bidder will be required to execute before or after award has been made, as contemplated by Contract Documents and as required by State law in case of such Bonds.
e. The Contract is subject to the appropriation of funds per N.J.A.C. 5:30-11.1, et seq.

9. START OF WORK

Shop Drawings, Submittals, etc. can be commenced after Notice to Proceed has been given by Owner or Architect.

10. COMPLETION OF THE PROJECT

The project must be completed by the date set forth in Section 01010, "Summary of Work".

11. INSURANCE

Requirements for Insurance are stated in the AIA Document A201 – 2017 General Conditions of Contract for Construction.

12. NEW JERSEY PREVAILING WAGE RATE / PUBLIC WORKS CONTRACTOR REGISTRATION

Bidders are required to comply with the New Jersey Prevailing Wage Act, N.J.S.A. 34:11-56.25 et seq. (the "Wage Act"), as amended.

Contractor shall ensure that all workers employed in the performance of this Contract shall be paid not less than the Prevailing Wage Rate designated for this locality by the Commission of Labor and Workforce Development. If it is found that any worker employed by the Contractor or any Subcontractor has been paid less than the Prevailing Wage Rate or otherwise violates the Wage Act, the Owner may terminate the Contractor's or Subcontractor's right to proceed with the work, or such part of the work as to which there has been a failure to pay required wages and to prosecute the work to completion or otherwise. The Contractor and its sureties shall be liable for any excess costs occasioned thereby to the Owner.

Pursuant to N.J.S.A. 34:11-56.27a, if the lowest responsive bidder submits a bid that is ten percent (10%) or more below than the next lowest bid, the lowest responsive bidder shall certify to the Owner that the prevailing wage rates required by the Wage Act shall be paid. If the bidder does not provide the certification prior to award of the contract, the bidder shall not be entitled to the award and its bid will be rejected.

The Contractors can reference the State of New Jersey Department of Labor and Workforce Development Website https://www.nj.gov/labor/wagehour/wagerate/CurrentWageRates.html to view current Prevailing Wage Rates. The official wage rates will be included in the contract by the Township.

The Public Works Contractor Registration Act, N.J.S.A. 34:11-56.48 et seq. (the "Registration Act") requires that Contractors and named Prime Subcontractors must be registered pursuant to the Registration Act prior to submitting a bid. The Owner requests bidder provide a copy of the Public Works Contractor Registration Certificate for itself and any named Prime Subcontractors at the time of submission of the bid, but bidder must provide the Public Works Contractor Registration Certificate for itself and any named Prime Subcontractors prior to award. The Contractor shall enter into subcontracts only with subcontractors, whether Prime Subcontractors or otherwise, who are registered pursuant to the Act.

13. CERTIFIED PAYROLL REQUIREMENTS

Governor Murphy signed into law S-1442/A-5345, now P.L. 2023, c. 138, which requires public works contractor registration and payroll certification for public works projects to be completed online at https://njwages.nj.gov/. The Contractor will be required to submit the certified payroll via the Hub and via hard copy to Southampton Township for itself and its subcontractors.

14. BUSINESS REGISTRATION AND USE TAX

Pursuant to N.J.S.A. 52:32-44, Southampton Township ("Contracting Agency") is prohibited from entering into a contract with an entity unless the bidder/proposer/contractor, and each subcontractor that is required by law to be named in a bid/proposal/contract has a valid Business Registration Certificate on file with the Division of Revenue and Enterprise Services within the Department of the Treasury.

Prior to contract award or authorization, the contractor shall provide the Contracting Agency with its proof of business registration and that of any named subcontractor(s).

Subcontractors named in a bid or other proposal shall provide proof of business registration to the bidder, who in turn, shall provide it to the Contracting Agency prior to the time a contract, purchase order, or other contracting document is awarded or authorized.

During the course of contract performance:

(1) the contractor shall not enter into a contract with a subcontractor unless the subcontractor first provides the contractor with a valid proof of business registration.

(2) the contractor shall maintain and submit to the Contracting Agency a list of subcontractors and their addresses that may be updated from time to time.

(3) the contractor and any subcontractor providing goods or performing services under the contract, and each of their affiliates, shall collect and remit to the Director of the Division of Taxation in the Department of the Treasury, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) on all sales of tangible personal property delivered into the State. Any questions in this regard can be directed to the Division of Taxation at (609)292-6400. Form NJ-REG can be filed online at http://www.state.nj.us/treasury/revenue/busregcert.shtml.

Before final payment is made under the contract, the contractor shall submit to the Contracting Agency a complete and accurate list of all subcontractors used and their addresses.

Pursuant to N.J.S.A. 54:49-4.1, a business organization that fails to provide a copy of a business registration as required, or that provides false business registration information, shall be liable for a penalty of $25 for each day of violation, not to exceed $50,000, for each proof of business registration not properly provided under a contract with a contracting agency.

15. OWNERSHIP DISCLOSURE CERTIFICATION N.J.S.A. 52:25-24.2

Pursuant to N.J.S.A. 52:25-24.2, no corporation, partnership, or limited liability company shall be awarded any contract nor shall any agreement be entered into for the performance of any work or the furnishing of any materials or supplies, the cost of which is to be paid with or out of any public funds, by the State, or any county, municipality or school district, or any subsidiary or agency of the State, or of any county, municipality or school district, or by any authority, board, or commission which exercises governmental functions, unless prior to the receipt of the bid or proposal, or accompanying the bid or proposal of said corporation, said partnership, or said limited liability company there is submitted a statement setting forth the names and addresses of all stockholders in the corporation who own ten percent (10%) or more of its stock, of any class, or of all individual partners in the partnership who own a ten percent (10%) or greater interest therein, or of all members in the limited liability company who own a ten percent (10%) or greater interest therein, as the case may be.

If one or more such stockholder or partner or member is itself a corporation or partnership or limited liability company, the stockholders holding ten percent (10%) or more of that corporation's stock, or the individual partners owning ten percent (10%) or greater interest in that partnership, or the members owning ten percent (10%) or greater interest in that limited liability company, as the case may be, shall also be listed. The disclosure shall be continued until the names and addresses of every non-corporate stockholder, and individual partner, and member, exceeding the ten percent (10%) ownership criteria established in this act, has been listed.

To comply with this section, a bidder with any direct or indirect parent entity which is publicly traded may submit the name and address of each publicly traded entity and the name and address of each person that holds a ten percent (10%) or greater beneficial interest in the publicly traded entity as of the last annual filing with the federal Securities and Exchange Commission or the foreign equivalent, and, if there is any person that holds a ten percent (10%) or greater beneficial interest, also shall submit links to the websites containing the last annual filings with the federal Securities and Exchange Commission or the foreign equivalent and the relevant page numbers of the filings that contain the information on each person that holds a 10 percent or greater beneficial interest.

The Ownership Disclosure Certification form shall be completed, signed, notarized, and submitted with the bid.

16. NON-COLLUSION AFFIDAVIT

The Bidder shall submit the Non-Collusion Affidavit included in the Specifications.

17. EQUIPMENT CERTIFICATION (N.J.S.A. 40A:11-20)

The Bidder shall submit the Equipment Certification included in the Specifications.

18. COMBINED CERTIFICATION: PROHIBITED ACTIVITIES IN RUSSIA AND BELARUS & INVESTMENT ACTIVITIES IN IRAN

The Owner, pursuant to N.J.S.A. 40A:11-2.1, P.L. 2022, c.3, N.J.S.A. 52:32-55 et seq., shall implement and comply with the Combined Certification: Prohibited Activities in Russia and Belarus & Investment Activities in Iran.

Pursuant to the law, any person or entity that is a successful bidder or proposer, or otherwise proposes to enter into or renew a contract, for goods or services must complete the certification below prior to contract award to attest, under penalty of perjury, that neither the person or entity, nor any parent entity, subsidiary, or affiliate, is identified on the Department of Treasury's Russia-Belarus list or Chapter 25 list as a person or entity engaging in prohibited activities in Russia, Belarus or Iran. Before a contract for goods or services can be amended or extended, a person or entity must certify that neither the person or entity, nor any parent entity, subsidiary, or affiliate, is identified on the Department of Treasury's Russia-Belarus list. Both lists are found on Treasury's website at the following web addresses:
https://www.nj.gov/treasury/administration/pdf/RussiaBelarusEntityList.pdf
www.state.nj.us/treasury/purchase/pdf/Chapter25List.pdf.
As applicable to the type of contract, the above referenced lists must be reviewed prior to completing the certification. A person or entity unable to make the certification must provide a detailed, accurate, and precise description of the activities of the person or entity, or of a parent entity, subsidiary, or affiliate, engaging in prohibited activities in Russia or Belarus and/or investment activities in Iran. The person or entity must cease engaging in any prohibited activities and provide an updated certification before the contract can be entered into.
If a vendor or contractor is found to be in violation of law, action may be taken as appropriate and as may be provided by law, rule, or contract, including but not limited to imposing sanctions, seeking compliance, recovering damages, declaring the party in default, and seeking debarment or suspension of the party.
The Combined Certification: Prohibited Activities in Russia and Belarus & Investment Activities in Iran is to be completed, certified and submitted prior to the award of contract.

19. N.J.S.A. 10:5-31, et seq. AFFIRMATIVE ACTION

Pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented, the following Affirmative Action Against Discrimination on the Project will be a condition of the Contract. The Bidder, its subconsultants and subcontractors shall comply with the anti-discrimination provisions of N.J.S.A. 10:2-1 et seq., the New Jersey Law Against Discrimination, N.J.S.A. 10:5-1 et seq., N.J.A.C. 17:27-1.1 et seq. and shall guarantee to afford equal opportunity in performance of this Agreement in accordance with an affirmative action program approved by the State Treasurer.

20. § 10:2-1. Antidiscrimination provisions
Antidiscrimination provisions. Every contract for or on behalf of the State or any county or municipality or other political subdivision of the State, or any agency of or authority created by any of the foregoing, for the construction, alteration or repair of any public building or public work or for the acquisition of materials, equipment, supplies or services shall contain provisions by which the contractor agrees that:

a. In the hiring of persons for the performance of work under this contract or any subcontract hereunder, or for the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under this contract, no contractor, nor any person acting on behalf of such contractor or subcontractor, shall, by reason of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex, discriminate against any person who is qualified and available to perform the work to which the employment relates;

b. No contractor, subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee engaged in the performance of work under this contract or any subcontract hereunder, or engaged in the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under such contract, on account of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex;

c. There may be deducted from the amount payable to the contractor by the contracting public agency, under this contract, a penalty of $ 50.00 for each person for each calendar day during which such person is discriminated against or intimidated in violation of the provisions of the contract; and

d. This contract may be canceled or terminated by the contracting public agency, and all money due or to become due hereunder may be forfeited, for any violation of this section of the contract occurring after notice to the contractor from the contracting public agency of any prior violation of this section of the contract.

21. DOMESTIC MATERIALS
Pursuant to N.J.S.A. 40A:11-18, only manufactured and farm products of the United States wherever available, shall be used in the execution of the work or supply of goods as specified herein.

22. Permits and Licenses

It is the Contractor's sole responsibility to observe the safety provisions of applicable Federal, State and Local laws, regulations and guidelines. Neither the Owner nor any of its Consultants assumes any responsibility for the Contractor's complying with the obligations therein. The Contractor is responsible for applying, on behalf of the Owner, and providing the information required for the building permits required for the project.

23. METHOD OF AWARD - LOWEST RESPONSIBLE BIDDER(S)

The Contract, if awarded, shall be to the lowest responsive and responsible bidder. The low bid will be determined based on the lowest base bid (with any accepted alternates) submitted by a responsible bidder (or bidders).

24. SUBSTITUTION REQUESTS

Please refer to Specification Section 01300, "Submittals." "Or Equal" substitutions are permitted so long as they are equal to or superior to the basis of design and the Contractor takes full responsibility for all coordination and costs associated with collateral issues related to the substitution. No Substitutions will be reviewed during the bidding process. The Contractor takes full responsibility for all substitutions. Substitution submittals shall be made **no later than 30 days after Notice to Proceed** in order to provide time for comparison review. All submittals after 30 days shall be in strict accordance with the basis of design / specified products. **No "or equal" Substitutions will be considered after 30 days unless the original specified product becomes unavailable.**

25. Form AIA 101, "Standard Form of Agreement Between Owner and Contractor" as modified by the Owner shall be the standard agreement form used for this project.

26. All references to separate Prime Contractors, each Prime Contractor, Mechanical Contractor, Electrical Contractor, Plumbing Contractor, or Structural Steel Contractor shall mean the Single Lump Sum Bid Contractor.

27. **MANDATORY ELEC DISCLOSURE REQUIREMENT, P.L. 2005, CHAPTER 271**

Vendor is advised of its responsibility to file an annual disclosure statement on political contributions with the New Jersey Election Law Enforcement Commission (ELEC), pursuant to N.J.S.A. 19:44A-20.13 if the contractor receives contracts in excess of $50,000 from a public entity in a calendar year. It is the contractor's responsibility to determine if filing is necessary. Failure to so file can result in the imposition of financial penalties by ELEC. Additional information about this requirement is available from ELEC at 888-313-3532 or at www.elec.state.nj.us.

28. The Owner reserves the right to reject all bids as permitted as permitted by law, or to waive minor informalities or non-material exceptions in the bids.

29. In case of default by the bidder or contractor, the Owner may procure the articles or services from other sources and hold the bidder or contractor responsible for any excess cost occasioned thereby.

30. The bidder, if awarded the contract, agrees to protect, defend and save harmless the Owner, against damage for payment for the use of any patented material process, article or devise that may enter into the manufacture, construction or form a part of the work covered by either order or contract, and he further agrees to indemnify and save harmless the Owner from suits or actions of every nature and description brought against it, for, or on account of any injuries or damages received or sustained by any party or parties by, or from any negligent acts or failure to act of the contractor, its servants or agents.

31. Any changes, whiteouts, strikeouts, etc., on the proposal page must be initialed by the person responsible for signing the bid.

32. Bids shall be prepared on forms furnished by the Owner. All blank spaces shall be filled in, by typewrite or ink, and amounts clearly shown.

33. Bids may not be modified after submittal. Bidders may withdraw bids at any time before opening.

34. All bids submitted shall include in the price any applicable permits, or fees required by any other government entity that has jurisdiction to require the same.

35. By submission of bid, the bidder certifies that the merchandise to be furnished will not infringe upon any valid patent or trademark.

36. No vendor shall influence, or attempt to influence or cause to be influenced, any officer or employee to use his/her official capacity in any manner which might tend to impair the objectivity or independence of judgment of said officer or employee.

37. No vendor shall cause or influence, or attempt to cause or influence, any officer or employee to use his/her official capacity to secure unwarranted privileges or advantages for the vendor or any other person.

38. The provisions above shall not be construed to prohibit an officer or employee from contracting with vendors under the same terms and conditions as are offered or made available to members of the general public.

39. Whenever a bid calls for an on-site inspection or a pre-bid meeting, by no means is anyone to assume that answers given at the site inspection or pre-bid meeting to be binding unless confirmed in writing via an addendum/clarification prior to the bid opening.

40. The vendor or contractor hereby guarantees that all materials, supplies, and equipment furnished or delivered to the Owner as listed on any bid, request for proposal, quotation, contract or purchase order meet the requirements, specifications and standards as provided for under the Federal Occupational Safety and Health Act of 1970, as from time to time amended and enforced as of the date thereof.

41. New Jersey Worker and Community Right to Know Act, N.J.S.A. 34:5A-1 et seq. provides that each bidder must furnish Owner a "Material Safety Data Sheets" for each product they or their suppliers supply to the Owner for which the act requirements a “Material Safety Data Sheets.” These Material Safety Data Sheets should be submitted during the shop drawing submission process.

42. The bidder should be aware, if awarded the contract, that it will be responsible for any and all subcontractors as well as itself and are required to comply with all applicable local, state, and federal safety, health, and environmental regulations, including provisions for protecting employees and the public from construction hazards.

43. The successful bidder will be required to supply to the Owner, a copy of their safety program and must also include a contact person to resolve any problems that may arise.

44. Contractor Safety Guidelines

In an effort to provide contractors with an overview of areas of concern, the following information is provided to all general contractors working on the Owner's property or under the Owner's auspices. It is the general contractor's responsibility to ensure that their subcontractors are in compliance.

1) The safety of the Owner's workers and the general public is paramount.
2) An outside contact person is to be provided on each job.
3) Material Safety Data Sheets are to be provided to the Architect during the Shop Drawing Process.
4) Copies of all product MSDS's are to be maintained on site.
5) The Contractor shall assure compliance with all OSHA & PEOSH regulations. New Jersey's Indoor Air Quality Standard Section N.J.A.C 12:100-13.5 is available upon request, and the Contractor shall be specifically responsible for complying with all other applicable laws, rules and regulations.
6) Any disruption in building services, loud noises or excessive dust should be anticipated and addressed prior to the commencement of the specific work involved and the disturbance eliminated or minimized to the maximum extent possible.
7) The Contractor is responsible for good housekeeping on the construction site. All exits and exit ways are to be kept free and clear of material storage, trash and equipment.
9) Access to the job site shall be provided to the Owner and its representatives.
10) The Owner reserves the right to stop work if an imminent hazard exists. The costs, if any, created by the work stoppage are the responsibility of the Contractor if the Contractor or one of his subcontractors is determined to be responsible for the imminent hazard.

45. **AMERICANS WITH DISABILITIES ACT, 42 U.S.C. 12101**

The CONTRACTOR and the OWNER do hereby agree that the provisions of Title II of the Americans with Disabilities Act of 1990 (the "Act") (42 U.S.C. §12101 et seq.), which prohibits discrimination on the basis of disability by public entities in all services, programs and activities provided or made available by public entities, and the rules and regulations promulgated pursuant thereunto, are made a part of this contract. In providing any aid, benefit, or service on behalf of the OWNER pursuant to this contract, the CONTRACTOR agrees that the performance shall be in strict compliance with the Act or ADA. In the event that the CONTRACTOR, its agents, servants, employees, or subcontractors violate or are alleged to have violated the Act or ADA during the performance of this Contract, the CONTRACTOR shall defend the OWNER in any action or administrative proceeding commenced pursuant to this Act or ADA. The CONTRACTOR shall indemnify, protect, and save harmless the OWNER, its agents, servants, and employees from and against any and all suits, claims, losses, demands, or damages, or whatever kind or nature arising out of or claimed to arise out of the alleged violation. The CONTRACTOR shall at its own expense, appear, defend, and pay any and all charges for legal services and any and all costs and other expenses arising from such action or administrative proceeding or incurred in connection therewith. In any and all complaints brought pursuant to the OWNER grievance procedure, the CONTRACTOR agrees to abide by any decision of the OWNER which is rendered pursuant to said grievance procedure. If any action or administrative proceeding results in an award of damages against the OWNER or if the OWNER incurs any expense to cure a violation of the Act or ADA which has been brought pursuant to its grievance procedure, the CONTRACTOR shall satisfy and discharge the same at its own expense. The

OWNER shall, as soon as practicable after a claim has been made against it, give written notice thereof to the CONTRACTOR along with full and complete particulars of the claim. If any action or administrative proceedings is brought against the OWNER or any of its agents, servants, and employees, the OWNER shall expeditiously forward or have forwarded to the CONTRACTOR every demand, complaint, notice, summons, pleading, or other process received by the OWNER or its representatives. It is expressly agreed and understood that any approval by the OWNER of the services provided by the CONTRACTOR pursuant to this contact will not relieve the CONTRACTOR of the obligation to comply with the Act or ADA and to defend, indemnify, protect, and save harmless the OWNER pursuant to this paragraph. It is further agreed and understood that the OWNER assumes no obligation to indemnify or save harmless the CONTRACTOR, its agents, servants, employees and subcontractors for any claim which may arise out to their performance of this Agreement. Furthermore, the CONTRACTOR expressly understands and agrees that the provisions of this indemnification clause shall in no way limit the CONTRACTOR'S obligations assumed in this agreement, nor shall they be construed to relieve the CONTRACTOR from any liability, nor preclude the OWNER from taking any other actions available to it under any other provisions of the Agreement or otherwise at law.

46. RECORD MAINTENANCE

Pursuant to N.J.A.C. 19:70-1.6, the Contractor shall maintain all documentation related to products, transactions or services under this Contract for a period of five years from the date of final payment. Such records shall be made available to the New Jersey Office of the State Comptroller upon request.

END OF SECTION

BID FORM

DATE: _____

Bidder's Information: (Print or Type)

Company Name: _____

Contact Name: _____

Contact Email Address: _____

Company Address: _____

_____

Telephone Number: _____ Fax Number:_____

Southampton Township
5 Retreat Road
Southampton, New Jersey 08088

Ladies and Gentlemen:

This Proposal is submitted in accordance with your Notice to Bidders inviting proposals to be received for the **Southampton Township 2026 Municipal Building Renovations**. Having carefully examined the Contract Documents and being familiar with various conditions affecting the work, the undersigned herein agrees to furnish all materials, perform all labor and do all else necessary to complete the **ENTIRE PROJECT** in accordance with said Contract Documents for the **TOTAL LUMP SUM BASE BID (including the allowance) OF**:

BID AMOUNT $_____

PLUS CASH ALLOWANCE
SECTION 01210 - ALLOWANCES ITEM A $ 40,000.00

TOTAL LUMP SUM BASE BID
(Numbers) (Bid Amount plus Allowances) $_____

(Words)_____

Amount shall be shown in both words and numbers. In case of discrepancy, the amount shown in words shall govern.

BID FORM

SUBCONTRACTOR DISCLOSURE

Southampton Township called "Owner" in accordance with bidding requirements for the work titled the **Southampton Township 2026 Municipal Building Renovations** for the portions of the Work below listed, the undersigned proposes to use the following Prime Subcontractors (indicate "Self-Performing" if you are doing the portion of the work required) pursuant to N.J.S.A. 40A:11-16 and N.J.S.A. 40A:11-23.2(d)

ELECTRICAL WORK:

1. _____
(Name of Subcontractor)

_____
(License Number)

PLUMBING AND GAS FITTING AND ALL KINDRED WORK:

1. _____
(Name of Subcontractor)

_____ _____
(Name of Plumber) (License Number)

NOTE: In compliance with N.J.S.A. 45:14C-2(h), you must identify your licensed master plumber who shall be the holder of not less than 10% of the issued and outstanding shares of stock in the corporation, or not less than 10% of the capital of the partnership, or not less than 10% of the ownership of any other firm or legal entity engaging in the business of plumbing contracting in the State and shall employ either journeyman plumbers or apprentice plumbers or both.

HOT WATER HEATING AND VENTILATING AND REGRIGERATION APPARATUS AND KINDRED WORK:

1. _____
(Name of Subcontractor)

_____
(License Number)

STRUCTURAL STEEL & ORNAMENTAL IRON WORK:

1. _____
(Name of Subcontractor)

NOT APPLICABLE
(License Number)

BID FORM

The undersigned hereby certifies that this Proposal is genuine and not sham or collusive or made in the interest of or in behalf of any person, firm or corporation not herein named and that the undersigned has not directly or indirectly induced or solicited any bidder to refrain from bidding and that the undersigned has not in any manner sought by collusion to secure for himself any advantages over any other bidder.

The undersigned, intending to be legally bound, agrees that this Proposal shall be irrevocable and shall remain subject to your acceptance for 60 days after date set for bid opening.

The undersigned submits this Proposal with the full knowledge of the Contract requirements and hereby agrees that the work of this Project, under the Contract, shall be fully and finally completed and ready for occupancy in accordance with the date found in Specification Section 01010 – Summary of Work.

_____

NAME OF BIDDER

_____ _____

SIGNATURE DATE

ACKNOWLEDGMENT OF RECEIPT OF ADDENDA / CLARIFICATIONS

The undersigned Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Dated
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Clarification Number	Dated
_____	_____
_____	_____
_____	_____

☐ Check here if No Addenda / Clarifications were issued.

Acknowledged for: _____
(Name of Bidder)

By: _____
(Signature of Authorized Representative)

Name: _____

Title: _____

FAILURE TO COMPLETE AND RETURN THIS FORM WITH YOUR BID SUBMISSION SHALL BE CAUSE FOR YOUR BID TO BE REJECTED

STATEMENT OF OWNERSHIP
(OWNERSHIP DISCLOSURE CERTIFICATION)
N.J.S.A. 52:25-24.2 (P.L. 1977, c.33, as amended by P.L. 2016, c.43)

This Statement Shall Be Included with All Bid and Proposal Submissions

Name of Business: _____

Address of Business: _____

Name of person completing this form: _____

N.J.S.A. 52:25-24.2:

"No corporation, partnership, or limited liability company shall be awarded any contract nor shall any agreement be entered into for the performance of any work or the furnishing of any materials or supplies, the cost of which is to be paid with or out of any public funds, by the State, or any county, municipality or school district, or any subsidiary or agency of the State, or of any county, municipality or school district, or by any authority, board, or commission which exercises governmental functions, unless prior to the receipt of the bid or proposal, or accompanying the bid or proposal of said corporation, said partnership, or said limited liability company there is submitted a statement setting forth the names and addresses of all stockholders in the corporation who own 10 percent or more of its stock, of any class, or of all individual partners in the partnership who own a 10 percent or greater interest therein, or of all members in the limited liability company who own a 10 percent or greater interest therein, as the case may be.

If one or more such stockholder or partner or member is itself a corporation or partnership or limited liability company, the stockholders holding 10 percent or more of that corporation's stock, or the individual partners owning 10 percent or greater interest in that partnership, or the members owning 10 percent or greater interest in that limited liability company, as the case may be, shall also be listed. The disclosure shall be continued until names and addresses of every non-corporate stockholder, and individual partner, and member, exceeding the 10 percent ownership criteria established in this act, has been listed.

To comply with this section, a bidder with any direct or indirect parent entity which is publicly traded may submit the name and address of each publicly traded entity and the name and address of each person that holds a 10 percent or greater beneficial interest in the publicly traded entity as of the last annual filing with the federal Securities and Exchange Commission or the foreign equivalent, and, if there is any person that holds a 10 percent or greater beneficial interest, also shall submit links to the websites containing the last annual filings with the federal Securities and Exchange Commission or the foreign equivalent and the relevant page numbers of the filings that contain the information on each person that holds a 10 percent or greater beneficial interest."

This Ownership Disclosure Certification form shall be completed, signed and notarized. **Failure of the bidder/proposer to submit the required information is cause for automatic rejection of the bid or proposal.**

Part I

Check the box that represents the type of business organization:

☐ Sole Proprietorship

☐ Non-Profit Corporation (skip Parts II and III, sign and notarize at the end)

☐ Partnership ☐ Limited Partnership ☐ Limited Liability Partnership

☐ Limited Liability Company

☐ For-profit Corporation (including Subchapters C and S or Professional Corporation)

☐ Other (be specific): _____

Part II

☐ I certify that the list below contains the names and addresses of all stockholders in the corporation who own ten percent (10%) or more of its stock, of any class, or of all individual partners in the partnership who own a ten percent (10%) or greater interest therein, or of all members in the limited liability company who own a ten percent (10%) or greater interest therein, as the case may be.

OR

☐ I certify that no one stockholder in the corporation owns 10 percent or more of its stock, of any class, or no individual partner in the partnership owns a 10 percent or greater interest therein, or that no member in the limited liability company owns a 10 percent or greater interest therein, as the case may be.

Sign and notarize the form below, and complete the list below. The disclosure shall be continued until names and addresses of every non-corporate stockholder, and individual partner, and member, meeting or exceeding the 10 percent ownership criteria established in N.J.S.A. 52:25-24.2, has been listed. (Please attach additional sheets if more space is needed):

Name: _____ Name: _____

Address: _____ Address: _____

_____ _____

Name: _____ Name: _____

Address: _____ Address: _____

_____ _____

Name: _____ Name: _____

Address: _____ Address: _____

_____ _____

Name: _____ Name: _____

Address: _____ Address: _____

_____ _____

Name: _____ Name: _____

Address: _____ Address: _____

_____ _____

Part III - Ten Percent Owners of Owners Identified in Part II:

"To comply with this section, a bidder with any direct or indirect parent entity which is publicly traded may submit the name and address of each publicly traded entity and the name and address of each person that holds a ten percent (10%) or greater beneficial interest in the publicly traded entity as of the last annual filing with the federal Securities and Exchange Commission or the foreign equivalent filing, and, if there is any person that holds a ten percent (10%)or greater beneficial interest, also shall submit links to the websites containing the last annual filings with the federal Securities and Exchange Commission or the foreign equivalent filing, and the relevant page numbers of the filings that contain the information on each person that holds a ten percent (10%)or greater beneficial interest."

☐ Pages attached with name and address of each publicly traded entity as well as the name and address of each person that holds a ten percent (10%) or greater beneficial interest.

AND

☐ Submit here the links to the Websites (URLs) containing the last annual filings with the federal Securities and Exchange Commission or the foreign equivalent.

_____

_____

AND

☐ Submit here the relevant page numbers of the filings containing the information on each person holding a 10 percent or greater beneficial interest.

_____

_____

AND

List the names and addresses of each stockholder, partner or member owning a ten percent (10%) or greater interest in any corresponding corporation, partnership and/or limited liability company listed in Part II **other than for any publicly traded parent entities referenced above**. The disclosure shall be continued until names and addresses of every noncorporate stockholder, and individual partner, and member meeting or exceeding the ten percent (10%) ownership criteria established pursuant to N.J.S.A. 52:25-24.2 has been listed. **Attach additional sheets if more space is needed.**

Stockholder/Partner/Member and Corresponding Entity Listed in Part II	Address

Subscribed and sworn before me this ___ day of _____, 20_____.

(Notary Public)

My Commission expires:

_____
(Affiant)

_____
(Print name of affiant and title if applicable)

(Corporate Seal if a Corporation)

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____
Company Name

_____
Company Address

as Principal, and _____
Insurance Company Name

_____
Insurance Company Address

as Surety, are hereby and firmly bound unto **Southampton Township, 5 Retreat Road, Southampton, New Jersey 08088** as Owner, in the penal sum of Ten Percent of the Amount of Bid Not to Exceed Twenty Thousand and 00/100 Dollars (10% Not to Exceed $20,000.00) for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed, this _____ Day of _____, 20_____.

The condition of the above obligation is such that, whereas the Principal has submitted to the Southampton Township a certain bid, attached hereto and hereby made a part hereof to enter into a contract in writing for the **Southampton Township 2026 Municipal Building Renovations.**

NOW, THEREFORE,

(a) If said Bid shall be rejected, or in the alternate,

(b) If said Bid shall be accepted and the Principal shall execute and deliver an AIA Document A101 Standard Form of Agreement Between Owner and Contractor (properly completed and amended in accordance with said Bid) and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of the Bid,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims thereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligation of said Surety and its bond shall be in no way impaired or affected by an extension of the time within which the Owner may accept such bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper offer, the day and year first set forth above.

_____
Company Name

Attest / Witness

_____
Signature

By: _____
Signature

_____
Name and Title

_____
Insurance Company Name

_____
Signature

By: _____
Signature

_____
Name and Title

ANY BOND COMPLYING WITH THE REQUIREMENTS OF N.J.S.A 40A:11-21 MAY BE USED.

CONSENT OF SURETY

The _____

_____

_____

(Name and Address of Surety)

a corporation existing under the Laws of the State of _____

and authorized to do business under the Laws of the State of New Jersey, hereby certifies that application has been made to us by

_____

_____

_____

(Name and Address of Contractor)

and satisfactory arrangements have been completed by which we have and do now agree to furnish a Performance Bond, Payment Bond, and Maintenance Bond each equal to 100% of the Contract price to ensure the faithful performance on the part of the Bidder of the terms and conditions of the contract.

Title of the Work: Southampton Township 2026 Municipal Building Renovations

Location of the Project: 5 Retreat Road, Southampton, New Jersey 08088

This proposition is made with the understanding that any change made in the specifications or agreements without the consent of the bondsman shall in no way vitiate the bond.

WITNESS:

_____

SURETY COMPANY

_____

(Name of Surety Company)

Title:_____

(Attorney-in-fact)

By:_____

Date:_____

(Affix corporate seal)

IMPORTANT NOTE

The Surety Company executing the Bond must be authorized to transact business in the State of New Jersey. For contracts in excess of $850,000, the Surety shall be listed on the Treasury Department's most current New Jersey List of Approved Sureties, located at www.state.nj.is/dobi/surety.htm.

ANY FORM CONSENT OF SURETY COMPLYING WITH THE REQUIREMENTS OF N.J.S.A. 40A:11-22 MAY BE USED.

HOLD HARMLESS AGREEMENT

It is further agreed that the undersigned hereby agrees to defend, indemnify and hold harmless the Southampton Township, its officers, employees, volunteers and agents, from and against all claims, damages, losses, and expenses, including reasonable attorney's fees and costs, in case it shall be necessary to file an action or claim or in case an action or claim is brought or made which is; 1) for personal or bodily injury, illness or death, for property damage, including loss of use, or for any economic loss and; 2) caused in whole or in part by _____ (Name of Bidder's) alleged negligent acts or omissions, breaches of contract, or otherwise arising out of their work, or those of a subcontractor, or that of anyone employed by them, or for whose acts contractor or subcontractor may be liable. Contractor's obligation hereunder shall apply in all instances whether the Southampton Township, its officers, employees, volunteers and/or agents is/are made a party to the action or claim or is subsequently made a party to the action by third-party in-pleading or is made a part to a collateral action arising, in whole or in part, from any of the issues emanating from the original cause of action or claim. Contractor's obligation hereunder shall apply even when such claims, damages, losses and expenses are caused in part by the Southampton Township, its officers, employees, volunteers or agents.

Full Name of Contractor: _____

Business Address: _____

Telephone Number: (____)_____ Zip Code_____

Project Description: _____

Signature / Authorized Person _____

Print Name: _____

Witness Signature _____

Print Name: _____

Summary of the Certification Requirements under N.J.S.A. 52:32-44.1

Pursuant to state law any natural person, company, firm, association, corporation, or other entity prohibited, or "debarred," from contracting with the federal government agencies, shall also be prohibited from contracting for public work in the state of New Jersey. This prohibition also extends to any affiliate organization(s) held by or subject to the control of an entity of that prohibited person or entity.

Prior to awarding a contract for public work a local units must obtain written certification from the contracting person or entity through the form below, attesting to their non-debarment from contracting with federal government agencies. Contracting units are reminded that they must fill-in the boilerplate information in the certification sections of Parts II through IV regarding their name and type of contracting unit before using the form.

CERTIFICATION OF NON-DEBARMENT FOR FEDERAL GOVERNMENT CONTRACTS

N.J.S.A. 52:32-44.1 (P.L. 2019, c.406)

This certification shall be completed, certified to, and submitted to the contracting unit prior to contract award, except for emergency contracts where submission is required prior to payment.

PART I: VENDOR INFORMATION	
Individual or Organization Name	
Physical Address of Individual or Organization	
Unique Entity ID (if applicable)	
CAGE/NCAGE Code (if applicable)	
Check the box that represents the type of business organization:	

☐Sole Proprietorship (skip Parts III and IV) ☐Non-Profit Corporation (skip Parts III and IV)

☐For-Profit Corporation (any type) ☐Limited Liability Company (LLC) ☐Partnership

☐Limited Partnership ☐Limited Liability Partnership (LLP)

☐Other (be specific): _____

PART II – CERTIFICATION OF NON-DEBARMENT: Individual or Organization			
I hereby certify that the **individual or organization listed above in Part I** is not debarred by the federal government from contracting with a federal agency. I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that **Southampton Township** is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the date of contract award by **Southampton Township** to notify **Southampton Township** in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with **Southampton Township**, permitting **Southampton Township** to declare any contract(s) resulting from this certification void and unenforceable.			
Full Name (Print):		Title:	
Signature:		Date:	

PART III – CERTIFICATION OF NON-DEBARMENT: Individual or Entity Owning Greater than 50 Percent of Organization	
Section A (Check the Box that applies)	
☐	Below is the name and address of the stockholder in the corporation who owns more than 50 percent of its voting stock, or of the partner in the partnership who owns more than 50 percent interest therein, or of the member of the limited liability company owning more than 50 percent interest therein, as the case may be.
Name of Individual or Organization	
Physical Address	
OR	
☐	No one stockholder in the corporation owns more than 50 percent of its voting stock, or no partner in the partnership owns more than 50 percent interest therein, or no member in the limited liability company owns more than 50 percent interest therein, as the case may be.
Section B (Skip if no Business entity is listed in Section A above)	
☐	Below is the name and address of the stockholder in the corporation who owns more than 50 percent of the voting stock of the organization's parent entity, or of the partner in the partnership who owns more than 50 percent interest in the organization's parent entity, or of the member of the limited liability company owning more than 50 percent interest in organization's parent entity, as the case may be.
Stockholder/Partner/Member Owning Greater Than 50 Percent of Parent Entity	
Physical Address	
OR	
☐	No one stockholder in the parent entity corporation owns more than 50 percent of its voting stock, no partner in the parent entity partnership owns more than 50 percent interest therein, or no member in the parent entity limited liability company owns more than 50 percent interest therein, as the case may be.

Section C – Part III Certification			
I hereby certify that no individual or organization that is debarred by the federal government from contracting with a federal agency owns greater than 50 percent of the **Organization listed above in Part I** or, if applicable, owns greater than 50 percent of a parent entity of **Southampton Township**. I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that **Southampton Township** is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the date of contract award **Southampton Township** to notify **Southampton Township** in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with **Southampton Township**, permitting **Southampton Township** to declare any contract(s) resulting from this certification void and unenforceable.			
Full Name (Print):		Title:	
Signature:		Date:	

Part IV – CERTIFICATION OF NON-DEBARMENT: Contractor – Controlled Entities	
Section A	
☐	Below is the name and address of the corporation(s) in which the **Organization listed in Part I** owns more than 50 percent of voting stock, or of the partnership(s) in which the **Organization listed in Part I** owns more than 50 percent interest therein, or of the limited liability company or companies in which the **Organization listed above in Part I** owns more than 50 percent interest therein, as the case may be.
Name of Business Entity	**Physical Address**
Add additional sheets if necessary	
OR	
☐	The **Organization listed above in Part I** does not own greater than 50 percent of the voting stock in any corporation and does not own greater than 50 percent interest in any partnership or any limited liability company.

Section B (skip if no business entities are listed in Section A of Part IV)		
☐	Below are the names and addresses of any entities in which an entity listed in Part III A owns greater than 50 percent of the voting stock (corporation) or owns greater than 50 percent interest (partnership or limited liability company).	
Name of Business Entity Controlled by Entity Listed in Section A of Part IV		**Physical Address**
Add additional Sheets if necessary		
OR		
☐	No entity listed in Part III A owns greater than 50 percent of the voting stock in any corporation or owns greater than 50 percent interest in any partnership or limited liability company.	

Section C – Part IV Certification			
I hereby certify that the **Organization listed above in Part I** does not own greater than 50 percent of any entity that that is debarred by the federal government from contracting with a federal agency and, if applicable, does not own greater than 50 percent of any entity that in turns owns greater than 50 percent of any entity debarred by the federal government from contracting with a federal agency. I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that **Southampton Township** is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the date of contract award by **Southampton Township** to notify **Southampton Township** in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with **Southampton Township** , permitting **Southampton Township** to declare any contract(s) resulting from this certification void and unenforceable.			
Full Name (Print):		Title:	
Signature:		Date:	

AFFIRMATIVE ACTION REQUIREMENTS

Bidder is required to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27.

1. After notification of award, but prior to signing a construction contract, the contractor shall submit to the public agency compliance officer and the Dept. of LWD, Construction EEO Monitoring Program an Initial Project Workforce Report (Form AA-201) electronically provided to the public agency by the Dept. of LWD, Construction EEO Monitoring Program, through its web-site, for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7.

2. The contractor also agrees to submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of this contract to the Dept. of LWD, Construction EEO Monitoring Program, and to the public agency compliance officer.

The undersigned certifies that he/she is aware of the commitment to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27 et seq. and agrees to furnish the required forms of evidence.

Subscribed and sworn to before me this

_____day of _____, 202__,

My Commission expires:

_____

Date

_____

Signature

_____

Name and Title
(Type or Print)

EXHIBIT B

MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE
N.J.S.A. 10:5-31 et seq. (P.L.1975, c.127) N.J.A.C. 17:27-1.1 et seq.

CONSTRUCTION CONTRACTS

During the performance of this contract, the contractor agrees as follows:

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor will send to each labor union, with which it has a collective bargaining agreement, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under this act and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer, pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

When hiring or scheduling workers in each construction trade, the contractor or subcontractor agrees to make good faith efforts to employ minority and women workers in each construction trade consistent with the targeted employment goal prescribed by N.J.A.C. 17:27-7.2; provided, however, that the Dept. of LWD, Construction EEO Monitoring Program, may, in its discretion, exempt a contractor or subcontractor from compliance with the good faith procedures prescribed by the following provisions, A, B, and C, as long as the Dept. of LWD, Construction EEO Monitoring Program is satisfied that the contractor or subcontractor is employing workers provided by a union which provides evidence, in accordance with standards prescribed by the Dept. of LWD, Construction EEO Monitoring Program, that its percentage of active "card carrying" members who are minority and women workers is equal to or greater than the targeted employment goal established in accordance with N.J.A.C. 17:27-7.2. The contractor or subcontractor agrees that a good faith effort shall include compliance with the following procedures:

(A) If the contractor or subcontractor has a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor shall, within three business days of the contract award, seek assurances from the union that it will cooperate with the contractor or subcontractor as it fulfills its affirmative action obligations under this contract and in accordance with the rules promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et. seq., as supplemented and amended from time to time and the Americans with Disabilities Act. If the contractor or subcontractor is unable to obtain said assurances from the construction trade union at least five business days prior to the commencement of construction work, the contractor or subcontractor agrees to afford equal employment opportunities minority and women workers directly, consistent with this chapter. If the contractor's or subcontractor's prior experience with a construction trade union, regardless of whether the union has provided said assurances, indicates a significant possibility that the trade union will not refer sufficient minority and women workers consistent with affording equal employment opportunities as specified in this chapter, the contractor or subcontractor agrees to be prepared to provide such opportunities to minority and women workers directly, consistent with this chapter, by complying with the hiring or scheduling procedures prescribed under (B) below; and the contractor or subcontractor further agrees to take said action immediately if it determines that the union is not referring minority and women workers consistent with the equal employment opportunity goals set forth in this chapter.

(B) If good faith efforts to meet targeted employment goals have not or cannot be met for each construction trade by adhering to the procedures of (A) above, or if the contractor does not have a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor agrees to take the following actions:

(l) To notify the public agency compliance officer, the Dept. of LWD, Construction EEO Monitoring Program, and minority and women referral organizations listed by the Division pursuant to N.J.A.C. 17:27-5.3, of its workforce needs, and request referral of minority and women workers;

(2) To notify any minority and women workers who have been listed with it as awaiting available vacancies;

(3) Prior to commencement of work, to request that the local construction trade union refer minority and women workers to fill job openings, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade;

(4) To leave standing requests for additional referral to minority and women workers with the local construction trade union, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade, the State Training and Employment Service and other approved referral sources in the area;

(5) If it is necessary to lay off some of the workers in a given trade on the construction site, layoffs shall be conducted in compliance with the equal employment opportunity and nondiscrimination standards set forth in this regulation, as well as with applicable Federal and State court decisions;

(6) To adhere to the following procedure when minority and women workers apply or are referred to the contractor or subcontractor:

(i) The contactor or subcontractor shall interview the referred minority or women worker.

(ii) If said individuals have never previously received any document or certification signifying a level of qualification lower than that required in order to perform the work of the construction trade, the contractor or subcontractor shall in good faith determine the qualifications of such individuals. The contractor or subcontractor shall hire or schedule those individuals who satisfy appropriate qualification standards in conformity with the equal employment opportunity and non-discrimination principles set forth in this chapter. However, a contractor or subcontractor shall determine that the individual at least possesses the requisite skills, and experience recognized by a union, apprentice program or a referral agency, provided the referral agency is acceptable to the Dept. of LWD, Construction EEO Monitoring Program. If necessary, the contractor or subcontractor shall hire or schedule minority and women workers who qualify as trainees pursuant to these rules. All of the requirements, however, are limited by the provisions of (C) below.

(iii) The name of any interested women or minority individual shall be maintained on a waiting list, and shall be considered for employment as described in (i) above, whenever vacancies occur. At the request of the Dept. of LWD, Construction EEO Monitoring Program, the contractor or subcontractor shall provide evidence of its good faith efforts to employ women and minorities from the list to fill vacancies.

(iv) If, for any reason, said contractor or subcontractor determines that a minority individual or a woman is not qualified or if the individual qualifies as an advanced trainee or apprentice, the contractor or subcontractor shall inform the individual in writing of the reasons for the determination, maintain a copy of the determination in its files, and send a copy to the public agency compliance officer and to the Dept. of LWD, Construction EEO Monitoring Program.

(7) To keep a complete and accurate record of all requests made for the referral of workers in any trade covered by the contract, on forms made available by the Dept. of LWD, Construction EEO Monitoring Program and submitted promptly to the Dept. of LWD, Construction EEO Monitoring Program upon request.

(C) The contractor or subcontractor agrees that nothing contained in (B) above shall preclude the contractor or subcontractor from complying with the union hiring hall or apprenticeship policies in any applicable collective bargaining agreement or union hiring hall arrangement, and, where required by custom or agreement, it shall send journeymen and trainees to the union for referral, or to the apprenticeship program for admission, pursuant to such agreement or arrangement. However, where the practices of a union or apprenticeship program will result in the exclusion of minorities and women or the failure to refer minorities and women consistent with the targeted county employment goal, the contractor or subcontractor shall consider for employment persons referred pursuant to (B) above without regard to such agreement or arrangement; provided

further, however, that the contractor or subcontractor shall not be required to employ women and minority advanced trainees and trainees in numbers which result in the employment of advanced trainees and trainees as a percentage of the total workforce for the construction trade, which percentage significantly exceeds the apprentice to journey worker ratio specified in the applicable collective bargaining agreement, or in the absence of a collective bargaining agreement, exceeds the ratio established by practice in the area for said construction trade. Also, the contractor or subcontractor agrees that, in implementing the procedures of (B) above, it shall, where applicable, employ minority and women workers residing within the geographical jurisdiction of the union.

After notification of award, but prior to signing a construction contract, the contractor shall submit to the public agency compliance officer and the Dept. of LWD, Construction EEO Monitoring Program an initial project workforce report (Form AA-201) electronically provided to the public agency by the Dept. of LWD, Construction EEO Monitoring Program, through its website, for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7. The contractor also agrees to submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of this contract to the Dept. of LWD, Construction EEO Monitoring Program, and to the public agency compliance officer. The contractor agrees to cooperate with the public agency in the payment of budgeted funds, as is necessary, for on-the-job and/or off-the job programs for outreach and training of minorities and women.

(D) The contractor and its subcontractors shall furnish such reports or other documents to the Dept. of LWD, Construction EEO Monitoring Program as may be requested by the Dept. of LWD, Construction EEO Monitoring Program from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Dept. of LWD, Construction EEO Monitoring Program for conducting a compliance investigation pursuant to N.J.A.C. 17:27-1.1 et seq.

Each contractor shall submit to the public agency, prior to execution of a public agency contract a completed form AA201:

****Southampton Township recognizes the right of its employees/students to work and study in an environment that is free from sexual harassment. Immediate and appropriate action will be taken against any vendor/agent of Southampton Township found liable for sexually harassing any employee/student.**

NON-COLLUSION AFFIDAVIT

STATE OF NEW JERSEY)

COUNTY OF)

I, of the City of in the County of, and the State of of full age, being duly sworn according to law on my oath depose and say that: I am of the firm of the bidder making this Proposal/Bid for **Southampton Township 2026 Municipal Building Renovations,** and that I executed the said Bid with full authority so to do; that said bidder has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free, competitive bidding in connection with **Southampton Township 2026 Municipal Building Renovations** and that all statements contained in said Bid and in this affidavit are true and correct, and made with full knowledge that the Owner relies upon the truth of the statements contained in said Bid and in the statements contained in this affidavit in awarding the contract for the said project.

I further warrant that no person or selling agency has been employed or retained to solicit or secure such contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, except bona fide employees or bona fide established commercial or selling agencies maintained by

_____
(Name of Bidder)

_____
Bidder's Signature

Sworn to and subscribed before me

this____ day of _____, 20____.

_____
Notary Public of

My Commission expires _____ 20___

EQUIPMENT CERTIFICATION

The undersigned Bidder hereby certifies as follows:

The bidder owns or controls all the necessary equipment required to accomplish the work described in the specifications.

Name of Bidder: _____

By: _____
(Signature)

Name of above: _____
(Print)

Title: _____

Date: _____

Prohibited Russia-Belarus Activities & Iran Investment Activities

Person or Entity	

Part 1: Certification

COMPLETE PART 1 BY CHECKING **ONE OF THE THREE BOXES BELOW**

Pursuant to law, any person or entity that is a successful bidder or proposer, or otherwise proposes to enter into or renew a contract, for goods or services must complete the certification below prior to contract award to attest, under penalty of perjury, that neither the person or entity, nor any parent entity, subsidiary, or affiliate, is identified on the Department of Treasury's Russia-Belarus list or Chapter 25 list as a person or entity engaging in prohibited activities in Russia, Belarus or Iran. Before a contract for goods or services can be amended or extended, a person or entity must certify that neither the person or entity, nor any parent entity, subsidiary, or affiliate, is identified on the Department of Treasury's Russia-Belarus list. Both lists are found on Treasury's website at the following web addresses:

https://www.nj.gov/treasury/administration/pdf/RussiaBelarusEntityList.pdf
www.state.nj.us/treasury/purchase/pdf/Chapter25List.pdf.

As applicable to the type of contract, the above-referenced lists must be reviewed prior to completing the below certification.

A person or entity unable to make the certification must provide a detailed, accurate, and precise description of the activities of the person or entity, or of a parent entity, subsidiary, or affiliate, engaging in prohibited activities in Russia or Belarus and/or investment activities in Iran. The person or entity must cease engaging in any prohibited activities and provide an updated certification before the contract can be entered into.

If a vendor or contractor is found to be in violation of law, action may be taken as appropriate and as may be provided by law, rule, or contract, including but not limited to imposing sanctions, seeking compliance, recovering damages, declaring the party in default, and seeking debarment or suspension of the party.

CONTRACT AWARDS AND RENEWALS

☐	*I certify, pursuant to law, that neither the person or entity listed above, nor any parent entity, subsidiary, or affiliate appears on the N.J. Department of Treasury's lists of entities engaged in prohibited activities in Russia or Belarus pursuant to P.L. 2022, c. 3 or in investment activities in Iran pursuant to P.L. 2012, c. 25 ("Chapter 25 List"). I further certify that I am the person listed above, or I am an officer or representative of the entity listed above and am authorized to make this certification on its behalf.* (Skip Part 2 and sign and complete the Certification below.)

CONTRACT AMENDMENTS AND EXTENSIONS	
☐	*I certify, pursuant to law, that neither the person or entity listed above, nor any parent entity, subsidiary, or affiliate is listed on the N.J. Department of the Treasury's lists of entities determined to be engaged in prohibited activities in Russia or Belarus pursuant to P.L. 2022, c. 3. I further certify that I am the person listed above, or I am an officer or representative of the entity listed above and am authorized to make this certification on its behalf.* (Skip Part 2 and sign and complete the Certification below.)
IF UNABLE TO CERTIFY	
☐	*I am unable to certify as above because the person or entity and/or a parent entity, subsidiary, or affiliate is listed on the Department's Russia-Belarus list and/or Chapter 25 Iran list. I will provide a detailed, accurate, and precise description of the activities as directed in Part 2 below, and sign and complete the Certification below. Failure to provide such will prevent the award of the contract to the person or entity, and appropriate penalties, fines, and/or sanctions will be assessed as provided by law.*

Part 2: Additional Information

PLEASE PROVIDE FURTHER INFORMATION RELATED TO PROHIBITED ACTIVITIES IN RUSSIA OR BELARUS AND/OR INVESTMENT ACTIVITIES IN IRAN.

You must provide a detailed, accurate, and precise description of the activities of the person or entity, or of a parent entity, subsidiary, or affiliate, engaging in prohibited activities in Russia or Belarus and/or investment activities in Iran in the space below and, if needed, on additional sheets provided by you.

Part 3: Certification of True and Complete Information

I, being duly sworn upon my oath, hereby represent and state that the foregoing information and any attachments there, to the best of my knowledge, are true and complete. I attest that I am authorized to execute this certification on behalf of the above-referenced person or entity.

I acknowledge that Southampton Township is relying on the information contained herein and hereby acknowledge that I am under a continuing obligation from the date of this certification through the completion of any contracts with Southampton Township to notify Southampton Township in writing of any changes to the answers of information contained herein.

I acknowledge that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I recognize that I am subject to criminal prosecution under the law and that it will also constitute a material breach of my agreement(s) with Southampton Township and that Southampton Township at its option may declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print)		**Title**	
Signature		**Date**	

DISCLOSURE OF CONTRIBUTIONS TO NEW JERSEY ELECTION LAW ENFORCEMENT COMMISSION IN ACCORDANCE WITH N.J.S.A. 19:44A-20.27

STATE OF NEW JERSEY

: SS

COUNTY OF

I, _____, of _____, in the County of _____ and the State of _____ of full age, being duly sworn according to law on my oath depose and say that:

I am a _____ in _____, the bidder making the proposal to

SOUTHAMPTON TOWNSHIP
(Name of Owner)

for work under

SOUTHAMPTON TOWNSHIP 2026 MUNICIPAL BUILDING RENOVATIONS
(Contract Description)

and that I executed the said Proposal with full Authority to do so; that said Bidder acknowledges our responsibility to file an annual disclosure statement of political contributions with the New Jersey Election Law Enforcement Commission (ELEC) pursuant to N.J.S.A. 19:44A-20.27 if in receipt of contracts in excess of $50,000.00 from public entities in a calendar year. I further acknowledge that business entities are solely responsible for determining if filing is necessary and that all statements contained in said Proposal and in this Affidavit are true and correct, and made with full knowledge that the

SOUTHAMPTON TOWNSHIP
(Name of Owner)

relies upon the truth of the statements contained in said Proposal and in the statements contained in this Affidavit in awarding the Contract for the said project.

I further warrant that no person or selling agency has been employed or retained to solicit or secure such contract upon an agreement or understanding for commission, percentage brokerage, or contingent fee, except Bona Fide employees of the Contractor, and as may be permitted by law.

Signature: _____

Type or Print Name: _____

Subscribed and Sworn to before me this
_____ day of _____, 20_____.

_____

AMERICANS WITH DISABILITIES ACT OF 1990
Equal Opportunity for Individuals with Disability

The Contractor and the Southampton Township, (hereafter "owner") do hereby agree that the provisions of Title 11 of the Americans With Disabilities Act of 1990 (the "Act") (42 U.S.C. S12101 et seq.), which prohibits discrimination on the basis of disability by public entities in all services, programs, and activities provided or made available by public entities, and the rules and regulations promulgated pursuant there unto, are made a part of this contract. In providing any aid, benefit, or service on behalf of the owner pursuant to this contract, the contractor agrees that the performance shall be in strict compliance with the Act. In the event that the contractor, its agents, servants, employees, or subcontractors violate or are alleged to have violated the Act during the performance of this contract, the contractor shall defend the owner in any action or administrative proceeding commenced pursuant to the Act. The contractor shall indemnify, protect, and save harmless the owner, its agents, servants, and employees from and against any and all suits, claims, losses, demands, or damages, of whatever kind or nature arising out of or claimed to arise out of the alleged violation. The contractor shall, at its own expense, appear, defend, and pay any and all charges for legal services and any and all costs and other expenses arising from such action or administrative proceeding or incurred in connection therewith. In any and all complaints brought pursuant to the owner's grievance procedure, the contractor agrees to abide by any decision of the owner which is rendered pursuant to said grievance procedure. If any action or administrative proceeding results in an award of damages against the owner, of if the owner incurs any expense to cure a violation of the ADA which has been brought pursuant to its grievance procedure, the contractor shall satisfy and discharge the same at its own expense.

The owner shall, as soon as practicable after a claim has been made against it, give written notice thereof to the contractor along with particulars of the claim then known by the owner. If any action or administrative proceeding is brought against the owner or any of its agents, servants, and employees, the owner shall expeditiously forward or have forwarded to the contractor every demand, complaint, notice, summons, pleading, or other process received by the owner or its representatives.

It is expressly agreed and understood that any approval by the owner of the services provided by the contractor pursuant to this contract, or an independent violation by the owner, will not relieve the contractor of the obligation to comply with the Act and to defend, indemnify, protect, and save harmless the owner pursuant to this paragraph.

It is further agreed and understood that the owner assumes no obligation to indemnify or save harmless the contractor, its agents, servants, employees and subcontractors for any claim which may arise out of their performance of this Agreement. Furthermore, the contractor expressly understands and agrees that the provisions of this indemnification clause shall in no way limit the contractor's obligations assumed in this Agreement, nor shall they be construed to relieve the contractor from any liability, nor preclude the owner from taking any other action's available to it under any other provisions of the Agreement or otherwise at law.

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS: that

_____

(Name of Contractor)

_____

(Address of Contractor)

a _____ , hereinafter called "PRINCIPAL", and
(Corporation, Partnership or Individual)

_____

(Name of Surety)

_____

(Address of Surety)

hereinafter called "SURETY", are held and firmly bound unto **Southampton Township**; hereinafter called "OWNER" in the total aggregate penal sum of

_____ Dollars ($ _____)
in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20_, a copy of which is hereto attached and made a part hereof for:

"Southampton Township 2026 Municipal Building Renovations"

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions and agreements of said Contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the SURETY and during the two-year guaranty period and if the PRINCIPAL shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said security, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed hereunder or the SPECIFICATION accompanying same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that it is expressly agreed that the BOND or LOC shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the CONTRACT as so amended. The term "Amendment", wherever used in this BOND, and whether referring to this BOND, the Contract or the Loan Documents shall include any alteration, addition, extension, or modification of any character whatsoever.

PROVIDED, FURTHER, that no final settlement between the OWNER and the PRINCIPAL shall abridge the right of the other beneficiary hereunder, whose claim may be unsatisfied. The OWNER are the only beneficiaries hereunder.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of
(number)
Which shall be deemed an original, this _ day of _____, 20____.

ATTEST:

_____
Principal

_____
(SEAL)

By _____

_____
(Witness as to Principal)

_____
(Address)

_____
(Address)

_____

SURETY DISCLOSURE STATEMENT AND CERTIFICATION

_____, surety(ies) on the attached bond, hereby certifies(y) the following:

(1) The surety meets the applicable capital and surplus requirements of R.S. 17:17-6 or R.S. 17:17-7 as of the surety's most current annual filing with the New Jersey Department of Insurance.

(2) The capital (where applicable) and surplus, as determined in accordance with the applicable laws of this State, of the surety(ies) participating in the issuance of the attached bond is (are) in the following amount(s) as of the calendar year ended December 31, _____ (most recent calendar year for which capital and surplus amounts are available), which amounts have been certified as indicated by certified public accountants (indicating separately for each surety that surety's capital and surplus amounts, together with the name and address of the firm of certified public accounts that shall have certified those amounts):

_____

_____

_____

_____.

(3) (a) With respect to each surety participating in the issuance of the attached bond that has received from the United States Secretary of the Treasury a certificate of authority pursuant to 31 U.S.C. § 9305, the underwriting limitation established therein and the date as of which that limitation was effective is as follows (indicating for each such surety that surety's underwriting limitation and the effective date thereof):

_____

_____

_____

_____.

(b) With respect to each surety participating in the issuance of the attached bond that has not received such a certificate of authority from the United States Secretary of the Treasury, the underwriting limitation of that surety as established pursuant to R.S. 17:18-9 as of (date on which such limitation was so established) is as follows (indicating for each such surety that surety's underwriting limitation and the date on which that limitation was established):

_____

_____

_____

_____.

(4) The amount of the bond to which this statement and certification is attached is $_____.

(5) If, by virtue of one or more contracts of reinsurance, the amount of the bond indicated under item (4) above exceeds the total underwriting limitation of all sureties on the bond as set forth in items (3)(a) or (3)(b) above, or both, then for each such contract of reinsurance:

(a) The name and address of each such reinsurer under that contract and the amount of that reinsurer's participation in the contract is as follows:

_____

_____

_____

_____; and

(b) Each surety that is party to any such contract of reinsurance certifies that each reinsurer listed under item (5)(a) satisfies the credit for reinsurance requirement established under P.L.1993, c. 243 (C. 17:51B-1 et seq.) and any applicable regulations in effect as of the date on which the bond to which this statement and certification is attached shall have been filed with the appropriate public agency.

CERTIFICATE
(to be completed by an authorized certifying agent for each surety on the bond)

I, _____ (name of agent) , as _____ _____(title of agent) for _____ _____(name of surety) , a corporation/mutual insurance company/other _____ _____ (indicating type of business organization) (circle one) domiciled in _____(state of domicile) , DO HEREBY CERTIFY that, to the best of my knowledge, the foregoing statements made by me are true, and ACKNOWLEDGE that, if any of those statements are false, this bond is VOID.

_____
(Signature of certifying agent)

_____
(Printed name of certifying agent)

_____
(Title of certifying agent)

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS: that

_____ _____
(Name of Contractor) *(Address of Contractor)*

a _____ , hereinafter called "PRINCIPAL" and
(Corporation, Partnership or Individual)

_____ ,
(Name of Surety)

hereafter called SURETY, are held and firmly bound unto **Southampton Township**, hereinafter called OWNER, and unto all persons, firms, and corporations, who or which may furnish labor, or who furnish materials to perform as described under the contract and to their successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the PRINCIPAL entered into a certain contract with the OWNER, dated the ___ day of _____, 20__, a copy of which is hereto attached and made a part hereof for:

"Southampton Township 2026 Municipal Building Renovations"

NOW, THEREFORE, if the PRINCIPAL shall make prompt payment to all persons, firms, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extensions or modification thereof, including all amount due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and for all labor costs incurred in such WORK including that by a SUBCONTRACTOR, and to any mechanic or materialman or lien-holder, whether it acquires its liens by operation of State or Federal law; then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, that beneficiaries or claimants hereunder shall be limited to the Owner, SUBCONTRACTOR, and person, firms, and corporations having a direct contract with the PRINCIPAL; or its SUBCONTRACTORS.

PROVIDED, FURTHER, that the said SURETY for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed hereunder or the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of this contract or to the WORK or to the SPECIFICATIONS.

Any beneficiary, as defined in N.J.S. 2A:44-143, to whom any money shall be due on account of having performed any labor or furnished any materials, provisions, provender or other supplies, or teams, fuels, oils, implements or machinery in, upon for or about the construction, erection, alteration or repair of any public building or other public work or improvement, shall, at any time before the expiration of one year from the last date upon which such beneficiary shall have performed actual work or delivered materials to the project, in the case of a material supplier, furnish the sureties on the bond required by this article a statement of the amount due to them.

No action shall be brought against any of the sureties on the bond required by this article until the expiration of 90 days after provision to the sureties and the contractor of the statement of the amount due to him, but in no event later than one year from the last date upon which such beneficiary shall have performed actual work or delivered materials to the project.

PROVIDED, FURTHER, that it expressly agreed that this BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the Contract as so amended. The term "Amendment", wherever used in this BOND and whether referring to this BOND, the Contract, or the loan documents, shall include any alteration, additions, extension or modification of any character whatsoever.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the rights of any beneficiary hereunder, whose claim may be unsatisfied.

WITNESS WHEREOF, this instrument is executed in _____ counterparts, each of which
(*number*)
shall be deemed an original, this the _____ day of _____ , 20__.

ATTEST:

_____ _____
(*Principal Secretary*) (*Principal*)

(SEAL) By _____
(s)

_____
(*Address*)

_____ _____
(*Witness as to Principal*)

_____
(*Address*)

_____ _____
(*Surety*)

ATTEST:

_____ By _____
(*Witness as to Surety*) (*Attorney - in Fact*)

_____ _____
(*Address*) (*Address*)

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is partnership, all partners should execute BOND.
IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the Project is located.

SURETY DISCLOSURE STATEMENT AND CERTIFICATION

_____, surety(ies) on the attached bond, hereby certifies(y) the following:

(1) The surety meets the applicable capital and surplus requirements of R.S. 17:17-6 or R.S. 17:17-7 as of the surety's most current annual filing with the New Jersey Department of Insurance.

(2) The capital (where applicable) and surplus, as determined in accordance with the applicable laws of this State, of the surety(ies) participating in the issuance of the attached bond is (are) in the following amount(s) as of the calendar year ended December 31, _____ (most recent calendar year for which capital and surplus amounts are available), which amounts have been certified as indicated by certified public accountants (indicating separately for each surety that surety's capital and surplus amounts, together with the name and address of the firm of certified public accounts that shall have certified those amounts):

_____

_____

_____

_____.

(3) (a) With respect to each surety participating in the issuance of the attached bond that has received from the United States Secretary of the Treasury a certificate of authority pursuant to 31 U.S.C. § 9305, the underwriting limitation established therein and the date as of which that limitation was effective is as follows (indicating for each such surety that surety's underwriting limitation and the effective date thereof):

_____

_____

_____

_____.

(b) With respect to each surety participating in the issuance of the attached bond that has not received such a certificate of authority from the United States Secretary of the Treasury, the underwriting limitation of that surety as established pursuant to R.S. 17:18-9 as of (date on which such limitation was so established) is as follows (indicating for each such surety that surety's underwriting limitation and the date on which that limitation was established):

_____

_____

_____

_____.

(4) The amount of the bond to which this statement and certification is attached is $_____.

(5) If, by virtue of one or more contracts of reinsurance, the amount of the bond indicated under item (4) above exceeds the total underwriting limitation of all sureties on the bond as set forth in items (3)(a) or (3)(b) above, or both, then for each such contract of reinsurance:

(a) The name and address of each such reinsurer under that contract and the amount of that reinsurer's participation in the contract is as follows:

_____

_____

_____

_____; and

(b) Each surety that is party to any such contract of reinsurance certifies that each reinsurer listed under item (5)(a) satisfies the credit for reinsurance requirement established under P.L.1993, c. 243 (C. 17:51B-1 et seq.) and any applicable regulations in effect as of the date on which the bond to which this statement and certification is attached shall have been filed with the appropriate public agency.

CERTIFICATE
(to be completed by an authorized certifying agent for each surety on the bond)

I, _____ (name of agent) , as _____ _____(title of agent) for _____ _____(name of surety) , a corporation/mutual insurance company/other _____ _____ (indicating type of business organization) (circle one) domiciled in _____(state of domicile) , DO HEREBY CERTIFY that, to the best of my knowledge, the foregoing statements made by me are true, and ACKNOWLEDGE that, if any of those statements are false, this bond is VOID.

_____
(Signature of certifying agent)

_____
(Printed name of certifying agent)

_____
(Title of certifying agent)

MAINTENANCE
BOND

Bond No:_____

KNOW ALL MEN BY THESE PRESENTS, That **we,** _____
_____, as Principal,
and _____ INSURANCE COMPANY OF AMERICA, a corporation duly organized under and by the virtue of the laws of the State of New Jersey and authorized to become sole surety on bonds in the State of New Jersey, as Surety, are held and firmly bound unto **Southampton Township, 5 Retreat Road, Southampton, New Jersey 08088**, hereinafter called Obligee, in the just and penal sum of

_____

Dollars **($**_____), lawful money of the United States of America, to the payment of which well and truly to be made the Principal binds itself , its successors and assigns, and the Surety binds itself, its successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has by means of a written agreement, dated
contracted with the Obligee aforesaid, for furnishing all materials and performing all of the work in connection with **"Southampton Township 2026 Municipal Building Renovations",** as specifically set forth in said contract for said work, and

WHEREAS, the Principal has completed the said contract in accordance with the plans and specifications thereof, and

WHEREAS, the Obligee has requested the Principal to guarantee said work against defective workmanship or faulty materials for a period of two (2) years from date of acceptance of said work for 100% of the final contract amount; and

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal shall well and truly make good any defects in material or workmanship which may arise in said work within two (2) years from the date of acceptance of said work, then this obligation shall be null and void, otherwise it shall remain in full force and effect.

IN WITNESS WHEREOF, we have set our hands and seals this _____ day of _____
_____, **20**___.

_____(SEAL)
Principal

_____
Surety

AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year Two Thousand Twenty-Six
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

Southampton Township
5 Retreat Road
Southampton, New Jersey 08088

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

Southampton Township 2026 Municipal Building Renovations
5 Retreat Road
Southampton, New Jersey 08088

The Architect:
(Name, legal status, address and other information)

Garrison Architects
713 Creek Road
Bellmawr, New Jersey 08031

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document may have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

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EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[X] The date of this Agreement.

[ ] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

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§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

[ ] Not later than ( ) calendar days from the date of commencement of the Work.

[X] By the following date: **October 15, 2027 TIME IS OF THE ESSENCE**

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates: NOT APPLICABLE

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates NOT APPLICABLE

§ 4.2.1 Alternates, if any, included in the Contract Sum: **NOT APPLICABLE**

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement. NOT APPLICABLE

(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

§ 4.3 Allowances, if any, included in the Contract Sum:

(Identify each allowance.)

Item	Price
Cash Allowance	$40,000.00

§ 4.4 Unit prices, if any: **NOT APPLICABLE**

(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

The Contractor understands and agrees that all work must be performed in an orderly and closely coordinated sequence so that the dates for Substantial Completion and Final Completion are met. TIME IS OF THE ESSENCE.

If the Contractor fails to complete his work or fails to complete a portion of his work and therefore not achieve Substantial Completion and/or Final Completion on the respective dates required, he shall pay the Owner, as liquidated damages and not as a penalty, Two Thousand Five Hundred Dollars ($2,500.00) per day, which is agreed upon as a reasonable and proper measure which the Owner will sustain each calendar day by failure of the Contractor to complete work within the stipulated time for the milestone dates.

The Owner will suffer significant financial loss if the project is not substantially complete on time. Liquidated Damages will be assessed if the Project is not substantially complete by the date required by the Contract Documents. The Contractor (and the

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Contractor's Surety) shall be liable for and pay to the Owner the sum of $2,500.00 stipulated and fixed, agreed as liquidated damages for each calendar day of delay until the work is substantially complete.

Final Completion must be reached Thirty (30) days following the date fixed in the contract for Substantial Completion. The Contractor (and the Contractor's Surety) shall be liable for and pay to the Owner the sum of $2,500.00 stipulated and fixed, agreed as liquidated damages for each calendar day of delay until the work is finally complete.

Substantial Completion will be determined by the Architect as defined in paragraph 9.8.1 of the General Conditions.

For damage occurring at the time of delay, the Owner may retain the amount due to him under this clause from any payments due to the Contractor.

§ 4.6 Other: NOT APPLICABLE
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents. An application for Payment shall include all work performed in one calendar month.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

Contractor shall submit a Pencil Copy / Rough Draft of the Application for Payment to the Architect for review no later than the 15 calendar days prior to the first Friday of the month payment is requested from Owner. The Architect will review the Pencil Copy / Rough Draft of the Application for Payment and return to the Contractor within five (5) calendar days from their receipt of same.

§ 5.1.3 Certified Application for Payment

.1. Within three (3) calendar days after receipt of the Pencil / Rough Draft of the Application for Payment from the Architect, the Contractor shall electronically submit the Certified Application for Payment consistent with the Architect's markup on the Pencil / Rough Draft to the Architect for signature.

.2. The Architect shall, if finding payment for the amount submitted is appropriate under the Contract Documents, sign the Certified Application for Payment within five (5) calendar days upon receipt and electronically transmit the Certified Application for Payment to the Owner on the first Friday of the month payment is requested. (Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.3.1 The form for Applications for Payment shall be a notarized AIA Document G702, Application and Certification for Payment, supported by AIA document G703 Continuation Sheets.

§ 5.1.3.2 All Applications for Payment, Certified Payroll Records and Manning Reports shall include the relevant purchase order number and project number.

§ 5.1.3.3 Pursuant to N.J.S.A. 2A:30A-1, et seq. (the "Act"), the Owner is not required to approve the Contractor's Application for Payment unless the Contractor has performed in accordance with the Contract Documents and is not required to provide approval until the next scheduled public meeting of the Board of Education following the Owner's receipt of the Architect's Certificate for Payment. Under the Act, the Owner shall not make payment to the Contractor for the payment amount until the Owner's subsequent payment cycle following its approval of the Application for Payment.

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§ 5.1.3.4 Governor Murphy signed into law S-1442/A-5345, now P.L. 2023, c. 138, which requires public works contractor registration and payroll certification for public works projects to be completed online at https://njwages.nj.gov/. The Contractor will be required to submit the certified payroll via the Hub and via hard copy to the Southampton Township for itself and its subcontractors.

§ 5.1.3.5 Disputes regarding whether a party has failed to make payments required by the Act must be submitted to a process of alternative dispute resolution, notwithstanding anything to the contrary in the Contract Documents. Alternative dispute resolution permitted by the Act shall apply to disputes over payment only and shall not apply to disputes concerning any other matters that may arise under or from this Contract. Any civil action brought to collect payments shall be conducted in Burlington County, State of New Jersey, and the prevailing party shall be awarded reasonable costs and attorneys' fees. See Article 6 of this Agreement regarding Claims and Disputes.

§ 5.1.3.6 The Architect may decide to disapprove an Application for Payment, or withhold payment, in whole or in part, to the extent reasonably necessary to protect the Owner if, in the Architect's opinion, the representations as described in Section 5.1.4.1 below cannot be made to the Owner. If the Architect withholds a Certificate for Payment, the Architect will notify the Contractor and Owner as provided in Article 5 hereof. The Architect may also decide to withhold certifying payment in whole or in part, because of subsequently discovered evidence or subsequent observations, to such extent as may be necessary to protect the Owner from loss because of:

1. Defective Work which has not been remedied;
2. Third party claims filed or reasonable belief probable filing of such claims;
3. Failure of the Contractor to make payments properly to vendors, subcontractors or for labor, materials and equipment;
4. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract sum;
5. Damage to the Owner or another contractor;
6. Reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
7. Failure to carry out the Work in accordance with the Contract Documents;
8. Avoidable delay in the progress of the Work;
9. Deliberate delay in the submission for approval of names of Subcontractors, material men, sources of supply, shop drawings and samples;
10. Failure to maintain the Project Site in a safe and satisfactory condition in accordance with good construction practices as recommended by the Architect after consultation with the Contractor; and
11. Failure to submit updates as requested by the District or as required by the General Conditions, attached hereto.

§ 5.1.3.7 The issuance of a separate Certificate for Payment will constitute representations made separately by the Architect to the Owner, based on its individual observations at the Site and the data comprising the Application for Payment submitted by the Contractor, that the Work has progressed to the point indicated and that, to the best of the Architect's knowledge, information and belief, quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to minor deviations from the Contract Documents correctable prior to completion and to specific qualifications expressed by the Architect. The issuance of a separate Certificate for Payment will further constitute a representation that the Contactor is entitled to payment in the amount certified. However, the issuance of a separate Certificate for Payment will not be a representation that the Architect has: (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed the Contractor's construction means, methods, techniques, sequences or procedures; (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contact Sum.

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

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§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work;

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and

.3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

Two (2) Percent. Retainage shall be withheld until the Owner approves the Architect's determination that the work has been satisfactorily completed and no unsettled claims exist. The final acceptance shall not be binding or conclusive upon the Owner should it subsequently discover that the contractor has supplied inferior material or workmanship or has departed from the terms of his contract. Should such a condition appear the Owner shall have the right, notwithstanding final acceptance and payment, to cause the work to be properly done in accordance with the drawings and specifications at the cost and expense of the contractor.

§ 5.1.7.1.1 The following items are not subject to retainage: NOT APPLICABLE

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows: NOT APPLICABLE

(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage upon Substantial Completion.)

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§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior written approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

Pursuant to N.J.S.A. 2A:30A-2 (c), if a payment due pursuant to the provisions herein is not made in a timely manner, the Owner shall be liable for the amount of money owed under the Contract, plus interest at a rate equal to the prime rate plus one percent (1%), notwithstanding anything to the contrary in the Contract Documents. Interest on amounts due pursuant to the Act shall be paid to the prime Contractor for the period beginning on the day after the required payment date and ending on the day on which the check for payment is received by the Contractor.

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[X] Litigation in the Superior Court of New Jersey, Burlington County

[ ] Other *(Specify)*

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ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

Mr. Brandon E. Umba
Township Administrator
Southampton Township
5 Retreat Road
Southampton, New Jersey 08088
bumba@southamptonnj.org

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A201™–2017, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A201™–2017 and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with a building information modeling exhibit, if completed, or as otherwise set forth below: NOT APPLICABLE
(If other than in accordance with a building information modeling exhibit, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

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§ 8.7 Other provisions:

1. The within contract shall be governed by and interpreted pursuant to the laws of the State of New Jersey without respect to the conflict of law principles thereof.

2. The Contractor shall comply with the anti-discrimination provisions of N.J.S.A. 10:2-1, et seq., the New Jersey Law Against Discrimination, N.J.S.A. 10:5-1, et seq., and all provisions regarding equal employment opportunity, N.J.S.A. 10:5-31, et seq., N.J.A.C. 17:27-1.1, and N.J.A.C. 6A:7-1.8. The Owner and the Contractor guaranty to afford equal opportunity in the performance of this Contract in accordance with an affirmative action program approved by the State Treasurer and shall provide the documents required for this Project.

3. Before final payment on the contract is made by Owner, the Contractor shall submit an accurate list and the proof of business registration in the State of New Jersey of each subcontractor or supplier used in the fulfillment of the contract or shall attest that no subcontractors were used.

4. For the term of the Agreement, the Contractor, any subcontractor and each of their affiliates, so designated pursuant to N.J.S.A. 52:32-44(g)(3), shall collect and remit to the New Jersey Director of the Division of Taxation in the Department of Treasury, the use tax due pursuant to the Sales and Use Tax Act, N.J.S.A. 52:32B-1, et seq., on all of their sales of tangible personal property delivered into the State of New Jersey, regardless of whether the tangible personal property is intended for a contract with a contracting agency. For purposes of this paragraph, "affiliate" shall mean any entity that: (a) directly, indirectly or constructively controls another entity; (b) is directly, indirectly or constructively controlled by another entity; or, (c) is subject to the control of a common entity. For purposes of the immediately preceding sentence, an entity controls another entity if it owns, directly or indirectly, more than fifty percent (50%) of the ownership interest of that entity.

5. It is the obligation of the Contractor to provide a full and complete copy of all insurance policies held by it at the Contractor's sole expense, upon reasonable request by the Owner, in the amounts specified in the Bid Documents (see Article 11 of the A201). The Contractor's failure to obtain or maintain adequate insurance coverage shall result in the immediate termination of this Agreement. The Owner will have the right to request copies of the Contractor's insurance policies or any part thereof for the duration of the contract period.

6. This Agreement and the General Conditions of the Contract as modified or supplemented in writing, shall control in the case of conflict between these documents and the Project Specifications, the Project Manual and any other exhibits incorporated by reference into this Agreement in Article 9 herein.

7. In claims against any person or entity indemnified under this Agreement by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under this Agreement shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

8. Contracts between the Contractor and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety and protection of the Subcontractor's Work, which the Contractor, by the Contract Documents, assumes toward the Owner and its consultants.

9. Unpaid Lien Balance

   a. To the fullest extent permitted by law, the Contractor shall not suffer or permit any Construction Lien (including a Construction Lien, lis pendens, or other encumbrance or cloud on title), Notice of Unpaid Balance and Right to File Lien ("NUB'') or Municipal Mechanics' Lien to be filed or to remain of record as a claim against the Work or the Project or against any monies due or to become due for any work performed or services, materials or equipment furnished by to or on behalf of Contractor or any of its Subcontractors or Sub-subcontractors or any suppliers to Contractor or its Subcontractors ("Suppliers"), nor shall Contractor suffer or permit any such Construction Lien or

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NUB to be so filed because of any claim or demand against, or any action or non-action of the Contractor or any Subcontractors, Sub-subcontractors or Suppliers.

b. In the event that any such Subcontractor, Sub-subcontractor or Supplier or any other party with whom the Contractor has entered into a relationship to perform any portion of the Work, files a Construction Lien and/or NUB arising out of or in connection with the Work or any work, services, material or equipment associated with this Agreement (and, as to a Municipal Mechanics' Lien, provided that Owner is not then in breach of its monetary obligation to Contractor for the work, services, material or equipment which is the subject of the Municipal Mechanics' Lien under the Contract Documents), Contractor shall within ten (10) days of receipt of notice of said Construction Lien, NUB or Municipal Mechanics' Lien cause same to be discharged, satisfied and/or bonded and, in default thereof, Owner shall have the right to bond said Construction Lien, NUB or Municipal Mechanics' Lien or otherwise discharge same (provided that Owner shall only pay and satisfy any Construction Lien, NUB or Municipal Mechanics' Lien if, within twenty (20) days from the earlier of (a) service of the lien claim on Contractor or (b) written notice from the Owner to Contractor or Subcontractor (where applicable), Contractor or Subcontractor (where applicable) has not notified Owner in writing that the claimant is not owed the monies claimed and the reason therefor, and, to retain out of any payment then due or thereafter to become due to Contractor 110% of the amount of such lien). Nothing in this paragraph shall reduce or limit Contractor's obligation to eliminate Construction Liens, NUBs or Municipal Mechanics' liens as provided elsewhere in this Paragraph 12.

c. Should a Construction Lien, NUB and/or Municipal Mechanics' Lien be filed by a Subcontractor or Supplier of any tier or any entity or person with whom the Contractor has entered into a relationship to perform any portion of the Work (or any additional or extra work after all payments have been made to Contractor under this Agreement), and should Contractor fail to abide by the terms of this Section, Contractor shall refund to Owner all monies that the latter may be compelled to pay to bond, discharge and/or defend the Construction Lien, NUB and/or Municipal Mechanics' Lien. Any such Construction Lien and/or NUB, until satisfied, bonded off or discharged or withdrawn, shall preclude any and all claim or demand for payment whatsoever by the Contractor. The Contractor further agrees to indemnify, defend, protect and save harmless Owner and the Indemnitees from and against any and all claims, actions, fines and penalties brought or imposed or judgments rendered thereon, or any loss, damages, liability, costs and expenses, including legal fees and disbursements, which Owner may sustain or incur as a consequence of the Contractor's failure to comply with the terms of this Section. The failure of the Contractor to satisfy, discharge and/or bond a Construction Lien and/or NUB filed by a Subcontractor, Sub-subcontractor or Supplier within twenty (20) days of notice thereof shall constitute a material breach of the Contract by the Contractor.

10. In the event the Contractor fails or refuses to discharge any NUB, Construction Lien, Municipal Mechanics' Lien, (for a Municipal Mechanics' Lien, as to work for which the Contractor has been paid) within the timeframe and in the manner set forth in this Section, the Contractor shall be liable to the Owner and Indemnities for the full amount of the Municipal Mechanics' Lien, NUB or Construction Lien and all direct damages sustained by the Owner as a result thereof, as well as, all attorneys' fees and costs incurred by the Owner or any Indemnitee in connection therewith. In such event, in addition to the Owner's right to recover the foregoing damages, attorneys' fees and costs from the Contractor and in addition to all of its other common law and statutory rights, the Owner shall be entitled to: (a) declare a material breach of the Contract and terminate the Contract for default pursuant to Section 14 of the A201 and withhold payment to Contractor; (b) withhold an amount from the Contractor equal to 110 percent of the amount claimed in the NUB, Construction Lien or Municipal Mechanics' lien (c) pay the amount set forth in the NUB, Construction Lien or Municipal Mechanics' Lien and deduct this amount from amounts otherwise owed to the Contractor under the Contract; and/or (d) obtain a discharge of the NUB, Construction Lien or Municipal Mechanics' Lien, in any matter permitted under the New Jersey law, and deduct all costs incurred in connection therewith from amounts otherwise owed to the Contractor under the Contract. The foregoing remedies shall be cumulative. In exercising its rights and remedies set forth in this Section, the Owner shall not be required to present a claim in accordance with the procedure or timeframe set forth in Article 6 or the A201.

11. Assignments/ Subcontracting: The Parties agree that there will be no Assignment and/or subcontracting of this Work without prior written consent and approval of the Owner.

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ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 AIA Document A201™–2017, General Conditions of the Contract for Construction

.3 Drawings – See Attached Index

.4 Specifications – See Attached Index

.5 Addenda, if any:

Number	Date	Pages

.6 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

New Jersey Department of Labor and Workforce Development Prevailing Wage Rate Determination

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

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AIA® Document A201® – 2017

General Conditions of the Contract for Construction

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ADDITIONS AND DELETIONS:
The author of this document may have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™–2017, Guide for Supplementary Conditions.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect.

§1.1.1.1 The Contract Documents shall include but not be limited to advertisement or Invitation to Bid, Instructions to Bidders, the Contractor's Bid Proposal Form and other bidding forms, Addenda or portions of the Addenda relating to any Bidding Documents, Payment and performance Bonds, Certificates of Insurance, the General Terms and Conditions, Drawings and Specifications and any other documents enumerated in the Owner-Contractor Agreement. The Contract Documents shall apply to the Contractor and their Subcontractors for the Project, and the Contractor is responsible for the content of all.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§1.1.3.1 It is strongly encouraged for the Contractor to visit the site of the Project before submitting a bid. Such site visit shall be for the purpose of familiarizing the Contractor with the conditions as they exist and the character of the operations to be carried on under the Contract Documents, including all existing site conditions, access to the site, physical characteristics of the site and surrounding areas. Whether or not Contractor visits the site, Contractor shall be charged with such knowledge as would have been obtainable from a thorough site visit and inspection.

§1.1.3.2 Nothing in these General Conditions shall be interpreted as imposing on either the Owner or Architect, or their respective agents, employees, officers, directors or consultants, any duty, obligation or authority with respect to any items that are not intended to be incorporated into the completed project, including but not limited to shoring, scaffolding, hoists, temporary weatherproofing, or any temporary facility or temporary activity, since these are the sole responsibility of the Contractor.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

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§ 1.1.5.1 The Drawings are diagrammatical and show the general arrangement and extent of the Work; exact locations and arrangements of parts shall be determined as the Work progresses, shall be subject to the Architect's approval, and shall not result in the extension of the Contract Time or additional compensation.

.1 The right is reserved by the Architect to make any reasonable change in location of equipment, ductwork, and piping prior to roughing in without involving additional expense to the Owner or extensions of Contract Time.

.2 Contractor shall coordinate his Work with the Work of others and shall be responsible for the coordination work, so that interference between mechanical, electrical, architectural, structural and other work does not occur.

.3 Contractor shall furnish and install supports, hangers, offsets, bends, turns, and the like in connection with this Work to avoid interference with work of other Contractors, to conceal Work where required, and to secure necessary clearance and access for operation and maintenance without involving additional expense to the Owner or extensions of Contract Time.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services which include the Instructions to Bidders, the Advertisement and forms required at the time of and after receipt of the bids.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith. The Architect shall be the Initial Decision Maker.

§1.1.9 Knowledge

The terms "knowledge," "recognize," and "discover," their respective derivatives, and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize), and discovers (or should discover) in exercising the care, skill, and diligence required by the Contract Documents. Analogously, the expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a Contractor generally familiar with the Project, the type of construction work required, and the circumstances attendant to the Project site and by a Contractor exercising the care, skill, and diligence required of the Contractor by the Contract Documents.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The Contract Documents include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The general character of the detail work is shown on the drawings, but minor modifications may be made in large scale details. Where the word "similar" occurs on the drawings it shall be used in its general sense and not as meaning identical, and all details shall be worked out by Contractor, consistent with the requirements of the Contract Documents, in relation to their location and their connection to other parts of the work.

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.1 Where on any drawings a portion of the work is drawn out and the remainder is indicated in outline, the parts drawn out shall apply also to other like portions of the work.
.2 Where detail is indicated by starting only, such detail shall be continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts in the work unless otherwise indicated.
.3 In case of differences between small and large-scale drawings, the larger scale drawings shall take precedence. Dimensions given shall take precedence over scale measurements.
.4 Any discrepancies or questions as to the application of, and interpretations related to 1.2.1.1, shall be referred to the Architect for adjustment before any work affected thereby has been performed.

§1.2.1.2 During the course of the work, should any ambiguities or discrepancies be found in the Specifications or on the Drawings; or should there be found any discrepancies between the Drawings and Specifications to which the Contractor has failed to call attention before submitting his bid, then the Architect will interpret the intent of the Drawings and Specifications; and the Contractor hereby agrees to abide by the Architect's interpretation and to carry out the work in accordance with the decision of the Architect.

§1.2.1.3 It is expressly stipulated that neither the Drawings nor the Specifications shall take precedence over the other, and it is further stipulated that the Architect may interpret or construe the Drawings and Specifications so as to secure in all cases the result most consistent with the needs and requirements of the work. In the event of such ambiguity or discrepancy subject to any Architect's interpretation, the Contractor shall comply with the more stringent requirement and supply the better quality or greater quantity of work.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§1.2.2.1 The various materials and products specified in the specifications by name or description are given to establish a standard of quality and of cost for bid purposes. It is not the intent to limit the acceptance to any one material or product specified, but rather to name or describe it as the absolute minimum standard that is desired and acceptable, all determinations as to equality of a proposed product or material shall be at the discretion of the Architect and/or the Owner.

.1 A material or product of lesser quality will not be acceptable.
.2 Where "Basis of Design" products or manufacturer's names are used, whether or not followed by the words "or approved equal," they shall be subject to approved equals and authorized only by the Architect and/or the Owner.
.3 Insofar as practicable, except as otherwise specified or shown, the material or product of one manufacturer shall be used throughout the work for each specified purpose.

§1.2.2.2 Substitutions lowering performance, quality, method of assembly or installation, or in general not in keeping with details and specifications, will not be permitted. Refer to substitution procedure indicated elsewhere in the Contract Documents.

§1.2.2.3 It is understood when a bid for any product or material is submitted, the Contractor is aware of specified requirements and all materials or products within its bid are equal or better than such specified items. The Contractor is aware that any pricing decisions utilizing substitutes are at Contractor's own risk that the Architect and/or the Owner will find the substitutes not equal or better than the specified items; in such cases the Contractor shall use the specified items or seek approval of different products asserted to be equal to or better than the specified items. In no event shall Contractor's requests to use substitutes delay Contractor's performance or entitle Contractor to an extension of the Contract Time.

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§1.2.2.4 In addition to the Specifications, it shall be understood that details on Drawings shall become part of the Specification in determining the required "standard of quality."

§1.2.2.5 If a conflict occurs between Drawing details and Specifications, bidder during bidding process and/or Contractor shall bring such conflicts to the attention of the Architect in accordance with applicable requirements indicated elsewhere in other sections of Contract Documents.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants. Drawings, specifications and other documents, including those in electronic form, prepared by the Architect and the Architect's consultants are Instruments of Service for use solely with respect to this Project, except that Owner shall be authorized to use any Instruments of Service for future maintenance or repair of or additions or alterations to this Project or for other Projects. The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service and shall retain all common law, statutory and other reserved rights, including copyrights.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement. All notices to Owner or Architect shall be provided to each of the Owner and the Architect.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery. In addition, Notices of Claims shall also be provided by electronic transmission.

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§ 1.7 Digital Data Use and Transmission

The parties shall agree upon written protocols governing the transmission and use of, and reliance on, Instruments of Service or any other information or documentation in digital form.

§ 1.8 INTENTIONALLY OMITTED

§ 1.9 EXECUTION OF CONTRACT DOCUMENTS

§ 1.9.1 The Contract Documents shall be signed by the Owner and Contractor. If either the Owner or Contractor or both do not sign all the Contract Documents, the Architect shall identify such unsigned Documents upon request. Execution of the Agreement and performance thereunder by Contractor shall constitute Contractor's acceptance of all unsigned Contract Documents as if they were fully executed, but this shall not impact Contractor's obligation to sign such documents. The Agreement shall be signed in not less than triplicate by the Owner and Contractor.

§ 1.9.2 Submission of a bid by the Contractor is a representation that said Contract Documents are full and complete, are sufficient to have enabled the Contractor to determine the cost of the Work therein and to enter into the Contract and that the Contract Documents are sufficient to enable it to construct the Work outlined therein, and otherwise to fulfill all its obligations hereunder, including, but not limited to, Contractor's obligation to construct the Work for an amount not in excess of the Contract Sum on or before the date(s) of Substantial Completion and Final Completion established in the Agreement. The Contractor further acknowledges and declares that it has visited and examined the site, examined all physical, legal, and other conditions affecting the Work and is fully familiar with all of the conditions thereon and thereunder affecting the same. In connection therewith, Contractor specifically represents and warrants to Owner that it has, by careful examination, satisfied itself as to: (1) the nature, location and character of the Project and the site, including, without limitation, the surface and subsurface conditions of the site and all structures and obstructions thereon and thereunder, both natural and man-made, and all surface and subsurface water conditions of the site and the surrounding area; (2) the nature, location, and character of the general area in which the Project is located, including without limitation, its climatic conditions, available labor supply and labor costs, and available equipment supply and equipment costs; (3) the quality and quantity of all materials, supplies, tools, equipment, labor, and professional services necessary to complete the Work in the manner and within the cost and time frame required by the Contract Documents; and (4) the condition of existing and planned structures on the site and the ability, safety and appropriateness of same to receive the Work in the manner required by the Contract Documents. The potential that such physical, practical and intangible conditions are not as understood by Contractor at the time of its bid or that such physical, practical and intangible conditions may change during the course of performance, and the costs associated with such potential, are risks borne and accepted by Contractor. In connection with the foregoing and the remainder of the Contract Documents, and having carefully examined all Contract Documents, as aforesaid, and having visited the site, the contractor acknowledges and declares that it has no knowledge of any discrepancies, errors, omissions, ambiguities, or conflicts in said Contract Documents, has correlated its personal observations with the requirements of the Contract Documents, and that if it becomes aware of any discrepancies, errors, omissions, ambiguities, or conflicts, it will promptly notify Owner and Architect of such fact. The Contractor shall not be entitled to additional compensation or an extension of the Contract Time as a result of any of the foregoing.

§ 1.9.3 Any differences between the requirements of the Drawings and the Specifications or any differences noted within the Drawings themselves or within the Specifications themselves have been referred to the Owner and Architect by Contractor prior to the submission of bids and have been clarified by an Addendum issued to all bidders. The failure of a Contractor to provide notice of such a conflict prior to the question deadline in the Notice to Bidders shall constitute an absolute bar to the assertion of a claim based on the presence such conflict.

1.9.3.1 To "provide" work means to furnish and install, complete, in place and ready for use.

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1.9.3.2 The Contractor shall request, from the Architect/Engineer's interpretation of apparent discrepancies, errors, conflicts, or omissions in the Specifications and Drawings. Subcontractors shall forward such requests through the Contractor. Such requests, and the Architect/Engineer's interpretation, shall be in written form; other forms of communications shall be used to expedite resolution of concerns, but will not be binding.

§1.9.3.3 Explanatory notes shall take precedence over conflicting drawn note indications.

§1.9.4 When more than one material, brand, or process is specified for a particular item of Work, the choice shall be the Contractor's. Contractor shall, after notifying the Architect and Owner, select the one it considers to be the best. Approval by Architect or Owner of materials, suppliers, processes, or Subcontractors does not imply a waiver of any Contract requirements including, without limitation, Contractor's warranty.

§1.9.5 In all cases, the details, drawings, and specifications shall be checked with existing conditions and with work in place, and variations, if any, shall be referred by the Contractor to the Architect for adjustment, as the Contractor will be responsible for the fit or work in place.

§1.9.6 When a profile, section or other finished condition is shown, furring or other method of obtaining such finished conditions shall be provided.

§1.9.7 Where it is required in the specifications that materials, products, processes, equipment, or the like be installed or applied in accordance with manufacturers' instructions, directions, or specifications, or words to this effect, it shall be construed to mean that said application or installation shall be in strict accordance with printed material concerned for use under conditions similar to those at the job site. Three copies of such instructions shall be furnished to the Architect and his written approval thereof obtained before work has begun. If there is any variance between the manufacturers' instructions, directions or specifications and the Specifications, the Contractor shall seek clarification from the Architect.

§1.9.8 Any material specified by reference to the number, symbol, or title of a Commercial Standard, Federal Specification, ASTM Specification, trade association standard, or other similar standards, shall comply with the requirements in the latest revision thereof and any amendments or supplements thereto in effect one month prior to the date on which bids are opened and read, except as limited to type, class, or grade, or modified in such reference. The standards referred to, except as modified in the specifications, shall have full force and effect as though printed in the specifications. The Architect will furnish upon request information as to how copies of the standards referred to may be obtained.

§1.9.9 The Contractor represents and warrants the following to the Owner (in addition to the other representations and warranties contained in the Contract Documents), as an inducement to the Owner to execute the Owner-Contractor Agreement, which representations and warranties shall survive the execution and delivery of the Owner-Contractor Agreement and the final completion of the Work

.1 that it is authorized to do business in the State, County, and / or City where construction will take place at the Project and is properly licensed by all necessary governmental and public authorities having jurisdiction over it and over the Work and the site of the Project;

.2 that it is familiar with all Federal, State, Municipal and Owner laws, ordinances and regulations, which may in any way affect the work of those employed herein, including but not limited to any special acts relating to the work or to the project of which it is a part;

.3 that such temporary and permanent work required by the Contract Documents as is to be done by it, can be satisfactorily constructed and used for the purposes for which it is intended;

.4 that it is familiar with local trade jurisdictional practices at the site of the project;

.5 that it has carefully examined the plans; the specifications and the site of the work, and that from his own investigations, it has satisfied itself as to the nature and location of the work, the character, quality and quantity of the surface and subsurface materials to be encountered, the character of equipment and other facilities needed for the performance of the work, and the general local conditions, and all other materials which may in any way affect the work or his/her performance;

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.6 that it has determined what local ordinances, if any, will affect his work. It has checked for any County, City, Borough, or Township rules or regulations applicable to the area in which the Project is being constructed and in addition, for any rules or regulations of other organizations having jurisdiction, such as chambers-of-commerce, planning commission, industries, or utility companies who have jurisdiction over property on which the Work will be performed. Any costs of compliance with local controls are included in the prices bid, even if documents of such local controlling agencies are not listed specifically in the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INTENTIONALLY OMITTED

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely only on the accuracy of the legal limitations furnished by the Owner and shall exercise proper precautions relating to the safe performance of the Work. The furnishing of these surveys and the legal description of the site shall not relieve the Contractor from its duties under the Contract Documents. Neither Owner nor the Architect shall be required to furnish Contractor with any information concerning subsurface characteristics, utilities or conditions of the areas where the Work is to be performed or concerning the structures on/in which the Work is to be performed. When the Owner or Architect has made investigations of subsurface characteristics or conditions of the areas where the Work is to be performed or concerning the structures on/in which the Work is to be performed, such investigations, if any, were made solely for the purposes of Owner's study and Architect's design. Neither such investigations nor the records thereof are a part of the Contract between Owner and Contractor. To the extent such investigations or the records thereof are made available to Contractor by the Owner or Architect, such information is furnished solely for the convenience of Contractor. Neither Owner nor Architect assumes any responsibility whatsoever in respect of the sufficiency or accuracy of the investigations thus made, the records thereof, or of the interpretations set forth therein or made by the Owner or Architect in its use thereof, and there is no warranty or guaranty, either express or implied, that the conditions indicated by such investigations or records thereof are accurate or that the indicated conditions are representative of those existing throughout the areas or structures where the Work is to be performed, or any part thereof, or that unforeseen developments may not occur, or that

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materials other than or in proportions different from those indicated may not be encountered. The Contractor shall undertake such further investigations and studies as may be necessary or useful to determine subsurface characteristics and conditions. In connection with the foregoing, Contractor shall be solely responsible for locating (and shall locate prior to performing any Work) all utility lines, telephone company lines and cables, sewer lines, water pipes, gas lines, electrical lines, including, without limitation, all buried pipelines and buried telephone cables and shall perform the Work in such a manner so as to avoid damaging any such lines, cables, pipes, and pipelines

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or fails to carry out Work in accordance with the Contract Documents, or fails or refuses to provide a sufficient amount of properly supervised and coordinated labor, materials, or equipment so as to be able to complete the Work within the Contract Time or fails to remove and discharge (within ten days) any lien filed upon Owner's property or funds by anyone claiming by, through, or under Contractor, disregards the instructions of Architect or Owner when based on the requirements of the Contract Documents or otherwise violates any terms and conditions of the Contract Documents the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

§ 2.4.1 Notwithstanding anything else in the Contract Documents, the Owner shall have the authority to immediately correct, service, repair, replace or otherwise make operational any component of their facilities including equipment if in the sole discretion of the owner the damaged component is a threat to safety or security. The Owner is obligated to put the Contractor on notice of the issue threatening safety or security, and the Owner's intent to remedy immediately with other resources and to back charge the Contractor for the cost of said service, but there is no obligation to provide Contractor an opportunity to cure required for corrective actions necessary to protect the Owner's interest in safety and security.

§ 2.5 Owner's Right to Carry Out the Work

§ 2.5.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and (i) fails within a seven-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness or (ii) Owner and Architect reasonably believe that such correction cannot be properly completed within a seven-day period, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor and/or its Surety shall pay the difference to the Owner.

§ 2.5.2 The Owner's rights and remedies stated in Sections 2.4, 2.5 and elsewhere in the Contract Documents are cumulative and not in limitation of any other rights or remedies of the Owner (i) granted in the Contract Documents; (ii) at law; or (iii) in equity.

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ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative. The Contractor is responsible for supervisory control over and allocation and coordination of all Subcontractors and trades, performance and completion of all portions of the Work, including cooperation with those doing portions of the Project under Separate Contracts with the Owner.

§ 3.1.2 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.1.3 Standard of Care: The Contractor shall exercise the highest and best skill, judgment, and care of a contractor performing work of the type required by the Contract Documents. Contractor acknowledges that this provision requires that it perform with more than a mere "reasonable" standard of care.

§ 3.2 Requests for Information; Field Conditions

§ 3.2.1 If the Contractor requires clarification of the intent of the Contract Documents after award, the Contractor shall be responsible to issue a typewritten request for information (RFI) to the Architect utilizing the Architect's sample form via acceptable methods set forth in Article 4.2.

All RFI's shall clearly identify the Architect's project number, the construction company's name, author's name, date issued, address, phone numbers, facsimile number and the addressee of the communication.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. The Contractor shall satisfy itself as to the accuracy of all dimensions and locations. In all cases of interconnection of its work with existing or other work, it shall verify at the site, all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to verify all such locations or dimensions shall be promptly rectified by the Contractor without any additional cost to the Owner. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents. If the Contractor performs any construction activity involving an error, inconsistency, legal nonconformity, or omission in the Contract Documents that the Contractor was obliged to recognize pursuant to the terms of the Contract Documents, the Contractor shall assume complete responsibility for such performance and shall bear the full amount of the attributable costs for correction and any damages to Owner, Architect, or Separate Contractors arising from that work.

§ 3.2.2.1 Contractor acknowledges, The Work required by the Contract Documents, including, without limitation, all construction details, construction means, methods, procedures, and techniques necessary to perform the Work, use of materials, selection of equipment, and requirements of products by manufacturers are consistent with;

.1 the highest and best skill, judgment, and care within the construction industry and applicable to the Work;

.2 requirements of any warranties applicable to the Work; and

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.3 all laws, ordinances, regulations, rules, and orders which bear upon the Contractor's performance of the Work.

§ 3.2.2.2 The Contract Sum is firm and all inclusive, and no escalation is contemplated for any reason whatsoever. The Contract Sum includes any and all costs associated with substantial and final completion by the dates and times specified, including any and all costs associated with out-of-sequence work, come-back work, stand-by work, stacking of trades, coordination with the schedules and work of Separate Contractors, allowing sufficient time, work and storage areas, and site access for Separate Contractors to timely progress and complete their work, overtime, expediting and acceleration that may be required to complete the work by those dates and times.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly provide notice to the Architect of any legal nonconformity discovered by or made known to the Contractor.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information, the Contractor shall submit Claims as provided in Article 15.

§ **3.2.5** Typographical and spelling errors will be interpreted by the Architect for their intended meaning and the interpretations of the Architect shall be final and binding.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.4 The Contractor, when requested by the Architect, shall meet with representative of the Architect at all times and furnish all information requested; it shall allow the Architect to inspect the work at all times. Neither the Owner, nor the Architect shall be liable to the Contractor for extra compensation or damages for interference or delays on account of any such meetings, information, or inspections so requested or other acts of the Architect done in good faith and within the scope of their employment by the Owner.

§ 3.3.5 The Contractor has the responsibility to ensure that all material suppliers and Subcontractors, their agents, and employees adhere to the Contract Documents, and that they order materials on time, taking into account the current and potential market and delivery conditions and that they provide materials on time. The Contractor is aware of the presence of market volatility and potentiality for significant delivery delays and has assumed the risk of same. The Contractor shall coordinate its Work with that of all others on the Project including deliveries,

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storage, installations, and construction utilities. The Contractor shall be responsible for the space requirements, locations, and routing of its equipment. In areas and locations where the proper and most effective space requirements, locations and routing cannot be made as indicated, the Contractor shall meet with all others involved, before installation, to plan the most effective and efficient method of overall installation.

§ 3.3.6 The Contractor shall establish and maintain benchmarks and all other grades, lines, and levels necessary for the Work and review the placement of the building(s) and permanent facilities on the site with the Owner and Architect after all lines are staked out and before foundation Work is started. Contractor shall provide access to the Work for the Owner, the Architect, other persons designated by Owner, and governmental inspectors. Any encroachments made by Contractor or its Subcontractor (of any tier) on adjacent properties due to construction as revealed by an improvement survey, except for encroachments arising from errors or omissions not reasonably discoverable by Contractor in the Contract Documents, shall be the sole responsibility of the Contractor, and Contractor shall correct such encroachments within thirty (30) days of the improvement survey (or as soon thereafter as reasonably possible), at Contractor's sole cost and expense, either by the removal of the encroachment (and subsequent reconstruction on the Project site) or agreement with the adjacent property owner(s) (in form and substance satisfactory to Owner in its sole discretion) allowing the encroachments to remain.

§3.3.6.1 The Contractor shall use best efforts to minimize the likelihood of any strike, work stoppage, or other labor disturbance.

§ 3.3.7 Coordination:

.1 The Contractor is the sole responsible party for the coordination of the entire project.

.2 The Contractor shall be responsible to coordinate and expedite the total construction process and all of its parts. The Owner relies upon the organization, management, skill, cooperation and efficiency of the Contractor to supervise, direct, control and manage the work and to coordinate and expedite the efforts of Separate Contractors and subcontractors so as to deliver the Work conforming to the contract within the scheduled time. The Contractor is responsible for proper sequence and coordination. It shall determine the location of work and attempt to resolve conflicts amongst itself and Separate Contractors and subcontractors.

.3 The Contractor shall provide a qualified full-time staff member or members to manage the project. THIS PROJECT MANAGER shall coordinate, organize and manage the project from the Contractor's main office and oversee the shop drawing process signing off for quality assurance and conformance with the Contract Documents on each shop drawing. The Project Manager shall be subject to the approval of the Owner and Architect who at all times have the right to require the Contractor to replace this Project Manager if their performance is not reasonably satisfactory. The Project Manager shall conduct an onsite meeting at least once a week with the construction superintendent and all Separate Contractors and/or subcontractors in attendance to coordinate the project and review the schedule. The Owner's Representative may attend but is not responsible for organizing or taking minutes. The Project Manager shall provide a meeting agenda and issue minutes within four (4) working days of each meeting.

.4 The Contractor shall provide a qualified full-time staff member or members to manage the project on site. THIS CONSTRUCTION SUPERINTENDENT and their assistants shall coordinate, organize and manage the project from the Contractor's on-site field office and oversee Contractor's own work and the work of its subcontractors. Should the Contractor be responsible for multiple projects at different sites, multiple locations on one large site or a multiple-site project under one contract then the Contractor shall provide a separate qualified Construction Superintendent for each of the projects or locations. This determination shall be made by the Owner and Architect who at all times may require additional manpower. The Construction Superintendent shall be responsible for onsite safety, quality assurance, conformance with the Contract Documents and perform coordination with all on site construction personnel and/or subcontractors. The Construction Superintendent and their assistants shall be subject to the approval of the Owner and Architect, who at all times have the right to require the Contractor to replace this Construction Superintendent and any assistant if their performance is not reasonably satisfactory.

.5 Contractor's Subcontractors shall also have a designated superintendent and/or foreman who will at all times be subject to the approval of the Owner and Architect. The Owner and Architect reserves the right to

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require the Contractor to replace the superintendent and/or foreman if their performance is not reasonably satisfactory; Contractor's Subcontractors shall be required to consent to same under the terms of their subcontracts.

.6 Each Subcontractor shall coordinate its activities with the activities of Contractor, Separate Contractors and other subcontractors.

.7 All questions pertaining to the Work are to be made, via request for information, to the Architect sufficiently in advance of performance to permit Architect time to thoroughly evaluate and investigate the request and provide a written response without delaying the progress of the Work. Contractor shall be responsible for any delay occasioned by the failure to timely submit a request for information based on the standard in this paragraph.

.8 The Contractor is required to submit a site logistics plan coordinating all Owner functions with the access and safety of the job site.

.9 The Contractor is required to coordinate all the inspection and material testing to meet the Contract Documents requirements.

.10 The Contractor has full and sole responsibility for construction methods and implementation of a "quality control system" to insure coordination.

.11 The Contractor shall make all necessary arrangements to conduct work so that all parts shall be carried on harmoniously and simultaneously or sequentially, so as components or increments of the same shall not interfere or retard the progress of others.

.12 The Contractor shall coordinate the delivery, unloading, movement, relocation, storage and protection of all materials.

.13 Accurate dimensions, sleeved and opening drawings are to be submitted by Contractor to Architect prior to placement in the field.

.14 The Contractor shall prepare coordination drawings for all above ceiling areas throughout the entire project. Such drawings shall show all piping, duct, cable trays, electrical duct banks, similar items (but not electrical conduit less than 4 inches in diameter), and complete architectural, mechanical and electrical reflected ceiling layouts, (including ductwork, conduits, piping, lighting, etc.).

.15 The Contractor is responsible for any omissions of the Subcontractors and is required to provide a complete operating facility.

.16 The Contractor shall be responsible for preserving the integrity of ceiling heights and room sizes and shall:

a. Check compatibility with equipment, other work, electrical characteristics, and operational control requirements; check motor voltages and control characteristics; coordinate controls, interlocks, wiring of pneumatic switches, and relays; coordinate wiring and control wiring diagrams; review the effect of changes on other work; and obtain and distribute installation data on each item of equipment requiring mechanical or electrical connections;
b. Coordinate and observe start-up and demonstration of equipment and systems; observe and maintain records of tests and inspections; and coordinate maintenance of record documents;
c. Assist the Architect, or Owner's consultants with final inspections.
d. Inform the Owner when coordination of Owner's work is required;
e. Coordinate all mechanical, plumbing, electrical, food service and equipment/furnishings work, and coordinate that work with all other work.

.17 Where space is limited, Contractor shall show plan and cross-section dimensions of space available, including structural obstructions and ceilings as applicable.

.18 Contractor shall coordinate cutting and patching activities and sequencing with Separate Contractors and subcontractors.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. The Contractor shall be solely responsible for providing sufficient labor and workforces to properly execute and complete the Work within the timeframe contemplated with this Contract for the completion of said Work.

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§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive and the provisions of Section 01300 of the Contract Specifications.

§ 3.4.2.1 The Architect will evaluate alternatives and substitutions and shall be the sole judge of whether the alternatives and substitutions are acceptable.

.1 The burden of proving the alternatives and substitutions are equal to or better than the specified product is that of the Contractor.
.2 Contractor shall submit request for substitution in accordance with substitution procedures indicated elsewhere in the Contract Documents.
.3 Products which do not meet the specifications will not be accepted.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly.

§ 3.4.4 The Contractor must provide suitable storage facilities at the site for the proper protection and safe storage of his materials. Such storage facilities must be approved in advance in writing by the Architect.

§ 3.4.5 All materials delivered to the premises which are to form a part of the work are to be considered the property of the Owner and must not be removed without the Architect's consent; but the Contractor shall remove all surplus materials upon completion of each phase of the work and as directed by the Architect.

§ 3.4.6 When any room is used as a shop, storeroom, etc., during the progress of the work, the Contractor making use of the space will be responsible for any repairs, patching, or cleaning arising from such use. Prior approval of the Architect for use of such areas is mandatory.

§ 3.4.7 Not later than seven (7) days from the execution of the Agreement, the Contractor shall provide a list showing the name of the manufacturer proposed to be used for each of the products identified in the Specifications Divisions 1-16, and if applicable, the installing Subcontractor's name.

§ 3.4.8 The Contractor will be held to be thoroughly familiar with all conditions affecting labor in the locale of the Project, including, but not limited to, trade jurisdictions and agreements, incentive and premium time, pay, procurement, living and commuting conditions. Contractor shall assume responsibility for costs resulting from his failure to verify conditions affecting his labor.

§ 3.4.9 Except as specifically provided in Subparagraph 8.3.1, Contractor shall be liable to Owner for all damages suffered by Owner occurring as a result of work stoppages, slowdowns, disputes, or strikes.
skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work shall conform to the requirements of the Contract Documents and shall be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. This Section shall not shorten or limit the manufacturer's warranties in any way.

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§ 3.5.2 The Contractor represents that all manufacturer and supplier warranties shall run directly to or be specifically assignable to the Owner. The Contractor warrants that all portions of the work that will be covered by a manufacturer or supplier's warranty shall be performed in such a manner so as to preserve all rights under such warranties. All such warranties shall commence in accordance with Section 9.8.4, Substantial Completion. The Contractor hereby assigns to the Owner, effective upon the earlier of termination of this contract or substantial completion, all manufacturer and supplier's warranties relating to the Work, and the Contractor shall upon request of the Owner, execute any document reasonably requested by Owner to effectuate such assignment. If the Owner attempts to enforce a claim based upon a manufacturer or supplier's warranty and such manufacturer or supplier refuses to honor such warranty based in whole or in part on a claim of defective installation by the Contractor, the Contractor shall be responsible for any resulting loss or damages incurred by the Owner as a result of the manufacturer or supplier's refusal to honor such warranty. The Contractor's obligations under this Section 3.5.2 shall survive the expiration or earlier termination of the Contract. The warranty period for all work of each Contractor shall be two (2) years from the date of final inspection and acceptance by the Owner unless otherwise specified.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.6.1 The owner is exempt from all taxes including Federal Excise Tax, fuel tax, transportation taxes and State Sales or Use Tax.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 The Contractor shall be required to secure permits or government approvals necessary for the proper execution and completion of the work. The Contractor shall obtain business licenses required by the State, County and/or City/Township and shall give all notices and comply with all laws, ordinances, rules, regulations and orders of any public authority bearing on the performance of the work.

§ 3.7.1.1 The required Building Permit or Permits shall be secured by the Contractor for the entire project.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 In addition to any other obligation under similar provisions of the Contract Documents, if the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear all costs attributable to the correction thereof or related thereto, including all fines and penalties.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than ~~14 days~~ three (3) days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially shall direct any necessary re-design of the Work. As set forth in Article 1, Contractor accepts the risk of concealed or unknown conditions.

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§3.7.4.1 If it shall be determined by a court of competent jurisdiction that Contractor cannot bear the full risk of concealed or unknown conditions as a matter of law, adjustment in the Contract Time or Contract Sum shall be permitted only for conditions that differ materially from those conditions specifically disclosed by Owner or Architect unusual and adverse conditions actually known to Owner or Architect that should have reasonably been disclosed to Contractor.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features.

§ 3.8 Allowances (See Specification "Section 01210 – Allowances")

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and all required taxes, less applicable trade discounts;

.2 whenever costs of materials and equipment are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect the difference between actual costs of material and equipment and the allowances under Section 3.8.2.1, but shall not reflect changes in the costs for unloading and handling at the site, labor, or installation costs.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Construction Superintendent shall represent the Contractor, and communications given to the Construction Superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed Construction Superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed Construction Superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule prepared by the Contractor shall indicate the proposed starting and completion date for the various subdivisions of the Work as

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well as the totality of the Work. The schedule shall be updated every thirty (30) days and must be submitted to the Architect with Contractor's Applications for Payment. If the schedule is not submitted with the payment application, no payment will be processed. Each schedule shall contain a comparison of actual progress with the estimated progress for such point in time started in the original schedule. If any schedule submitted sets forth a date for Substantial Completion for the Work or any phase of the Work beyond the Date(s) of Substantial Completion established in the Contract (as the same may be extended as provided in the Contract Documents), then Contractor shall submit to Architect and Owner for their review and approval an explanation for the cause of the schedule slippage and a description of the means and methods which Contractor intends to employ to expedite the progress of the Work to ensure timely completion of the various phases of the Work as well as the totality of the Work. To ensure such timely completion, Contractor shall take all necessary action including, without limitation, increasing the number of personnel and labor on the Project and implementing overtime and double shifts. In that event, Contractor shall not be entitled to an adjustment in the Contract Sum or the schedule. Upon request and demand by Architect/Owner, Contractor shall provide a recovery schedule in accordance with the Specifications.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 Schedules shall comply with the requirements of the Division 1 "Section 01040 - Project Coordination," and Section 01310 - "Construction Progress Documentation". The Schedule shall also (i) provide a graphic representation of all activities and events that will occur during performance of the Work; (ii) identify each phase of construction and occupancy; and (iii) set forth dates that are critical in ensuring the timely and orderly completion of the Work in accordance with the requirements of the Contract Documents (hereinafter referred to as "Milestone Dates").

§ 3.10.5 In the event the Owner determines that the performance of the Work, as of a Milestone Date, has not progressed or reached the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (i) working Additional shifts or overtime, (ii) supplying Additional manpower, equipment, and facilities, and (iii) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule.

.1 The Contractor shall not be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by the Owner under or pursuant to this Subsection 3.10.5.
.2 The Owner may exercise the rights furnished to the Owner under or pursuant to this Subsection 3.10.5 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with any Milestone Date or completion date set forth in the Contract Documents.
.3 The Owner's failure to direct Extraordinary Measures shall in no event excuse Contractor's failure to maintain the schedule or timely reach substantial or final completion of the Work.

§ 3.10.6 The Owner shall have the right to direct a postponement or rescheduling of any date or time for the performance of any part of the Work that may interfere with the operation of the Owner's premises or any tenants or invitees thereof. The Contractor shall, upon the Owner's request, reschedule any portion of the Work affecting operation of the premises during hours when the premises are not in operation. Any postponement, rescheduling,

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or performance of the Work under this Subsection 3.10.6 may be grounds for an extension of the Contract Time, if permitted under Subsection 8.3.1, and an equitable adjustment in the Contract Sum if (i) the performance of the Work was properly scheduled by the Contractor in compliance with the requirements of the Contract Documents, (ii) Contractor was on schedule to timely reach substantial and final completion of the Work; and (iii) such rescheduling or postponement is required for the convenience of the Owner.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Owner upon completion of the Work as a record of the Work as constructed. See Specification "Section 01300 - Submittals," and "Section 01700 - Project Closeout," for specific details and requirements.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, **APPROVE**, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Architect without action.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been reviewed by the Architect.

§ 3.12.8 The Work shall be in accordance with the reviewed submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's

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review of the Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's review thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's review of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.12.11 Detailed requirements are specified in Specification "Section 01300 - Submittals."

§3.12.12 All shop drawings are to include manufacturer's data. All shop drawings and samples are to be submitted by the Contractor to the Architect for review. Each sheet of the shop drawings shall identify the project, contractor, subcontractor, fabricator or manufacturer and the date of the drawings. All shop drawings shall be numbered in consecutive sequence, and each sheet shall indicate the total number of sheets in the set.

§ 3.12.13 Substitutions: All substitutions or deviations from plans and specifications must be clearly noted as such on all shop drawings. Contractor shall identify, coordinate and pay for any additional requirements as a result of substitutions, deviations, etc., including necessary change orders. In addition, substitution submittals shall be made no later than 30 days after the execution of the Agreement in order to provide time for comparison review. All submittals after 30 days shall be in strict accordance with the basis of design / specified products.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

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§ 3.13.1 Location and weights of all equipment and materials and the Contractor intends to place on the slab shall be submitted to the Architect for review.

§ 3.13.2 Only materials and equipment which are to be used directly in the Work shall be brought to and stored on the Project site by the Contractor. After equipment is no longer required for the Work, it shall be promptly removed from the Project site. Protection of construction materials and equipment stored at the Project site from weather, theft, damage and all other adversity is solely the responsibility of the Contractor.

§ 3.13.3 The Contractor and any entity for whom the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner with the exception of those directed to be erected through the Contract Documents and those necessary for site safety or in an emergency.

§ 3.13.4 Contractor shall ensure that the Work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the Work shall be free from all debris, building materials and equipment likely to cause hazardous conditions. Without limitation of any provision of the Contract Documents, Contractor shall use its best efforts to minimize any interference with the occupancy or beneficial use of (1) any areas and buildings adjacent to the site of the Work or (2) the Building in the event of partial occupancy, as more specifically described in Paragraph 9.9.

§ 3.13.5 Without prior approval of the Owner, the Contractor shall not permit any workers to use any existing facilities at the Project site, including without limitation, lavatories, toilets, entrances and parking areas other than those designated by the Owner. Without limitation of any other provision of the Contract Documents, the Contractor shall use its best efforts to comply with all rules and regulations promulgated by the Owner in connection with the use and occupancy of the Project site and the Building, as amended from time to time. The Contractor shall immediately notify the Owner in writing if during the performance of the Work, the Contractor finds compliance with any portion of such rules and regulations to be impracticable, setting forth the problems of such and suggest alternatives through which the same results can be achieved. The Owner may, in the Owner's sole discretion, adopt such suggestions, develop new alternatives or require compliance with the existing requirement of the rules and regulations. The Contractor shall also comply with all insurance requirements and collective bargaining agreements applicable to use and occupancy of the Project site and the Building.

§3.13.6 The Contractor shall provide a temporary construction fence whether shown on the contract documents or not as required to separate the area or areas under construction from the Owners area or areas used by the public. The temporary fencing shall be approved by the Owner prior to installation. The fence shall be 6' high and have vinyl privacy fabric obstructing views into the construction area.

§ 3.14 Cutting and Patching (See Specification Section 01045 – Cutting and Patching)

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from

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and about the Project. The Work shall not be considered completed until the Contractor thoroughly cleans and vacates the site in a condition satisfactory to the Owner.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.15.3 The Contractor shall perform all daily clean up and removal of debris from the site including that of its Subcontractors. The Contractor shall maintain an adequate supply of laborers to accomplish daily clean up and removal of debris from the site and work areas. No debris will be allowed to accumulate in or around the building including masonry debris. The building site must be maintained free of all litter, dirt, dust and debris on a daily basis. The Owner or Architect may stop all work and require all personnel on site to clean up. No accumulation of flammable material is permitted. Prior to installation of finishes, the floors will be swept or vacuumed and kept free of dust and dirt until turned over to the Owner. Contractor shall immediately notify Architect and Owner in the event of snow and or ice accumulation in the site which can reasonably affect safety.

§ 3.15.4 Cleaning and debris removal may be considered a safety concern by judgment of the Owner or Architect and as such the work may be stopped to provide time and labor for immediate clean up.

§ 3.15.5 Final Clean-Up: The Contractor has the responsibility for the final clean-up and policing of the entire site after Separate Contractors have removed their own waste materials, rubbish, equipment, tools and plant. In addition, thereto, the Contractor shall have a professional cleaning company perform the following immediately prior to the Architect's inspection for Substantial Completion:

.1 Removal of all manufacturer's temporary labels from materials, equipment and fixtures.
.2 Removal of all stains from glass and mirrors; wash, polish, inside and outside.
.3 Removal of marks, stains, fingerprints, other soil, dust, dirt, from painted, decorated, or stained woodwork, plaster or plasterboard, metal, acoustic tile, and equipment surfaces.
.4 Remove spots, paint, soil, from resilient flooring.
.5 Remove temporary floor protections; clean, strip and provide three (3) coats of wax on new VCT floors or otherwise treat as directed by the material manufacturer's recommendation, all finished floors. Final vacuum all carpet.
.6 Clean all interior finished surfaces, including doors and window frames, and hardware required to have a polished finish, of oil, stains, dust, dirt, paint, and the like; leave without fingerprints, blemishes.
.7 Final site clean-up shall extend beyond the Contract Limit Lines as reasonably required to ensure the complete removal of all construction debris from the entire site, including staging areas.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.16.1 The Contractor shall promptly notify the Architect and Owner of the presence of hazardous conditions at the site, including the start of hazardous operations or the discovery or exposure of hazardous substances.

§ 3.16.2 Contractor shall be responsible for snow plowing and snow removal as required to maintain ingress to, egress from and mobility around construction areas.

§ 3.16.3 Contractor shall keep only necessary equipment on site and shall cooperate with the Owner regarding location of stored material.

§ 3.16.4 The Contractor is to maintain reasonable access to site for structural steel erection including crane, steel deliveries, etc. The Contractor will be responsible to coordinate requirements with the Owner a minimum of 21 days prior to deliveries.

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§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall defend, indemnify and hold harmless the Owner, Architect, and other consultants or professionals retained by Owner and their respective officers, employees, owners, volunteers and agents ("Indemnitees"), from and against all claims, damages, losses, and expenses, including reasonable attorney's fees and costs, in case it shall be necessary to file an action or claim or in case an action or claim is brought or made which is; 1) for personal or bodily injury, illness or death, for property damage, including loss of use, or for any economic loss and; 2) caused in whole or in part by Contractor's alleged negligent acts or omissions, breaches of contract, or otherwise arising out of their work, or those of a Subcontractor, or that of anyone employed by them, or for whose acts Contractor or Subcontractor may be liable. Contractor's obligation hereunder shall apply in all instances whether the Indemnitees are made a party to the action or claim or are subsequently made a party to the action by third-party in-pleading or are made a part to a collateral action arising, in whole or in part, from any of the issues emanating from the original cause of action or claim. Contractor's obligation hereunder shall apply even when such claims, damages, losses and expenses are caused in part by the Indemnitees. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18

§ 3.18.1.1 Contractor shall defend, indemnify and hold harmless the Indemnitees against all fines, penalties or losses, including reasonable attorney's fees and costs, incurred as a result of violations by Contractor of any statute, ordinance, regulation, rule of law of any political subdivision or duly constituted public authority.

§ 3.18.1.2 The Contractor assumes the entire risk, responsibility, and liability for any and all damage or injury of every kind and nature whatsoever (including death resulting therefrom) to all persons, whether employees of the Contractor or otherwise, and to all property (including the Work itself) caused by, resulting from, arising out of or occurring in connection with the execution of the Work, or in preparation for the Work, or any extension, modification, or amendment to the Work by the Change Order or otherwise.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

§3.18.3 The Contractor assumes all risks and bears any costs and expenses occasioned by neglect or accident during the progress of the Work until, at earliest, same shall have been completed and accepted by the Owner. The Contractor must properly protect all adjacent work during the progress of construction and make good all damage that may occur to any work herein specified or to adjacent property in consequence of the work herein specified.

§3.18.4 The work in every respect shall be under the care of the Contractor and at his risk, he shall properly safeguard against any or all injury or damage to the public, to any property, materials, or thing, except where stipulated otherwise in the specifications, and also be responsible for any such damage or injury from his undertaking of this work to any person or persons or thing connected therewith.

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ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement. The term "Architect" means the Architect or the Architect's authorized representative.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect whose status under the Contract Documents shall be that of the Architect.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents (1) during construction, (2) until final payment is due and (3) with the Owner's concurrence, from time to time during the two-year period for correction of Work described in Paragraph 12.2. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communication between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner and Architect. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect have authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or

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not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's review of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 INTENTIONALLY OMITTED

§ 4.2.11 The Architect will interpret and decide matters concerning the Contractor's performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness..

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site or provide material or equipment directly to the Contractor. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

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§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Identification of Subcontractors required by N.J.S.A. 18A:18A-18 shall be provided with the bid in accordance with that statute. The names of all Subcontractors and material suppliers not covered by N.J.S.A. 18A:18A-18 shall be submitted to the Architect for approval not later than seven (7) days after the date of the notice to proceed. The list of proposed Subcontractors shall include a description of the materials and equipment each proposes to furnish and install in the work. The description shall be in sufficient detail to allow the Architect to determine general conformance to the Contract Documents. Approval of the submittals required under the Article shall not relieve the Contractor from conformance to the Contract Documents.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.2.1 The Architect will promptly reply in writing to the Contractor stating whether the Owner or Architect, after due investigation, has reasonable objection to any such proposed persons. If adequate data on any proposed Subcontractor or manufacturer is not available, the Architect may state that action will be deferred until the Contractor provides further data. Failure of the Owner or Architect to reply promptly shall not constitute a waiver of any of the requirements of the Contract Documents, and all materials and work furnished by the listed Subcontractor or manufacturer must conform to such requirements.

§ 5.2.3 INTENTIONALLY OMITTED

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected, or decide to self-perform such Work, if the Owner or Architect makes reasonable objection to such substitution or self-performance, including on the grounds that Contractor is attempting to improve its profits on the project without commensurate benefit to the Owner.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.3.1 The Contractor shall obligate each Subcontractor specifically to comply with the New Jersey Law Against Discrimination NJ.S.A. 10:5-31 and N.J.A.C. 17:27 et seq. to avoid discriminatory practice in employment.

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§ 5.3.2 The Contractor shall obligate each Subcontractor to comply with the applicable prevailing wage schedule of the New Jersey Department of Labor and Workforce Development.

§ 5.3.3 The Contractor shall obligate each Subcontractor to comply with the Public Works Contractor Registration Act, N.J.S.A. 34:11-56.48 et seq.

§ 5.4 INTENTIONALLY OMITTED

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE ALL WORK. All trades have a mutual obligation to coordinate their work with the other trades and cooperate as necessary with the Contractor and the Construction schedule – to complete the work as required by the Owner.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent. Should the Contractor be damaged by any Separate Contractor on the Project by reason of such Separate Contractor's failure to perform properly his Contract with the Owner, no action will lie against the Owner and the Owner shall have no liability therefore, but the Contractor may assert his claim for damage against such Separate Contractor as a third-party beneficiary under the Contract between such other Contractor and the Owner.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction .

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5 or to other completed or partially completed construction or to the site or adjoining property.

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§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and will allocate the cost among those responsible as the Owner determines to be just, based on the recommendation of the Architect.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.1.1 A directive, order, field directive or field order shall not be recognized as constituting a change in the Work or the Contract Documents or having any impact upon the Contract Sum or the Contract Time, and the Contractor shall have no claim therefor unless it shall, prior to complying with same and in no event no later than five (5) working days from the date such direction or order was given, submit to the Owner and Architect its change proposal for approval.

§ 7.1.1.2 When submitting its change proposal, the Contractor shall include and set forth in clear and precise detail breakdowns of labor and materials for all trades involved and the estimated impact on the construction schedule including a specific number of days for a time extension. If the proposal does not provide an additional time request, the Contractor shall not be entitled to an extension of time. The Contractor shall furnish spreadsheets from which the breakdowns were prepared, plus spreadsheets if requested of any Subcontractors. The Contractor may not claim additional time at a later date and shall remove any language to that effect from its proposal.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone in accordance with Paragraph 7.4.

§ 7.1.2.1 Except as permitted in Section 7.3 and Section 9.7, a change in the Contract Sum or the Contract Time shall be accomplished only by Change Order. Neither this Contract nor the Work to be performed hereunder can be changed by oral agreement. No course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work and no claims that the Owner has been unjustly enriched by any alteration or addition to the Work, whether there is, in fact, any unjust enrichment, shall be the basis for any alleged implied agreement by the Owner to the change, any alleged waiver of the Owner's right under this Contract or any increase in any amounts due under the Contract or any or a change in any time period provided for in the Contract Documents.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

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§ 7.2.2 Methods used in determining adjustments to the Contract Sum include those listed in Subparagraph 7.3.4 The total for overhead and profit shall NOT exceed 15% combined and shall not include markups below the Subcontractor level.

§ 7.2.3 Any change in work authorized in writing by the Owner and Architect that will require a change in the cost of the work, whether an additive or deductive change in cost, shall show a complete cost breakdown of labor, material, appropriate increase or reduction in overhead and profit (15% maximum combined) and contract time.

§ 7.2.4 When a Change Order involves both additions and deletions in material, the net quantity is to be determined and the 15% overhead and profit is to be applied to the net change.

§ 7.2.5 When any change in the Work, regardless of the reason therefore, requires or is alleged to require an adjustment in Contract Time, such request for time adjustment shall be submitted by the Contractor as part of the change proposal. Any Change Order approved by the Owner and for which payment is accepted by the Contractor, in which no adjustment in Contract Time is stipulated, shall be understood to mean that no such adjustment is required by reason of the change, and any and all rights of the Contractor or any subsequent request for adjustment of Contract Time by reason of the change is waived.

§ 7.2.6 Request by the Contractor for adjustment of the Contract Amount regardless of the reason therefore, shall be submitted to the Architect and the Owner with itemized labor and material quantities and unit prices to permit proper evaluation of the request. A submission by the Contractor containing unsubstantiated lump sum requests for adjustment of the Contract Amount will not be considered by the Owner and Architect. The Owner and Architect will not be liable for any delay incurred by reason of the Contractor's failure to submit satisfactory justification and back-up with any request for adjustment to the Contract Amount.

§ 7.2.7 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the initial Work which is the subject to the Change Order, including, but not limited to, all direct, indirect and impact costs associated with such change and any and all adjustment to the Contract Sum and the Construction Schedule. The Contractor will not be entitled to any compensation for additional work, impact costs or delays in the Construction Schedule not included in the Change Order.

§ 7.2.8 No additional time will be granted to the Contractor for a Change Order of less than $100,000.

§ 7.2.9 All Change Orders will be consistent with N.J.A.C. 6A:23A-21.1 and N.J.A.C. 6A:26-4.9.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.4.

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§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in Section 7.2. In such case, and also under Section 7.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data, including such supporting and itemized data from Subcontractors. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor shall be in accordance with the New Jersey Prevailing Wage Rates at the time of the Contract commencement with no additional "labor burden", future increases or any other considerations ;

.2 Costs of materials, supplies, and equipment, whether incorporated or consumed ;

.3 Rental costs of machinery and equipment, exclusive of hand tools, only when machinery or equipment is not already on site and without any compensation for Contractor or Subcontractor-owned machinery or equipment;

.4 Costs of premiums for all bonds and insurance shall be limited to 1.5%, and must be directly related to the change; and

.5 Costs of home office, supervision and field office personnel, whether directly or indirectly attributable to the change, WILL NOT BE PERMITTED UNDER ANY CIRCUMSTANCE .

§ 7.3.5 INTENTIONALLY OMITTED

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost plus the 15% combined overhead and profit as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the increase or decrease for overhead and profit shall be figured on the basis of net change with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order

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for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect within five (5) calendar days and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work .

§ 8.1.2 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.3 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.2.4 The Owner, in coordination with the Contractor, shall set work hours. Contractor may be required to work nights, weekends or holidays as necessary to complete the Work in accordance with the Schedule or in coordination with the building's activities. Under no circumstances shall the Contractor begin or continue with work that is adversely impacting the building's activities or operations. All utility shutdowns, interruptions, work in or adjacent to existing buildings will be coordinated through the Owner and may have to be performed during hours when the building is not in operation. All cutting, hammering or other activity that is noisy, produces smoke or fumes or is otherwise disruptive to the building's functions may have to be done during hours when the building is not in operation. Work required to be performed during non-operating hours, as determined by the Owner, will be performed at no additional cost to the Owner.

§ 8.2.5 Absent direction of the Owner to the contrary, Work shall proceed uninterrupted to Final Completion. The Contractor acknowledges and recognizes that the Owner is entitled to full and beneficial occupancy and use of all or part of the completed Work in accordance with the Milestone Dates set forth in other sections of the Contract Documents, as per approved Schedule, and that the Owner has made arrangements to discharge its public obligations based upon the Contractor's achieving Substantial Completion of all of the Work within the Contract Time. The Contractor further acknowledges and agrees that if the Contractor fails to complete substantially or cause the Substantial Completion of any portion of the Work as required by the Project Construction Schedule and/or within the Contract Time, the Owner will sustain extensive damages and serious loss as a result of such failure. The exact amount of such damages will be difficult to ascertain.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) negligence, bad faith, activate interference or tortious conduct of the Owner; (2) changes ordered in the Work; or (3) other occurrences, despite Contractor's best avoidance and mitigation efforts, beyond the control and without the fault or negligence of the Contractor and as to which the Contractor has not accepted the risk elsewhere in the Contract

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Documents, then, provided that the Contractor is in compliance with Subparagraph 8.3.3 hereof, the Contract Time shall be extended by Change Order or Construction Change Directive for the length of time actually and directly caused by such occurrence as determined by the Architect and approved by the Contractor and Owner (such approval not to be unreasonably withheld, delayed, or conditioned); provided, however, that such extension of Contract Time shall be net of any delays caused by or due to the fault or negligence of the Contractor or which are otherwise the responsibility of the Contractor or as to which Contractor has accepted the risk elsewhere in the Contract Documents and shall also be net of any contingency or "float" time allowance included in the Contractor's construction schedule. The Contractor shall, in the event of any occurrence likely to cause a delay, cooperate in good faith with the Architect and Owner to minimize and mitigate the impact of any such occurrence and do all things reasonable under the circumstances to achieve this goal whether or not an extension of time may be available to Contractor.

§ 8.3.2 Any claim for extension of time shall be made in writing to the Architect not more than five (5) days after the delay commences or Contractor reasonably should know a delay is likely, whichever is earlier, otherwise, it shall be waived. The Contractor shall provide an estimate of the probable effect of such delay on the progress of the work. No claim made beyond the five (5) days shall be considered valid.

§ 8.3.2.1 The Contractor agrees that if any delay in the Contractor's works unnecessarily delays the work of any other Contractor or Contractors, the Contractor shall in that case pay all costs and expenses incurred by such parties due to such delays and hereby authorizes the Owner to deduct the amount of such costs and expenses from any moneys due or to become due the Contractor under this Contract. The Architect shall be responsible for ascertaining whether the Contractor is responsible for delaying any of the work of any other Contractor. His decision shall be final.

§ 8.3.3 Notwithstanding anything to the contrary in the Contract Documents, any extension of the Contract Time, to the extent permitted under Paragraph 8.3.1., shall be the sole remedy of the Contractor for any (1) delay in the commencement, prosecution or completion of the Work, (2) hindrance or obstruction in the performance of the Work, (3) loss of productivity or (4) other similar claims (collectively referred to in this Paragraph 8.3.3. as "delays"), whether or not such delays are foreseeable, subject to the limitations of N.J.S.A. 18A:18A-41. In no event shall the Contractor be entitled to any compensation or recovery of any damages in connection with any delay including without limitation consequential damages, lost opportunity cost, impact damages or other similar remuneration. The Owner's exercise of any of its rights or remedies under the Contract Documents (including without limitation ordering changes in the Work or directing suspension, rescheduling or correction of the Work) regardless of the extent or frequency of the Owner's exercise of such rights or remedies shall not be construed as an act of interference with the Contractor's performance of the Work. This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents that expressly permit same.

§ 8.3.4 The Contractor agrees that the Owner can deduct from the Contract Sum, or shall be entitled to reimbursement for, any wages or fees paid or to be paid by the Owner to any inspectors and the Architect employed by it on the Project for any number of days in excess of what would have been required had the Work timely been substantially and finally completed and that such wages and fees are determinable damages not factored into the liquidated damages set forth in the Agreement.

§ 8.3.5 Contractor accepts the risk of interruptions and delays in the Work from typical weather conditions. Where the cause of delay is due to weather conditions, an extension of time shall be granted only for unusually severe weather, as determined by reference to historical data. The term "historical data" as used in the previous sentence shall be construed to require a consideration of the five previous years of data at the location of the Project for the month in which the weather delay is claimed. Weather is unusually severe if the number of days in which weather conditions preclude the performance of the Work during the month in question exceed the average shown in the historical data for the month in question; the extension of time shall be limited to the number of days in excess of the average. Any delay attributable to lack of coordination and cooperation by and between the Contractor and their Subcontractors and Suppliers will not be recognized by the Owner as the basis for any claim for an increase in any Contract Sum or Contract Sum.

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ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 INTENTIONALLY OMITTED

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work which in the aggregate equals that total Contract Sum, divided so as to facilitate payments to Subcontractors, supported by such evidence of correctness as the Architect may direct or as required by the Owner. It will be necessary for all Contractors to divide their contract into a separate schedule for the work performed at the project. These schedules, when approved by the Architect and Owner, shall be used to monitor the progress of the Work and as a basis for Certificates for Payment. All items with entered values will be transferred by the Contractor to the "Applications and Certificate for Payment," and shall include the latest approved Change Orders and Construction Change Directives. Change Order values and Construction Change Directive values shall be broken down to show the various subcontracts. The Application for Payment shall be on AIA Document G702 and G703 and the approved Voucher obtainable from the Owner. Each item shall show its total scheduled value, value of previous applications, value of the application, percentage completed, value completed and value yet to be completed. All blanks and columns must be filled in, including every percentage complete figure. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect.

§ 9.2.1 In addition to other elements of the Work, Contractor shall include the following separate items in its schedule of values:

Punch List Work - Minimum of 1% of contract value
Value for testing
Value for Record Drawings and manuals
Value for final clean-up and monthly value for daily clean up by the Contractor
Value for equipment start-up and commissioning
Value for shop drawings
Value for Owner's attic stock
Safety protections
Project Schedule and Monthly Updates
Winter Protection
Allowance
TAB, coordination, shiv, belts and modifications, as required

§ 9.3 Applications for Payment

§ 9.3.1 The Contractor shall submit to the Architect an itemized Application for Payment for their Contract on AIA Document G702 and G703 and the approved Voucher obtainable from the Owner. Payroll Certification for all employees of all of the workers on the project, including Contractor's, Subcontractors, and Sub-subcontractors, shall be submitted as well as other such data for the purposes of summarizing the Work and tracking the Project. The Architect will process the application and forward it with his recommendations to the Owner .

§ 9.3.1.1 INTENTIONALLY OMITTED

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

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§ 9.3.1.3 Upon final completion, the Contractor shall submit a separate voucher for the full amount of the retainage along with the Consent of Surety, A.I.A. Form G707A, and the Contractor shall be required to furnish a Maintenance Bond for 100% of the Project Cost for a period of two (2) years from Substantial Completion.

§ 9.3.1.4 Upon final acceptance of the work performed pursuant to this Contract for which the Contractor has agreed to the withholding of payments pursuant to Article 9 of this Contract, all amounts being withheld by the Owner shall be paid in accordance with Paragraph 9.3.1.3 without further withholding of any amounts for any purposes whatsoever, provided that all obligations of the Contract Documents has been satisfactorily completed and no claims for which Contractor may have responsibility are pending or anticipated.

§ 9.3.1.5 In addition to requirements set forth elsewhere in the Contract Documents, applications for payment shall be accompanied by the following, all in form and substance satisfactory to the Owner and Architect:

.1 A current Contractor's lien and claim waiver and a duly executed and acknowledged sworn statement by an officer of the Contractor showing all subcontractors and materialmen with whom the Contractor has entered into subcontracts, the amount of each such subcontract, the amount requested for any subcontractor and materialmen in the requested progress payment and the amount to be paid to the Contractor from such progress payment.

.2 A Subcontractor's lien and claim waiver for each Subcontractor identified in the statement referenced in the preceding paragraph.

.3 Purchase Order or Voucher if required by the Owner.

.4 A Schedule Update approved by the Architect.

.5 A Third Party (not the General Contractor) written Field Safety Inspection Report.

.6 An updated Shop Drawing Log showing the status of all of the required Shop Drawings.

§ 9.3.2 Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with Sections 9.3.2.1, 9.3.2.2, 9.3.2.3 and 9.3.2.4 and satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site. The Contractor shall store the off-site materials and equipment in a secure, bonded warehouse.

§ 9.3.2.1 With each Application for Payment the Contractor shall submit to the Architect and Owner a written list identifying each location where materials are stored off the Project site and the value of materials at each location. The Contractor shall procure insurance satisfactory to the Owner for materials stored off the Project site in an amount not less than the total value thereof.

§ 9.3.2.2 The consent of any surety shall be obtained to the extent required prior to the payment for any materials stored off the Project site.

§ 9.3.2.3 Owner and Architect shall have the right to make inspections of the off-site storage areas at any time.

§ 9.3.2.4 Materials stored off site shall be protected from diversion, destruction, theft and damage to the satisfaction of the Owner, shall specifically be marked for use on the Project and shall be segregated from other materials at the storage facility.

§ 9.3.3 The Contractor warrants and agrees that title to all Work will pass to the Owner either by incorporation in the construction or upon receipt of payment therefor by the Contractor, whichever occurs first, free and clear of all liens, claims, security interests, or encumbrances whatsoever, that the vesting of such title shall not impose any obligation on Owner or relieve Contractor of any of its obligations under the Contract, that the Contractor shall remain responsible for damages to or loss of the Work, whether completed or under construction, until responsibility for the Work has been accepted by Owner in the manner set forth in the Contract Documents, and that no Work covered by an Application for Payment will have been acquired by the Contractor, or by any other person performing Work at the site or furnishing materials and equipment for the Project, subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person.

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§**9.3.4** The Owner will issue timely payments to the Contractor in accordance with the requirements of "The Prompt Payment Act", N.J.S.A. 2A:30A-1, et seq. The Contractor is hereby notified that the Owner, as a public entity, requires all payments to be approved at scheduled public Council meetings. The vote on authorization for payments will be made at the first public meeting of the Council, following the Council's receipt of the Architect's authorization for payment, and paid during the subsequent payment cycle.

Typically, the Owner has monthly public business meetings. Provided an Application for Payment is received by the Architect not later than the date required by the Owner, and upon issuance of a Certificate of Payment for all or part of the Application for Payment, the Owner shall make payment to the Contractor not later than the tenth (10th) day after the Owner's regular public meeting held during the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than ten (10) calendar days after the next regular public meeting of the Owner held after the late submitted Application for Payment has been reviewed and certified for payment by the Architect.

§ 9.3.4.1 Certification shall be subject to Consent of Surety presented by the Contractor for each application.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and the Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

.1 defective Work not remedied;

.2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;

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.3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a Separate Contractor;

.6 repeated failure to carry out the Work in accordance with the Contract Documents;

.7 avoidable delay in the progress of the Work;

.8 delay in the submission for approval of the names of Subcontractors, materialmen, sources of supply, shop drawings, samples, or other submittals'

.9 failure to maintain the Project Site in a clean, safe and satisfactory condition in accordance with good construction practices as recommended by the Architect after consultation with the Contractor;

.10 failure to submit updates as required by the Owner or as required by the Contract Documents;

.11 failure of the Contractor to comply with mandatory requirements for maintaining record drawings. The Contractor shall be required to check record drawings each month. Written confirmation that the record drawings are up-to-date shall be required by the Architect before approval of the Contractor's monthly payment requisition will be considered;

.12 failure of Contractor to provide a third-party Insurance Safety Site Inspection Report monthly and remedy all issues promptly;

.13 reasonable evidence that a legal impediment has arisen or can reasonably be expected to arise that would preclude the Contractor from completing the Work, timely or otherwise; or

.14 Failure to cooperate with Owner or Architect relative to construction schedule, material storage, coordination with the Owner, clean up or safety.

§ 9.5.2 INTENTIONALLY OMITTED

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

.1 If the Contractor disputes any determination by the Architect with regard to any Certificate of Payment, the Contractor nevertheless expeditiously shall continue to prosecute the Work.

.2 The failure of the Owner to retain any percentage payable to the Contractor or any change in or variation of the time, method or condition of payments to the Contractor shall not release or discharge to any extent whatsoever the Surety upon any bond given by Contractor hereunder. The Owner shall have the right, but not the duty, to disregard any schedule of items and costs that the Contractor may have furnished and defer or withhold in whole or in part any payment if it appears to the Owner, in its sole discretion, that the balance available in the Contract Sum as adjusted and less retained percentages, may be insufficient to complete the Work.

.3 The Contractor agrees that the time and conditions for payment under the Contract shall be as stated in the Contract Documents. The Contractor specifically agrees that Owner's failure to give, or timely give, notice of:

.1 any error in an invoice or application for payment submitted by the Contractor for payment;

.2 any deficiency or non-compliance with the Contract Documents with respect to any Work for which payment is requested, shall not waive or limit any of the Owner's rights or defenses under the Contract Documents, or require the Owner to make a payment in advance of the time, or in an amount greater than, as provided by Contract Documents; or

.3 The Contractor shall make payments to its Subcontractors in accordance with the provisions of any applicable law governing the time, conditions, or requirements for payment to its Subcontractors, and shall comply with the provisions of any such law. The Contractor

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and its Surety shall indemnify and defend the Owner any loss, cost, expenses, or damages including attorney's fees, arising from or relating to the Contractor's failure to comply with such law.

.4 The Contractor shall make payments to its Subcontractors in accordance with the provisions of any applicable law governing the time, conditions, or requirements for payment to its Subcontractors, and shall comply with the provisions of any such law. The Contractor and its Surety shall indemnify and defend the Owner any loss, cost, expenses, or damages including attorney's fees, arising from or relating to the Contractor's failure to comply with such law.

§ 9.5.5 If the Contractor disputes any determination by the Owner with regard to any Certification for Payment, the Contractor shall nevertheless expeditiously continue to prosecute the Work.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment and if the Owner has agreed to the amount certified and has accepted the Work certified and has accepted the Work certified by the Architect, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect. Notwithstanding Certification by the Architect, the Owner may refuse to make payment based on any default by the Contractor including, but not limited to those defaults set forth in Section 9.5.1. The Owner shall not be deemed in default by reason of withholding payment while any of such defaults by the Contractor remain uncured.

§ 9.6.2 If a Subcontractor has performed in accordance with the provisions of its Contract with the Contractor and the Work has been accepted by the Owner, the Owner's authorized approving agent, or the contractor, as applicable, and the parties have not otherwise agreed in writing, the Contractor shall pay to its Subcontractor within 10 calendar days of the receipt of payment from the Owner, the full amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor.

§ 9.6.8 INTENTIONALLY OMITTED

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§ 9.7 Failure of Payment

If the Owner does not pay the Contractor as required by "the Prompt Payment Act"; does not provide a written statement of the amount withheld and the reason for the withholding; and the Owner is not engaged in a good faith effort to resolve the reason for the withholding, then the Contractor may, upon seven calendar days' written notice to the Owner, stop the Work, without penalty for breach of contract, until payment of the amount owing has been received. The Contract Time shall be extended appropriately.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof which the Owner agrees to accept separately is sufficiently complete in accordance with this definition and the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The Work will not be considered substantially complete until all project systems included in the Work are operational as designed and scheduled, all designated or required inspections, certifications, permits, approvals, licenses and other documents from any governmental authority having jurisdiction thereof necessary for the beneficial use and occupancy of the Project are received, designated instruction of Owner's personnel has been completed, and all final finishes within the Contract are in place. In general, the only remaining Work shall be minor in nature, so that the Owner can occupy the building on that date and the completion of the Work by the Contractor would not materially interfere or hamper the Owner's (or those claiming by, through or under the Owner) normal operations. Contractor recognizes that normal operations require the use and occupancy of the Work by students and faculty without interruption and that any punchlist or corrective work shall be done at times when the Work is not so occupied. As a further condition of substantial completion acceptance, the Contractor shall certify that all remaining Work will be completed within thirty (30) consecutive calendar days following the date of substantial completion. In addition to any other definitions of Substantial Completion as defined by the contract documents, the following is required before the project is considered "Substantially Complete":

.1 All required final inspections have been completed by the authority having jurisdiction resulting in a TCO or CO.

.2 Air Balancing Reports: Reports can be handwritten field notes but must be reviewed and approved via the shop drawing process by the Mechanical Engineer. Final Air and Water Balancing Reports certified by the licensed balancer are required for "Final Acceptance" and the start of the warranty period. (These reports must be submitted in accordance with the shop drawing process to the Architect so that they can be tracked and approved and distributed to all applicable parties).

.3 Equipment Start Up Reports: Reports can be handwritten field notes but must be reviewed and approved via the shop drawing process by the Mechanical Engineer. (These reports must be submitted in accordance with the shop drawing process to the Architect so that they can be tracked and approved and distributed to all applicable parties).

.4 Owner On-site ATC Training: Refer to the ATC specifications for training requirements on-site and off-site. The Owner does not have beneficial use of the mechanical system until they can operate it following this training.

.5 Completion of Commissioning: Refer to the Start-up and Adjustment specifications. This process will require the Owner's Operator and the Mechanical Engineer on site to witness a demonstration and operation of every mechanical device. The devices shall be operated from the on-site Owner's ATC Computer and verified by the Mechanical Contractor's field personnel to confirm proper operation. In addition to this demonstration, the contractor shall demonstrate Owner required maintenance of all mechanical equipment to maintain the manufacturer's warranty. This should include but not be limited to belt tension/adjustments, filters, etc. Please schedule several days for the commissioning process.

.6 Written certification from a qualified AHC (Certified Architectural Hardware Consultant) that the hardware, cores and keying has been installed and tested in every door and is 100% complete for each phase or the total project whichever comes first.

.7 Provide a Fire Alarm System NFPA Record of Inspection and Testing Certification Form.

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§ 9.8.2 "PUNCH LIST": When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items "PUNCH LIST" to be completed or corrected along with all special warranties required by the Contract Documents endorsed by the contractor prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents .

§ 9.8.2.1 The Contractor shall perform a Quality Control / Quality Assurance QC/QA Punchlist of all work prior to requesting Substantial Completion and a punch list from the Architect. The Contractor's Project Manager shall take the lead and conduct an onsite review with the Contractor's superintendent and representation from every Prime Subcontractor. Notification of this onsite walk thru shall be provided in writing to the Architect and Owner who may or may not choose to attend. The Contractor's Project Manager shall record and distribute this QC/QA Punchlist in a matrix that provides an additional column for the Contractor to document the completion of the work and the date. After successful completion of the Contractor's QC/QA Punchlist and all work, the Contractor shall request the Architect perform a Punchlist. Substantial Completion shall be requested in accordance with paragraph 9.8.1.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents and the requirements above so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit in writing a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.4.1 The Architect's Certificate of Substantial Completion shall be subject to the Owner's final approval.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate .

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

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§ 9.9.3 Partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents nor does it waive the Owner's right to Liquidated Damages. Final Acceptance of the Work shall be for the whole Work only and not part of a portion thereof.

§ 9.9.4 The occupancy of any portion of the Work shall not constitute acceptance of any Work, except as hereinafter stated, nor does it waive the Owner's right to Liquidated Damages. Final Acceptance of the Work shall be for the whole Work only and not part.

§9.9.5 As portions of the Project are completed, and occupied, Contractor shall ensure the continuing construction activity will not unreasonably interfere with the use, occupancy and quiet enjoyment of the completed portions thereof.

.1 The Contractor agrees to coordinate the Work with the Architect and the Owner in order to minimize disturbance to occupied portions of the structure.

.2 In the event performances or scheduled events by the Owner are conducted in close proximity to the Work in progress, the Contractor agrees to cease all work which may disturb the Owner's occupants at the site.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. All warranties and guarantees required pursuant to the Contract Documents shall be assembled and delivered by the Contractor to the Owner as part of the final application for payment. The final Certificate for Payment will not be issued by the Architect until all warranties and guarantees and Maintenance Bond have been received and accepted by the Owner.

§ 9.10.1.1 The Architect's Certificate of Final Completion shall be subject to the Owner's final approval.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, (6) as-built drawings, and (7) evidence of compliance with all requirements of the Contract Documents: notices, certificates, affidavits, other requirements to complete obligations under the Contract Documents: including but not limited to (a) instruction of Owner's representatives in the operation of mechanical, electrical, plumbing and other systems, (b) delivery of keys to Owner with keying schedule: master, sub-master and special keys, (c) delivery to the Owner of Contractor's General Warranty (as described in Paragraph 3.5) and each written warranty and assignment thereof prepared in duplicate, certificates of inspections, and bonds for the Owner's review, (d) delivery to the Owner a printed or typewritten operating, servicing, maintenance and cleaning instructions for all Work; parts lists and special tools for mechanical and electrical Work, in approval form, (e) delivery to the Owner of specified Project record documents, (f) delivery to Owner of a Final Waiver of Liens (AIA Document G-706 or other form satisfactory to Owner), covering all Work including that of all Subcontractors, vendors, labor, materials and services, executed by an authorized officer and duly notarized (g) delivery to the Owner of the Maintenance Bond. In addition to the foregoing, all other submissions required by other articles and paragraphs of the

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Specifications including final construction schedule shall be submitted to the Architect before approval of final payment. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.1.1

.1 The Contractor must fully comply with the job safety requirements in addition to all Federal, State and Local safety guidelines. All costs associated with complying with all safety requirements shall be included in the Contractor's base bid.

.2 The Contractor will serve as the overall Project Safety Coordinator and shall be responsible for all issues of safety and protection. The Contractor shall designate a safety person at the job site while the Contractor is working on the project site. The designated safety person shall be responsible for the safety of their work and for their workers and to make continuous inspections for all safety issues relating to his work. The Architect are not responsible for safety on this project but will endeavor to promote safety. The Contractor must comply with job Safety Requirements in addition to OSHA and local agency requirements. Failure to comply with safety requirements will be grounds for withholding of payments.

.3 Contractor will comply with all reasonable requests of the Owner with respect to additional security and protections required for work interfacing with Facility Operations. Safety is of utmost importance on this project and all issues relative to safety and protection of the Facility, Staff and Occupants will be treated as emergency needs and will not be subject to the 7-day notice requirements of Article 14.

.1 The Contractor shall provide, maintain, relocate and remove in coordination the Owner, a 6' high, perimeter security fence. Fence will surround the building or relevant portions thereof and proposed parking areas and will have signage attached at 100' intervals advising "Construction Area – Please Keep Out". The Contractor to be responsible for opening and securing site each day.

.2 Orange safety fencing will be installed around the entire area of any and all earthwork, excavations, etc. and will be maintained until the work is complete.

.3 This is a hard hat job. Identifying hard hats shall be worn at all times.

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.4 Hot work permits will be issued by foreman for all activities involving open flames.

.4 The proper execution of the required safety provisions is directly related to the general condition safety line item on the schedule of values. The failure to provide a competent person on site to properly identify and take immediate corrective action may result in deductions to the general condition safety line item of the schedule of values.

.5 The Contractor shall be responsible for the immediate investigation and resolution of all safety and environmental complaints / issues generated by contractor employees, owners, owner's representatives or members of the public.

.6 Contractor shall maintain all egress routes throughout building. Contractor shall post exit signs as coordinated with the Owner. Contractor shall provide wall hung fire extinguishers throughout building as deemed necessary by the Owner and fire officials.

.7 Contractor's safety representative shall perform a daily safety inspection walk through to ensure that all requirements of the OSHA Standards, Fire Protection Standards and Safe Work Practices are being with and/or corrected. The responsibility of the Contractor is to provide a safe and healthy work environment for construction personnel, Owner's personnel and representative, and the public.

.8 Upon written receipt of safety concerns and /or issues, the Contractor shall respond in writing addressing how the safety concerns or issues were resolved. The Owner shall be copied on all safety-related correspondence.

.9 The Contractor's response and compliance with correction of deficiencies noted in the safety concerns notice issued by the Authority having jurisdiction is mandatory. Failure to comply will be grounds for withholding progress payments until the conditions are acceptable to OSHA or Authority having local jurisdiction.

.10 The Contractor shall submit to the Owner, a copy of all licenses (welding, power nailers, asbestos, etc.) as required by applicable agencies.

.11 Contractor shall have all required personal protective equipment and materials available for use by each employee as required by Federal, State and Local guidelines.

.12 Contractor shall supply proper equipment and crew sizes as necessary to safely complete the work.

.13 Contractor shall provide documented safety training for each of their employees and subcontractor's employees no later than the first day they arrive on site. The training shall be documented and signed by the trainer and employee. A copy of all safety-training documents is to be provided to the Owner and updated as manpower loading increases.

.14 The Contractor shall supply (2) two OSHA approved means of access/egress to each floor and roof for the course of the entire project for use by all applicable parties. The Contractor shall erect and maintain OSHA approved pedestrian walking bridges, for emergency access/egress and as necessary to protect personnel from overhead work.

.15 The Contractor shall be responsible for providing and maintaining all temporary emergency egress routes. The Contractor shall obtain the approval of the Building and Fire Departments for all temporary emergency egress routes. The Contractor shall provide for fire separation walls between occupied areas as required by local officials.

.16 The Contractor shall provide, relocate and /or maintain barricades, signage, provide flagmen etc. as necessary to ensure public safety and safe egress.

.17 The Contractor shall notify the Owner immediately upon arrival of OSHA inspector/representative to the site.

.18 The Contractor shall submit to the Owner all MSDS sheets and shall cooperate in the posting of all required notifications relative to the use of hazardous substances on the property. Contractor to comply with New Jersey law regarding the use or storage of hazardous substances in Public Buildings. MSDS sheets shall be posted prior to product being delivered to site.

.19 The Contractor, Subcontractors, vendors, etc. must enforce a no smoking, vaping or alcohol use policy for all employees during the entire course of the project. Any worker found violating these restrictions, or being belligerent, will be subject to removal from the site at the sole discretion of Owner.

.20 The Contractor shall be responsible to secure the site at the end of each workday by an effective means and maintain same until all parties determine same is no longer required.

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.21 For the safety of occupants, staff, and the public, the steel erection must be scheduled and coordinated with the Owner. Swinging of steel and crane boom over occupied space will not be allowed. Steel Subcontractor shall provide additional barricades and fencing around his crane and steel at all times.

.22 The Contractor must submit an acceptable OSHA compliant site specific written safety plan to the Owner prior to mobilizing on site. The written safety plan shall include (as applicable to their work) but is not limited to the following:

- No smoking, vaping or alcohol use is allowed on the project, including while away from the site if the worker will go to or return to the site that day. Any worker found violating these restrictions, or being belligerent, will be subject to removal from the site. (Contractors shall post required signs).
- Full time hard hat policy (identifying hard hats shall be worn at all times).
- Site specific emergency action plan with contractor phone numbers, active 24 hours a day, 7 days a week.
- Competent on-site safety representative, named and active (Provide alternate)
- Scaffold erection plan, including a log of daily inspections.
- Full time fall protection plan for exposures over 6'-0".
- Job site signage plan (Perimeter fence warning signs posted 50'-0" o/c.
- First aid and CPR provisions.
- OSHA 200 log and Job Safety and Health Protection poster.
- Daily clean up.
- Hazard Communication Program with MSDS logged and maintained.
- Daily diary of work, issues, and incident, etc.
- Sheeting, shoring and excavations protection line.
- GFI safety program.
- Hazardous Energy Control Lock out tag out program.
- Required safety clothes; Eye & ear protection, respirators, boots, belts, gloves etc. as appropriate to their work requirement.
- Fire Extinguishers.
- Removal guard rail and protection at material loading areas, 200lb force minimum requirement.
- All stairs and platforms must have railings, 200lb force minimum requirement. Stair pains and landings must be filled prior to their use.
- Daily inspection of tools and equipment; verify safety devises are operational.
- Ladder usage plan.
- Weekly toolbox meetings, documented and signed by each employee
- Temporary heat procedures.

.23 The Contractor shall maintain and submit a complete copy of the written safety plan, logs, diaries, plans and programs on site for the project files.

.24 The Contractor shall provide a third-party Insurance Safety Site Inspection Report monthly and remedy all issues promptly.

.25 The speed limit within the project property is 5 MPH. Contractor employees operating vehicles in excess of the speed limit or in any otherwise unsafe manner will be directed to leave the site and not permitted to return.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction as well as any other real or personal property of the Owner.

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§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.2.1 It is the Contractor's responsibility to determine the existence of potentially hazardous materials, including lead, and to protect his workmen and the work area.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable directly to grossly negligent acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.2.9 The Contractor shall provide and maintain in good operating condition suitable and adequate fire protection equipment and shall comply with all reasonable recommendations regarding fire protection made by the representatives of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal.

§ 10.2.10 The Contractor shall remove snow or ice which may accumulate on the site within areas under his control which might result in damage or delay.

§ 10.2.11 The Contractor shall take all precautions necessary to prevent loss or damage caused by vandalism, theft, burglary, pilferage, or unexplained disappearance of property of the Owner and Contractor, whether or not forming part of the Work, located within those areas of the Project to which the Contractor has access. Whenever unattended, including nights and weekends, mobile equipment and operable machinery shall be kept locked and made inoperable and immovable.

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§ 10.2.12 Neither the Owner nor the Architect shall be responsible for providing a safe working place for the Contractor, the Subcontractors or their employees, or any individual responsible to them for the work.

§ 10.2.13 When all or a portion of the Work is suspended for any reason, the Contractor shall securely fasten down all coverings and protect the Work as necessary from injury or any cause.

§ 10.2.14 The Contractor shall promptly report in writing to the Owner and Architect all accidents arising out of or in connection with the Work which caused death, personal injury or property damage giving full details and statements of any witnesses. In addition, if death, serious personal injury or serious property damage is caused, the accident shall be reported immediately by telephone or messenger to the Owner and Architect.

§ 10.2.15 Contractor is required to follow and enforce the work rules set forth below in addition to other rules set forth in the Contract Documents. Failure to comply with or enforce any of these rules will be grounds for suspension and/or termination of this Contract:

.1 Anyone found impaired will be escorted from the Project site.

.2 No use of illegal drugs or prescription medications which could induce drowsiness or otherwise impair perception or performance. Use of illegal drugs may result in prosecution to the fullest extent of the law. Any warning associated with use of prescription drugs must be complied with, particularly warning against operation of machinery and equipment.

.3 No horseplay or rough housing will be allowed.

.4 No sexual, racial, or ethnic harassment, or similar conduct will be tolerated.

.5 All employees shall use proper sanitation habits including use of toilet facilities and garbage cans.

.6 All employees shall dress in clothing appropriate for the work they are to perform. All personnel are to wear hardhats, safety shoes, glasses, gloves, masks or respirators, noise protection devices, and other protective clothing and equipment as required by OSHA standards.

.7 All equipment is to be properly stored and/or secured at the end of the workday or if it is to remain idle for greater than one hour.

.8 All personnel are to be made aware of the availability of Material Safety Data Sheets for materials used at the Project site. This information is available from the Contractor using the product. The Contractor shall maintain a copy of all MSDS forms at the construction site office for all personnel to review.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up adjustments shall be accomplished as provided in Article 7.

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§ 10.3.3 INTENTIONALLY OMITTED

§ 10.3.4 INTENTIONALLY OMITTED

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.3.7 Prior to bringing any fill material (such as topsoil, engineered fill, DGA, tire scrub at the construction entrance, etc.) onto the project site, the Contractor must have the material tested and certified to be clean and free from any hazardous material. Provide this information per the submittal requirements via a shop drawing.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

§ 10.4.1 – EMERGENCY/SAFETY PLAN

All parties involved in the construction process should be aware of emergency services that may be required during the construction process.

Contractor shall establish the site-specific Emergency Action Plan and, after approval by the Owner, and local authorities, shall display at site trailers and various locations at the site.

In case of an accident, emergency, or injury on the job site, the Contractor shall immediately follow the Site-Specific Emergency Action Plan. Following the incident, the Contractor shall submit to the Owner a complete written accident report detailing the circumstances which caused the accident, extent of injuries, damage to the building, time of accident, corrective action required, etc.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

All insurance provisions shall be confirmed with the Owner's Insurance Agent.

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located and such company shall be rated at least A- by A.M. Best.

§11.1.1.1 Contractor shall, without in any way altering Contractor's liability under the Contract or applicable law, obtain, pay for and maintain insurance for the coverages and amounts of coverage not less than those set forth below in the Schedule of Insurance Coverages and shall provide to Owner certificates issued by insurance companies satisfactory to Owner to evidence such coverage no later than 7 days of the date of the execution of the Agreement and prior to any personnel or equipment being brought onto and/or before any work commences at the job site. The coverage afforded under any insurance obtained pursuant to this paragraph shall be primary to any valid and collectible insurance carried separately by any of the indemnities. Such certificates shall provide that there shall be

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no cancellation, non-renewal or material change of such coverage without thirty (30) days prior written notice to Owner. In the event of any failure by Contractor to comply with the provisions of this Article 11, Owner may, at its option, on notice to Contractor, suspend the Contract for cause until there is full compliance with this Article 11 and / or terminate the Contract for cause. Alternatively, Owner may on twenty-four hour's notice purchase such insurance at Contractor's expense, provided that Owner shall have no obligation to do so, and if Owner shall do so, Contractor shall not be relieved of or excused from the obligation to obtain and maintain such insurance amounts and coverages. Contractor shall provide to Owner a copy of any and all applicable insurance policies. The Owner, Architect, other Indemnitees referenced in Section 3.18, the State of New Jersey shall be named as additional insured on a primary and non-contributory basis on all Insurance Policies to be provided by the Contractor.

§ 11.1.1.2 Schedule of Insurance Coverages

.1 Commercial General Liability, Each Occurrence

a. Each Occurrence: $ 2,000,000.00
b. Damage to Rented Premises: $ 300,000.00
c. Medical Expense (Any one person): $ 15,000.00
d. Personal & Adv Injury: $ 2,000,000.00
e. General Aggregate: $ 2,000,000.00
f. Products – Comp/Op Agg: $ 2,000,000.00

.2 Automobile Liability: (Hired autos, scheduled autos, non-owned autos)

a. Combined Single Limit (each accident): $ 1,000,000.00

.3 Workers Compensation and Employers Liability:

a. WC Statutory Limits:

1. E.L. Each Accident: $ 1,000,000.00
2. E.L. Disease – Each Employee: $ 1,000,000.00
3. E.L. Disease – Policy Limit: $ 1,000,000.00

.4 Builder's Risk Insurance: The Contractor shall provide Builder's Risk Insurance for all risk of physical loss or damage to the property described in the Contract Documents in an amount equal to the Total Project Value, excepting excavations, foundations and other structures customarily excluded by such insurance. The Builders Risk Policy is to include coverage for the perils of Earthquake, Flood, Full Windstorm, Equipment Breakdown and Theft (excluding employee theft), contain an endorsement allowing permission to occupy and include coverage for both transit and offsite storage. In addition to the other additional named insured requirements set forth in this Article 11, the policy is also to include all contractors, subcontractors and sub-subcontractors as Additional Named Insureds on a primary and non-contributory basis. The contractor and all subcontractors are responsible for all policy deductibles and uninsured or underinsured losses, notwithstanding the cause of the loss.

.5 Contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

.6 Workers' Compensation Insurance of not less than statutory limits.

.7 Completed Operations Insurance written to the limits specified for liability insurance specified under subparagraph .1 above. Coverage shall be required from the date of the start of Beneficial Occupancy until one year after the issuance date of Final Certificate for Payment.

.8 Certificates of insurance must be submitted on the ACORD Form, Certificate of Insurance. The Contractor's ACORD Certificate of Insurance must state "Contractual Liability Included" or it will be rejected.

.9 The Contractor shall either

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.1 require each of its Subcontractors to procure and to maintain during the life of their subcontracts, Subcontractor's Public Liability and Property Damage, of the type and in the same amounts as specified in the preceding paragraph; or
.2 insure the activities of their Subcontractors under their respective policies.

§ 11.1.2 The Contractor shall provide surety bonds for the entire contract amount of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of written notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage. Any and all costs, expenses, losses or damages (including delay-related costs) incurred by Owner as a result of any Work stoppage as a result of the Contractor's lapse or interruption of the required insurance coverage shall be at the Contractor's sole costs. The Contractor shall not be entitled to any extension of Contract Time upon any Work stoppage because of the Contractor's lapse of required insurance coverage.

§ 11.1.4.1 In the event the Contractor fails to cure any lapse or interruption in the required insurance coverage within five (5) business days after written notice as provided in Section 11.1.4 to the Owner, the Owner may procure replacement coverage to protect the Project as required in the Bid Documents upon the expiration or cancellation of such insurance coverage. All reasonable costs, premiums, and fees incurred by the Owner shall be charged to and reimbursed by the Contractor within thirty (30) days of invoicing.

§ 11.1.4.2 Any lapse or interruption in the insurance coverage required by the Bid Documents by the Contractor shall constitute a material breach of contract and the Owner shall have the right to pursue remedies, including Work stoppage, damages, and/or termination of the Contract. This Section shall not be construed to limit the Owner's remedies as provided otherwise in the Bid Documents.

§ 11.1.5 Contractor shall furnish a Performance and Payment Bond in the form required by the Contract Documents, without limitation complying with the following specific requirements:

.1 The bonds shall be executed by a responsible surety licensed in the State of New Jersey Best's rating of no less than A-/X and shall remain in effect for a period of not less than two years following the date of Substantial Completion or the time required to resolve any items of incomplete or inadequate work and the payment of any disputed amounts, whichever time period is longer;
.2 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of his power of attorney indicating the monetary limit of such power;
.3 A rider including the following provisions shall be attached to each bond:

1. Surety hereby agrees that it consents to and waives notice of any addition, alteration, omission, change or other modification of the Contract Documents. Any other alterations, change, extension of time or other modification of the Contract Documents or a forbearance on the part of either the Owner or the Contractor

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to the other shall not release the surety of its obligations hereunder and notice to surety of such matter is hereby waived.

2. Surety further agrees that in the event of any default by the Owner in the performance of the Owner's obligations to the Contractor under the Contract, the Contractor or surety shall cause written notice of such default (specifying said default in writing) to be given to the Owner, and the Owner shall have 30 days after receipt of such notice within which to cure such default of such additional reasonable time as may be required if the nature of such default is such that it cannot be cured within 30 days. Such notice of default shall be sent by certified or registered U.S. mail, return receipt requested, first class postage prepaid to the Owner and Architect.

§ 11.1.6 If any of the foregoing insurance coverages are required to remain in force after final payment, including, but not limited to coverage for completed operations, an additional certificate evidencing continuation of such coverage shall be submitted with the Final Application for Payment.

§ 11.1.7 In no event shall any failure of the Owner to receive certificates of policies or the policies themselves required under Paragraph 11.1 or to demand receipt of such certificates or policies prior to the Contractor commencing Work be construed as a waiver of the Owner or the Architect of the Contractor's obligations to obtain insurance pursuant to this Article 11. The obligation to procure and maintain any insurance required by this Article 11 is a separate responsibility of the Contractor and independent of the duty to furnish a certificate of such insurance policies or the policies themselves.

§ 11.1.8 When any required insurance due to the attainment of a normal expiration date or renewal date shall expire the Contractor shall supply the Owner with certificates of insurance and amendatory riders or endorsements that clearly evidence the continuation of all coverage in the same manner, limits of protection and scope as was provided by the previous policy. In the event, any renewal or replacement policy for whatever reason obtained or required is written by a carrier other than that with whom the coverage was previously placed or the subsequent policy differs in any way from the previous policy, the Contractor shall also furnish replacement policy unless the Owner provides the Contractor with prior written consent to submit only a certificate of insurance for any such policy. All renewal and or replacement policies shall be in form and substance satisfactory to the Owner and written by carriers acceptable to the Owner.

§ 11.1.9 The Contractor shall cause each Subcontractor to (1) procure insurance in the amounts set for in Article 11 and (2) name the persons referenced in Section 11.1.1.1 as additional insureds under the Subcontractor's comprehensive general liability policy. The additional insured endorsement included on the Subcontractor's comprehensive general liability policy shall state that coverage is afforded the additional insureds with respect to claims arising out of operations performed by or on behalf of the Contractor. If the additional insureds have other insurance which is applicable to the claims, such other insurance shall be on an excess or contingent basis. The amount of the insurance liability under this insurance policy shall not be reduced by the existence of such other insurance.

§ 11.1.10 Property insurance provided by the Owner shall not cover any tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring, or other similar items commonly referred to as construction equipment which may be on the site and the capital value of which is not included in the work. The Contractor shall make its own arrangements for any insurance it might require on such construction requirement.

§ 11.1.11 The Contractor may carry whatever additional insurance he deems necessary to protect itself against hazards not covered for theft, collapse, water damage, materials and equipment stored on the site, and for materials and equipment stored off site, and against loss of owned or rented capital equipment and tools owned by mechanics or any tools, equipment, scaffolding, staging, towers and forms owned or rented by the Contractor, the capital value of which is not included in the cost of the Work.

§ 11.1.12 All insurance coverage procured by the Contractor shall be provided by insurance companies having policy holder ratings no lower than "A-" and financial rating no lower than, "X" in the Best's Insurance guide,

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latest edition in effect as the date of the Contract and subsequently in effect at the time of the renewal of the policies required by the Contract Documents.

§ 11.1.13 If the Owner or the Contractor is damaged by the failure of the other party to purchase or maintain insurance required under Article 11, then the party who failed to purchase or maintain the insurance shall bear all reasonable costs (including attorney's fees and court and settlement costs) properly attributable thereto.

§ 11.1.14 The Contractor and Subcontractors must remove all "X, C & U" exclusions from their policies.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. Property insurance provided by the Owner shall not cover any tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring, and other similar items commonly referred to as construction equipment that may be on the site and the capital value of which is not included in the Work. The Contractor shall make its own arrangements for any insurance it may require on such construction equipment.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 INTENTIONALLY OMITTED

§ 11.4 INTENTIONALLY OMITTED

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ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time or Contract Sum.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense. If prior to the date of Substantial Completion, the Contractor, a Subcontractor or anyone for whom either is responsible, uses or damages any portion of the Work, including without limitation, mechanical, electrical, plumbing and other building systems, machinery, equipment or other mechanical device, the Contractor shall cause each such item to be restored to "like new condition" at no expense to the Owner.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within two years after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

.1 The obligations under Section 12.2 shall cover any repairs and replacement to any part of the Work or other property caused by the defective Work.

.2 Upon completion of any work under or pursuant to Section 12.2., the two-year correction period in connection with the work requiring correction shall be renewed and recommenced.

§ 12.2.2.2 The two-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

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§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the two-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.2.6 The Contractor and its surety guarantee to make good, repair and/or correct, at no cost or expense to the Owner, any and all latent defects hereafter discovered, provided only that notice in writing, shall be given by the Owner to the Contractor or Subcontractor within two year of the discovery of such defects. This obligation shall survive the termination of any or all other obligation or obligations under the Bid Documents and it is agreed by the Contractor and its surety that in the event the Owner is required to bring suit under this provision against the Contractor or its surety to enforce this obligation, the Contactor and its surety hereby waive any defense of the statute of limitations.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made. This paragraph relates exclusively to the knowing acceptance of nonconforming work by the Owner. It has no applicability to work accepted by the Owner or Architect without the knowledge that such work fails to conform to the requirements of the Contract Documents.

§ 12.3.1 The Contractor and its Surety guarantee to make good, repair and/or correct, at no cost or expense to the Owner, any and all latent defects hereafter discovered, provided only that notice in writing, shall be given by the Owner to the Contractor within two years of the discovery of such defects.

.1 This obligation shall survive the termination of any or all other obligation or obligations under the Contract Documents and it is agreed by the Contractor and its Surety that in the event the Owner is required to bring suit under this provision against the Contractor or its Surety to enforce this obligation, the contractor and its Surety hereby waive any defense of the status of limitations.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The governing law shall be the law of the State of New Jersey without respect to the conflict of law principles thereof. The parties consent to exclusive jurisdiction in the Superior Court of New Jersey venued in Burlington County, New Jersey, unless claims fall under exclusive jurisdiction of federal courts and such claims shall be brought in the District Court of New Jersey, Gloucester Division.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 INTENTIONALLY OMITTED

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be cumulative and in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law or equity.

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§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 The Owner shall provide and contract for "structural tests and special inspections" as required by the NJ DCA Bulletin 03-5. The Contractor shall coordinate, schedule, and provide on-site supervision and manpower to facilitate the testing. All other tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor. The Architect, Owner and Contractor shall be afforded a reasonable opportunity to attend, observe, and witness all inspections and tests of the Work. The Architect or Owner may at any time request and receive from the Contractor satisfactory evidence that materials, supplies or equipment are in conformance with the Contract Documents. The Conduct of any inspection of test and the receipt of any approval shall not operate to relieve the Contractor from its obligations under the Contract Documents unless specifically so stated by Owner in writing.

§ 13.4.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense. The Contractor also agrees that the cost of testing services required for the convenience of the Contractor in his scheduling and performance of the Work and the cost of testing services related to remedial operations performed to correct deficiencies in the Work shall be borne by the Contractor.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect .

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

§ 13.5.1 The Contractor shall not be entitled to any payment of interest for any reason, action or inaction by the Architect or the Owner unless required by law.

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§ 13.5.2 Payments withheld for time delays, faulty materials, workmanship, or other failure to follow the Contract Documents shall not bear interest.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract in the manner provided in Subparagraph 14.1.2 only if the Project has been delayed in aggregate more than 100% of the total number of days scheduled for completion as a result of any combination of the following:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner, without cause, has not made payment on a Certificate for Payment within the time stated in the Contract Documents

§ 14.1.2 If the requirements of Section 14.1.1 are met, the Contractor may, upon fourteen (14) days written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment on the same basis as if Owner had terminated the Contract for convenience.

§ 14.1.3 If the Work is stopped for a period of 120 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.2.

§ 14.1.4 INTENTIONALLY OMITTED

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials and/or equipment;

.2 repeatedly fails to make prompt payment to Subcontractors or suppliers as required by the Contract Documents ;

.3 disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority ; or

.4 is otherwise is guilty of substantial breach of a provision of the Contract Documents or disregards significant instructions of Architect or Owner (when such instructions are based on the requirements of the Contract Documents);

.5 is adjudged bankrupt or insolvent, or makes a general assignment for the benefit of Contractor's creditors, or a trustee or a receiver is appointed for Contractor or for any of its property, or files a petition to take advantage of any debtor's act, or to recognize under bankruptcy or similar laws;

.6 breaches any warranty made by the Contractor under or pursuant to the Contact Documents;

.7 fails to furnish the Owner with assurances satisfactory to the Owner evidencing the Contractor's ability to complete the Work in compliance with the requirements of the Contract Documents;

.8 fails after the commencement of the Work to proceed continuously with the construction and completion of the work for more than 10 days except as permitted under the Contract Documents;

.9 repeatedly fails to maintain site cleanliness or site safety;

.10 engages in any acts or omissions specifically identified as providing a basis for termination elsewhere in the Contract Documents; or

.11 repeatedly fails to meet any other obligation of the Contract Documents.

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§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor. The provision of notice hereunder does not provide the Contractor an opportunity to cure. If Owner terminates under this Section, it may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor; and ;

.2 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work,

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the costs of finishing the Work, including compensation for the services of any consultants and the Architect's services and expenses made necessary thereby, and the other costs and expenses identified hereinafter, exceed the unpaid balance of the Contract Sum, the contractor and its Surety shall pay the difference to the Owner upon demand. The costs of finishing the Work include, without limitation, all reasonable attorney's fees, additional title costs, insurance, additional interest because of any delay in completing the Work, the payment of replacement contractors, and all other direct and indirect consequential costs, including, without limitation, Liquidated Damages for untimely completion as specified in the Contract Documents, incurred by the Owner by reason of, or arising from, or relating to the termination of the Contractor as stated herein.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 INTENTIONALLY OMITTED

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 Payment for the Owner's termination for convenience shall be as set forth in the Agreement. The warranty and indemnity obligations of the Contractor and Surety shall survive and continue, notwithstanding any termination pursuant to this paragraph, with respect to the Work performed as of the date of termination.

§ 14.4.4 If Owner terminates the Contract for cause pursuant to Section 14.2 and it is subsequently determined that the Owner was not authorized or permitted to terminate the Contract as provided in Section 14.2, the Owner's termination shall be treated as a termination for convenience under this Section 14.4 and the rights and obligations of the parties shall be the same as if the Owner had issued a notice of termination to the Contractor under Section 14.4 rather than Section 14.2.

§ 14.5 In the event of the appointment of a trustee and/or receiver or any similar occurrence affecting the management of the account of the Contractor pertaining to the Work, it shall be the obligation of the Contractor,

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its representatives, receivers, sureties, or successors in interest to continue the progress of the Work without delay and specifically to make timely payment to Subcontractors and Suppliers of all amounts that are lawfully due them and to provide the Owner and all Subcontractors and Suppliers whose work may be affected with timely notice of the status of receivership, bankruptcy, etc., and the status of their individual accounts.

§ 14.6 Regularly scheduled job meetings shall be held at a location and time convenient to the Owner's representatives, the Architect and the Contractor. The Contractor shall attend such meetings or be represented by a person in authority who can speak for and make decisions for the Contractor.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims The Contract shall be governed by the laws of the State of New Jersey. For construction contracts, as defined in N.J.S.A. 40A:11-50, disputes arising under the contract shall be submitted to mediation or non-binding arbitration pursuant to industry standards prior to being submitted to a court for adjudication.

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of and within the period specified by applicable law. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.2.1 No act or omission by the Owner or Architect, or by anyone acting on behalf of either shall be deemed or construed as a waiver or limitation of any right or remedy under the Contract Documents, or as an admission, acceptance, or approval with respect to any breach of the Contract or failure to comply with the Contract Documents by the Contractor, unless the Owner expressly agrees, in writing.

§ 15.1.2.2 The Owner's exercise, or failure to exercise, any rights, claims or remedies it may have arising out of or relating to the Contract documents shall not release, prejudice, or discharge the Owner's other rights and remedies, nor shall it give rise to any right, claim, remedy or defense by any other person, including the Contractor, its Surety, any Subcontractor, or any other person or entity.

15.1.2.3 Whenever possible, each provision of the Contract Documents shall be interpreted in a manner as to be effective and valid under applicable law. If, however, any provision of the Contract Documents, or portion thereof, is prohibited or found invalid by law, only such invalid provision or portion thereof shall be ineffective, and shall not invalidate or affect the remaining provision of the Contract Documents or valid portions of such provision, which shall be deemed severable. Further, if any provision of this Contract is deemed inconsistent with applicable law, applicable law shall control, and the provision shall be interpreted to the greatest extent possible in favor of the Owner.

§ 15.1.2.4 Contractor shall promptly pay to Owner all costs and reasonable attorney's fees incurred in connection with any action or proceeding in which Owner prevails, based on a breach of the Contract or other dispute arising out of or in connection with the Contract.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated

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by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Injury or Damage to Person or Property. If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding five (5) days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ **15.1.3.3** Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the resolution of the claim.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice shall be given to the Owner and Architect before proceeding to execute the portion of the Work that is the subject of the Claim and within five (5) days after the occurrence of the event giving rise to such Claim for increase in the Construct Sum. The foregoing written notice shall contain a written statement from the Contractor setting forth in detail the nature and cause of the Claim and an itemized statement of the increase requested. No such written notice shall form the basis of an increase to the Contract Sum unless and until such increase has been authorized by a written Change Order executed and issued according to the terms and conditions set forth herein. The Contractor hereby acknowledges that the Contractor shall not have any right to and the Owner will not consider any requests for an increase in the Contract Sum that is not submitted in compliance with the foregoing requirements. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 8.3.2 shall be given. Said notice shall itemize all claims and shall contain sufficient detail and substantiating data to permit evaluation of same by Owner and Architect. No such claim shall be valid unless so made. The Contractor's Claim shall include an estimate of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 INTENTIONALLY OMITTED

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor waive Claims against Owner for consequential damages arising out of or relating to this Contract. This waiver includes, but is not limited to, damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

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This waiver is applicable, without limitation, to all consequential damages due to Owner's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to litigation. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may file litigation unless mediation is specifically required by the Contract Documents. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to litigation and, if specifically required by the Contract Documents, mediation.

§ 15.2.6 In the event of a Claim against the Contractor, the Owner and Architect may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner and Architect may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.6.1 INTENTIONALLY OMITTED

§ 15.2.7 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines prior to resolution of the claim by the Architect.

§ 15.2.8 INTENTIONALLY OMITTED

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SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

A. The Project consists of Renovations to the Southampton Township Municipal Building, 5 Retreat Road, Southampton, New Jersey 08088.

B. Owner: Southampton Township, 5 Retreat Road, Southampton, New Jersey 08088.

C. Contract Documents were prepared for the Project by Garrison Architects, 713 Creek Road, Bellmawr, NJ 08031; Environmental Resolutions, Inc., 815 East Gate Drive, Suite 103, Mount Laurel, NJ 08054; Mulhern Consulting Engineers, 321 South York Road, Hatboro, Pennsylvania 19040; and Orndorf and Associates, 8600 West Chester Pike, Suite 201, Upper Darby, Pennsylvania 19082.

D. The Work includes but is not limited to the following. Refer to the Construction Drawings and Specifications for the complete scope of work.

1. The Contractors are strongly encouraged to verify all existing conditions, dimensions and areas prior to submitting a responsive/responsible bid. Site visits can be arranged through Brandon Umba, Township Administrator, bumba@southamptonnj.org, (609) 859-2736 | Ext. 2100.
2. Bidding contractors are strongly encouraged to visit the site of the Project before submitting a bid. Such site visit shall be for the purpose of familiarizing the Contractor with the conditions as they exist and the character of the operations to be carried on under the Contract Documents, including all existing site conditions, access to the site, physical characteristics of the site and surrounding areas.
3. The Contractor shall provide one (1) full-time onsite Superintendent who is present for all work at all times including, but not limited to, subcontractor work. The Superintendent is responsible for maintaining a daily log of all personnel onsite and all other responsibilities outlined in the Specifications. The Superintendent shall coordinate and supervise, not be performing the work.
4. This work is scheduled to occur during periods of time when weather protection and temporary HVAC dehumidification will be required. The Contractor is responsible for all weather-related protection required to ensure that the work will continue uninterrupted until completion.
5. LOOSE FURNITURE, EQUIPMENT AND PERSONAL ITEMS: Unless noted otherwise, Owner shall be responsible to remove loose furniture, equipment and personal items from areas of work as needed to facilitate scheduled renovations.
6. Restore all grades, lawns, concrete curbing, sidewalks, asphalt, and pavement to pre-construction condition. All dumpsters or storage containers placed on existing concrete or asphalt paving must be placed on 5/8" plywood sheathing to protect paving.
7. The Work consists of the abatement of all asbestos containing materials throughout the existing space, the demolition of the ceilings, walls, insulation and mechanical and electrical components. The Heritage Shingle Roof (color is neutral timber) is six (6) years old and under warranty by Tamko. The roof remains and all work shall comply with the warranty for roof and shingle infill. The renovations shall include reconfiguration, new wood stud walls, new gypsum wall board, insulation, acoustic tile ceilings, new windows and exterior veneer. All existing brick remains. All building systems are being replacement including mechanical, plumbing and electrical. The scope also includes all site work. Refer to the Contract Documents for the complete scope of work.

E. Schedule of work sequence:

1. No work On Site can be started until all permits are received. The existing building will be unoccupied during construction. **The project must be completed on or before October 15, 2027.**
2. All construction preparation work, project startup, submittals, schedules, approvals, procurement, coordination, and other preparatory tasks must commence immediately upon receipt of the Notice to Proceed or the date of the fully executed Owner/Contractor Contract, whichever comes first. The Awarded Contractor must be fully prepared to deliver and install all materials and equipment on the first day of the scheduled on-site Construction period.

F. The Work will be constructed under one lump sum prime contract.

G. Separate Contract: The Owner has awarded separate contracts for construction operations that will be conducted simultaneously with work under this Contract. Refer to the Contract Documents.

H. Cooperate with separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

I. Future Contracts: The Owner will award separate contracts for work to be performed. Refer to the Electrical Drawings "responsibility schedule." Completion of that work depends on completion of work under this Contract. The schedule of this work will be coordinated with the Contractor to ensure the smooth, successful completion of the project.

J. Contractor Use of Premises: The Contractor shall be limited to work within the construction phase area, fencing, laydown and staging areas. Any time there is a necessity to enter the existing school outside the work phase area, the contractors shall coordinate with the Owner's on-site representative.

K. Use of the Site: Limit use of premises to the work phase, fencing, laydown and staging areas. The construction traffic shall operate with extra precaution to avoid conflict with the building's operations and public traffic.

1. Provide daily cleaning of facilities; restore any damage at completion of the specific item of work to the complete satisfaction of the Owner's Representative.
2. Keep driveways and entrances clear. Do not use these areas for parking or material storage. Schedule deliveries to minimize on-site storage of materials and equipment.
3. It is the Contractor's responsibility to provide safe, protected egress from all existing exits from the existing building as directed by the Building Official and the Fire Marshal.
4. Contractor's personnel are required to wear an identification badge and high visibility vests or clothing indicating the company for which they work. Anyone not conforming to this requirement will be immediately removed from the building. **This is a zero tolerance policy.**
5. Verbal and visual comments to the public or anyone other than the Architect will not be tolerated and will be cause for removal from the site. **This is a zero tolerance policy.**

6. The use of drugs, cannabis, tobacco or alcohol anywhere on the grounds or in the building will not be permitted and will be cause for removal from the site.

L. Provide temporary construction fencing to completely encompass areas that would be disturbed during construction, including areas where material will be stored. The fencing must completely surround all construction areas and material storage areas. Provide, "NO TRESPASSING" signs on all construction fencing at intervals of 40 feet on center or closer.

M. Perform weekly mowing, weed whacking, cleaning and maintenance inside all construction staging areas until the fencing is removed.

N. Use of the Existing Building: Maintain building weather tight. Repair damage caused by construction. Protect the building and its occupants during construction.

O. Owner-Furnished Products: The Owner may furnish some products for the contractor to install including (but not limited to) toilet accessories. The Work includes providing support systems to receive Owner's equipment, and mechanical and electrical connections.

1. If items are damaged, defective, or missing, the Owner will arrange for replacement.
2. The Contractor shall designate delivery dates in the Contractor's Construction Schedule.
3. The Contractor shall provide support blocking and related systems as needed for proper installation as recommended by the product manufacturer.
4. The Contractor is responsible for receiving, unloading, and handling Owner-furnished items at the site.
5. The Contractor is responsible for protecting items from damage, including exposure to the elements. The Contractor shall repair or replace items damaged as a result of its operations.

P. Fees, Permits and Taxes: The Contractor is advised that Building Permits for the building are required for this project. The plans have been submitted to the Construction Official. Upon contract award, it shall be the responsibility of the **Contractor** to secure all required permits. It shall be the **Owner's** responsibility to pay for all fees and permit costs if required. It shall be the **Contractor's** responsibility to pay for all fees and permit costs for the jobsite trailer.

Q. **SAFETY**: The Contractor is responsible for providing and enforcing all safety onsite and conform with all OSHA regulations, codes and standards. The Owner, Construction Manager, Clerk of the Works and Architect have no responsibility to provide for the safety or protection of the trades. The Contractor shall submit a site specific Emergency Action Safety Plan and review this with all onsite personnel. The Contractor shall conduct periodic (as needed at least one a month) site safety inspections and issue a report on the conditions. The Contractor shall maintain a first aid kit onsite. For further Contractor responsibilities with respect to safety, refer to article 10 of the General Conditions of the Contract for Construction.

R. The Contractor shall not use any product containing asbestos and all plumbing shall be lead free. The Contractor shall provide a notarized letter to the Owner during the Project Closeout phase stating: "No asbestos containing materials were provided on the project and the plumbing is lead free".

S. SUBSTITUTION REQUESTS

Please refer to Specification Section 01300, "Submittals." "Or Equal" substitutions are permitted so long as they are equal to or superior to the basis of design and the Contractor takes full responsibility for all coordination and costs associated with collateral issues related to the substitution. No Substitutions will be reviewed during the bidding process. The Contractor takes full responsibility for all substitutions. Substitution submittals shall be made **no later than 30 days after Notice to Proceed** in order to provide time for comparison review. All submittals after 30 days shall be in strict accordance with the basis of design / specified products.

T. **The Contractor is required to submit all Shop Drawings within (45) days of the Award of the Contract and have all long lead items in fabrication and provide proof from the manufacturer within (45) days of the award of the contract.** The Owner will pay for stored material in accordance with the General Conditions. Delays caused by the failure of the Contractor to adhere to this requirement will not be cause for a time extension.

1. Supply Chain Shortages: Due to the ongoing supply chain shortages, the Contractor will be required to do the following:

   a. Once a purchase order has been issued or the Contract has been signed, the Contractor shall order ALL materials ASAP.
   b. The materials must be stored in a secured location, out of the weather and within acceptable storage temperatures. The cost of this material handling is to be included in the project cost.

U. Provide a 4' x 8' plywood Construction Identification Sign at the site. The sign shall have 4 x 4 posts and be three (3) colors. The graphics for the project sign will be provided. Engage an experienced sign painter to apply the graphics.

END OF SECTION 01010

SECTION 01040 – COORDINATION

1.1 GENERAL

A. This Section includes requirements for coordinating construction operations including, but not necessarily limited to, the following:

1. Coordination drawings and Specifications with all subcontractors.
2. Administrative and supervisory personnel.
3. Cleaning and protection is the responsibility of the Contractor.

1.2 COORDINATION

A. Coordinate construction to assure efficient and orderly installation of each part of the Work. Coordinate operations that depend on each subcontractor for proper installation, connection, and operation. The Contractor shall be responsible for the following:

1. Schedule operations in the sequence required to obtain the best results where installation of one part depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to assure maximum accessibility for maintenance, service, and repair.
3. Make provisions to accommodate items scheduled for later installation.
4. Coordination with the owner for furniture and equipment which shall be relocated to new facilities.

B. Where necessary, prepare memoranda for distribution to each party involved, outlining procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the Owner and his contractors where coordination of their work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required procedures with other activities to avoid conflicts and assure orderly progress. Such activities include, but are not limited to, the following:

1. Preparation of schedules.
2. Delivery and processing of submittals.
3. Progress meetings.
4. Project closeout activities.

D. Conservation: Coordinate construction to assure that operations are carried out with consideration for conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not incorporated in, the Work.

E. Coordination Drawings: Prepare coordination drawings for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space necessitates maximum utilization of space for efficient installation of different components.

1. Show the relationship of components shown on separate shop drawings.
2. Indicate required installation sequences.
3. Comply with requirements contained in Section "Submittals."

F. Staff Names: **The Contractor shall** Within 7 days of commencement of construction, submit to the Construction Manager a list of the Contractor's staff assignments, including the superintendent and other personnel at each Project Site. Identify individuals and their responsibilities. List their telephone numbers.

1. Post copies in the Project meeting room, the temporary field office, and each temporary telephone.

1.3 PRODUCTS (Not Applicable)

1.4 EXECUTION

A. Inspection of Conditions: Require Installers of major components to inspect substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.

B. Coordinate temporary enclosures with inspections and tests to minimize the need to uncover completed construction.

C. Clean and protect construction in progress and adjoining materials, during handling and installation. Apply protective covering to assure protection from damage.

D. Clean and maintain completed construction as necessary through the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

E. Limiting Exposures: Supervise construction to assure that no part is subject to harmful, dangerous, or damaging exposure. Such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Water or ice.
5. Solvents and chemicals.
6. Abrasion.
7. Soiling, staining, and corrosion.
8. Combustion.
9. Excessive dust.

END OF SECTION 01040

SECTION 01045 - CUTTING AND PATCHING

1.1 GENERAL

A. Cutting and Patching Proposal: The Contractor shall be responsible for arranging and providing the necessary cutting and patching that is required to furnish and install all work connected with this project. The Contractor shall submit a proposal describing procedures in advance of the time cutting and patching will be performed. Request approval from the Owner / Architect before proceeding. Include the following:

1. Describe extent of cutting and patching. Show how it will be performed and indicate why it cannot be avoided.
2. Describe changes to existing construction. Include changes to structural elements and operating components and changes in the building's appearance and other significant visual elements.
3. List products to be used and firms that will perform Work.
4. Indicate dates when cutting and patching will be performed.
5. Utilities: List utilities that will be disturbed or relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
7. Approval to proceed does not waive the Architect's right to later require complete removal and replacement of unsatisfactory work.

B. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

1. Obtain approval before cutting and patching the following structural elements:
   a. Foundation construction.
   b. Existing exterior door system
   c. Bearing and retaining walls
   d. Existing roof system

C. Operational Limitations: Do not cut and patch operating elements in a manner that would reduce their capacity to perform as intended. Do not cut and patch operating elements in a manner that would increase maintenance or decrease operational life or safety.

1. Obtain written approval before cutting and patching the following operating elements or safety related systems:
   a. Primary operational systems and equipment.
   b. Fire protection systems.
   c. Electrical wiring systems.
   d. Water and sewer systems.
   e. H.V.A.C. systems.
f.
   g. Security System.
   h. Computer System.
   i. Telephone and Cable TV System.

D. Visual Requirements: Do not cut and patch exposed construction in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.

E. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged in such a manner as not to void warranties.

1.2 PRODUCTS

A. Use materials that visually match adjacent surfaces to the fullest extent possible. Use materials whose performance will equal that of existing materials.

1.3 EXECUTION

A. Examine surfaces to be cut and patched and conditions under which work is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action.

1. Before proceeding, meet with parties involved. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect existing construction to prevent damage. Provide protection from adverse weather conditions for portions that might be exposed during cutting and patching operations.

D. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

E. Avoid cutting pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

F. Performance: Employ skilled workmen. Proceed at the earliest feasible time and complete without delay.

1. Cut construction to install other components or perform other construction and subsequent fitting and patching required to restore surfaces to their original condition.

G. Cutting: Cut using methods that will not damage elements retained or adjoining construction. Comply with the original Installer's recommendations.

1. Use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. To avoid marring finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
4. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating and backfilling.

5. Where services are required to be removed, relocated, or abandoned, by-pass utility services before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

H. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Inspect and test patched areas to demonstrate integrity of the installation.
2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove floor and wall coverings and replace with new materials to achieve uniform color and appearance.

    a. Where patching occurs in a smooth painted surface, extend final paint coat over entire surface containing the patch after the area has received primer and second coat.

4. Patch, repair, or rehang ceilings as necessary to provide an even-plane surface of uniform appearance.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar items. Clean piping, conduit, and similar features before applying paint or finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

1.1 GENERAL

A. Definitions: Basic Contract definitions are included in the Conditions of the Contract.

B. Indicated refers to graphic representations, notes, or schedules on the Drawings, paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. Location is not limited.

C. Directed, requested, authorized, selected, approved, required, and permitted mean directed by the Architect, requested by the Architect, and similar phrases.

D. Approved, when used in conjunction with the Architect's action on submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.

E. Regulations include laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. Furnish means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. Install describes operations at the Project Site including unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. Provide means to furnish and install, complete and ready for the intended use.

I. Installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term experienced, when used with the term Installer, means having a minimum of 5 previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authorities having jurisdiction.

J. Project Site is the space available for performing construction activities, either exclusively or in conjunction, with others performing work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. Testing Agency is an independent entity engaged by the Owner to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

L. Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-Division format and MASTERFORMAT numbering system.

1. Abbreviated Language: Language used in Specifications is abbreviated. Implied words and meanings shall be interpreted as appropriate. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative and streamlined language is used. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.

    a. The words "shall be" are implied where a colon (:) is used within a sentence or phrase.

M. Abbreviations and Names: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA - American Forest & Paper Association; www.afandpa.org.
12. AGA - American Gas Association; www.aga.org.
13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.

30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWPA - American Wood Protection Association; www.awpa.com.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc.; www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
49. CDA - Copper Development Association; www.copper.org.
50. CE - Conformite Europeenne; http://ec.europa.eu/growth/single-market/ce-marking/.
51. CEA - Canadian Electricity Association; www.electricity.ca.
52. CEA - Consumer Electronics Association; www.ce.org.
53. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CPA - Composite Panel Association; www.pbmdf.com.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - CSA Group; www.csagroup.com.
65. CSA - CSA International; www.csa-international.org.
66. CSI - Construction Specifications Institute (The); www.csinet.org.
67. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
69. CWC - Composite Wood Council; (See CPA).
70. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
71. DHI - Door and Hardware Institute; www.dhi.org.
72. ECA - Electronic Components Association; (See ECIA).
73. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).

74. ECIA - Electronic Components Industry Association; www.eciaonline.org.
75. EIA - Electronic Industries Alliance; (See TIA).
76. EIMA - EIFS Industry Members Association; www.eima.com.
77. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
78. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
79. ESTA - Entertainment Services and Technology Association; (See PLASA).
80. ETL - Intertek (See Intertek); www.intertek.com.
81. EVO - Efficiency Valuation Organization; www.evo-world.org.
82. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
83. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
84. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
85. FM Approvals - FM Approvals LLC; www.fmglobal.com.
86. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
87. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridaroof.com.
88. FSA - Fluid Sealing Association; www.fluidsealing.com.
89. FSC - Forest Stewardship Council U.S.; www.fscus.org.
90. GA - Gypsum Association; www.gypsum.org.
91. GANA - Glass Association of North America; www.glasswebsite.com.
92. GS - Green Seal; www.greenseal.org.
93. HI - Hydraulic Institute; www.pumps.org.
94. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
95. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
96. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
97. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
98. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
99. IAS - International Accreditation Service; www.iasonline.org.
100. ICBO - International Conference of Building Officials; (See ICC).
101. ICC - International Code Council; www.iccsafe.org.
102. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
103. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
104. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
105. IEC - International Electrotechnical Commission; www.iec.ch.
106. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
107. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
108. IESNA - Illuminating Engineering Society of North America; (See IES).
109. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
110. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
111. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
112. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
113. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
114. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
115. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).

116. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
117. ISO - International Organization for Standardization; www.iso.org.
118. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
119. ITU - International Telecommunication Union; www.itu.int/home.
120. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
121. LMA - Laminating Materials Association; (See CPA).
122. LPI - Lightning Protection Institute; www.lightning.org.
123. MBMA - Metal Building Manufacturers Association; www.mbma.com.
124. MCA - Metal Construction Association; www.metalconstruction.org.
125. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
126. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
127. MHIA - Material Handling Industry of America; www.mhia.org.
128. MIA - Marble Institute of America; www.marble-institute.com.
129. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
130. MPI - Master Painters Institute; www.paintinfo.com.
131. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
132. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
133. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
134. NADCA - National Air Duct Cleaners Association; www.nadca.com.
135. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
136. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
137. NBI - New Buildings Institute; www.newbuildings.org.
138. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
139. NCMA - National Concrete Masonry Association; www.ncma.org.
140. NEBB - National Environmental Balancing Bureau; www.nebb.org.
141. NECA - National Electrical Contractors Association; www.necanet.org.
142. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
143. NEMA - National Electrical Manufacturers Association; www.nema.org.
144. NETA - InterNational Electrical Testing Association; www.netaworld.org.
145. NFPA - National Fire Protection Association; www.nfpa.org.
146. NFPA - NFPA International; (See NFPA).
147. NFRC - National Fenestration Rating Council; www.nfrc.org.
148. NHLA - National Hardwood Lumber Association; www.nhla.com.
149. NLGA - National Lumber Grades Authority; www.nlga.org.
150. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
151. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
152. NRCA - National Roofing Contractors Association; www.nrca.net.
153. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
154. NSF - NSF International; www.nsf.org.
155. NSPE - National Society of Professional Engineers; www.nspe.org.
156. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
157. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
158. NWFA - National Wood Flooring Association; www.nwfa.org.
159. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
160. PDI - Plumbing & Drainage Institute; www.pdionline.org.

161. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
162. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
163. RFCI - Resilient Floor Covering Institute; www.rfci.com.
164. RIS - Redwood Inspection Service; www.redwoodinspection.com.
165. SAE - SAE International; www.sae.org.
166. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
167. SDI - Steel Deck Institute; www.sdi.org.
168. SDI - Steel Door Institute; www.steeldoor.org.
169. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
170. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
171. SIA - Security Industry Association; www.siaonline.org.
172. SJI - Steel Joist Institute; www.steeljoist.org.
173. SMA - Screen Manufacturers Association; www.smainfo.org.
174. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
175. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
176. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
177. SPIB - Southern Pine Inspection Bureau; www.spib.org.
178. SPRI - Single Ply Roofing Industry; www.spri.org.
179. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
180. SSINA - Specialty Steel Industry of North America; www.ssina.com.
181. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
182. STI - Steel Tank Institute; www.steeltank.com.
183. SWI - Steel Window Institute; www.steelwindows.com.
184. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
185. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
186. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
187. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
188. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
189. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
190. TMS - The Masonry Society; www.masonrysociety.org.
191. TPI - Truss Plate Institute; www.tpinst.org.
192. TPI - Turfgrass Producers International; www.turfgrasssod.org.
193. TRI - Tile Roofing Institute; www.tileroofing.org.
194. UL - Underwriters Laboratories Inc.; www.ul.com.
195. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
196. USAV - USA Volleyball; www.usavolleyball.org.
197. USGBC - U.S. Green Building Council; www.usgbc.org.
198. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
199. WA - Wallcoverings Association; www.wallcoverings.org.
200. WASTEC - Waste Equipment Technology Association; www.wastec.org.
201. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
202. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
203. WDMA - Window & Door Manufacturers Association; www.wdma.com.
204. WI - Woodwork Institute; www.wicnet.org.

205. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
206. `WWPA - Western Wood Products Association; www.wwpa.org.

N. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. IAPMO – International Association of Plumbing and Mechanical Officials; www.iapmo.org.
2. ICC - International Code Council; www.iccsafe.org.
3. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

O. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

P. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.

   a)Available from Defense Standardization Program; www.dsp.dla.mil.
   b)Available from General Services Administration; www.gsa.gov.
   c)Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.

6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

Q. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

END OF SECTION 01095

SECTION 01200 - PROJECT MEETINGS

1.1 GENERAL

A. It is the responsibility of the Contractor to set up, run and record the minutes for the meetings.

B. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:

1. Preconstruction conferences.
2. Preinstallation conferences.
3. Progress meetings.

C. Preconstruction Conference: A preconstruction conference shall be scheduled before starting any construction to review responsibilities and personnel assignments.

D. Attendees: Authorized representatives of the Owner, Architect, and their consultants; the Contractor and his superintendent; major subcontractors; and other concerned parties shall attend.

1. Participants shall be familiar with the Project and authorized to conclude matters relating to the Work.

E. Agenda: Discuss items that could affect progress, including the following:

1. Tentative construction schedule.
2. Critical work sequencing.
3. Submittal of Shop Drawings, Product Data, and Samples.
4. Use of the premises.
5. Product delivery dates.
6. Job site safety.

F. Preinstallation Conferences: The Contractor shall conduct a conference before each activity that requires coordination with other operations.

G. Attendees: The Installer, the Contractor, the Subcontractors related to the work, and representatives of manufacturers and fabricators involved in or affected by the installation shall attend.

1. Review the progress of other operations and preparations for the activity under consideration at each preinstallation conference, including requirements for the following:

a. Compatibility problems and acceptability of substrates.
b. Time schedules and deliveries.
c. Manufacturer's recommendations.
d. Warranty requirements.
e. Inspecting and testing requirements.

2. The Contractor shall record significant discussions and agreements and disagreements, and the approved schedule. Promptly distribute the record of the meeting to everyone concerned, including the Owner and the Architect.

3. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate actions necessary to resolve problems and reconvene the conference.

H. Progress Meetings: The Contractor shall conduct progress meetings at the construction site every two weeks. The Contractor will notify the Owner, the Architect and all subcontractors of scheduled dates. Coordinate meeting dates with preparation of the payment request. It is the Owner / Architect's option to require weekly job site coordination meetings at each job site in addition to the bi-weekly progress meeting.

I. Attendees: The Owner, Architect, Contractor, and other entities concerned with current progress or involved in planning, coordination, or future activities shall be represented. Participants shall be authorized to conclude matters relating to the Work.

J. Agenda: Review and correct or approve minutes of the previous meeting. Review items of significance that could affect progress. Include topics for discussion appropriate to Project status.

1. Contractor's Construction Schedule: The Contractor shall review the progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule. Determine how to expedite construction behind schedule; secure commitments from parties involved to do so. Discuss revisions required to insure subsequent activities will be completed within the Contract Time.

2. Review the present and future needs of each entity present, including the following:

   a. Time.
   b. Sequences.
   c. Status of submittals.
   d. Deliveries and off-site fabrication problems.
   e. Temporary facilities and services.
   f. Quality and work standards.
   g. Change Orders.
   h. Coordinate with the Owner's schedule and programs.

3. Reporting: Distribute meeting minutes to each party present and to parties who should have been present. Include a summary of progress since the previous meeting and report.

4. Schedule Updating: Revise the Contractor's Construction Schedule after each meeting where revisions have been made. Issue the revised schedule concurrently with the report of each meeting.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

END OF SECTION 01200

SECTION 01210 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

1. A Lump Sum Amount is specified in this Section of the Contract Documents. This amount shall be included as a separate line item in the Schedule of Values for the Project.

B. Related Sections:

1. Bid Form Section "Unit Prices" for procedures for using unit prices.
2. A201 General Conditions of the Contract for procedures for submitting and handling Change Orders.
3. Divisions 2 through 16 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, the Contractor shall advise the Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At the Architect's request, the Contractor shall provide a Change Order proposal for additional work to be deducted from the allowance. Include recommendations that are relevant to performing the Work. The Change Order Proposal shall include all material and labor with sufficient breakdown for review.

1.4 SUBMITTALS

A. Submit proposals for purchase of products or systems included in the Cash Allowance, in the form specified for Change Order Requests.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

SECTION 01210 - ALLOWANCES

1.5 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 CASH ALLOWANCES (Overhead and profit are permitted totaling a maximum of 15% per the AIA Contract. Supervision, bond and insurance are not permitted)

A. Cash Allowance shall be used only as directed and approved by the Architect for the Owner's purposes.

B. The Change Order Request format shall be used to request authorization for use of funds from the Cash Allowance. The Contractor's overhead and profit margins are fixed to a maximum of 15% per the AIA Contract. The Contractor is not permitted to charge for additional supervision, bond and insurance as these costs are included in the Base Contract Sum.

C. At Project closeout, the contractor shall provide a full credit for unused amounts remaining in the Cash Allowance to the Owner by Change Order.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Provide a $40,000.00 cash allowance.

END OF SECTION 01210

SECTION 01300 – SUBMITTALS

1.1 GENERAL

A. The Contractor shall use the enclosed Cover Page form for **every copy** of every shop drawings submitted with the exception of full size drawings that have a title block for custom or project specific materials or systems. The Contractor's Cover Page form shall be signed by the Project Manager with an original signature indicating that the information has been reviewed and coordinate.

B. Submittal Procedures: Coordinate submittal and preparation with construction, fabrication, other submittals, and activities that require sequential operations with all Sub-Contractors. Transmit in advance of construction operations to avoid delay.

1. Coordinate submittals for related operations to avoid delay because of the need to review submittals concurrently for coordination. The Architect reserves the right to withhold action on a submittal requiring coordination until related submittals are received.
2. Processing: Allow 2 weeks for initial review. Allow more time if the Architect must delay processing to permit coordination with other trades or Owner's contractors. Allow 2 weeks for reprocessing.

    a. No extension of Contract Time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.
    b. **All Shop Drawings, product data and samples shall be submitted within forty-five (45) days of Notice of Award. No Payments will be approved if the Shop Drawings process is not completed within this time schedule.**
    c. Substitution submittals shall be made no later than 30 days after Notice to Proceed in order to provide time for comparison review. All submittals after 30 days shall be in strict accordance with the basis of design / specified products. No Substitutions will be considered after 30 days.

C. Contractor's Construction Schedule: Prepare a horizontal bar-chart-type, contractor's construction schedule. Provide a separate time bar for each activity and a vertical line to identify the first working day of each week. Use the same breakdown of Work indicated in the "Schedule of Values." Indicate estimated completion in 10 percent increments. As Work progresses, mark each bar to indicate actual completion.

1. Submit within 14 days of the date established for "Commencement of the Work."
2. Prepare the schedule on stable transparency, or other reproducible media, of width to show data for the entire construction period.
3. Secure performance commitments from parties involved. Coordinate each element with other activities; include minor elements involved in the Work. Show each activity in proper sequence. Indicate sequences necessary for completion of related Work.
4. Coordinate with the Schedule of Values, list of subcontracts, Submittal Schedule, payment requests, and other schedules.

5. Indicate completion in advance of Substantial Completion. Indicate Substantial Completion to allow time for the Architect's procedures necessary for certification of Substantial Completion.
6. Phasing: Show how phased completion affects the Work.
7. Work Stages: Indicate important stages for each portion of the Work.
8. Area Separations: Provide a separate time bar to identify each construction area for each portion of the Work. Indicate where each element must be sequenced with other activities.

D. The Contractor shall receive the schedule from each Sub-Contractor. The Contractor shall coordinate with all Sub-Contractors and prepare an overall construction schedule in five (5) days to submit to the Owner / Architect for approval.

E. Submittal Schedule: After developing the Contractor's Construction Schedule, prepare a schedule of submittals. Submit the Submittal Schedule to indicate compliance with Item A, Paragraph 2b, on page one of this section.

1. Coordinate with list of subcontracts, Schedule of Values, list of products, and the Contractor's Construction Schedule.
2. Prepare the schedule in chronological order. Provide the following information:

    a. Date for first submittal.
    b. Related details on drawings.
    c. Related Section number in the Specifications.
    d. Submittal category (Shop Drawings, Product Data, or Samples).
    e. Name of the subcontractor.
    f. Description of the Work covered.
    g. Date for the Architect's final approval.

3. Schedule Distribution: Distribute copies of the Contractor's Construction Schedule and the Submittal Schedule to the Architect, Owner, subcontractors, and parties required to comply with submittal dates. Post copies in the field office.

    a. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their Work and are no longer involved in construction activities.
    b. Updating: Revise the schedule after each meeting or activity where revisions have been made. Issue the updated schedule concurrently with the report of each meeting.

F. Daily Construction Reports: The Contractor shall prepare a daily report recording events at the site and submit copies to the Owner, Construction Manager (if applicable) and Architect on a monthly basis or upon request. Include the following information:

1. List of subcontractors at the site.
2. High and low temperatures, general weather conditions.
3. Accidents and unusual events.
4. Stoppages, delays, shortages, and losses.

5. Meter readings and similar recordings.
6. Emergency procedures.
7. Orders and requests of governing authorities.
8. Services connected, disconnected.
9. Equipment or system tests and startups.
10. Substantial Completions authorized.
11. A list of all visitors indicating the nature of their visit, the company they represent and the person with whom they spoke.

G. Color Selection Schedule: The Contractor shall submit a color selection schedule providing a listing of every product that requires color selections and categorized by exterior colors, interior colors and by room. The Contractor is responsible to coordinate meeting times with the Owner and Construction Manager (if applicable) to select colors so as not to affect the overall construction schedule or material procurement. All color samples shall be delivered to the job site trailer. **Do not submit color samples with shop drawings to the Architect.** Provide actual material color samples. **Reproduced paper or web-based email color charts are not acceptable.**

H. Shop Drawings: The Contractor shall submit newly prepared information drawn to scale. Indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information. The Contractor shall email electronic Shop Drawings to shopdrawings@garrisonarch.com Each separate Shop Drawing shall be submitted in a separate email as one PDF file with the "Shop Drawing Cover Page" completely filled out as the first page. The Shop Drawings shall be numbered sequentially. Include the following information:

1. Dimensions.
2. Identification of products and materials included by sheet and detail number.
3. Compliance with standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.
6. Sheet Size: At least 8-1/2 by 11 inches **but no larger than 30 by 42 inches**. The Contractor shall then copy if required and forward the reviewed prints to all of the Sub-Contractors.

    a. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

7. The Contractor shall be responsible to provide the Owner and Construction Manager (if applicable) with a completed printed set of all final Shop Drawings. Promptly provide each shop drawing paper copy as approved. Do not hold or delay the paper copy from the field.

I. Product Data: Collect Product Data into a single submittal for each element of construction. Mark each copy to show applicable choices and options. Where Product Data includes information on several products, mark copies to indicate applicable information.

1. Include the following information:
    a. Manufacturer's printed recommendations.

b. Compliance with trade association standards.
c. Compliance with recognized testing agency standards.
d. Application of testing agency labels and seals.
e. Notation of dimensions verified by field measurement.
f. Notation of coordination requirements.

2. Preliminary Submittal: Submit a preliminary single copy of Product Data where selection of options is required.
3. Submittals: Submit a PDF via email to shopdrawings@garrisonarch.com with the completed "Shop Drawing Cover Page" as the first page of the PDF. The Architect will return the PDF via email marked with action taken. Please note that the Contractor shall be required to submit a paper copy of all finalized Shop Drawings to the Owner and Construction Manager (if applicable).

   a. Unless noncompliance with Contract Documents is observed, the submittal serves as the final submittal.

4. Distribution: Furnish copies to installers, subcontractors, suppliers, and others required for performance of construction activities. Show distribution on Cover Page forms. Do not proceed with installation until a copy of Product Data is in the Installer's possession.

   a. Do not use unmarked Product Data for construction.

J. Samples: Submit full-size Samples cured and finished as specified and identical with the material proposed. Mount Samples to facilitate review of qualities. Provide samples to the Owner or Construction Manager's on-site office. **Do not deliver to the Architect.**

1. Include the following:

   a. Specification Section number and reference.
   b. Generic description of the Sample.
   c. Sample source.
   d. Product name or name of the manufacturer.
   e. Compliance with recognized standards.
   f. Availability and delivery time.

2. Submit Samples for review of size, kind, color, pattern, and texture, for a check of these characteristics, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed. Where variations are inherent in the material, submit at least 3 units that show limits of the variations.

   a. Refer to other Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar characteristics.

   b. Refer to other Sections for Samples to be incorporated in the Work. Samples must be undamaged at time of use. On the Cover Page, indicate

special requests regarding disposition of Sample submittals.

c. Samples not incorporated into the Work, or designated as the Owner's property, are the Contractor's property and shall be removed from the site.

3. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 3 sets. One set will be returned marked with the action taken. Maintain sets of Samples, at the Project Site, for quality comparison.

   a. Unless noncompliance with Contract Documents is observed, the submittal may serve as the final submittal.

   b. Sample sets may be used to obtain final acceptance of the construction associated with each set.

4. Distribution of Samples: Distribute additional sets to subcontractors, manufacturers, and others as required for performance of the Work. Show distribution on Cover Page forms.

K. Quality Assurance Submittals: Submit quality-control submittals, including design data, certifications, manufacturer's instructions, and manufacturer's field reports required under other Sections of the Specifications.

1. Certifications: Where certification that a product or installation complies with specified requirements is required, submit a notarized certification from the manufacturer certifying compliance.

   a. Signature: Certification shall be signed by an officer authorized to sign documents on behalf of the company.

L. Architect's Action: Except for submittals for the record or information, where action and return are required, the Architect will review each submittal, mark to indicate action taken, and return. Compliance with specified characteristics is the Contractor's responsibility.

1. Action Stamp: The Architect will stamp each submittal with an action stamp. The Architect will mark the stamp appropriately to indicate the action taken.
2. Unless requested and paid by the submission contractor, all submittals will be returned by email. All review times start when the Architect receives the submission in his office.
3. "Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with requirements of the drawings and specifications. This check is only for the review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for verifying quantities, dimensions, field conditions and coordinating all work, information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the work of all trades; and for performing work in a safe and satisfactory manner. Review does not

authorize changes to contracts sum, or project completion date unless stated on separate letter or change order. Refer to the A201 Contract, including but not limited to sections 3.2, 3.3, 3.5, 3.12 and 4.2.7."

M. **The Contractor shall be responsible to note in the Cover Page of the shop drawings any changes or deviations from the contract documents. This is to include but is not limited to manufacturers, electrical, plumbing, mechanical and structural requirements. The Contractor shall be responsible to distribute to all effected contractors and subcontractors all shop drawings which may affect their work.**

N. Deviations from the construction documents must be noted by the General Contractor at the time of shop drawing submission. Failure to do so will result in the implication of Section 3.2 of the General Conditions and Paragraphs 3.2.1, 3.2.2 and 3.2.2.1.

O. Approval of shop drawings is conditional upon the contractor fully and completely complying with all review comments by the Owner, Architect, and Engineer. Where the contractor fails to or is unable to fully and completely comply with every review comment, then the shop drawings are *disapproved* (whether or not they are stamped or noted as "approved" in any manner in any review comment) and must be resubmitted as within seven (7) days. Immediately upon receipt of shop drawing review comments, the contractor is responsible for carefully reviewing all comments in detail and for complying with comments. Where unable to fully satisfy any comment or where the contractor takes exception to any comment, revise and resubmit acceptable shop drawings (or, where taking exception, notify the Architect / Engineer in writing) within seven (7) days. Where the contractor fails to comply with these requirements (including resubmitting/notifying within the seven (7) day period specified), the contractor shall provide acceptable equipment meeting all specified requirements and all review comments (including removing unacceptable equipment [if installed] and replacing with acceptable equipment) at no cost to the Owner.

P. No extra claims, time or compensation shall be granted under any circumstance associated with any party's failure or delay in properly submitting, transmitting, obtaining, reviewing, and/or coordinating shop drawings.

2.1 SUBSTITUTIONS

A. Substitution submittals shall be made **no later than 30 days after Notice to Proceed** in order to provide time for comparison review. All submittals after 30 days shall be in strict accordance with the basis of design / specified products. **No Substitutions will be considered after 30 days.**

B. Materials and equipment manufacturers and catalog numbers specified constitute the type and quality of design, material, workmanship, ruggedness of construction, resistance to vandalism, exact operating and performance characteristics, features, configuration, dimensions, etc. The Architect / Engineer will consider substitutions of similar equipment superior to specified equipment (meeting or exceeding all characteristics of the specified equipment).

C. Submit shop drawings associated with substitutions complete with **comparison documentation** necessary to establish compliance with the basis of design. Submit samples of substitutions where requested. If comparison documentation and/or samples are not submitted when required, the request for substitution will be denied.

D. Determination of compliance with specifications rests with the Architect/ Engineer. When a request for substitution is denied, furnish the equipment specified. The Architect's / Engineer's decisions in cases of substitutions are final and binding upon the contractor, provide equipment accordingly. No claims for time delay, contract extensions or cost will be considered.

E. Pay all costs associated with a substitution where granted. For the provisions of this section, "substitutions" includes equipment where characteristics or operation vary significantly from equipment specified (including equipment of the specified manufacturer). This includes costs incurred by any party (Contractor, Sub-contractors, Owner, Architect, Engineers, etc.), costs resulting from differences of details, configuration, ratings, operation, characteristics, and dimensions between the specified and substituted equipment, costs to provide features of the specified equipment which may be manufacturer's options of the substituted equipment, and costs to remove and replace work already installed and any other remedial work as a result of substitutions. Approval of substitutions is conditional upon there being no cost change to the contract, unless specifically indicated on the shop drawings submittal and corresponding approval. The Contractor is fully responsible for coordinating with the Owner, Architect, and other trades to identify all possible cost impacts associated with any substitution before releasing equipment and before any party proceeds with work effected by the substitution.

F. Submit bid based on the items as specified. Substitutions will be considered only after a contract has been awarded.

G. "Or Equal" substitutions are permitted so long as they are equal to or superior to the basis of design and the Contractor takes full responsibility for all coordination and costs associated with collateral issues related to the substitution. No Substitutions will be reviewed during the bidding process. The Contractor takes full responsibility for all substitutions.

END OF SECTION 01300

Contractor's Letterhead
Contractor's Letterhead to Include Name, Physical Address, Telephone Number and Fax Number
SHOP DRAWING COVER PAGE

Project Name
Date

Garrison Architects
Architect's Name
713 Creek Road
Bellmawr, NJ 08031

Sub Contractor's Name, Physical Address, Telephone Number and Fax Number
Supplier's Name, Physical Address, Telephone Number and Fax Number
Manufacturer's Name, Physical Address, Telephone Number and Fax Number
Specification Number and Specification Title and Section
Construction Document Plan Drawing Number and Detail Reference
Contractor's Quality Assurance Signature

Check one of the following:

☐ The signature above certifies that the enclosed submittal is in conformance with the construction documents and in fact is the **exact** product and manufacturer specified in the bid specifications. The signature confirms that the Contractor is responsible for dimensions and quantities that have been field verified and that the Shop Drawing will be distributed to all affected Contractors whose work may be affected by the material or equipment enclosed.

☐ The signature above certifies that the enclosed submittal is in conformance with the construction documents and in fact a **substitution** of the product and manufacturer specified. The Contractor shall provide all Substitutions no later than thirty (30) days from Notice to Proceed and fully comply with page 01300, paragraph 2.1. A complete comparison document must be provided. The signature confirms that the Contractor is responsible for dimensions and quantities that have been field verified and that the Shop Drawing will be distributed to all affected Contractors whose work may be affected by the material or equipment enclosed.

The Contractor assumes responsibility to fully comply with Specification Section 01300, Submittals," and note below any changes or deviations that have resulted from the proposed product substitution. The Contractor also is solely responsible to communicate these changes to all other Prime Contractor and Sub Contractors following review by the Architect / Engineer.

SHOP DRAWING NO _____ Date _____ Reviewed By _____

RECEIVED FROM GC		Reviewed	
SENT TO ENGINEER		Provide as Corrected	
RETURN FROM ENG		Revise and Resubmit	
RETURN TO GC		Rejected	

Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. The contractor is responsible for all corrections indicated. This check is only for the review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for verifying quantities, dimensions, field conditions and coordinating all work; including all electric for all HVAC and all other equipment; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the work of all trades; and for performing work in a safe and satisfactory manner. Review does not authorize changes to contracts sum, or project completion date. Refer to the A201 contract, including but not limited to sections 3.2, 3.3, 3.5, 3.12, and 4.2.7. The contractor shall provide all portions of the work per the manufacture's installation recommendations and instructions.

REQUEST FOR SUBSTITUTION:

Submit this form for each requested substitution. Fill in all blanks, check all boxes that apply and attach all necessary supporting data.

SUBSTITUTION NO.: _____

Specified Item: _____

Specification Section(s)/Paragraph(s): _____

Drawing Number(s): _____

Proposed Substitute: _____
(Include, as applicable, manufacturer's name and address, trade name and model number of product, and name of fabricator or supplier.)

Reason for Proposed Substitution: _____

_____

_____

Net Change to Contract Sum: _____ ☐ No Change; ☐ Deduct $ ____

Change to Contract Time: _____ ☐ No Change;

The following required supporting documents are attached (Check all that apply) Items with a * are mandatory requirements for consideration.:

☐ *Complete Product Data

☐ *Itemized comparison of properties of proposed product to specified product.

☐ *List of other projects on which proposed has been used, with project name, design professional's name and phone number, as well as owner contact name and phone number.

☐ List of maintenance services and replacement materials available.

☐ *Statement of effect of substitution on construction schedule.

☐ *Description of change that will be required in other work or products if substitute product is approved.

ADDITIONAL INFORMATION:

_____

_____

_____

_____

REQUEST FOR SUBSTITUTION:

The undersigned testifies that he/she:

- Is submitting this substitution request within the limits set forth in the Contract Documents.
- Has investigated the proposed product and determined that it is equal or better than the specified product.
- Will provide the same warranty for the proposed product as for the specified product.
- Will coordinate installation and make other changes as required for the work to be complete in all respects, including: (a) redesign and (b) additional components and capacity required by other work affected by the change.
- Waives all claims for additional costs for evaluation of the substitution request, redesign if required, and reapproval by authorities having jurisdiction, if required.
- Will reimburse the Owner for additional costs for evaluation of the substitution request, redesign if required, and reapproval by authorities having jurisdiction, if required.

Contractor's Signature: _____

Typed or Printed Name: _____

Title: _____

Company: _____

Address: _____

Phone Number: _____

Owner Approval: _____ Date: _____

Construction Manager Approval (If Applicable): _____ Date: _____

Garrison Architects Approval: _____ Date: _____

Consulting Engineer Approval: _____ Date: _____

MONTHLY SAFETY & HEALTH REPORT (Required for Payment Application)

Project/Client	Construction Company	Inspector's Name	Date

		Yes	No	N/A
1	Safety and health protection poster on job.			
2	Emergency telephone numbers conspicuously posted.			
3	First aid kit and supplies on job.			
4	Copy of federal safety and health regulations for construction available on job.			
5	Supply of tags or locks to identify unsafe equipment.			
6	Hard hats used where there is a danger of head injury.			
7	Eye, face, ear, hand, foot & respiratory protection on job and used where necessary.			
8	Fire protection programs and fire extinquishers on job.			
9	Construction area lighted to minimum requirements.			
10	All hand and power tools in safe condition.			
11	All power tools properly guarded and grounded, hand held tools equipped with constant pressure switches.			
12	Electric tools grounded or double insulated.			
13	All extension cords (three wire) grounding type.			
14	Temporary lighting properly protected and installed.			
15	Services and fixed electrical equipment grounded and fused properly.			
16	Subpart "K" electrical complete article.			
17	Abrasive wheels and tools properly equipped and used.			
18	L.P.G. and gas storage, use and handling in accordance with appropriate standards. (i.e. capped, secured upright, cart for handling cylinders)			
19	Welding and cutting and transporting, moving and storing of gas cylinders according to standards.			
20	Employees instructed in safe welding and cutting practices.			
21	Fire protection measures taken and protective equipment used in cutting-welding.			
22	Rigging equipment inspected before each use and employees instructed for safe use.			
23	Housekeeping materials stored properly. / Good housekeeping procedures in effect.			
24	Scrap and debris removed.			
25	Egress route, corridor and passageways clean.			
26	Ladders have no broken or missing rungs or siderails (tag or lock bad ladders).			
27	Ladders used properly (1 to 4 pitch, top and bottom clear, side rails extended 36" above landing area & secured).			
28	Scaffold (rolling and free-standing) more than four times minimum base dimension, equipped with ladder.			
29	Platforms tightly planked or full width of scaffold except for necessary entrance opening.			
30	Platforms secured in place.			
31	Scaffolds provided with guardrail of 2" x 2" or equivalent, 42" high; midrail of 1" x 6" or equivalent; 4" toeboard.			
32	Scaffolds secured to the structure every 26ft. Vertically and 30 ft. horizontally			
33	Floor and roof openings and holes effectively protected with guardrails or covers.			
34	Stairways equipped with railings.			
35	Adequate supply of drinking water on job, clearly marked; paper cups.			
36	Appropriate temporary toilet facilities.			
37	Confirm a safety meeting was held this month.			
38	Perimeter guardrail protection provided around all floors 2 stories and above and roof where applicable.			
39	Adequate ventilation of work and storage spaces.			
40	Temporary heating devises inspected.			
41	Exposed rebar capped.			
42	Masonry walls braced?			
43	Trenches properly sloped for soil type.			
44	Trenches not sloped and over 5' deep are shored and braced adequately.			
45	Trenches 4' and deeper have ladder exits at least each 25' of lateral travel.			
46	Materials hoist operating rules posted in operator's station.			
47	Hoist operator's station overhead protection provided.			
48	Hoistway entrances guarded and guards painted.			
49	Onsite Cranes (Current Inspections, Swings radius marked, Clear of power lines, Outriggers and their dunnage properly set)			

SECTION 01310 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Submittals Schedule.
4. Daily construction reports.
5. Material location reports.
6. Field condition reports.
7. Special reports.

1.3 SUBMITTALS

A. Submittals Schedule: Email the schedule. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's and Construction Manager's final release or approval.

B. Contractor's Construction Schedule: Email the baseline schedule. Provide updates on a bi-weekly basis at the progress meetings.

C. Daily Construction Reports: Email daily.

D. Material Location Reports: Email at weekly intervals.

E. Field Condition Reports: Email at time of discovery of differing conditions via RFI with photos and location plan.

1.4 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate subcontractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Initial Submittal: Submit prior to initial application for payment. Submit concurrently with preliminary bar-chart schedule or network diagram. Include all submittals in the schedule. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.
4. Shop drawing log and schedule is to be updated and submitted at each job meeting along with job meeting report form.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Prepare baseline Gantt Chart schedule. Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion

C. Update schedule on a bi-weekly basis (for each project meeting). Updates shall show percent complete for each activity.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (refer to special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial Completions and occupancies.
19. Substantial Completions authorized.

B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation (RFI). Include a detailed description of the differing conditions, photos and location plan together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At bi-weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule at each regularly scheduled progress meeting.

B. Distribution: Email the approved schedule to Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01310

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control. (To be paid and hired by the Owner and coordinated by the Contractor.)

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. See all Contract Documents for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.

D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five (5) previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.

5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven (7) days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.

J. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in the Contract Documents.

1.6 QUALITY CONTROL

A. Contractor Responsibilities: Quality-control services are the Contractor's responsibility. The Owner will hire and pay for a qualified testing agency to perform these services but it is the Contractor's responsibility to coordinate and remedy any non-conforming work. Additional tests that are required resulting from any non-conforming work shall be paid for by the Contractor.

1. Contractor will furnish the Architect and Owner with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
3. The Owner will engage a qualified Special Inspector to conduct special tests and inspections oversight in accordance with DCA Bulletin 03-5. The Owner's special inspection services will not relieve the Contractor of responsibility for certifying the work and completing the contract work in accordance with the Contract Documents.

B. The Contractor shall provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required by authorities having jurisdiction, whether specified or not.

1. The Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Submit a certified written report, of each quality-control service to the Construction Manager, Architect, Owner, Special Inspector and authorities having jurisdiction.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

D. Retesting/Reinspecting: The Contractor shall provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, Owner's Special Inspector and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.

7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.7 SPECIAL TESTS AND INSPECTIONS (BY OWNER)

A. Special Tests and Inspections: Owner will engage a qualified **Testing Agency/Special Inspector** to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner in accordance with DCA Bulletin 03-5, and as follows:

B. Special Tests and Inspections: Conducted by a qualified **Testing Agency/Special Inspector** as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Review test and inspection reports completed by the Contractor's Quality Assurance and Quality Control qualified testing agency. Any irregularities or deficiencies shall be brought to the attention of the Contractor and Architect immediately.
5. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
6. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
7. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

D. The following items shall be tested in accordance with this section if not specifically listed in the Contract Documents as applicable to the Work:

1. Soils and Geotechnical Engineering
2. Foundations
3. Concrete
4. Masonry Reinforcing
5. Structural Steel
6. Cold Formed Steel Framing
7. Roof Trusses (Wood or Steel)
8. Sprayed-on Fire Resistant Materials

END OF SECTION 01400

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BULLETIN 03-5

Issued: November 2003 Revised: September 2022

Subject: Special Inspections

Reference: N.J.A.C. 5:23-2.20(b), 3.14 and 5.3

Chapter 17 of the Building Subcode, entitled "Structural Tests and Special Inspections," is modified by N.J.A.C. 5:23-3.14. As per N.J.A.C. 5:23-2.20(b), for purposes of this chapter of the Building Subcode, a special inspection is an independent verification by a qualified person (special inspector) rendered to the code official for **Class 1 buildings, mass timber elements of Type IV-A, IV-B, and IV-C construction and a smoke control system in any building**. The special inspector is to be independent so that there is no possible conflict of interest. A summary of the special inspections provisions is included to better explain the requirements of the code.

Chapter 17 of the Building Subcode contains requirements for structural tests and special inspections. Certain special inspections required by Chapter 17 of the Building Subcode were deleted upon adoption because, in New Jersey, they are the responsibility of the construction official.

Approved Special Inspection Agencies: Agencies of this nature are regularly engaged in conducting special tests or inspections. Very often, they specialize in one aspect of the construction industry, due to the complexity of construction. This is why a special inspector who is trained in a specific area may be needed to conduct certain inspections. Special inspectors are independent of the contractor and responsible to the building owner or building owner's agent. The established and recognized special inspector, or special inspection agency proposed by the permit applicant for each special inspection, must be acceptable to the construction official.

Certified Special Inspectors: As per N.J.A.C. 5:23-5.3, special inspectors are those who will be required to perform field inspections for structural welding, structural steel and bolting, concrete placement, reinforced concrete, prestressed concrete, structural masonry, mass timber construction, soils, spray-applied fireproofing, and exterior insulation finish systems (EIFS).

Building Permits and Reports: The permit applicant is required to submit a statement of the special inspections to be performed at the time of application. The statement is to be prepared by the responsible person in charge of the work.

Structural Systems: Special inspections are required for the following as per the corresponding sections of the Building Subcode.

- *Fabrication of Structural Load-Bearing Members/Assemblies*, Section 1704.2.5: These inspections are normally handled through an in-plant, quality-control process and reports are forwarded to the local construction code office when the elements are delivered.

- *Steel Construction*, Section 1705.2: This section requires the inspection of certain aspects of the on-site erection of structural steel, cold-formed steel deck, open-web steel joists and joist girders, and cold-formed steel trusses spanning 60 feet or greater. These special inspections include welding, high-strength bolting, joint connection, and temporary restraint/bracing and permanent individual truss member restraint/bracing of cold-formed steel trusses. There are specific exceptions listed in the above-referenced code section. Additional quality control and quality assurance information is available in Chapter N of AISC 360, Specification for Structural Steel Buildings, at *https://www.aisc.org/globalassets/aisc/publications/standards/a360-16-spec-and-commentary_june-2018.pdf*
  → Per N.J.A.C. 5:23-5.3, certified special inspectors are authorized to carry out field inspections for steel construction using the above-referenced section and the following:
    1. Certified Structural Welding Special Inspector -- Inspections in compliance with the applicable AWS standard.
    2. Certified Structural Steel and Bolting Special Inspector -- Inspections are performed to verify compliance with the details shown on the approved construction documents such as bracing, stiffening, member locations, and proper application of joint details at each connection. Inspection of open-web steel joists and joist girders are required to be performed in accordance with Table 1705.2.3. Also, high-strength bolts are to be inspected in accordance with AISC 360 Tables N5.6-1, 6-2 and 6-3.

- *Concrete Construction*, Section 1705.3 This section addresses the placement of structural concrete. Exceptions are listed in the above-referenced section.
  → Per N.J.A.C. 5:23-5.3, certified concrete placement, reinforced concrete and prestressed concrete special inspectors are authorized to carry out field inspections for concrete construction using the above-referenced sections

- *Masonry Construction, Section 1705.4*: This section addresses the placement of structural masonry elements.
  → Per N.J.A.C. 5:23-5.3, certified structural masonry special inspectors are authorized to carry out field inspections of structural masonry and vary based on "occupancy category" as per the above-referenced section.

- *Mass timber construction,* Section 1705.5.3: This section requires inspections of mass timber elements in Types IV-A, IV-B and IV-C construction.
  → Per NJAC 5:23-5.3, certified special inspectors are authorized to carry out continuous and periodic inspections of mass timber construction in accordance with Table 1705.5.3

- *Soils*, Section 1705.6: This section addresses existing site soil conditions, fill placement and load-bearing requirements. A soils report, required as per Section 1803 of the Building Subcode, is used to determine compliance with the placement of load-bearing fill.
  → Per NJAC 5:23-5.3, certified special inspectors are authorized to carry out continuous and periodic inspections of soils in accordance with Table 1705.6.

- *Driven deep (Pile) Foundations*, Sections 1705.7, 1705.8 and 1705.9: These sections require special inspections during the installation of driven, cast-in-place and helical pile foundations. There are no current certification requirements for driven deep foundations special inspectors, however, a licensed design professional is required.

Special Inspections for Seismic Resistance: Special inspections are required for seismic force-resisting systems; designated seismic systems; and architectural, mechanical, and electrical components in Seismic Design Category D, E and F buildings[1]. The following components are special inspections related to seismic resistance found in Section 1705.13 of the Building Subcode.

* Structural Steel
* Structural Wood
* Cold-Formed Steel-Light Frame Construction
* Designated seismic systems
* Architectural Components
* Plumbing, Mechanical and Electrical Components
* Seismic Isolation Systems
* Storage Racks
* Cold-Formed Steel Special Bolted Moment Frames

Structural Testing for Seismic Resistance: Prior to construction, all materials and assemblies used for isolation damping systems in Seismic Design Category D, E and F buildings[1] are required to be tested and verified as per Section 1705.14 for seismically isolated structures.

Finishes:

- *Sprayed, Fire-Resistant Materials*, Section 1705.15: Special inspections are required for sprayed, fire-resistant materials applied to floor, roof and wall assemblies and structural members. Details include condition of the substrates, thickness of application, density in pounds per cubic foot, bond strength adhesion/cohesion and condition of the finished application.
  → Per N.J.A.C. 5:23-5.3, certified special inspectors are authorized to carry out field inspections for sprayed, fire-resistant materials using the above-referenced section and are to be based on the fire-resistance design as designated in the approved construction documents.

- *Mastic and Intumescent Fire-Resistant Coatings*, Section 1705.16: Special inspections are required for mastic and intumescent fire-resistant coatings applied to structural elements and decks and are to be based on the fire-resistance design as designated in the approved construction documents.

- *Exterior Insulation and Finish Systems (EIFS)*, Section 1705.17: Special inspections are required for all EIFS applications. *Exceptions:* installations over a water-resistive barrier with a means of draining moisture to the exterior, or when installed over masonry or concrete
  → Per N.J.A.C. 5:23-5.3, certified special inspectors are authorized to carry out field inspections for all EIFS using the above-referenced section.

- *Fire-resistant penetrations and joints*, Section 1705.18: Special inspections are required for through-penetrations, membrane penetration firestops, fire-resistant joint systems and perimeter fire containment systems in high-rise buildings, in buildings assigned to Risk Category III or IV, or in fire areas containing Group R occupancies with an occupant load greater than 250.

Special Inspection for Smoke Control: A special inspector, qualified as per Section 1705.19.2 of the Building Subcode, is required to test smoke control systems. The inspector inspects for leakage testing, recording of device location, pressure difference testing, flow measurements, and detection and control verification.

Special Cases: N.J.A.C. 5:23-2.19(a) authorizes the building subcode official to require special inspections for proposed work that is unusual in nature. Some examples include alternative construction materials and systems, unusual design applications of materials, and materials and systems required to be installed in accordance with additional manufacturer's instructions that prescribe requirements not contained or referenced in the Building Subcode.

Examples:

- Any building that meets N.J.A.C. 5:23-4.3A(d)3, Class 1 building → apply applicable special inspections.
- Any Class building of Type IV-A, IV-B, and IV-C construction → apply mass timber special inspection.
- Any Class building of any construction type with a smoke control system → apply smoke control special inspection.

[1] Seismic Design Categories are determined in accordance with Section 1613 of the building subcode. In order to utilize the equations, figures and tables of this section, one will need the Site Class definition per the ASCE 7, as adopted at Chapter 35 of the building subcode, and the Risk Category per Table 1604.5 of the building subcode.

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1.1 GENERAL

A. Summary: This Section specifies construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection facilities.

B. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, fire department and rescue squad rules. Local traffic requirement.
5. Environmental protection regulations.
6. New Jersey Department of Education.
7. ADA requirements.
8. OSHA.

The Contractor may be required to pay for and obtain building permits, temporary construction trailer permits, etc. as required by the local construction code office.

C. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."

D. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

E. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. Submit reports and tests, inspections, meter readings, and procedures performed on temporary utilities. At the earliest time, change over from use of temporary service to use of permanent service.

1.2 PRODUCTS

A. Materials: Provide new materials. If acceptable to the Architect, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.

1. Lumber and Plywood: Comply with Division 6 Section "Rough Carpentry." Provide UL-labeled, fire-treated lumber and plywood for temporary offices and sheds. Provide exterior, Grade B-B high density concrete form overlay plywood for signs. Provide 5/8" (16 mm) thick exterior plywood for other uses.

2. Roofing Materials: Provide UL Class A standard-weight asphalt shingles or UL Class C mineral-surfaced roll roofing on roofs of job-built temporary offices, shops, and sheds.

3. Paint: Comply with requirements of Division 9 Section "Painting."

    a. For exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
    b. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
    c. For interior walls of temporary offices, provide 2 coats interior latex-flat wall paint.

4. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
5. Water: Provide potable water approved by local health authorities.
6. Open-Mesh Fencing: Provide 0.120-inch- (3-mm-) thick, galvanized 2-inch (50-mm) chain-link fabric fencing 6 feet (2 m) high with galvanized steel pipe posts, 1-1/2 inches (38 mm) I.D. for line posts and 2-1/2 inches (64 mm) I.D. for corner posts.

B. Equipment: Provide new equipment.

1. Water Hoses: Provide 3/4-inch (19-mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet (30 m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
2. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
3. Electrical Power Cords: Grounded extension cords. Use hard-service cords where exposed to abrasion and traffic.
4. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
5. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
6. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.

    a. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

1.3 EXECUTION

A. Installation, General: Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

1. **Provide each facility ready for use when needed to avoid delay.** Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
2. Conditions of Use: Keep temporary facilities clean and neat in appearance. Operate safely and efficiently. Relocated as the Work progress. Do not overload facilities or permit them to interfere with progress. Take necessary fire prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

B. Temporary Utility Installation: The **Contractor** shall Engage the local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.

1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
4. Use Charges: The Owner will be responsible for the temporary utility use costs for the utilities supplied through the existing permanent service to the building. This will include both water and electric usage costs. The contractor will be responsible for the cost of material and labor to hook-up and maintain the temporary services through Substantial Completion.
5. Temporary Water Service: (Installed and maintained by Contractor). Install temporary water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use. If temporary water is connected to the Owner's line, the Owner will be responsible for the usage cost for the water that is supplied through the building's permanent services.
6. Temporary Electric Power Service: (installed and maintained by Contractor). Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear. The Owner will be responsible for the electrical usage cost for power that is supplied through the building's permanent service.
    a. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage.
    b. Temporary Lighting: Provide temporary lighting with local switching to fulfill security requirements and illumination for construction operations and traffic conditions.

c. If temporary power/lighting connect to the Owner's panel, the Contractor shall compensate the Owner for the electrical usage.

d. Under no circumstances will the temporary electric be turned off due to labor disputes, work hours, etc. **If any Prime Subcontractor wants to or is working second shift, Saturdays, Holidays, or any other time, temporary electric shall be provided by the Contractor and usage paid for by the Contractor at no additional cost.**

C. Temporary Heat: (installed and paid of usage by Contractor). Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Temporary heat must be on to dry out masonry walls at least two weeks prior to painting. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy. All temporary heat must be on by **November 11th**. Anywhere in the building, the minimum temperature is to be 60 degrees Fahrenheit.

1. Heating Facilities: **The use of the building's permanent HVAC systems is prohibited and shall not be used. The building must be 100% white glove clean and dust free prior to starting the HVAC system**. Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP-gas or fuel-oil heaters with individual space thermostatic control. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.
2. Safety Requirements: provide a fire extinguisher for each heating unit. Comply with all local, governmental and manufacturer's requirements for safe operation.

D. Temporary Telephones: The Contractor shall be responsible for their own telephone service.

E. Sanitary Facilities: (installed and paid for maintenance by Contractor). Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.

1. Toilets: Install self-contained, single occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass fiber reinforced polyester steel or similar nonabsorbent material. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted. The construction team is not permitted to use the building at any time. Provide separate facilities for male and female personnel. Provide the number of units as required by code.

F. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

1. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

G. Support Facilities Installation: Locate field offices, storage sheds, and other temporary construction and support facilities for easy access. Maintain facilities until near Substantial Completion. Remove prior to Substantial Completion. If the Contractor wants their own offices, they may provide them. The location will be determined by the Owner.

1. Construction Manager, Owner's Field Office: **NOT REQUIRED**
2. A separate construction trailer shall be provided for the Contractor's use.
3. Provide incombustible construction for offices, shops, and sheds located within the construction area or within 30 feet (9 m) of building lines. Comply with requirements of NFPA 241.
4. Storage and Fabrication Sheds: (Contractors): Install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on-site.
5. Dewatering Facilities and Drains: (by Contractor). For temporary drainage and dewatering facilities and operations, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water.
6. Temporary Enclosures: (by Contractor). Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

    a. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 sq. ft. (2.3 sq. m) or less with plywood or similar materials.
    b. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.

7. Temporary Lifts and Hoists: The Contractor shall provide facilities for hoisting their own materials.

8. Project Signs: The Contractor shall furnish and install 4' x 8' project identification and other signs where indicated to inform the public and persons seeking entrance to the Project. Support on framing of preservative treated wood or steel. Do not permit installation of unauthorized sings. Engage an experienced sign painter to apply graphics. Comply with details indicated. The content of sign shall be similar to the cover sheet of the drawings plus all prime subcontractors' names.
9. Temporary Exterior Lighting: (Contractor) Install exterior yard and sign lights so signs are visible when Work is being performed.

10. Collection and Disposal of Waste: (Contractor). The Contractor shall collect their own waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly.

    a. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C).

11. Pest Control: (by Contractor). Retain an exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and control procedures at regular intervals so the Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

H. Access to the building pad (by the Contractor): The Contractor shall provide and maintain through the construction project a stoned access roadway for vehicles and deliveries to the building pad and as required around the building pad. This temporary access roadway shall be installed at the beginning of the project and be removed at the end of the project with the area affected fully restored.

I. Security and protection facilities installation: (by Contractor). Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Architect.

1. Temporary Fire Protection: (by Contractor). Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."

    a. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
    b. Store combustible materials in containers in fire-safe locations.
    c. Prohibit smoking in hazardous fire-exposure areas.
    d. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

2. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

3. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
4. Enclosure Fence: Before excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.

    a. Provide open-mesh, chain-link fencing with posts set in a compacted mixture of gravel and earth.
    b. Provide plywood fence, 8 feet (2.5 m) high, framed with four 2-by-4-inch (50-by-100-mm) rails, and preservative-treated wood posts spaced not more than 8 feet (2.5 m) apart.
    c. The Contractor shall provide a temporary construction fence whether shown on the contract documents or not as required to separate the area or areas under construction from the Owner's area or areas used by the public. The temporary fencing shall be approved by the Owner prior to installation. Temporary construction fence shall be minimum 6' height; any fence facing occupied student areas must have opaque wind screen securely fastened to each fence panel.

5. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
6. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

J. Operation: The Contractor shall be responsible to enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

K. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements. Maintain temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

L. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

M. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.

2. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:

   a. Replace air filters and clean inside of ductwork and housings.
   b. Replace significantly worn parts and parts subject to unusual operating conditions.
   c. Replace lamps burned out or noticeably dimmed by hours of use.

3. Prior to Final Completion, restore site damages resulting from construction activities. This includes, but is not limited to: removal of temporary fencing; restoring site disturbance resulting from contractor parking, trailers, sanitary facilities, dumpsters, construction equipment, etc. Site restoration to include fine grading with approved topsoil and reseeding with approved seed.

END OF SECTION 01500

SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous construction waste.
2. Recycling nonhazardous construction waste.
3. Disposing of nonhazardous construction waste.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

D. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

E. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE GOALS

A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 50 percent by weight of total waste generated by the Work.

B. Salvage/Recycle Goals: Owner's goal is to salvage and recycle as much nonhazardous construction waste as possible including the following materials:

1. Construction Waste:

a. Site-clearing waste.
b. Masonry and CMU.
c. Lumber.

d. Wood sheet materials.
e. Wood trim.
f. Metals.
g. Roofing.
h. Insulation.
i. Carpet.
j. Gypsum board.
k. Piping.
l. Electrical conduit.
m. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

1) Paper.
2) Cardboard.
3) Boxes.
4) Plastic sheet and film.
5) Polystyrene packaging.
6) Wood crates.
7) Plastic pails.

1.5 SUBMITTALS

A. Waste Management Plan: Submit 3 copies of plan within 30 days of date established for the Notice to Proceed.

B. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.7 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

D. Forms: Prepare waste management plan on forms included at end of Part 3.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 1 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: Not permitted on Project site.

C. Salvaged Items for Owner's Use:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site.
5. Protect items from damage during transport and storage.

D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

3.3 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 4-inch (100-mm) size.

B. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Clean and stack undamaged, whole masonry units on wood pallets.

C. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

D. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

E. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

F. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

1. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.

G. Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

H. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

I. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 01524

SECTION 01600 - MATERIALS AND EQUIPMENT

1.1 GENERAL

A. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock.

1. "Named Products" are items identified by the manufacturer's product name, including make or model number or designation, shown or listed in the manufacturer's published product literature.

B. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

C. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

D. Product List: Products required are included in all sections of these specifications. Provide the manufacturer's name and proprietary product names for each item. Coordinate product list with the Contractor's Construction Schedule and Submittal Schedule.

1. Form: Prepare product list with information on each item tabulated under the following column headings:

a. Related Specification Section number.
b. Generic name used in Contract Documents.
c. Proprietary name, model number, and similar designations.
d. Manufacturer's name and address.
e. Supplier's name and address.
f. Installer's name and address.
g. Projected delivery date or time span of delivery period.

2. Within 30 days after date of commencement of the Work, submit 3 copies of the product list. Provide a written explanation for omissions of data and variations from Contract requirements.
3. The Architect will respond within 2 weeks of receipt of the list. No response within this period constitutes no objection to listed manufacturers or products but does not waive the requirement that products comply with Contract Documents. The Architect's response will include a list of unacceptable products.

E. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.

1. When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected.

F. Nameplates: Except for required labels and operating data, do not attach manufacturer's nameplates or trademarks on surfaces exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:

    a. Name of product and manufacturer.
    b. Model and serial number.
    c. Capacity.
    d. Speed.
    e. Ratings.

G. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery as early as possible. Coordinate with installation to assure safety for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
2. Deliver products in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
3. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
4. Store products to facilitate inspection and measurement of quantity or counting of units. Store heavy materials away from the structure in a manner that will not endanger the supporting construction.
5. Store products subject to damage by the elements aboveground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

1.2 PRODUCTS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.

1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

B. Product Selection Procedures: Procedures governing product selection include the following:

a. Proprietary Specification Requirements: Where products are specified by name, accompanied by the term "or equal" or "or approved equal" comply with specified product standards and data to obtain approval for use of an unnamed product. Where products are specified by name not accompanied by the term "or equal" or "or approved equal" comply with specified product standards and data to obtain approval for use of an unnamed product. See Specification Section 01300, "Submittals," page 01300-6 and 01300-7, Paragraph 2.1 for specific Substitution requirements.

2. Nonproprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning submissions to obtain approval for use of an unnamed product.
3. Descriptive Specification Requirements: Where Specifications describe a product, listing characteristics required, with or without use of a brand name, provide a product that provides the characteristics and otherwise complies with requirements.
4. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply and are recommended for the application. Manufacturer's recommendations may be contained in product literature or by the manufacturer's certification of performance.
5. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
6. Visual Matching: Where Specifications require matching a Sample or existing building items, the Architect's decision on whether a product matches will be final.
7. Visual Selection: Where requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product that complies with other requirements. The Architect / Owner will select the color, pattern, and texture from the product line selected.

1.3 EXECUTION

A. Comply with manufacturer's instructions for installation of products. Anchor each product securely in place, accurately located and aligned with other Work. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600

SECTION 01700 - CONTRACT CLOSEOUT

1.1 GENERAL

A. Please refer to the **"PROJECT CLOSEOUT CHECKLIST"** at the end of this section for the summary of materials required to complete the contract obligation. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

B. Substantial Completion: The Contractor shall request the Owner and Architect to inspect the job and perform a punch list to certify Substantial Completion. Refer to Specification Section AIA 201 General Conditions of the Contract for Construction, paragraph 9.8, for the definition of Substantial Completion. Before requesting inspection for certification of Substantial Completion, the Contractor shall complete the following:

1. "PUNCH LIST": Before the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list (PUNCH LIST) of items to be completed or corrected. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

2. The Contractor shall perform a Quality Control / Quality Assurance QC/QA Punchlist of all work prior to requesting Substantial Completion and a punch list from the Owners Team. The Contractor's Project Manger shall take the lead and conduct an onsite review with the Contractor's superintendent and representation from every major sub prime contractor. Notification of this onsite walk thru shall be provided in writing to all members of the Owners Team who may or may not choose to attend. The Contractor's Project Manager shall record and distribute this QC/QA Punchlist in a matrix that provides an additional column for the Contractor to document the completion of the work and the date. After successful completion of the Contractor's QC/QA Punchlist and all work, the Contractor shall request the Architect perform a Punchlist. Substantial Completion shall be requested in accordance with paragraph 9.8.1 of Specification Section AIA 201 General Conditions of the Contract for Construction,

3. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the Work claimed as substantially complete.

    a. Include supporting documentation for completion and an accounting of changes to the Contract Sum.

4. Advise the Owner of pending insurance changeover requirements.
5. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
6. Submit record drawings, maintenance manuals, and, if specified elsewhere, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
7. Deliver tools, spare parts, extra stock, and similar items.
8. Changeover locks and transmit keys to the Owner.

9. Changeover temporary construction utilities to Owner including electric, water, gas, sewer, storm, fire protection, etc.
10. Complete startup testing of systems and instruction of operation and maintenance personnel. Remove temporary facilities, mockups, construction tools, and similar elements.
11. Complete final cleanup requirements, including touchup painting.
12. Touch up and repair and restore marred, exposed finishes.
13. Submit Certificate of Occupancy/Approval
12. Remove temporary covered walkway, fence, and complete all curbs, paving, concrete walks, etc.

C. Inspection Procedures: On receipt of a request for inspection, the Architect will advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Architect will repeat inspection when requested and assured that the Work is substantially complete.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

D. Final Acceptance: Please refer to the **"FINAL PAYMENT CHECKLIST"** at the end of this section for the summary of materials required to complete the contract obligation. All **"PROJECT CLOSEOUT CHECKLIST"** items shall be completed before requesting Final Acceptance or Final Payment.

E. Reinspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work has been completed, except for items whose completion is delayed under circumstances acceptable to the Owner and Architect.

1. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance. If the Work is incomplete, the Architect will advise the Contractor of Work that is incomplete or obligations that have not been fulfilled but are required.
2. If necessary, one (1) reinspection will be provided free of cost to the Contractor. If the Contractor fails to complete the work and a third or subsequent inspections are required, then the Contractor agrees to pay the Owner and/or Architect for all extra inspections.

F. Record Document Submittals: Do not use record documents for construction. Protect from loss in a secure location. Provide access to record documents for the 's (if applicable) / Architect's reference.

G. Record Drawings: Maintain a set of Original Signed and Sealed Prints of Contract Documents and Shop Drawings in the job trailer accessible to the Local Authority having jurisdiction, Owner and/or Architect. The drawings shall be updated daily. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark the drawing most capable of showing conditions fully and accurately. Give attention to concealed elements.

1. Mark sets with red pencil. Use other colors to distinguish between variations in separate categories of the Work.
2. Organize record drawing sheets into manageable sets. Bind with durable-paper cover sheets; print titles, dates, and other identification on the cover of each set.

H. Maintenance Manuals: Organize operation and maintenance documents into two (2) sets of manageable size. Bind in individual, heavy-duty, 2-inch (51-mm), 3-ring, binders, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include all the information required in the **"PROJECT CLOSEOUT CHECKLIST." Project Closeout Checklist Documents including these Maintenance Manuals shall be delivered to the OWNER.**

1.2 PRODUCTS

1.3 EXECUTION

A. Operation and Maintenance Instructions: The Contractor shall coordinate and arrange for each Installer/Manufacturer to provide instruction in proper operation and maintenance to the Owner's Staff. Refer to the applicable Specification Section for the requirements of Owner Instruction. The Owner and Architect shall be notified of this instructional meeting 3 days in advance. The instructional meeting shall include a detailed review, but not be limited to, the following items:

1. Maintenance manuals.
2. Spare parts, tools, and materials.
3. Lubricants and fuels.
4. Identification systems.
5. Control sequences.
6. Hazards.
7. Warranties and bonds.
8. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following:

1. Startup and shutdown.
2. Emergency operations and safety procedures.
3. Noise and vibration adjustments.

C. Final Cleaning: Employ experienced cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Complete the following operations before requesting inspection for certification of Substantial Completion.

1. Remove labels that are not permanent labels.
2. Clean transparent materials, including mirrors and glass. Remove glazing compounds. Replace chipped or broken glass.
3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. The Contractor shall clean vinyl composite tile, ceramic tile, terrazzo, sealed concrete, etc. "mop clean." Strip all VCT flooring and apply three coats of wax. Vacuum carpeted surfaces.
4. Wipe surfaces of mechanical and electrical equipment to a dust free condition.

Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures and lamps.

5. Clean the site of rubbish, litter, and foreign substances. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even-textured surface.

D. Removal of Protection: Remove temporary protection and facilities.

E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Remove waste materials and dispose of lawfully.

F. Contractor shall provide an as-built survey of all installed utilities, as well as existing utility features to remain that are uncovered during construction, including locations and elevations. The as-built survey shall be provided as a hard copy plan sheet and in electronic format (AutoCAD or similar file type) on a CD, flash drive or similar acceptable electronic media.

END OF SECTION 01700

PROJECT CLOSEOUT CHECKLIST

CONTRACTOR MUST COMPLETE AND SUBMIT (1) ONE SET OF AS-BUILT DOCUMENTS, TWO (2) SETS OF CLOSEOUT BINDERS AND ONE (1) TRAINING VIDEO TO THE OWNER OR WITH AN ELECTRONIC COPY OF THE AS-BUILT DOCUMENTS EMAILED TO THE OWNER, (if applicable) AND ARCHITECT

Complete,
Incomplete or
N/A _____

AS-BUILT DOCUMENTS - ONE SET per Building Location

* All As-Built Documents must be clearly labeled "AS-BUILT" with a date and Contractor's signature.

1. Record "as-built" contract drawings. (1 paper copy & PDF files emailed to the Owner and Architect. In lieu of emailing the file, the Contractor can provide a flash drive of the PDF.)

2. Record "as built" shop drawings. (1 paper copy & PDF files emailed to the Owner and Architect. In lieu of emailing the file, the Contractor can provide a flash drive of the PDF.)

CLOSE-OUT BINDERS - TWO SETS per Building Location

* All items shall be in a 3-ring loose leaf binder, clearly labeled (minimum: building, discipline/trade & year) on Front and Side Spine. Include a helpful table of contents and index tabs. Also provide this information in a PDF File emailed to the Owner.

1. Maintenance manuals/operating and maintenance instruction. See Specification Section 01700.

2. Warranties and bond manual. See Specification Section 01740.
   * WARRANTY CLARIFICATION: Contractor shall separately identify any warranty that requires execution by Owner or otherwise. "Copies" of warranties should be included in the close-out "binder". "Original" warranties requiring execution should be sent under a separate cover. The separate cover should clearly identify the action required to execute the warranty.

3. List of contact persons for the Contractor and all sub-contractors. Include contract responsibility, name of company, name of person, street address, mailing address (if different), telephone and email address.

4. Copy of final inspection reports / permit closeout document.

5. Attic Stock, Special tools, spare parts, extra stock materials, etc. shall be turned over to Owner. Include a list in the closeout binder.

OWNER TRAINING VIDEO – ONE COPY per Building Location

FINAL PAYMENT CHECKLIST

Complete, *** DO NOT submit Final Payment until all items can be included.**

Incomplete or
N/A _____

CONTRACTOR MUST COMPLETE AND SUBMIT (3) THREE SETS OF COLLATED, NOTARIZED ORIGINALS & (1) ONE COMPLETE ELECTRONIC COPY VIA EMAIL TO THE ARCHITECT WITH FINAL PAYMENT APPLICATION:

1. An Index of Documents Included on the Contractor's Letterhead.
2. Owner Payment Voucher (if required by Owner).
3. AIA Payment Application.
4. AIA Document G706 – 1994 Contractor's Affidavit of Payment of Debts and Claims
5. AIA Document G706A – 1994 Contractor's Affidavit of Release of Liens
6. Contractor's Certification of Completion
7. AIA Document G707 – 1994 Consent of Surety to Final Payment
8. Maintenance Bond for 100% of the Project Cost for a warranty period of two (2) years from the Date of Final Acceptance.
9. The Contractor shall not use any product containing asbestos and all plumbing shall be lead free. The Contractor shall provide a notarized letter stating: " No asbestos containing materials were provided on the project and the plumbing is lead free."
10. Contractor shall furnish a letter agreeing to provide complete parts and labor service and maintenance of all HVAC systems, equipment, devices, controls, etc., for 2 years from date of substantial completion as determined by architect. The letter shall also affirm that the Contractor will provide scheduled maintenance service quarterly (3-month interval) as the maximum time period between scheduled service.
11. Certificate of Occupancy or Acceptance by the Local Construction Official.
12. Provide a Fire Alarm System NFPA Record of Inspection and Testing Certification Form.

ADDITIONAL REQUIREMENTS TO BE SATISFIED PRIOR TO CERTIFICATION OF FINAL PAYMENT:

1. Project Closeout Documents (submit separately as indicated on the Project Closeout Checklist).

SECTION 01740 - WARRANTIES AND BONDS

1.1 GENERAL

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.
2. Requirements for Warranties and Bonds for products and installations that are specified are included in the individual sections of these specifications.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

D. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

E. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

F. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefitted from use of the Work through a portion of its anticipated useful service life.

G. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
2. Where the Contract Documents require a special warranty, or similar commitment, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

H. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, submit written warranties upon request of the Architect.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within 15 days of completion of that designated portion of the Work.

I. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.

1. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

J. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.
3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.2 PRODUCTS (Not Applicable)
1.3 EXECUTION (Not Applicable)

END OF SECTION 01740

SECTION 01770 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1. Related Documents

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 Summary

A. This Section requires the selective removal, salvage to Owner and/or subsequent offsite disposal of the following:

1. Removal of HVAC equipment and/or relocation of pipes, conduits, ducts and/or other mechanical and electrical work as required and specified in other Divisions.
2. Cutting nonstructural concrete floors and masonry walls for piping, ducts and/or conduits as required to perform the work specified in other Divisions. Refer to the respective mechanical and electrical specification sections for additional demolition requirements.

1.3 Submittals

A. General: Submit the following in accordance with General Conditions of the Contract and Division 1 Specification Section: SUBMITTALS.

B. Schedule indicating proposed sequence of operations for selective demolition work to the Construction Manager for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.

1. Provide a detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
2. Coordinate with Owner's continuing occupancy of portions of existing building and site.

C. Photographs of existing conditions of structures, HVAC equipment and adjacent improvements that might be misconstrued as damage related to removal operations. File with Owner's Representative prior to start of work.

1.4 Job Conditions

A. Condition of Structures: Owner assumes no responsibility for actual condition of structures to be demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner insofar as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of demolition work.

B. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.

1. Storage or sale of removed items will not be permitted on site.

C. Protections: Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.

1. Erect temporary covered passageways as required by authorities having jurisdiction.
2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structures to be demolished and adjacent facilities to remain.
3. Protect from damage existing finish work that is to remain in place that becomes exposed during selective demolition operations.
4. Protect floors with suitable coverings to protect from demolition activities.
5. Construct temporary insulated dust-proof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dust-proof doors and security locks.
6. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
7. Remove protections at completion of work.
8. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to occupied portions of building.

D. Damages: Promptly repair damages caused to adjacent facilities by selective demolition operations.

E. Traffic: Conduct selective demolition operations and debris removal of to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close, block or otherwise or obstruct streets, walks, or other occupied or used facilities without permission from the Owner or the authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

F. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.

G. Utility Services: Maintain existing utilities indicated to stay in service and protect against damage during selective demolition operations.

1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities. **WATER SERVICE MUST REMAIN UNINTERRUPTED TO ALL PORTIONS OF THE BUILDING(S) AND SITE.**

2. Maintain fire protection services during selective demolition operations.

H. Environmental Controls: Use water sprinkling, temporary enclosures and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.

1. Do not use water when it may cause damage or create hazardous or objectionable conditions such as ice, flooding and pollution.

I. Occupancy: Owner will occupy portions of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advanced notice to Owner of demolition activities that will affect Owner's normal operations.

PART 2 - ITEMS TO BE SALVAGED AND RETAINED AS PROPERTY OF THE OWNER

A. Items to be relocated/reset or turned over to the Owner, shall be safely stored by the Contractor until relocation or turning over to the Owner is possible. Owner shall have first right of refusal for RTUs prior to removal from site.

PART 3 – EXECUTION

3.1 Preparation

A. General: Provide interior and exterior shoring, bracing or support to prevent movement, settlement or collapse of areas to be demolished and adjacent facilities to remain.

1. Cease operations and notify the Owner and Architect immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

2. Cover and protect furniture, equipment and fixtures from spoilage or damage when demolition work is performed in areas where such items have not been removed.

3. Erect and maintain dust-proof partition and closures as required to prevent spread of dust or fumes to occupied portions of the building.

a. Provide weatherproof closures for exterior openings resulting from demolition work.

b. Where selective demolition occurs immediately adjacent to occupied portions of the building, construct dust-proof partitions of minimum 4-inch studs, ⅝-inch drywall (joints taped) on occupied side, ½-inch fire retardant plywood on demolition side. Fill partition cavity with sound deadening insulation.

4. Locate, identify, stub off and disconnect utility services that are not indicated to remain.

a. Provide bypass connections as necessary to maintain continuity of service to occupied area of building. Provide minimum of 72 hours advance notice to Owner if shutdown of service is necessary during changeover.

3.2 Demolition

A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.

1. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
2. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.

B. If unanticipated mechanical, electrical or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written accurate detail. Pending receipt of directive from Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

C. Vermin Control: Employ a certified, licensed exterminator and treat entire area of building demolition and removal as well as entire area of all building additions in accordance with governing health regulations for rodent and insect control.

3.3 Salvaged Materials

A. General: Salvaged Items are those so indicated on Drawings or Schedules, or as listed in this Section. Carefully remove salvaged items; clean and protect until disposition.

1. Items to be incorporated into new work: Store until required for installation or for required modification or restoration.
2. Other salvage items: Turn over to Owner and obtain receipt.

B. Salvage items damaged during demolition shall be replaced by the Contractor with equivalent new items at no cost to the Owner.

3.4 Disposal of Demolished Materials

A. General: Remove from building site debris, rubbish and other materials resulting from demolition operations. Transport and legally dispose off-site.

1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws and ordinances concerning removal, handling and protection against exposure or environmental pollution.

2. Burning of removed materials is not permitted on project site.

3.5 Cleanup and Repair

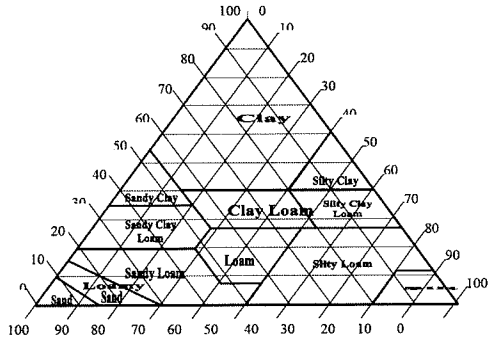
A. General: Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.

1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start of operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION 01770

ENVIRONMENTAL RESOLUTIONS, INC.
Engineers · Planners · Scientists · Surveyors

Environmental Resolutions, Inc.
Soil Boring Log



Project: **Southampton Municipal Building**
Location: 5 Retreat Rd, Southampton Township, NJ 08088
Job Number: **70527-06**
Date: 9/25/26
Driller: J. Carson
Technician: S. Marion
Equipment: 3 1/4" Hand Auger

Boring No.: SB-1

Depth(in.)	Munsell® Color	Type	Structure	Consistency	% gravel	Mottles Color	Mottles Abundance	Mottles Size	Mottles Contrast
0-6"		TOPSOIL							
6-18"	10YR 3/4 Dark Yellowish Brown	Loamy Sand	Sub-Angular Blocky	Friable	0%				
18-30"	7.5YR 4/6 Strong Brown	Loamy Sand	Sub-Angular Blocky	Friable	0%				
30-54"	7.5YR 5/4 Strong Brown	Loamy Sand	Sub-Angular Blocky	Friable	0%				
54-68"	2.5Y 6/6 Olive Yellow	Loamy Sand	Sub-Angular Blocky	Friable	0%				
68-72"	2.5Y 6/8 Olive Yellow	Loamy Sand	Sub-Angular Blocky	Friable	0%	5YR 5/8 Yellowish Red	Common	Medium	Distinct

NOTE:
Mottling encountered at 68"

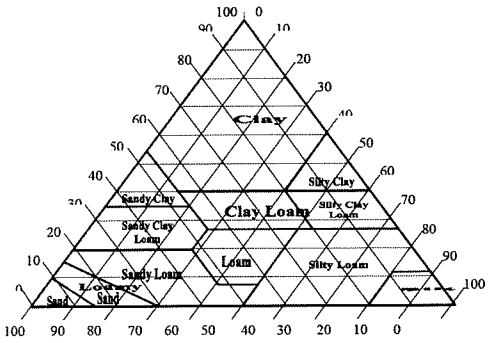
Ground Water Depth from Surface: NE

Estimated Seasonal High Water Table Depth from Surface: 68"

** The purpose of this soil log is to show general soil characteristics and ground water information only. Bidders shall conduct their own surface and subsurface investigations to ascertain all the facts concerning physical conditions above and below the surface of the ground at the site of the project. Additionally, soil classified above is based on visual assessment only. No guarantee is made that soils listed will meet NJDOT standards and requirements.

ENVIRONMENTAL RESOLUTIONS, INC.
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Environmental Resolutions, Inc.
Soil Boring Log



Project: **Southampton Municipal Building**
Location: 5 Retreat Rd, Southampton Township, NJ 08088
Job Number: **70527-06**
Date: 9/25/26
Driller: J. Carson
Technician: S. Marion
Equipment: 3 1/4" Hand Auger

Boring No.: SB-2

Depth(in.)	Munsell® Color	Type	Structure	Consistency	% gravel	Mottles			
						Color	Abundance	Size	Contrast
0-6"		TOPSOIL							
6-21"	10YR 3/4 Dark Yellowish Brown	Sandy Loam	Sub-Angular Blocky	Friable	0%				
21-55"	7.5YR 4/6 Strong Brown	Loamy Sand	Sub-Angular Blocky	Friable	0%				
55-60"	7.5YR 5/4 Strong Brown	Loamy Sand	Sub-Angular Blocky	Friable	0%	5YR 5/8 Yellowish Red	Common	Medium	Distinct

NOTE:
Mottling encountered at 55"

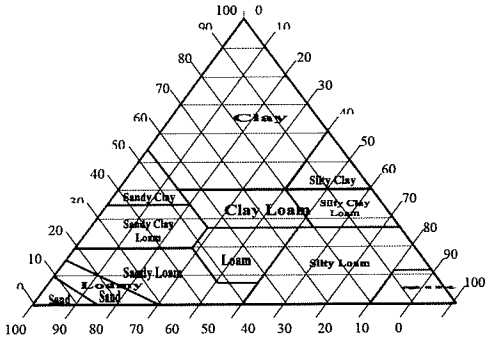
Ground Water Depth from Surface: NE

Estimated Seasonal High Water Table Depth from Surface: 55"

** The purpose of this soil log is to show general soil characteristics and ground water information only. Bidders shall conduct their own surface and subsurface investigations to ascertain all the facts concerning physical conditions above and below the surface of the ground at the site of the project. Additionally, soil classified above is based on visual assessment only. No guarantee is made that soils listed will meet NJDOT standards and requirements.

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Soil Boring Log



Project: **Southampton Municipal Building**
Location: 5 Retreat Rd, Southampton Township, NJ 08088
Job Number: **70527-06**
Date: 9/25/26
Driller: J. Carson
Technician: S. Marion
Equipment: 3 1/4" Hand Auger

Boring No.: SB-3

Depth(in.)	Munsell® Color	Type	Structure	Consistency	% gravel	Mottles			
						Color	Abundance	Size	Contrast
0-12"		TOPSOIL							
12-22"	7.5YR 3/3 Dark Brown	Sandy Loam	Sub-Angular Blocky	Friable	0%				
22-52"	10YR 6/8 Brownish Yellow	Loamy Sand	Sub-Angular Blocky	Friable	0%				
52-70"	10YR 5/2 Grayish Brown	Loamy Sand	Sub-Angular Blocky	Friable	0%				
70-76"	2.5Y 7/1 Light Gray	Loamy Sand	Sub-Angular Blocky	Friable	0%	2.5YR 5/8 Red	Few	Fine	Distinct

NOTE:
Mottling encountered at 70"

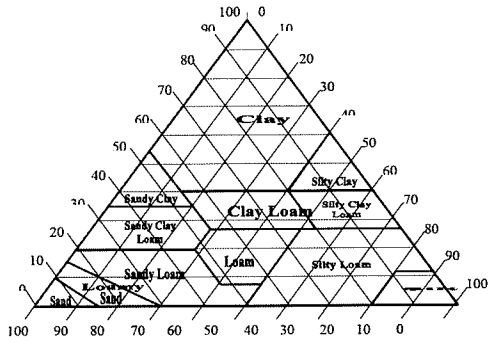
Ground Water Depth from Surface: NE

Estimated Seasonal High Water Table Depth from Surface: 70"

** The purpose of this soil log is to show general soil characteristics and ground water information only. Bidders shall conduct their own surface and subsurface investigations to ascertain all the facts concerning physical conditions above and below the surface of the ground at the site of the project. Additionally, soil classified above is based on visual assessment only. No guarantee is made that soils listed will meet NJDOT standards and requirements.

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Soil Boring Log



Project: **Southampton Municipal Building**
Location: 5 Retreat Rd, Southampton Township, NJ 08088
Job Number: **70527-06**
Date: 9/25/26
Driller: J. Carson
Technician: S. Marion
Equipment: 3 1/4" Hand Auger

Boring No.: SB-4

Depth(in.)	Munsell® Color	Type	Structure	Consistency	% gravel	Mottles			
						Color	Abundance	Size	Contrast
0-12"		TOPSOIL			50%				
12-32"	10YR 3/4 Dark Yellowish Brown	Loamy Sand	Sub-Angular Blocky	Friable	0%				
32-36"	7.5YR 4/6 Strong Brown	Loamy Sand	Sub-Angular Blocky	Friable	0%	5YR 5/8 Yellowish Red	Common	Medium	Distinct

NOTE:
Mottling encountered at 34"

Ground Water Depth from Surface: 36"

Estimated Seasonal High Water Table Depth from Surface: 34"

** The purpose of this soil log is to show general soil characteristics and ground water information only. Bidders shall conduct their own surface and subsurface investigations to ascertain all the facts concerning physical conditions above and below the surface of the ground at the site of the project. Additionally, soil classified above is based on visual assessment only. No guarantee is made that soils listed will meet NJDOT standards and requirements.

UTILITY LOCATING REPORT

TRINITY Subsurface LLC

Specialist Name: **Andrew Stackhouse** Date: **07/07/2026** Project #: **26-26558.001**

Project Name: **Southampton Municipal Complex - 5 Retreat Rd**

Client Name: **Environmental Resolutions Inc** Client Services Manager: **Paul Amato**

Scope of Work:

Trinity will perform Subsurface Utility Engineering (SUE) Level B utility designating to identify and mark the locations and alignments of all locatable underground utilities in support of planned new fire house construction and safe excavation/construction.

Summary of Work:

Investigated surface features inside/outside of scope
Investigated interior utility rooms
Scanned area with:
-EM Induction
-Radio/Power modes
-Splitbox
-GPR
-Drop the box method
-Two man sweeps

Site Contact:

Signature	Printed Name	Date Signed (MM/DD/YYYY)

Utility Investigation Completed? ✓

Site Walk After Work

Site Contact Present?

Time Spent On-Site

Half Day Full Day ✓

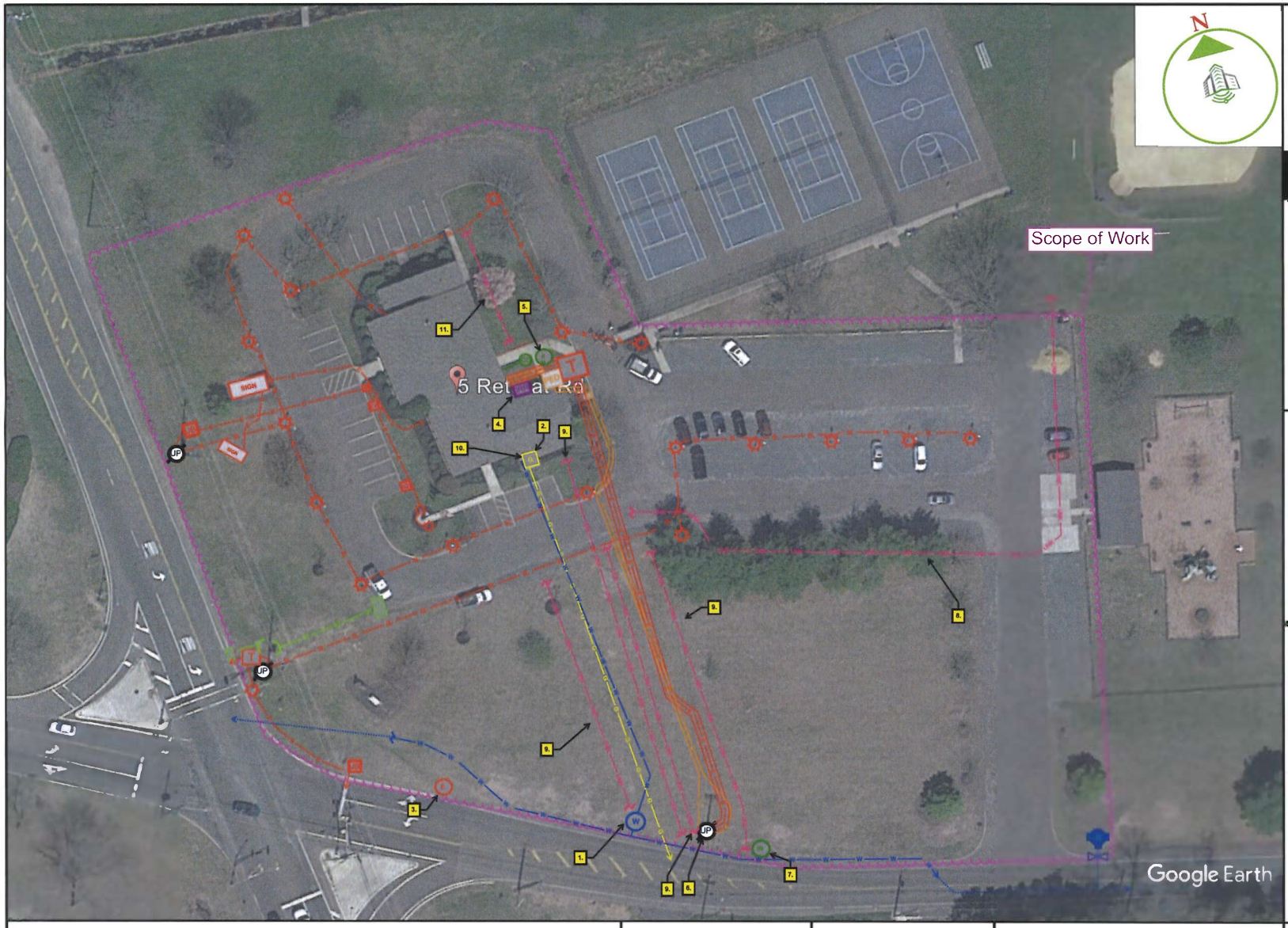
Thank you for choosing Trinity Subsurface, LLC.

Please see the field report with our findings from the project mentioned previously. Should any questions or concerns arise, do not hesitate to contact your project's Client Services Manager. Please utilize the button links for more information on the equipment used to obtain results for this utility investigation and a glossary of commonly used terms used in our field reports.

Glossary Of Terms

Equipment & Limitations

Buttons open electronic copy via the Trinity Subsurface Website.



TRINITY Subsurface LLC
335 Water St.
Wilmington, Delaware, 19804
(855) 387-4648
www.trinitysubsurface.com

FIELD SKETCH

"Not to Scale"

APWA ® UNIFORM COLOR CODE

E	ELECTRIC
C	COMMUNICATIONS
G	GAS
W	WATER
ST	STORM SEWER
SS	SANITARY SEWER
UNK	UNKNOWN
	ASSUMED LINE LOCATION (NOT CONFIRMED, COLOR CORRESPONDS WITH LINE TYPE)

SYMBOL LEGEND

(COLOR WILL CORRESPOND WITH UTILITY TYPE)

- UTILITY POLE
- JUNCTION BOX
- MANHOLE
- END OF INFORMATION
- VALVE
- CONTINUOUS LINE
- UNDERGROUND STORAGE TANK
- CLEANOUT
- SITE LIGHT
- TRANSFORMER
- ELECTRIC SIGN
- GENERATOR
- COMM PEDESTAL
- COMM MARKER
- EMERGENCY CALL BOX
- CAMERA
- WATER VAULT
- FIRE HYDRANT
- POST INDICATOR VALVE
- WATER SPIGOT
- WELL HEAD
- FIRE DEPARTMENT CONNECTION
- IRRIGATION HEAD
- IRRIGATION BOX
- GAS METER/ MANIFOLD
- GAS MARKER
- ROOF DRAIN
- SQUARE INLET
- ROUND INLET
- FORCE MAIN LID
- FORCE MAIN VALVE
- SEPTIC TANK
- GREASE TRAP
- PROPOSED BORING LOCATION
- AREA SCANNED DESIGNATION
- PROPOSED TRENCH LINE

PROJECT NAME	PROJECT NUMBER	DATE	DRAFTED BY	SHEET NUMBER
Southampton Municipal Complex - 5 Retreat Rd	26-26558.001	07/07/2026	Andrew Stackhouse	2 of 4

Notes, Limitations & Suggestions

Notes:

1. Water line located by direct connection onto water meter in manhole. Signal very shaky. Carried signal as far as possible. Assumed lines based on valve locations and water hydrant across highway out of scope. Tried dropping on line to extend with no new information. Line runs with gas line. Approximate depths were 4-6 feet
2. Gas line located with tracer wire. Approximate depths were 2-3 feet
3. Electric manhole labeled DOT. Unable to open due to partial burial of manhole and apparent surface damage
4. PVC irrigation line visible above ground. No control wire present in irrigation valve box
5. Sanitary lift station/force main. Unable to locate effectively without utility prints
6. Utility pole has communications lines that are running to the building aerially as well as the lines found in the ground
7. Unable to get direction on manhole. Filled with water
8. Unknown line located on Radio mode, GPR, and Two man sweeps. After dropping the box on the line the signal was not carried out past the original point of EOI.
9. Unknown lines located with GPR
10. Water and gas lines confirmed on GPR
11. Unknown line located with GPR. Assumed to be irrigation line

Limitations:

-Utility congestion
-No utility prints
-Major splitbox interference in paved areas and areas of utility congestion

Suggestions:

Call 811 to verify any and all public utilities

Vacuum excavation/soft dig on known/unknown lines

VPI on filled sanitary manhole and sanitary/storm systems\

Remark for any lines washed away

Terms and Conditions

Trinity performs geophysical services as outlined by the SUE Quality Level "B" (QLA) of CI/ASCE 38-02 Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data for the above referenced project.

It is the legal requirement and sole responsibility of the client to contact 811 or Miss Utility, or any relevant local authority, to request utility markings before initiating any excavation or construction activities. Trinity Subsurface's services do not substitute or replace the obligation to call Miss Utility prior to excavation.

The utility designation provided herein shall remain valid for a period of thirty (30) days from the date of issuance. Should any work be performed in the designated area subsequent to this period, a re-mark of the utilities must be scheduled. After Trinity Subsurface has completed the utility designation process and marked the utilities, it becomes the client's sole responsibility to ensure the maintenance and preservation of these marks (paint and flags). Trinity Subsurface holds no control over site conditions that may impact the durability or visibility of these marks.

Depending on the changing site conditions, weather, or other factors that may affect the visibility or accuracy of the utility marks, a re-marking of utilities may become necessary. The decision to request a re-marking of utilities should be made by the client in consultation with Trinity Subsurface or the relevant local authority.

Utility Scanning will include a variety of electromagnetic magnetic (EM), radio frequency (RF) and handheld (Concrete) ground penetrating radar (GPR) equipment to determine SUE Quality Level "B" information (the approximate horizontal position of subsurface utilities embedded or below a concrete structure) to identify the potential for Utility conflicts. Underground utilities will be designated in the field with paint, flags, crayon and/or tape according to the American Public Works Association (APWA) Uniform Color Codes. Any utility or mark within four feet (4') of any type of excavation, cut, surface disturbance, etc... must be exposed via test cores to determine/confirm the actual utility type, orientation, depth, number, condition and size. There are several factors that affect the ability to designate the location of subsurface features and as such Trinity strives to minimize, but cannot eliminate, issues associated with excavation activities. For interior scans, Trinity is unable to scan within four inches (4") from any obstructions including walls, columns, surface defects, etc.

Multiple types of equipment are used for every scope of work with the goal of confirming findings with multiple scans. Several factors may limit the ability of a facility to be designated and are listed below. The inability to remediate the below may result with incomplete/partial subsurface data. At the request of the client Trinity may also perform Quality Level A services (test holes via core drilling) to determine the precise horizontal and vertical location of underground utilities.

Limitations
- Utility composition, size, construction and depth.
- Soil saturation / dielectric properties.
- Uneven / coarse terrain.
- Access to utilities either via building or utility structure, such as a manhole, cleanout, utility box, etc.
- Walls or obstructions within four inches (4") prevents scans for parallel conflicts with proposed coring locations and areas of excavation.
- Utility / metallic congestion both above and below the surface.
- Availability of utility records and drawings.
- Site access

Technicians will utilize handheld ground penetrating radar equipment as deemed appropriate to scan for underground utilities, conduits, rebar and/or post tensioning cables embedded within or underneath the concrete slab, walls, or floors. Rebar and/or post tension diameters will not be provided. Either a targeted scan or a general grid sweep will be employed. The grid sweep typically entails numerous areas about 2'x 2' grid patterns in two perpendicular directions with occasional diagonal sweeps. Typically, the outline of detected or imaged structures will be marked in paint or crayon on the ground surface.

Technicians will utilize a suite of electromagnetic utility locating instruments having different frequencies and power settings to detect and follow locatable utility systems under or embedded within the concrete slab. These instruments will have the full characteristics to enable passive and active signal detection by induction, direct connecting, and inductive clamping to identify all privately owned facilities within the project boundaries described by the client. Inactive and abandoned lines will be investigated and marked if possible.

If requested, Trinity also provides Concrete Analysis Services that include the following: Concrete Strength Test, Enhanced Void & Delamination Detection along with 3D Imaging at an additional cost.

Southhampton Minicipal Complex

Vacuum Excavation Report

Trinity Project #: 26-26558.002
Inspection Date: 02 September 2026



TRINITY Subsurface LLC

UNDERSTAND WHAT'S UNDERNEATH

(855) 387-4648
www.trinitysubsurface.com

TEST HOLE LOCATION SHEET

MAP LEGEND

Test Hole Location

Southhampton Minicipal Complex PROJECT NAME	26-26558.002 PROJECT NUMBER	09/02/2026 DATE	Aidan Wilson DRAFTED BY	1 of 1 SHEET NUMBER

TRINITY Subsurface LLC

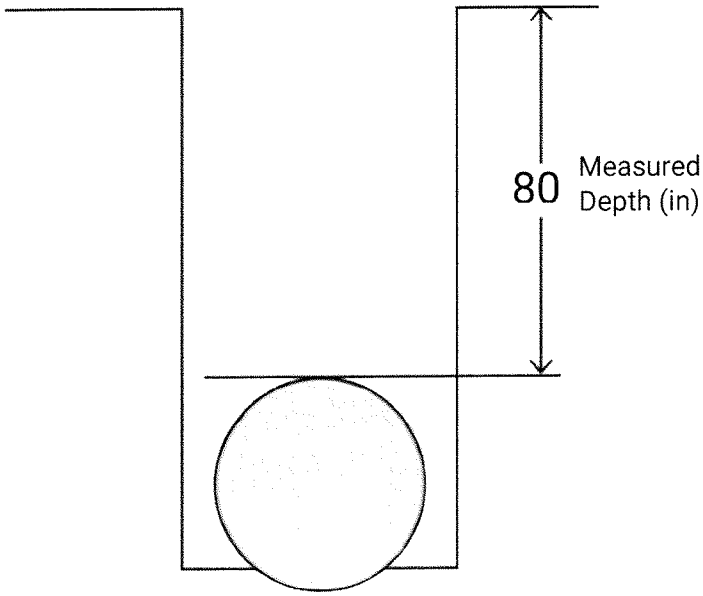
UNDERSTAND WHAT'S UNDERNEATH

TEST HOLE DATA SHEE

(885) 387-464

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Test Hole Profile

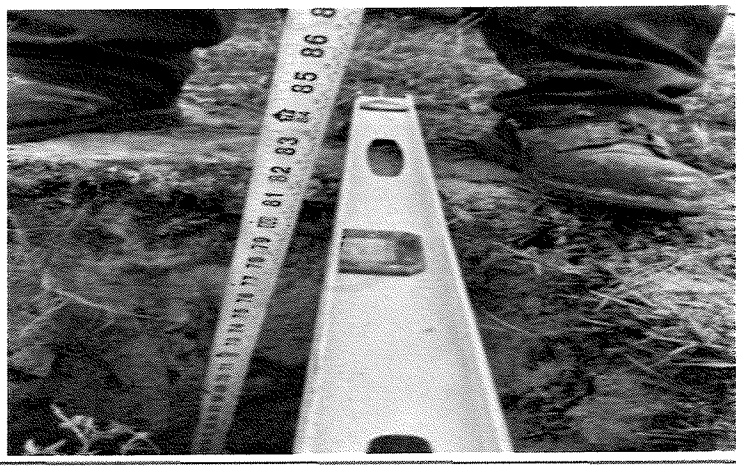


Test Hole Number: **TH1**

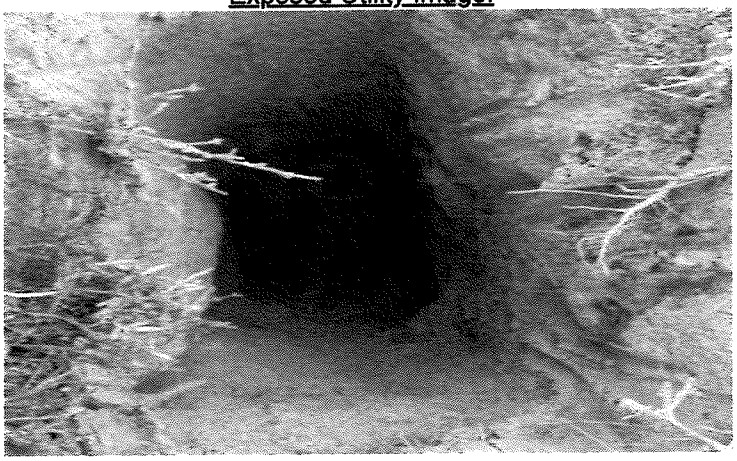
Excavation Date: **09/02/2026**

Project Name: **[002] 26-26558 » Environmental Resolutions Inc 4 - use**

Utility Depth Image:



Exposed Utility Image:



Restoration Image:



:avation Information

lity Found:	Sanitary Sewer	Marker Type:	Flag
iterial Composition:	Unknown	Marker Placement:	Center
lity Size (in):	None	Pavement Type:	Grass
lity Shape:	Unknown	Pavement Thickness (in):	None
lity Depth (in):	80	Soil Type:	Sand

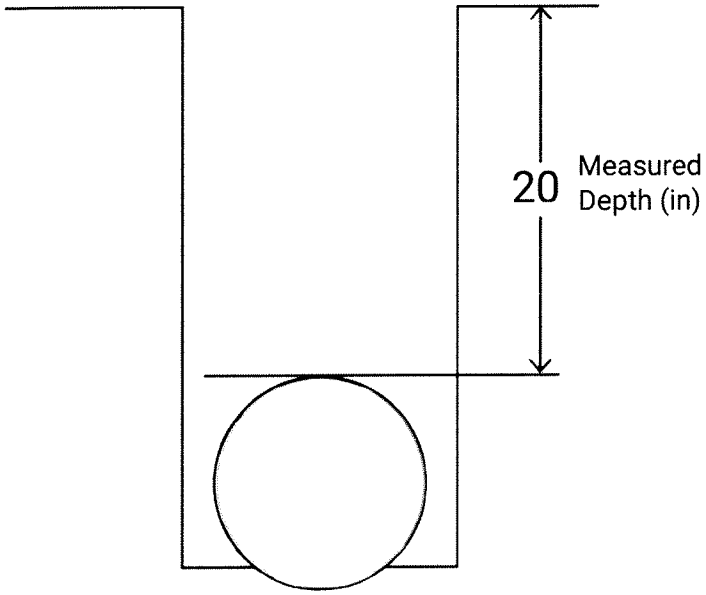
nity Technician:

rank Whiteman SR

ld Notes:

lo utility found

Test Hole Profile



Test Hole Number: **TH2**

Excavation Date: **09/02/2026**

Project Name: **[002] 26-26558 » Environmental Resolutions Inc 4 - use**

:avation Information

lity Found:	Communications	Marker Type:	Flag
ıterial Composition:	PVC	Marker Placement:	Center
lity Size (in):	1	Pavement Type:	Grass
lity Shape:	Circular	Pavement Thickness (in):	0
lity Depth (in):	20	Soil Type:	Sand

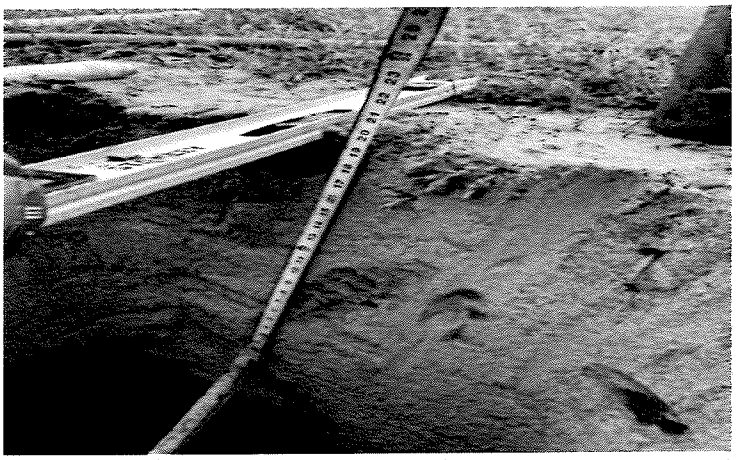
ıity Technician:

:rank Whiteman SR

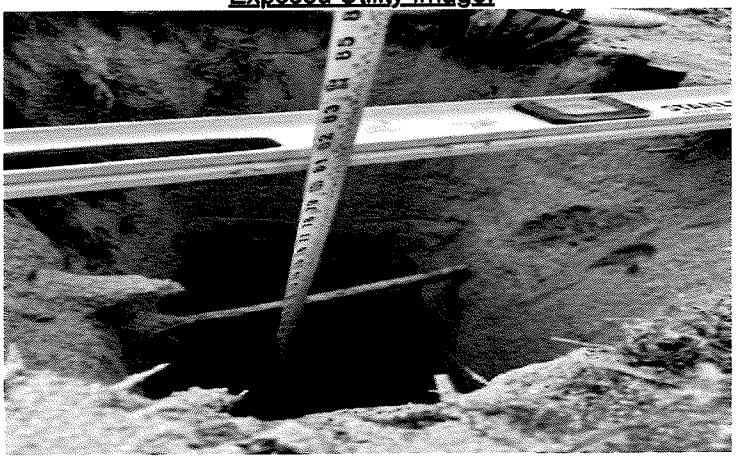
ld Notes:

Vere looking for sewer but found communication line instead

Utility Depth Image:



Exposed Utility Image:



Restoration Image:



TRINITY Subsurface LLC

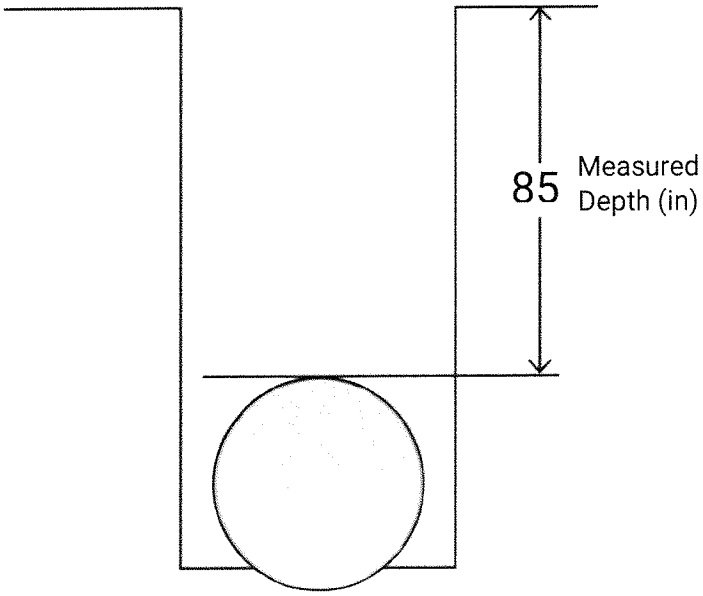
UNDERSTAND WHAT'S UNDERNEATH

TEST HOLE DATA SHEE

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Test Hole Profile



Test Hole Number: **TH3**

Excavation Date: **09/02/2026**

Project Name: **[002] 26-26558 » Environmental Resolutions Inc 4 - use**

:avation Information

lity Found:	Unknown	Marker Type:	Flag
ıterial Composition:	Unknown	Marker Placement:	Center
lity Size (in):	0	Pavement Type:	Grass
lity Shape:	Unknown	Pavement Thickness (in):	0
lity Depth (in):	85	Soil Type:	Sand

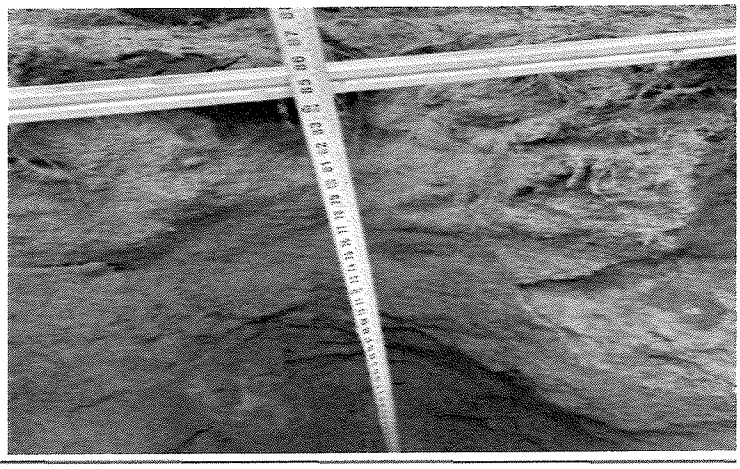
ıity Technician:

rank Whiteman SR

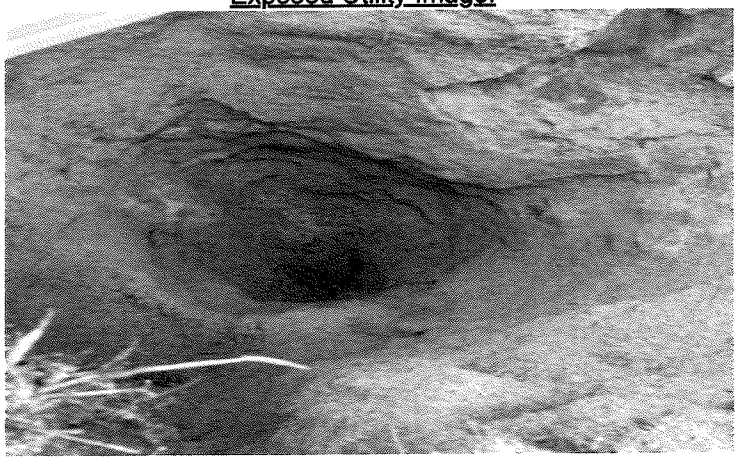
ld Notes:

lothing found

Utility Depth Image:



Exposed Utility Image:



Restoration Image:



TRINITY Subsurface LLC

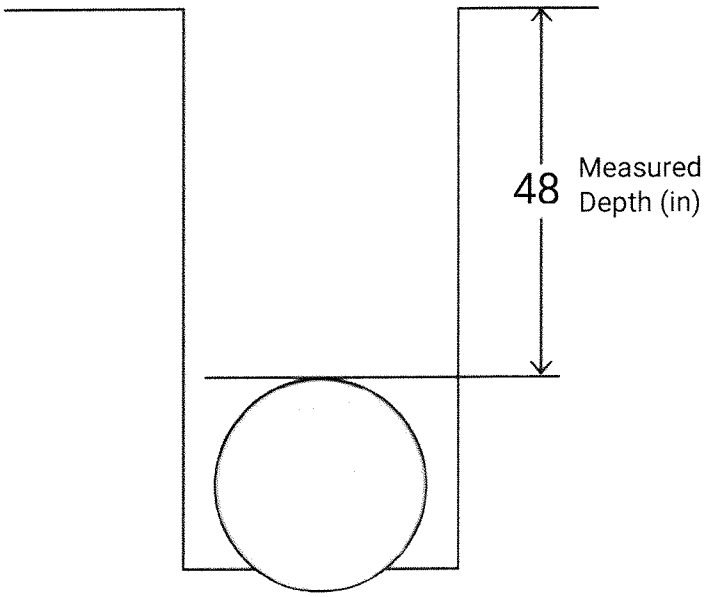
UNDERSTAND WHAT'S UNDERNEATH.

TEST HOLE DATA SHEE

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Test Hole Profile

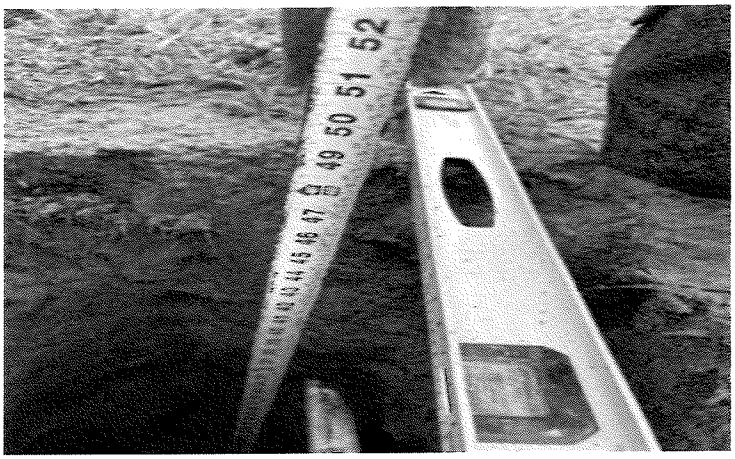


Test Hole Number: **TH4**

Excavation Date: **09/02/2026**

Project Name: **[002] 26-26558 » Environmental Resolutions Inc 4 - use**

Utility Depth Image:



Exposed Utility Image:



Restoration Image:



:avation Information

lity Found:	Sanitary Sewer	Marker Type:	Flag
ıterial Composition:	PVC	Marker Placement:	Center
lity Size (in):	1.5	Pavement Type:	Grass
lity Shape:	Circular	Pavement Thickness (in):	0
lity Depth (in):	48	Soil Type:	Sand

ıity Technician:

rank Whiteman SR

ld Notes:

ewer expo

TRINITY Subsurface LLC

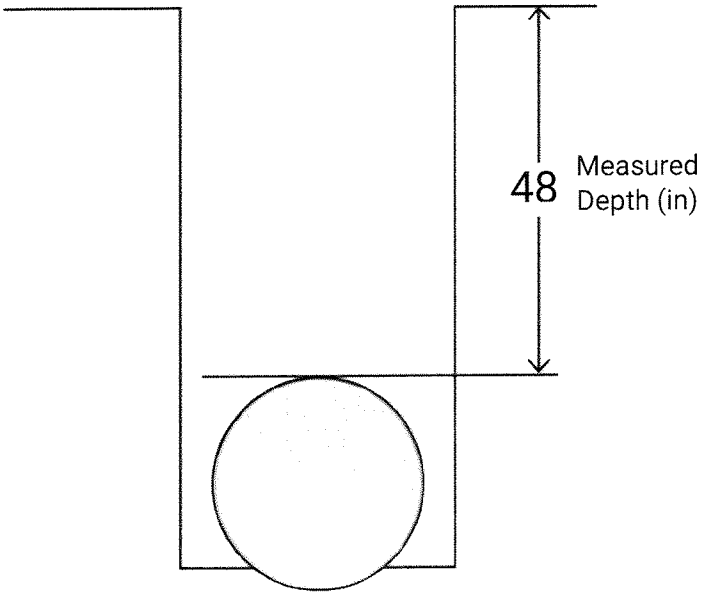
UNDERSTAND WHAT'S UNDERNEATH.

TEST HOLE DATA SHEE

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Test Hole Profile



Test Hole Number: **TH5**

Excavation Date: **09/02/2026**

Project Name: **[002] 26-26558 » Environmental Resolutions Inc 4 - use**

:avation Information

lity Found:	Sanitary Sewer	Marker Type:	Flag
ıterial Composition:	PVC	Marker Placement:	Center
lity Size (in):	1.5	Pavement Type:	Grass
lity Shape:	Circular	Pavement Thickness (in):	0
lity Depth (in):	48	Soil Type:	Sand

ıity Technician:

rank Whiteman SR

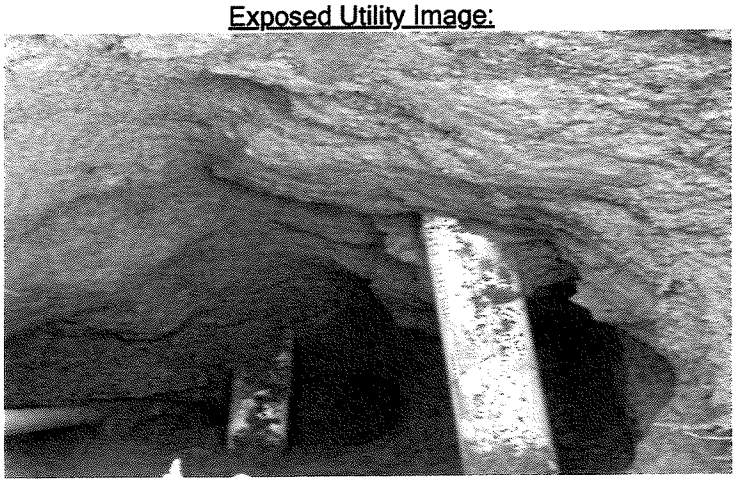
ld Notes:

xposed sump pump pipe as well along with sewer pipe

Utility Depth Image:



Exposed Utility Image:



Restoration Image:



TRINITY Subsurface LLC

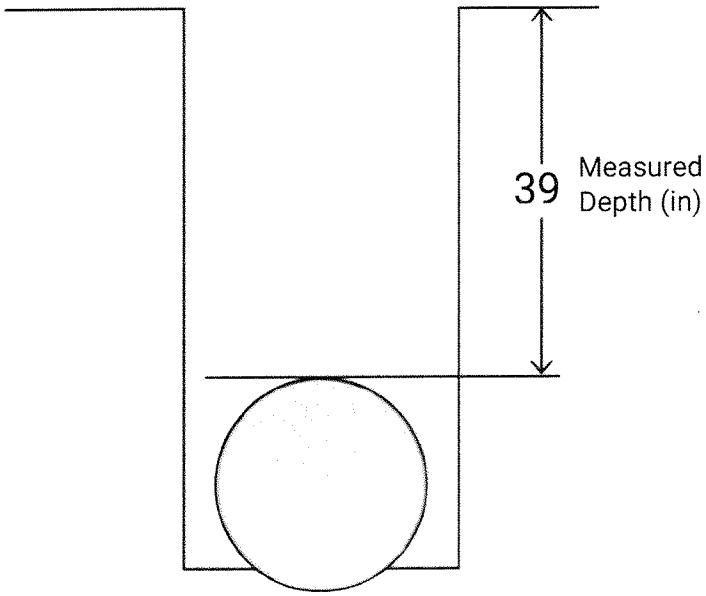
UNDERSTAND WHAT'S UNDERNEATH.

TEST HOLE DATA SHEE

(885) 387-464

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Test Hole Profile

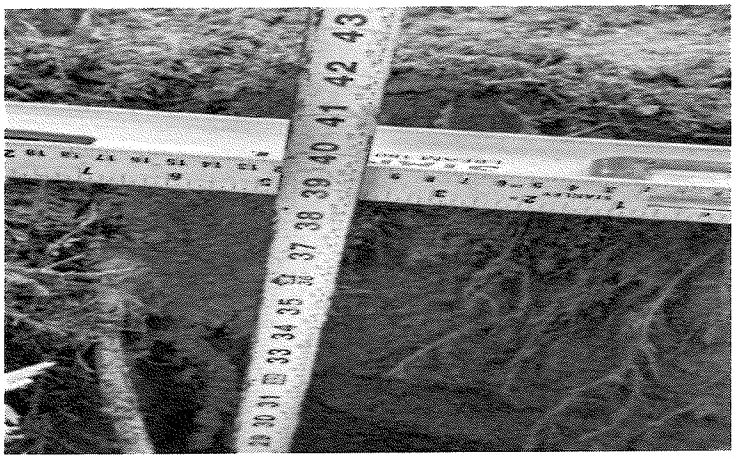


Test Hole Number: **TH6**

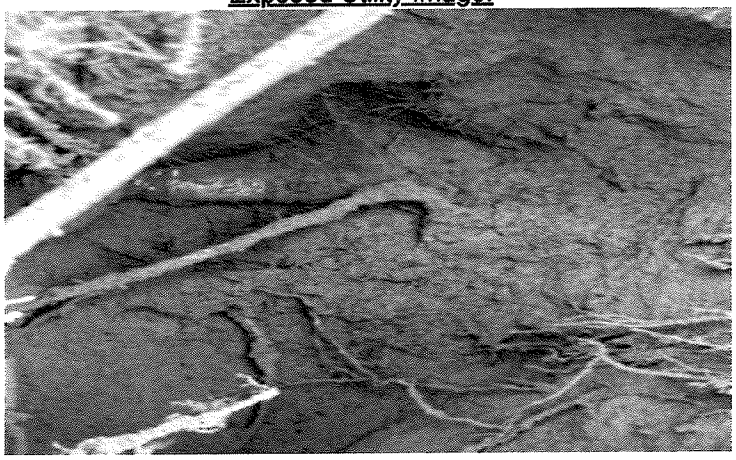
Excavation Date: **09/02/2026**

Project Name: **[002] 26-26558 » Environmental Resolutions Inc 4 - use**

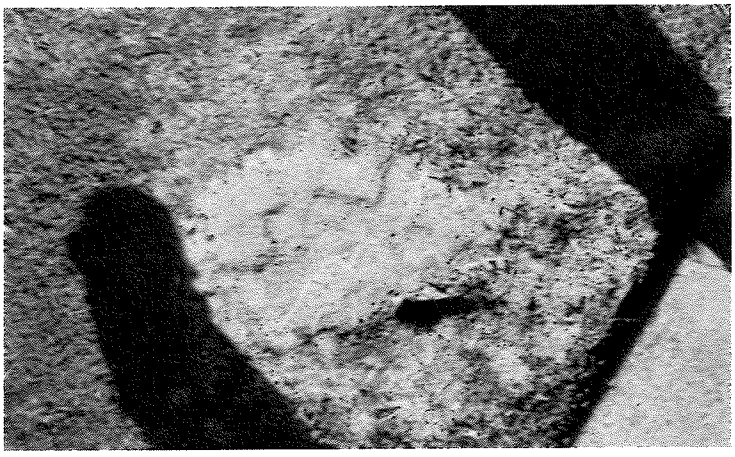
Utility Depth Image:



Exposed Utility Image:



Restoration Image:



:avation Information

lity Found:	Sanitary Sewer	Marker Type:	N/A
terial Composition:	PVC	Marker Placement:	N/A
lity Size (in):	1.5	Pavement Type:	Grass
lity Shape:	Circular	Pavement Thickness (in):	0
lity Depth (in):	39	Soil Type:	Sand

nity Technician:

rank Whiteman SR

ld Notes:

xposed sewer pipe by pump station.

Report Complete

SECTION 02000 – SITE WORK

DIVISION 02, EARTHWORK

SECTION 02 01 - CLEARING SITE

02 01 01 DESCRIPTION

Clearing site shall include all labor and equipment required for the work of clearing the site of the project, grubbing, traffic control signs and other work as herein described, all in accordance with the Plans and Specifications.

02 01 02 MATERIALS

Paint, required for cuts on trees where branches have been removed, shall be an asphalt base paint, prepared for tree surgery and approved by the Engineer.

02 01 03 METHODS OF CONSTRUCTION

Within the limits of the site of the Project and outside thereof within slope areas to be graded, or as otherwise prescribed, the ground surface shall be cleared of trees, brush, weeds, roots, matted leaves, structures, traffic control devices debris and other unsuitable matter before construction work is commenced, except that trees which do not interfere with the Project, in the opinion of the Engineer, shall not be removed but shall be protected during the progress of the work. Tree stumps shall be grubbed out for all trees removed.

Material accumulated by clearing, grubbing, removal of structures and cleaning out as above described shall be disposed of by the Contractor in a manner satisfactory to the Engineer and in conformance with Federal, State and local regulations.

SECTION 02 02 - SOIL EROSION CONTROL

02 02 01 DESCRIPTION

Soil Erosion Control shall include the installation and maintenance of inlet sediment control devices, silt fencing, construction entrances or any other devices as required by the County Soil Conservation District and the carrying out of such other soil erosion control measures as may be described elsewhere herein, or shown on the Plans. The Contractor is responsible for complying with Applicable Soil Erosion Control measures for this project.

All soil erosion and sediment control facilities shall be constructed in conformance with the New Jersey Standards, therefore.

02 02 02 CONSTRUCTION SEQUENCE

For purposes of soil erosion control, the Contractor shall adhere to the following construction sequence:

1. Install inlet sediment control devices on existing inlets before disturbing any ground or pavements on the site.

2. Install silt fence adjacent to construction area in the locations shown on the plans or as directed by

engineer.

3. Complete underground utilities reconstruction with as little disruption of paved and stable surfaces as possible. Add sediment control devices to new inlets as they are built. Construct temporary cold patch pavements when and as required in other Sections of these Specifications.

4. Reconstruct curbs, sidewalks and drive aprons.

5. Stabilize earth areas with sod or other prescribed ground cover.

6. Roadway excavation and repaving. No disturbed soil shall be exposed for a period longer than ten (10) calendar days.

7. Remove inlet sediment control facilities as the ground draining to each inlet is stabilized.

8. Clean all storm drains of silt and debris.

9. Operations 3, 4, 5 and 6 above may be in a different sequence from that shown.

02 02 03 INLET SEDIMENT CONTROL

Inlet sediment control devices shall be constructed in accordance with the details in the Plans and shall be placed where indicated in the Plans. They shall be securely fastened in place and shall be maintained in good working order by the Contractor as long as they are needed.

A sediment control device no longer needed at one location may be reset at another, provided that it is in good condition and functions properly. All sediment control facilities shall be ultimately removed from the Project site by the Contractor.

02 02 04 CONSTRUCTION ACCESS/ENTRANCE

Contractor shall install a construction entrance at a minimum 18' wide for 50' in length utilizing ASTM No.1 1.5"-3.5" stone 12"-17" thick on top of geotextile separation fabric. Where soil is soft, the contractor shall utilize geogrid. The material shall be model TX190L or NXL as Manufactured by Tensar or approved equal. The Construction entrance beyond the 50' length shall be constructed with dense graded aggregate atop of 1 or 2 layers of geogrid see construction detail. Geogrid for the remaining portion of the construction entrance shall be model NX850 as manufactured by Tensar or approved equal. Contractor shall be required to provide all necessary stabilization of the site for construction of all improvements shown and any laydown/staging Areas. Contractor shall be required to maintain and repair the construction entrance throughout the course of the project.

02 02 05 ROADWAY CLEANING

The roads are to be kept clean and dust free. All streets are to be swept daily with a power broom with a water tank or with a water wagon.

SECTION 02 03 - ON-SITE EXCAVATION

02 03 01 DESCRIPTION

On-site excavation shall include the demolition, excavation and removal of all on-site materials as required for construction of the Project. On-site excavation shall also include the transportation of excavated materials, the disposal of excavated materials, and other work as herein specified.

On-site excavation shall be unclassified and shall include the excavation and removal of all earth, rock, boulders, concrete, masonry, small structures, sidewalks, drive aprons, paving, tree roots and other materials which require removal prior to construction of improvements, topsoil stripping, and all other materials encountered, of whatever nature.

02 03 02 METHOD OF CONSTRUCTION

Under proposed paved areas, including roadways, sidewalks, curbs, drive aprons and driveways, topsoil will be stripped completely. Complete topsoil stripping will also be required under and within ten feet (10') of proposed buildings or other structures. Complete topsoil stripping is defined as removal of all topsoil regardless of depth.

Excavation shall be carried to the lines, grades and slopes indicated in the Plans. Where the cellar walls or foundations lie within paved areas, dedicated street rights-of-way, utility rights-of-way, or building areas, the structure shall be completely removed.

When indicated on the Plans, existing concrete slabs and/or asphalt paving shall be saw-cut at the limits of work. This shall be a full depth saw-cut, the purpose of which is to prevent damage to the existing structures and surfaces to remain, and to provide a neat, straight joint between the new and existing construction.

All pavements to be excavated shall be cut with a sharp tool to form neat vertical edges. If a neat straight line satisfactory to the Engineer cannot be achieved by other means at a pavement joint that will be exposed, the Contractor shall saw cut the pavement at that location.

Excavation in all locations shall be carried out in such a manner that the site is kept properly drained at all times in the area of site improvements.

Tree roots shall be removed a minimum of four (4) inches clear of the subgrade. All roots larger than one (1) inch in diameter shall be cut with a saw and treated with an approved tree wound compound. Refer to Division 9 Earthwork for tree root and vegetation removals within the proposed building footprint and footings.

The contractor shall exercise extreme care when working near existing trees that are to remain. Any damage shall be promptly repaired by cutting, cleaning and treating as directed by the Engineer. Any tree severely damaged in the opinion of the Engineer shall be removed and replaced. This work shall be done at the Contractor's own expense.

02 03 03 DISPOSAL OF MATERIALS

Except for the specific exceptions listed below, all excavated materials shall become the property of the Contractor, and he shall be responsible for their transportation and disposal. Disposal shall take place at sites provided by the Contractor which are licensed by N.J.D.E.P. to accept the particular material(s).

During construction topsoil, other soils and soil aggregates shall be hauled and stockpiled by the Contractor at locations designated by the Owner or their representative on-site. Surplus topsoil shall be kept

segregated during construction. All Surplus soils and soil aggregates not used as part of the project shall become property of the Contractor and shall be hauled and disposed of at their own expense.

Castings, valves, fire hydrants, and similar items which are removed shall, at the Engineer's discretion, remain the property of the Owner. The Contractor shall haul and stockpile the selected items at locations designated by the Owner. Those items not wanted by the Owner shall become the property of the Contractor, and he shall be responsible for their transportation and disposal as described above.

Pavements over which excavated materials are transported shall be maintained clean of such materials at all times.

SECTION 02 04 – BORROW EXCAVATION

02 04 01 DESCRIPTION

Borrow Excavation shall include the furnishing, transporting, placing and compacting of materials required for embankments or backfills in excess of those obtained from on-site excavation and other excavation and incidental work within the Project site. Undercut and Subgrade Material shall include the excavation and disposal of deleterious material as well as refill with Subgrade Material.

02 04 02 MATERIALS

Borrow material shall be a certified clean, well graded granular material suitable for embankment; shall be in conformance with NJDOT gradation designation I-8; and shall be approved by the Engineer. The Contractor shall provide the Engineer with a certified sieve analysis of the materials he proposes to use prior to transporting any material to the Project site. The materials shall be taken from sources furnished by the Contractor. All topsoil, brush, sod, weeds and other unsuitable materials shall be removed.

Undercut and Subgrade Material shall be 3/4" clean stone or approved equal.

02 04 03 METHODS OF CONSTRUCTION

Pavements over which Borrow materials are transported shall be maintained clean of such material at all times.

Placement of material for Borrow Excavation or Undercut and Subgrade Material shall be made in layers not exceeding six inches (6") compacted thickness. Each lift shall be compacted in accordance with Section 02 05 of the Specification prior to constructing the subsequent lift.

SECTION 02 05 - COMPACTION

02 05 01 GENERAL REQUIREMENTS

All soils and soil aggregate courses (except topsoil) shall be compacted to at least 95% of their Maximum Density at a moisture content within 2% of optimum as defined and determined by current A.S.T.M. Designation D-698, Method C.

Included in the areas to be so compacted are:

- All surfaces on which embankments or roadways are to be constructed.
- Each layer of embankment.

- The bottoms of all subsurface structure excavations.
- Each layer of ALL backfills, including trenches.
- All subgrades, including those for sidewalks, curbs, drive aprons, and areas to be planted.
- All dense graded aggregate base and subbase courses.

02 05 02 STRUCTURAL REQUIREMENTS

The Contractor shall supply and install all sand and/or gravel required for fill or as detailed on the Plans or as required to achieve the compaction requirements herein. Deposit such clean fill (free of all debris, rubble, building materials, etc.) in eight (8") inch layers and thoroughly dampen and compact to tight compaction prior to depositing each succeeding 8" layer. Calculation of fill quantities required for select borrow excavation/structural fill shall be the Contractor's responsibility.

Compaction of select borrow excavation/structural fill as noted above shall be done with clean, well graded sand and gravel. The compaction shall be tested, at the Contractor's expense, and shall provide at least 95% of maximum standard dry density according to AASHO T99-62 (ASTM D698-ggt). No fill materials shall be placed, spread or rolled while ground or fill is frozen, thawing or excessively wet, or during periods of precipitation. Following precipitation interruptions of fill work, fill operations shall not be resumed until the moisture content and density of all materials are approved by the Engineer. Corrective action will be required where the Engineer's/Geotechnical inspection (or tests required of the Contractor by the Owners Representative) show compaction results are less than those specified. All required corrections shall be the responsibility of the Contractor.

Where the Geotechnical Inspections show compaction results are less than those specified, and the contractor has completed all the compaction remedies referenced within the geotechnical report the contractor will be required to over-excavate the found areas to the depth and extents as determined in the field by the Geotechnical Engineer. It shall consist of the removal and disposal of the unsuitable subgrade following excavation from the demolition and compaction remedies and fill with suitable replacement material as defined in division 9 and the geotechnical report. It is the intent to remove and replace any identified soft areas within the proposed areas of improvements and shall be performed on an "If and Where Basis" as directed by the Geotechnical Engineer.

02 05 03 COMPACTION METHODS AND EQUIPMENT

The Contractor may use whatever methods and equipment he deems best to achieve the required compaction, provided however, that he shall not use any methods or equipment that might cause damage to any above or below ground structures or utilities, either in or adjacent to the Project.

The Contractor shall be responsible for providing, at no additional cost to the Owner, an independent testing laboratory on-site and prior to operations to validate and verify the compaction through testing of the material prior to placement and field verification via density testing. Reports shall be furnished to the Engineer indicating test location and results for each test.

No soils or soil aggregate courses shall be built upon in any manner until they have been compacted to the required density. Any surface or course which is subsequently disturbed in any way that could lessen its density shall be recompacted before proceeding with any construction thereon.

The Contractor shall moisten materials being compacted when and as necessary to achieve optimum moisture content requirements.

SECTION 02 06 - SUBSURFACE STRUCTURE EXCAVATION

02 06 01 DESCRIPTION

Subsurface structure excavation shall include all the labor and equipment for excavation and backfill for drains, drain pipes, culverts, sewers, water pipes, conduits, manholes, inlets and similar structures at the required locations, to the prescribed lines and elevations and in accordance with the Plans and Specifications.

02 06 02 MATERIALS

Material shall be a clean, well graded granular material suitable for embankment; shall have a maximum 25% by weight of materials passing a number 200 sieve; shall be in conformance with NJDOT gradation designation I-10 and shall be approved by the Engineer. The Contractor shall provide the Engineer with a certified sieve analysis of the materials he proposes to use prior to transporting any material to the Project site. The materials shall be taken from sources furnished by the Contractor. All topsoil, brush, sod, weeds and other unsuitable materials shall be removed.

02 06 03 METHODS OF CONSTRUCTION

The Contractor shall do all excavation of whatever substances encountered to the limits indicated in the Plans.

Excavation shall not be carried below the prescribed elevations for the foundations of pipes and structures, except where unstable soil is encountered. Where unstable soil is found, the Engineer will indicate to the Contractor the extent of Undercut and Borrow Excavation to be performed in conformance with Section 02 04 of the Specification.

Pipe trenches and pipe bedding shall conform to the details in the Plans. Excavations for manholes and other structures shall have twelve-inch minimum clearance on all sides and have the same compacted bedding as shown for pipe. Rocks and boulders in excavations shall be removed within six inches of all pipe structures.

Before laying pipe, the Contractor shall ascertain the locations and elevations of other pipes and subsurface structures that might interfere with the proposed construction and he shall make exploratory excavations when and where necessary to obtain such information.

Pipe trenches shall not be opened further in advance of laying pipe than the length of pipe the Contractor can reasonably expect to lay in one day.

The Contractor shall do all bracing, shoring and sheathing necessary to prevent failure of the banks of excavations and to protect the work, workmen, public, under and above ground utilities and structures, pavements, and public and private property. No bracing, shoring, or sheeting shall be placed below the bottom of the pipe or structure unless approved by the Engineer. All bracing, sheathing and shoring shall be withdrawn one 6" layer at a time as backfilling proceeds.

Ground adjacent to the excavations shall be graded to prevent water from running in. The Contractor shall remove any water accumulating in excavations by pumping or other means approved by the Engineer.

The Contractor shall provide, install and operate an adequate system of dewatering devices when necessary to stabilize trench bottoms and banks or other excavations, or when necessary to protect the work, workmen, public, under and above ground utilities and structures, pavements, or public and private property. The system shall be removed by the Contractor upon completion of backfill, and the holes remaining shall

be backfilled and tightly compacted It is the Bidder's obligation to ascertain by his own investigation when and where dewatering is likely to be needed for the proper execution of the work.

The discharges from all dewatering pumps shall be conducted to storm drains or natural drainage channels in a manner that will not cause damage to any surface, structure or work.

After the structure has been completed, inspected and approved, or, in the case of pipe, after each joint has been made, inspected and approved backfilling shall proceed immediately. The entire backfill, from the bottom of the excavation to proposed finished subgrade, shall be placed in layers of not more than six inches compacted thickness, and each layer shall be compacted as specified in Section 02 05 of the Specification. Puddling of backfills will not be permitted.

Soils which are determined by the Engineer to be suitable for use as embankment materials shall be stockpiled on the project site for that use. Stockpiles shall be kept neat in appearance and stabilized with rye grass or other methods approved by the Engineer.

(All surplus soils and excavated materials which are not suitable for embankment shall be disposed of by the Contractor in accordance with applicable rules and regulations at no cost to the owner unless otherwise provided for in the specifications.)

On trees that are to remain, all roots 1/2 inch in diameter and larger which are damaged by the Contractor shall be cut and treated with an approved tree wound compound. The Contractor shall exercise extreme care when working near existing trees that are to remain. Any damage shall be promptly repaired by cutting, cleaning and treating as directed by the Engineer. Any tree severely damaged in the opinion of the Engineer shall be removed and replaced. This work shall be done at the Contractor's own expense.

SECTION 02 07 - DEWATERING

02 07 01 DESCRIPTION

The Contractor shall furnish all labor, material, and equipment necessary to plan, obtain approval for, provide for, implement, maintain and guarantee an adequate system of dewatering as required to keep all excavations free of groundwater and stormwater in order to perform work of the contract and protect the work, workmen, public, under and above ground utilities and structures, pavements, building pads, foundations and public and private property. All permits are the responsibility of the Contractor.

02 07 02 RELATED SECTIONS

Section 02 01 – Clearing Site
Section 02 02 – Soil Erosion Control
Section 02-03 – On-Site Excavation
Section 02 04 – Compaction
Section 03 02 – Dense Graded Aggregate Subbase
Section 05 02 – Storm Drains
Section 09 01 – Structural Earthwork

02 07 03 DEWATERING METHODS AND EQUIPMENT

The Contractor may use whatever methods and equipment he deems best to achieve the required dewatering, provided however, that he shall not use any methods or equipment that might cause damage to above or below ground structures or utilities, either in or adjacent to the project. The Contractor shall

maintain on site backup pumps or other components as necessary to provide for continuous and uninterrupted dewatering during the project.

All components of the dewatering system or portion thereof shall be removed by the Contractor upon the completion of backfill, and any holes remaining from the system shall be backfilled and thoroughly compacted to the satisfaction of the Engineer. All permits are the responsibility of the Contractor.

SECTION 02 08 – SITE GRADING

02 08 01 DESCRIPTION

This section includes all the labor and necessary equipment for preparing sub-grades for slabs-on-grade, walks, pavements, lawns, and plantings and shall reference Section 02 03 for achieving the prescribed grades and elevations. Shall include rough and finish grading. Contractor may also refer to Section 07 01 for topsoil placement and finish grading.

The contractor is to minimally firm the soil to the consistency needed to place equipment on the surface, with no tracking or depressions from equipment with turf type tires, to complete the project. This shall mean no more than 75-80% of maximum using ASTM D1557.

02 08 02 MATERIALS

Materials being graded shall be suitable therefore and shall be free from stumps, wood, brush, sod, rubbish, garbage and other matter that may decay. The primary materials shall be those available from work within the Project Site. No such materials are to be wasted or otherwise disposed of by the Contractor. When additional material is needed, it shall be obtained from approved Borrow Excavation, Topsoil stock pile, Modified/Imported or Topsoil and Seed, at no additional cost to the Owner.

02 08 03 METHODS OF CONSTRUCTION

Site grading shall have uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

The Contractor shall provide a smooth transition between adjacent existing grades and new grades.

Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

Slope grades to direct water away from buildings, provide positive drainage in accordance with the plans and to prevent ponding. Finish sub-grades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus, or minus 1 inch (25 mm).
2. Walks: Plus or minus 1 inch (25 mm).
3. Pavements: Plus or minus 1/2 inch (13 mm).

Grading inside Building Lines: Finish sub-grade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

Finish Grading shall be performed in conjunction with the spreading of the topsoil at the prescribed locations, to the prescribed lines and grades, and in accordance with the plans and specifications. Where applicable, the Contractor shall reuse the stripped topsoil on the areas it is stripped from.

Finish grading should be performed to bring all areas to the prescribed finished elevation per the plans. All grades shall be approved by the Engineer before proceeding.

Contractor shall protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

Where settling occurs before project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

DIVISION 03, PAVEMENTS

SECTION 03 01 - MILLING & RECYCLING OF PAVEMENT

03 01 01 DESCRIPTION

Milling and Recycling of Pavement shall include all the labor and equipment necessary for removal of bituminous concrete and subbase to the depth specified or shown on the Plans, compaction of subbase as per Section 02 05 of this Specification and grading to the profile and cross slope as shown on the Plans or directed by the Engineer.

The Contractor shall mill out and recycle the existing bituminous pavement. The existing pavement depth may vary. Millings are to be reused on the site for supplementing the existing subbase to the proposed grades and for repairs to the subbase, if required. Millings in excess of those used on the project are to become the property of the Contractor and are to be removed from the site and taken to an appropriate recycling facility. The Contractor shall provide to the Engineer certification of the gross tonnage of material milled and recycled.

The Contractor shall be responsible for the excavation, transport, placement, grading, and compaction of the existing pavement. The Contractor is directed to Division 02 of this specification for additional requirements. Unless otherwise provided for in the Proposal the cost of all earthwork shall be included in the price for this item. The removed pavement shall be transported to and deposited at an approved facility by the Contractor.

This item includes the restoration of all previously grassed disturbed areas with 4" thick topsoil, seed, & fertilizer

03 01 02 EQUIPMENT

The milling machine shall be a self-propelled planning, grinding or cutting machine with variable operating speeds, capable of removing bituminous concrete without the use of heat to the depth, profile and cross slope shown on the Plans.

The milling machine shall be equipped with automatic grade controls. The reference system may be either string line or ski type. Use of the automatic grade controls will be required except at intersections and other locations where its use is not practical.

The milling operation, including removal of the milled material, shall be carried out in a manner that will prevent dust and other particulate matter from escaping into the air.

Teeth in the milling drum that become dislodged, broken or unevenly worn shall be replaced immediately with teeth that are of the same length as the remaining teeth in that row.

If the milled material is to be recycled, the milling equipment, where practical, shall be operated in such a manner as to produce milled material of which 95 percent will pass a 2-1/2 inch sieve. The roadway surface shall be cleared of all debris and power broomed to remove fine particles prior to milling. On shoulders before brooming, any earth berm shall be removed as necessary to expose the full width of the roadway and prevent silt and grass from contaminating the milled material.

03 01 03 EQUIPMENT & METHOD OF CONSTRUCTION

Milling shall start at the low side of the cross section and progress toward the high side. Provisions shall be made for removal of any water that may be trapped due to the milling operation, such as by lateral saw cuts to provide adjacent overlay relief. In the event that all milled areas which are opened to traffic have

not been milled to a flush surface by the end of the workday the longitudinal edges of the milled area, exceeding 1 1/2 inches high, shall be sloped and a smooth transition shall be provided at the transverse edges.

Areas to be milled not accessible to the milling machine shall be removed by other equipment.

Bituminous Concrete below the specified level of milling that becomes dislodged or delaminated shall be removed at no cost to the Owner and replaced with bituminous concrete conforming to these Specifications.

The surface of the milled area shall be swept clean prior to being opened to traffic and prior to the following construction or resurfacing stage. Millings shall be removed from the curb, sidewalk and park strip.

The roadway surface that will be opened to traffic before resurfacing shall be free from gouges, continuous grooves, ridges and delaminated areas and shall have a uniformly textured appearance consisting of discontinuous longitudinal striations which shall not deviate more than 1 inch in 200 feet from a line parallel to the center of the roadway and not to exceed 0.375 inch depth and which shall provide a skid resistance not less than that of the original surface prior to milling and shall permit passage of highway traffic at the posted speed limit without vehicle operators experiencing impaired directional control.

The depth of the completed milling from the original surface to the top of the high spots of the textured surface shall be as shown on the Plans while producing a smooth profile and cross section.

SECTION 03 02 - DENSE GRADED AGGREGATE SUBBASE

03 02 01 DESCRIPTION

Dense Graded Aggregate Subbase shall include the purchase, placement and all labor and equipment required for the preparation of subgrade for and the construction of subbase at the prescribed locations and as directed by the Engineer, to the prescribed lines, grades and dimensions, and in accordance with the Plans and Specifications.

DGA, with a minimum 6" thickness shall be provided Under all asphalt (Unless otherwise Noted) and material shall be where denoted installed in accordance with the construction details

DGA, 4" Thick shall be provided and installed under all concrete flatwork, unless otherwise noted, on the construction details, or as directed by the construction engineer/owner representative within the construction details.

03 02 02 MATERIALS

The material for the subbase shall be Dense Graded Aggregate Base Course, conforming to the current N.J.D.O.T. specifications, except the requirements for moisture content immediately prior to placement. Recycled concrete will not be permitted. Before any material is delivered to the project site, the Contractor shall furnish the Engineer with a certification attesting that the material he proposes to use has been tested and does conform to all N.J.D.O.T. requirements for Dense Graded Aggregate Base Course. Only approved material shall be furnished and placed, and only one type of material - i.e., either quarry-processed stone, or blast furnace slag, or crushed gravel - shall be used throughout the Project.

03 02 03 METHODS OF CONSTRUCTION

For all dense graded aggregate subbase, the subgrade shall be properly shaped to the prescribed elevations and contours, and compacted as specified in Section 2.5, before the new course is laid.

The dense graded aggregate shall be spread in a uniform layer (or layers) to obtain the full depth of the specified thickness, when compacted. The material shall be compacted as specified in Section 02 05.

The surface of the finished new subbase shall be smooth and free of defects, and it shall be true to the required grades and contours.

SECTION 03 03 - BITUMINOUS STABILIZED BASE COURSE (Hot Mix Asphalt HMA 19M64)

03 03 01 DESCRIPTION

Bituminous Stabilized Base Course shall include purchase and the construction of hot-mixed bituminous concrete base course, on approved foundations, at the prescribed locations, and to the prescribed lines, grades and thicknesses per the construction plans. Removed pavements as well as other excavated materials shall be transported and legally disposed of by the Contractor. Pavement Excavation and Grading as necessary to achieve design grades shall be included as part of this item.

03 03 02 MATERIALS AND METHODS OF CONSTRUCTION

All materials and methods of construction for Bituminous Stabilized Base Course shall conform to the following requirements:

All paving operations are to be performed during normal business hours.

Bituminous Stabilized Base Course shall be, 19M64. No carbonate rock shall be used in the mix design. No recycled concrete shall be permitted.

HMA 19M64 Base Course shall be constructed in accordance with the requirements of Section 404 of the NJDOT Standard Specifications modified and amended as follows.

The proposed full depth paving, asphalt path paving and/or overlay shall be constructed at the thickness indicated on the plans/specs.

The Contractor shall be responsible for setting all manhole castings, water valve boxes, curb stops, cleanouts, inlet heads and all other structures and miscellaneous castings to the proper finished grades prior to placing the new surfaces. Unless provided otherwise in the Proposal, the cost thereof shall be included in the prices bid for the bituminous paving items.

The Contractor shall submit the job mix formula for the bituminous concrete mixture to the Engineer for approval, before ordering such materials, and he shall provide the Engineer with certifications from the bituminous concrete producer that the materials delivered to the Project conform to the approved job mix formulas.

All bituminous concrete base course shall be constructed to the respective compacted thickness specified.

Soil subbase courses shall be given a prime coat before bituminous-stabilized base course is laid. Each underlying pavement course shall be swept clean and given a tack coat before the next pavement course is laid thereon. The vertical contact surfaces of pavement edges, manholes and other structures shall be painted with a thin uniform coating of tack coat material just prior to placing bituminous concrete against them.

Bituminous concrete pavers with automatic grade and slope controls may be used but will not be required.

03 03 03 SAMPLING AND TESTING

Testing for conformance with the job mix formula shall be performed by taking extractions at the plant. The testing of the extractions shall be performed by an independent laboratory or at the plant laboratory and witnessed by the Engineer's representative. The samples will be taken at the plant from the loaded trucks and the tests will be performed or witnessed by an independent testing laboratory chosen by the Owner. Approximately one sample will be taken for every 600 tons of material.

The Owner may have drilled cores taken from finished bituminous concrete pavement and base courses and have them tested for conformance as specified in the above specification. When samples are taken, all surface and/or base courses disturbed by the sampling shall be restored at the expense of the Contractor. The paving Contractor shall be required to repair the core holes drilled by the testing laboratory with hot mix material and painted with hot asphalt cement. The paving Contractor shall arrange to be at the site at the same time the testing laboratory is drilling the cores. If the paving Contractor cannot arrange this, then he will be responsible for removing the patch installed by the testing company prior to installing the hot mix. No additional payment will be made for the patching of the cores. The cost of patching should be included in the cost of the various Bituminous Concrete Courses in the Proposal.

All sampling and testing will be done by an independent testing laboratory chosen by the Owner. The cost of the laboratory will be paid for by the Owner.

Cores may be taken at random locations selected by the Engineer throughout the Project.

The Engineer may order the removal of any material represented by core samples that does not meet the requirements of every characteristic as outlined in the specifications. The removal of such unsatisfactory material, repaving with acceptable material, and additional sampling and testing as deemed necessary by the Engineer, shall all be at the expense of the Contractor.

03 03 04 SURFACE REQUIREMENTS

In addition to other surface requirements, if the bituminous concrete base course will be used as a finished surface course, even temporarily, its acceptance will be based upon the extent to which the finished surface retains water. The Contractor shall repair any and all pavement areas which in the opinion of the Engineer are ponding water. The Engineer's evaluation of ponded areas will be made approximately one hour after a rainfall has ceased.

Repairs shall be made by full depth replacement of the course, utilizing the same type of material. All methods of repair shall conform to the recommended procedures of the Asphalt Institute. All pavement cutting shall be accomplished with an approved asphalt saw. Jackhammer cutting will not be permitted.

SECTION 03 04 - BITUMINOUS CONCRETE SURFACE COURSE (Hot Mix Asphalt –HMA 9.5M64)

03 04 01 DESCRIPTION

Bituminous Concrete Surface Course shall include the construction of hot-mixed bituminous concrete surface on approved foundations, at the prescribed locations, and to the prescribed lines, grades and thicknesses per the construction plans. Removed pavements as well as other excavated materials shall be transported and legally disposed of by the Contractor. Any grassed area disturbed through the installation of pathway shall be replaced with topsoil, seed, and fertilizer.

03 04 02 MATERIALS AND METHODS OF CONSTRUCTION

All materials and methods of construction for Bituminous Concrete Surface Course shall conform to the following requirements:

All paving operations are to be performed during normal business hours.

The Contractor shall be responsible for setting all manhole castings, water valve boxes, curb stops, cleanouts, inlet heads and all other structures and miscellaneous castings to the proper finished grades prior to placing the new surfaces.

The proposed full depth paving, asphalt path paving and/or overlay shall be constructed at the thickness indicated on the plans/specs.

Bituminous Concrete Surface Course shall be HMA 9.5M64. No carbonate rock shall be used in the mix design. No recycled concrete shall be permitted.

HMA 9.5M64 Surface Course shall be constructed in accordance with the requirements of Section 404 of the NJDOT Standard Specifications modified and amended as follows.

The Contractor shall submit the job mix formula to the Engineer for approval for each bituminous concrete mixture and a certification from the producer that the job mix formula has been approved by the New Jersey Department of Transportation, before ordering such materials. The Contractor shall also provide the Engineer with certifications from the bituminous concrete producer that the materials delivered to the Project conform to the approved job mix formulas.

Before laying bituminous concrete surface course, the contact surfaces of all pavement edges, curbs, inlets, manholes, and other structures shall be painted with a thin uniform coating of asphaltic oil, Grade RC-250.

Bituminous concrete pavers with automatic grade and slope controls may be used but will not be required.

The Contractor shall rake out large pieces of aggregate in feathered areas, as necessary, to provide a smooth surface.

All bituminous concrete surface shall be constructed to the respective compacted thickness specified and as shown on the plans from edge to edge along the cartway. The Contractor shall rake out large pieces of aggregate in feathered areas, as necessary, to provide a smooth surface.

All existing paved surfaces on which bituminous concrete are to be laid shall be broom swept clean and given a tack coat prior to paving. The vertical contact surfaces of pavement edges, manholes and other structures shall be painted with a thin uniform coating of tack coat material just prior to placing bituminous concrete against them.

Pavement joints, curb lines, inlets, manholes and other structures in the paving shall be sealed with a hot-poured joint sealing compound.

Butt joints shall be constructed wherever an end or an edge of an overlay is located in an existing paved roadway surface. Finished butt joints shall be sealed with a hot-poured joint sealing compound.

The Raising of Manhole and Inlet Castings shall conform to the requirements for resetting castings in Section 603 of NJDOT Standard specifications, except that the use of extension frames will not be permitted. If a manhole casting or lid needs to be replaced, the lid and casting will be supplied by the contractor and the cost of replacement shall be included in the cost of the pavement.

03 04 03 SAMPLING AND TESTING

Testing for conformance with the job mix formula shall be performed by taking extractions at the plant. The testing of the extractions shall be performed by an independent laboratory or at the plant laboratory and witnessed by the Engineer's representative. The samples will be taken at the plant from the loaded trucks

and the tests will be performed or witnessed by an independent testing laboratory chosen by the Owner. Approximately one sample will be taken for every 600 tons of material.

The Owner may have drilled cores taken from finished bituminous concrete pavement and base courses and have them tested for conformance as specified in the above specification. When samples are taken, all surface and/or base courses disturbed by the sampling shall be restored at the expense of the Contractor. The paving Contractor shall be required to repair the core holes drilled by the testing laboratory with hot mix material and painted with hot asphalt cement. The paving Contractor shall arrange to be at the site at the same time the testing laboratory is drilling the cores. If the paving Contractor cannot arrange this, then he will be responsible for removing the patch installed by the testing company prior to installing the hot mix. No additional payment will be made for the patching of the cores. The cost of patching should be included in the cost of the Bituminous Concrete Surface Course in the Proposal.

All sampling and testing will be done by an independent testing laboratory chosen by the Owner. The cost of the laboratory will be paid for by the Owner.

Cores may be taken at random locations selected by the Engineer throughout the Project.

The Engineer may order the removal of any material represented by core samples that does not meet the requirements of every characteristic as outlined in the NJDOT Specifications. The removal of such unsatisfactory material, repaving with acceptable material, and additional sampling and testing as deemed necessary by the Engineer, shall all be at the expense of the Contractor.

03 04 04 SURFACE REQUIREMENTS

All joints and the center seam shall be applied with a Polymerized Joint Adhesive as required by the latest NJDOT Specifications. The adhesive shall be applied to the newly paved center line joint prior to installing the opposite pavement pass. The joint adhesive shall be "Crafco, Inc. Pavement Joint Adhesive Part No. 34524" or approved equal. No separate payment shall be made for the use of a Polymerized Joint Adhesive.

The acceptance of bituminous concrete surface courses will be based upon the extent to which the finished surface drains water. The Contractor shall repair any and all pavement areas which are ponding water under the following conditions:

(A) Any area, regardless of size or depth, which is in an intersection, at handicap access ramps, drive aprons or within the parking lot drive aisles.

(B) Ponding in any other areas which ponds water deeper than one-quarter inch (1/4") at any point or is greater than five feet (5') in length, or greater than one foot (1') in width.

Repairs shall be made by full depth replacement of the wearing course, utilizing the same type of material. All methods of repair shall conform to the recommended procedures of the Asphalt Institute. All pavement cutting shall be accomplished with an approved asphalt saw. Jackhammer cutting will not be permitted.

The Engineer's evaluation of ponded areas will be made approximately one hour after a rainfall has ceased.

SECTION 03 05 - TRAFFIC STRIPING AND MARKINGS

03 05 01 DESCRIPTION

Traffic Striping and Markings shall include the purchase and installation of all the epoxy resin and/or painted pavement striping of varying widths or markings as required by the construction plans. The striping

shall be installed in all locations as indicated by the construction plans. Color shall be as indicated on the construction plans.

Temporary Striping and Pavement Markings as shown on the Plans shall be provided to maintain safe and orderly parking and vehicular circulation during the temporary condition. Color shall be as indicated on the construction plans. Existing striping to be removed by Contractor through a method acceptable to the Engineer. Methods include blacking out existing striping or a method that would cover the existing striping.

03 05 02 MATERIALS

Traffic striping and traffic markings shall conform to the requirements of Section 610 of the NJDOT Standard Specifications modified and amended as follows:

Stop bars shall be applied with white epoxy resin, centerline stripes shall be applied with yellow epoxy resin. Parking stall, gore and loading zone striping shall be applied with white pavement paint and traffic markings shall be applied with white epoxy resin, unless otherwise noted on the plans. Final colors for all traffic striping shall be determined.

Temporary parking stall lines shall be **4-inch-wide white waterborne traffic marking paint**, suitable for application to asphalt pavement and capable of maintaining satisfactory visibility under normal vehicular and weather conditions. Apply pavement marking material in accordance with the manufacturer's recommendations.

03 05 03 METHODS OF CONSTRUCTION

The installation of traffic striping and traffic markings shall conform to the requirements of Section 610 of the NJDOT Standard Specifications, modified and amended as follows:

Thermoplastic shall be applied on thoroughly dried surfaces when the ambient and surface temperatures are above 50 degrees F and rising. The thermoplastic material shall be readily applicable at temperatures between 400 and 440 degrees F from the approved equipment to produce 125 mils thickness.

Epoxy resin striping shall be installed as per the manufacturer's specifications.

Prior to acceptance, additional applications of traffic stripes may be directed. These applications shall be applied at least 15 days after the initial application of traffic stripes and after any sawing or sealing of joints in bituminous concrete overlay.

The Contractor shall lay out the lines for traffic stripes, which shall be subject to the approval of the Engineer. The Contractor shall take care to record the location of all existing markings so they may be reapplied at the same locations. Irregular stripes shall be obliterated and reapplied by the contractor at his own expense.

Temporary pavement markings shall be maintained by the Contractor in a clearly visible and serviceable condition for the entire duration of the temporary condition. The Contractor shall restripe faded, worn, or otherwise unsatisfactory markings as directed by the Engineer, at no additional cost to the Owner.

Temporary accessible parking spaces, access aisles, pavement symbols, and other accessibility-related markings shall be provided and maintained in accordance with the Plans and all applicable federal, state, and local requirements.

SECTION 03 06 - CRACK SEALING

03 06 01 DESCRIPTION

This item shall consist of cleaning and sealing of cracks in the existing pavement surface in preparation for overlay, slurry sealing, and other miscellaneous surface treatment. The work shall be accomplished in accordance with these specifications and the applicable drawings.

03 06 02 MATERIALS AND METHODS OF CONSTRUCTION

All cracks ¼ inch wide or wider shall be sealed. The cracks shall be cleaned to a depth of approximately 1 inch by means of a random crack saw, carbide-tipped, rotary-impact router, commercial power-driven wire brush, or by other approved means. The Contractor shall provide acceptable protective screening if cleaning operations will cause damage to or interference with traffic in adjacent lanes. Any excess joint or crack sealer on the surface of the pavement shall also be removed from the pavement surface. If vegetation is a problem a soil sterilant shall be applied after cleaning and prior to placement of the sealant.

Immediately before sealant application, the cracks shall be cleaned and dried further with a hot compressed air lance (heat lance), or by air-blasting.

The cracks shall be sealed with a commercially available hot-poured polymer modified joint sealant product meeting any of the following specifications:

ASTM D3405/1190
AASHTO M-301-851
Federal Specification SS-S-1401C
FAA Specification P-605, Type II

The sealant shall be cut into small pieces to facilitate uniform melting and shall be melted slowly with constant stirring. A copy of the manufacturer's recommendations pertaining to the heating and application of the sealant material shall be submitted prior to the start of work. The manufacturer's recommendations shall be adhered to. The temperature of the sealant in the field application equipment shall not exceed the recommended safe heating temperature. Sealant material shall not be heated at the pouring temperature for more than six hours and shall not be reheated. The heating kettle or melter shall be equipped with temperature gauges to monitor heating temperature.

Sufficient sealant shall be applied by a pump and wand system into the cracks so that, upon completion of the work, the surface of the sealant is flush with or not more than 1/5 inch lower than the surface of the adjacent HMA surface course. If the sealant subsides to a lower level, another pouring shall be required. When more than one pouring is required to fill the cracks, succeeding pourings shall be done immediately after shrinkage of the previous pouring. Pouring shall be done in such a manner that the sealant is not spilled on exposed adjacent HMA surface course. Overfilling of the cracks shall also be avoided. If spilling or overfilling occurs, the crack shall immediately be squeegeed. If the Engineer determines that the overfilled crack or spilled sealant creates a slippery, hazardous, or otherwise undesirable condition, the area shall initially be corrected by sprinkling a light application of abrasive (sand or grit material) to absorb the excess materials, restore skid-resistance, and abate the condition caused by the overpour. After the excess material has been absorbed, the area shall be swept clean and restored to its original condition or texture to the Engineer's satisfaction. The Engineer may suspend the work, wholly or in part if overpouring continues, or if any undesirable condition caused by the overpour is not properly restored.

Traffic or construction equipment will not be permitted over the poured joints and cracks until the sealant has hardened sufficiently to resist pickup. The Engineer may direct dry sand to be sprinkled over poured areas at no additional cost to aid in resisting pick-up by traffic.

03 06 03 EQUIPMENT

All equipment shall be as specified herein or by the manufacturer or as approved by the Engineer. The equipment shall not cause damage to the pavement to remain in place.

Hand squeegees, shovels and all other necessary equipment shall be provided to perform the work in a proper manner. Air compressors for air-blasting shall be equipped with oil and moisture-filtering systems.

03 06 04 CURING

Sealed joints may be opened to traffic after they have completely cooled, but not until the engineer has given his/her approval. Where possible, parking shall be prohibited for twenty-four (24) hours after the work is finished.

SECTION 03 07 - ASPHALT FABRIC

03 07 01 DESCRIPTION

This item includes the purchase, installation and shall consist of a geotextile interlayer intended to control cracking in underlying existing pavement surfaces in preparation for overlaying and other miscellaneous surface treatment. The work shall be accomplished in accordance with these specifications and the applicable drawings.

03 07 02 MATERIALS

The Asphalt Fabric material shall be polypropylene, staple fiber, needle punched nonwoven geotextile, calendared on one side and resistant to ultraviolet degradation having the following roll values:

Property	Test Method	Units	Property Requirement
Grab Tensile Strength	ASTM D-4632	N (lbs)	780 (175)
Grab Elongation	ASTM D-4632	percent	50
Thickness	ASTM D-5199	mm (mils)	1.65 (65)
Puncture Resistance	ASTM E-154	N (lbs)	890 (200)
Strip Tensile Strength	ASTM D-882 (modified)	N/m (lbs/in)	8760 (50)
Permeance-Perms	ASTM E-96 Method B		0.05 max
Pliability – ¼" Mandrel 180 deg, Blend at -25 deg F	ASTM D-146 (modified)		No cracks in fabric or rubberized asphalt

Testing shall be performed at a laboratory accredited by GAI-LAP for tests required for the geotextile, at frequency exceeding ASTM D 4354 if required by the Engineer at no additional cost to the Owner.

The Asphalt Fabric shall be Petrotac 4591 as manufactured by Propex Inc., or approved equal.

03 07 03 METHODS OF CONSTRUCTION

The asphalt fabric shall be installed as per the manufacturer's recommendations. Neither the asphalt sealant nor the geotextile shall be placed when weather conditions, in the opinion of the Engineer, are not suitable. Air and pavement temperatures shall be sufficient to allow the asphalt sealant to hold the

geotextile in place. For asphalt cements, air temperature shall be 10°C and rising. For asphalt emulsions, air temperature shall be 15°C (60°F) and rising.

The surface on which the geotextile is to be placed shall be reasonably free of dirt, water, vegetation, or other debris. Cracks exceeding 3 mm (1/8 in) in width shall be filled with suitable crack filler. Potholes shall be properly repaired as directed by the Engineer. Fillers shall be allowed to cure prior to geotextile placement.

The sealant material used to impregnate and seal the geotextile, as well as bond it to both the base pavement and overlay, shall be a paving grade asphalt recommended by the geotextile manufacturer and approved by the Engineer.

The asphalt sealant (tack coat) application must be sufficient to satisfy the asphalt retention properties of the geotextile and bond the geotextile and overlay to the old pavement. When emulsions are used, the application rate must be increased to offset water content of the emulsion.

Application of the sealant shall be by distributor spray bar, with hand spraying kept to a minimum. Temperature of the asphalt sealant shall be sufficiently high to permit uniform spray pattern. For asphalt cements the minimum temperature shall be 150°C (300°F). To avoid damage to the geotextile, however, the distributor tank temperatures shall not exceed 160°C (320°F).

A spray pattern for asphalt emulsion is improved by heating. Temperatures in the 55°C (130°F) to 70°C (160°F) range are desirable. A temperature of 70°C (160°F) shall not be exceeded since higher temperatures may break emulsion.

The target width of asphalt sealant application shall be the geotextile width plus 150 mm (6 in). The asphalt sealant shall not be applied any farther in advance of geotextile placement than the distance the Contractor can maintain free of traffic.

Asphalt spills shall be cleaned from the road surface to avoid flushing and geotextile movement.

When asphalt emulsions are used, the emulsion shall be cured prior to placing the geotextile and final wearing surface. This means essentially no moisture remaining.

The geotextile shall be placed onto the asphalt sealant (calendared or smooth side up) with minimum wrinkling prior to the time the asphalt has cooled and lost tackiness. As directed by the Engineer, wrinkles or folds in excess of 25 mm (1 in) shall be slit and laid flat. Blooming and/or pneumatic rolling will be required to maximize geotextile contact with the pavement surface.

Overlap of geotextile joints shall be sufficient to ensure full closure of the joint but should not exceed 150 mm (6 in). Transverse joints shall be lapped in the direction of paving to prevent edge pickup by the paver. A second application of asphalt sealant to the geotextile overlaps will be required if in the judgement of the Engineer additional asphalt sealant is needed to ensure proper bonding of the double geotextile layer. Removal and replacement of geotextile that is damaged will be the responsibility of the Contractor.

Placement of the hot-mix overlay should closely follow geotextile laydown. The temperature of the mix shall not exceed 160°C (320°F). In the event asphalt bleeds through the geotextile causing construction problems before the overlay is placed, the affected areas shall be blotted by spreading sand. To avoid movement of, or damage to the seal-coat saturated geotextile, turning of the paver and other vehicles shall be gradual and kept to a minimum.

03 07 04 EQUIPMENT

The asphalt distributor shall be capable of spraying the asphalt sealant at the prescribed uniform application rate. No streaking, skipping, or dripping will be permitted. The distributor shall also be equipped with a hand spray having a single nozzle and positive shut-off valve.

Mechanical or manual lay down equipment shall be capable of laying the geotextile smoothly.

The following miscellaneous equipment shall be provided: stiff bristle brooms or squeegees to smooth the geotextile; scissors or blades to cut the geotextile; brushes for applying asphalt sealant to geotextile overlaps.

Pneumatic rolling equipment to smooth the geotextile into the sealant, and sanding equipment may be required for certain jobs. Rolling is especially required on jobs where thin lifts or chip seals are being placed. Rolling helps ensure the geotextile bond to the adjoining pavement layers in the absence of heat and weight associated with thicker lifts of asphaltic pavement.

SECTION 03 08 - SOIL STABILIZATION GRID

03 08 01 DESCRIPTION

This item shall consist of a polypropylene material intended to be placed over poor, over undetermined or soft soils. The work shall be accomplished in accordance with these specifications and the applicable drawings.

The geogrid is manufactured from a coextruded, composite polymer sheet, which is then punched and oriented. The resulting structure consists of continuous and non-continuous ribs forming three aperture geometries (hexagon, trapezoid, and triangle) and an unimpeded suspended hexagon.

03 08 02 MATERIALS

The geogrid material shall be polypropylene, and resistant to ultraviolet degradation having the following Identification Properties:

Identification Properties1	General
Aperture shapes	Hexagonal, Trapezoidal, & Triangular
Structure	Coextruded & Integrally Formed
Rib shape	Rectangular
Continuous parallel rib pitch(2), mm (in)	80 (3.2)
Rib aspect ratio(3)	>1.0
Node thickness(2), mm (in)	4.5 (0.18)
Color identification	White / Black / White

The Soil Stabilization Grid shall be InterAx® NX850™ Geogrid as manufactured by Tensar, A Division of CMC 2500 Northwinds Parkway, Suite 500 Alpharetta, Georgia 30009 800-TENSAR-1 www.tensarcorp.com or approved equal.

The geogrid material shall be polypropylene, and resistant to ultraviolet degradation having the following Identification Properties:

Identification Properties1 NX 850 & HX5.5	General
Aperture shapes	Hexagonal, Trapezoidal, & Triangular
Structure	Coextruded & Integrally Formed
Rib shape	Rectangular
Continuous parallel rib pitch(2), mm (in)	80 (3.2)
Rib aspect ratio(3)	>1.0
Node thickness(2), mm (in)	3.0 (.12) or 4.5 (0.18)
Color identification	White / Black / White

The Soil Stabilization Grid under vehicular travel ways shall be InterAx® NX850™ Geogrid as manufactured by Tensar, or approved equal.

The Soil Stabilization Grid under pedestrian travel ways shall be H-Series HX5.5™ Geogrid as manufactured by Tensar or approved equal.

03 08 03 METHODS OF CONSTRUCTION

The soil stabilization grid shall be installed as per the manufacturer's recommendations prior to the installation of dense graded aggregate, or other specified subbase material. Contractor shall strip all topsoil. A minimum of 6" of DGA material shall be installed over the geogrid. Refer to construction detail for actual depth of DGA. The geogrid shall not be placed when weather conditions, in the opinion of the Engineer, are not suitable. The soil stabilization grid shall be overlapped at least 12" at every joint, however it is based on the CBR rating and the contractor shall confirm the overlap based on the manufacturers specifications.

To ensure overlapping material should be zipped tied.

Material shall be install manually laid down smoothly. Material should be anchored using large stakes to keep material in place while installing the stone.

The following miscellaneous equipment shall be provided scissors or blades to cut the geogrid.

DIVISION 04, MASONRY STRUCTURES

SECTION 04 01 - CONCRETE STRUCTURES

04 01 01 DESCRIPTION

Concrete Structures shall include the removal and construction of concrete stairs, ramps, walls, slabs, footings, curbs, sidewalks, driveway aprons, headwalls and other miscellaneous structures at the prescribed locations, to the prescribed lines, grades, dimensions and thickness, reinforcement in accordance with the Plans and Specifications. The work shall conform in all respects to the requirements of the Standard Specifications of the New Jersey Department of Transportation as amended and revised to date.

04 01 02 MATERIALS

Cement used shall conform to the following requirements of the A.S.T.M. as amended and revised to date.

Standard Portland Cement A.S.T.M. Designation C-150, Type 1.

High Early Strength Portland Cement A.S.T.M. Designation C-150, Type 3

Air Entraining Portland Cement A.S.T.M. Designation C-150, Type 1A. Air Entraining Agent shall be Vinsol resin, Darex A.E.A. or approved equal.

Aggregates, both fine and coarse, shall conform to the requirements of the New Jersey Department of Transportation Standard Specifications.

Water shall be clean, fresh and free of oils, acids, salts, organic matter or other potentially injurious substances.

Concrete shall have 4% to 7% of entrained air, and shall be produced by using Standard Portland Cement with additive, or Air Entraining Portland Cement with additive as required. The Strength of concrete required for the various items of work shall be as shown on the Plans or in the Specifications.

Concrete shall have a 3" slump, with a tolerance of plus or minus 1".

Reinforcement Steel shall be ASTM Grade 60 deformed bars, conforming to the requirements of AASHTO M 31.

Wire Mesh or Fabric shall conform to AASHTO M55 as amended and revised to date. Where specified, Fiber Mesh reinforcing shall be required in lieu of wire mesh and/or fabric.

Joint Filler shall be a cellular compression material conforming to the requirements of the Standard Specifications of the New Jersey Department of Transportation.

04 01 03 METHODS OF CONSTRUCTION

Prior to construction, the Contractor shall furnish a copy of the concrete mix design(s) to the Engineer for approval, including cut sheets on any proposed admixtures. Ready mix or transit mix concrete may be used if obtained from NJDOT approved sources. Equipment used to proportion and mix concrete on the job shall be subject to the approval of the Engineer.

Forms shall conform to the shapes, lines, dimensions and grades shown on the Plans. They shall be firmly braced, tight and sufficiently substantial to prevent movement bulging or mortar leakage. Wherever concrete will be exposed to view, the forms shall be smooth and clean. Forms for footings may be omitted wherever soil conditions and workmanship permit accurate excavation to size. All forms shall be completely removed and taken from the site.

Reinforcement shall be accurately cut, bent and placed in accordance with the Plans. It shall be free of excessive scale or any foreign material that would tend to reduce bond. It shall be securely supported, tied and fastened with non-corrosive materials to prevent movement while concrete is being placed. It is not permitted to heat reinforcing to facilitate bending.

Subgrades, excavations and soil bases for all concrete work shall be properly finished to the prescribed lines, grades and dimensions, and shall be approved by the Engineer before concrete is placed. All areas to receive concrete shall be free of frost, foreign matter and excessive water, provided, however, that forms and soil surfaces shall be uniformly damp when the concrete is placed.

Concrete shall be handled and placed so as to avoid any segregation. Concrete which has begun to set or which has been contaminated with foreign materials or to which too much water has been added shall not be used. Pouring of concrete shall generally be a continuous operation until the placing of an individual section has been completed. Concrete shall be thoroughly compacted with vibrators or by other suitable means.

All concrete flat work shall be finished by screeding and floating to the required lines and grades. Unless otherwise specified, all work shall have a wood float finish, provided, however, that the Contractor shall provide other finishes when so required by the Plans or Specifications or so directed by the Engineer.

After the concrete has been poured, it shall be kept continuously wet for a period of three days or longer, as directed by the Engineer. Curing shall be done in accordance with Section 504.03 of the N.J.D.O.T. Standard Specifications.

Expansion joints, dummy joints, construction joints and other appurtenances shall be provided as shown on the Plans. Expansion joints shall have joint filler of the thickness indicated which shall extend the full depth of the concrete.

After removal of forms, all permanently exposed surfaces shall be cleaned of stains and dirt, and hand rubbed to produce a true surface of uniform texture and color. Voids or surface defects, which do not impair structural strength, shall be repaired by cutting and patching in a manner satisfactory to the Engineer.

Concrete shall not be poured when the atmospheric temperature is below 40° F. or when there is any precipitation, unless precautions satisfactory to the Engineer have been taken to protect the work. Precautions to protect concrete in cold weather shall be in accordance with the current recommendations of the American Concrete Institute.

04 01 04 SAMPLING AND TESTING METHODS

When specifically required by notation on the Plans or statement in the Supplemental Specifications, the Contractor shall perform sampling and testing of the concrete. No separate payment will be provided for such sampling and testing; the costs shall be included in the prices bid for the various items involving concrete construction. Sampling and testing of concrete shall be done in accordance with the New Jersey Department of Transportation Standard Specifications for road and bridge design Section 903.03 as follows:

AASHTO

T 22 Compressive Strength of Cylindrical Concrete Specimen (Including the Annex providing for use of neoprene caps)
T 23 Making and Curing Concrete Test Specimens in the Field
T 24 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
T 119 Slump of Portland Cement Concrete
T 121 Weight Per Cubic Foot, Yield and Air Content (Gravimetric) of Concrete
T 126 Making and Curing Concrete Test Specimens in the Laboratory Sampling Fresh Concrete
T 152 Air Content of Freshly Mixed Concrete by the Pressure Method
T 196 Air Content of Freshly Mixed Concrete by the Volumetric Method

ASTM

C 567 Unit Weight of Structural Lightweight Concrete
C 311 Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete. (See note)
Note - The Department may modify the sampling rate for individual and composite samples.

SECTION 04 02 - CONCRETE CURB

04 02 01 DESCRIPTION

Concrete Curb shall include the removal and replacement of existing curbing as well as installation of new curbing, where shown on the Plans or directed by the Engineer. It shall include but is not limited to the saw cutting, removal, excavation for and the construction of County, depressed, flush and standard curb in accordance with the Plans and Specifications, at the prescribed locations and to the prescribed lines, grades and dimensions.

The curb to be removed shall be sawcut from the existing curb to remain. The replacement curb shall be 6" x 8" x 18" curb as shown on the detail and as specified in Section 04 02 of this Specification. This includes any saw cutting, excavation, grading, and any other work required.

Curb in County Right of Ways, regardless of material of construction, shall be removed and replaced where shown on the Plans or directed by the Engineer. The curb to be removed shall be sawcut from the existing curb to remain. The removed curb shall be transported to and deposited at an approved facility by the Contractor. The replacement curb shall be 8" x 9" x 20" curb or as shown on the detail and as specified in Section 04 02 of this Specification.

Playground curbing shall be installed in accordance with the construction detail and is non-tapered.

The Contractor shall be responsible for all pavement restoration preparation under this item. This includes any saw cutting, excavation, grading, and any other work required.

Any grassed area disturbed through the removal and replacement of curb shall be restored with topsoil and seed in accordance with Section 07 01 of this Specification which cost is to be included in this item.

04 02 02 MATERIALS

Concrete shall conform to the requirements of section 04 01 of the Specifications and be constructed with air entrained concrete with a minimum twenty-eight (28) day compressive strength of 4,500 psi. Concrete shall have a 4% to 7% of entrained air and shall have a slump of 4" plus or minus 1".

Joint Filler shall be a cellular compression material conforming to the requirements therefore of the Standard Specifications of the New Jersey State Highway Department as amended and revised to date.

Reinforcement, when required, shall conform to the requirements of Section 04 01 of the Specification.

04 02 03 METHODS OF CONSTRUCTION

The Contractor shall make all necessary excavations, including demolition and removal of existing curb, paving and sidewalk, if any; and embankments for the construction of Concrete Curb, including disposal of excess material and demolished structures. Subgrades, excavations and embankments shall be prepared in accordance with the requirements of Section 04 01 of the Specification. No more excavation shall take place than may reasonably be expected to be formed and poured the following day.

Curb forms shall be removed no later than the day following the pour. Immediately after removal of the forms, the curb shall be backfilled. Backfill shall be compacted as soon as the concrete has gained sufficient strength to withstand the compaction process.

The Contractor shall exercise extreme care when utility appurtenances, i.e., water boxes, sanitary sewer cleanouts, etc., are present, and shall be solely responsible for repair or replacement of any and all damaged appurtenances at his own expense.

Forms for concrete may be of lumber or steel. They shall be straight and of sufficient strength to prevent warping or bulging and to retain the concrete accurately in position. All mortar and dirt shall be removed from forms which have been previously used. Forms shall be well staked to the lines and grades given by the Engineer and their upper edges shall conform to the finished surface of the curb. All forms shall be thoroughly wetted immediately before concrete is deposited against them. Curved forms shall be used for the construction of all radius curbs.

Slip forming may be used in lieu of standard forming methods. The slip form machine shall be equal to the Easi-Pour Model No. TP-880 as manufactured by Huron Manufacturing Corporation. However, the concrete shall have a slump of approximately one inch (1") and conform to machine requirements when extrusion construction is to be done.

Concrete construction, including curing, shall conform to the applicable requirements of Article 04 01 03 of these Specifications. The concrete shall be tamped and spaded or vibrated so that the forms are completely filled, the concrete thoroughly compacted, and mortar is flushed to the face and top. Before initial set, the top of the curb shall be finished with a wood float to an even, smooth and dense surface. As soon as the forms can be removed, the face of the curb shall be given the same finish. No voids or honeycombs will be permitted. Both final surfaces shall have a soft broom finish, utilizing a light horse-hair broom. Exposed edges shall be neatly rounded to the radius specified on the Plans.

Expansion joints shall be provided at intervals of 20 feet or when new curb abuts existing curbs or inlets. Expansion joints where new curb abuts existing curbs or inlets shall be filled with 1/2 inch thick cellular compression material to within 1/2 inch of the top and face of the curb and to within 1/4 inch of the top of the gutter.

Construction joint 1/16 inch wide shall be provided midway between expansion joints except where the distance between the adjacent expansion joint is less than 12 feet.

Expansion joints for slip forming shall be provided at intervals of 100 feet or when new curb abuts existing curb. Construction joints 1/16 inch wide shall be provided every 20 feet.

Finished curb shall be true to the required grades, lines, dimensions and curvatures. Completed work shall be protected from traffic and the elements and shall be thoroughly wetted and kept moist for at

least three (3) days. Damaged, broken or cracked work shall be renewed by the Contractor at his own sole cost and expense.

04 02 04 SAMPLING AND TESTING

Sampling and testing shall conform to the N.J.D.O.T. standard specifications for road and bridge construction, dated latest revision, sections 607, 903 and 904.

SECTION 04 03 – CONCRETE 4", CONCRETE 6"

04 03 01 DESCRIPTION

Concrete 4" Thick (Sidewalk/Flat work) shall include the removal of and replacement existing concrete sidewalk, including curb ramps or other flat work, where shown on the Plans or as directed by the owner, prior to construction. It shall also include the Concrete 6" Thick (reinforced). This includes the preparation of subgrade for and the construction of concrete flatwork of the types specified, in accordance with the Plans and Specifications, at the prescribed locations, and to the prescribed lines, grades and dimensions. The concrete to be removed shall be sawcut from the existing concrete to remain. The removed concrete shall be transported to and deposited at an approved facility by the Contractor.

All re-grading of the sidewalk/ flat work areas is included under this item. All flat work shall conform to all pertaining specifications in Section 04. The contractor shall clear and grade all areas as shown on the plan where proposed sidewalk/flat work is proposed.

Fiber mesh shall be installed in all concrete flat work regardless of thickness.

No separate or additional payment will be made for adjusting manhole castings, utility valves and meters, etc.

04 03 02 MATERIALS

Concrete

Concrete shall be constructed with air entrained concrete with minimum twenty-eight (28) day compression strength of 4,500 psi. Concrete shall have 4% to 7% of entrained air and shall have a slump of 3" plus or minus 1".

Joint Filler

Joint Filler shall be a cellular compression material conforming to the requirements therefore of the Standard Specifications of the New Jersey Department of Transportation as amended and revised to date.

Joint Sealant

Joint Sealer shall be a hot poured, elastomeric type for Portland Cement Concrete Pavements conforming to ASTM Designation D 3406.

Reinforcement

Reinforcement when required and illustrated on the Plans or Details, shall conform to the requirements of Section 04 01 02 of these Specifications.

04 03 03 METHODS OF CONSTRUCTION

The Contractor shall make all necessary excavations, including demolition and removal of existing

sidewalks and aprons, if any; and embankments for the construction of concrete sidewalks and drive aprons, or 6" thick concrete, including disposal of excess material and demolished structures. Subgrades, excavations and embankments shall be prepared in accordance with and meet the requirements of Section 04 01 of the Specification. No more excavation shall take place than may reasonably be expected to be formed and poured the following day.

Immediately after the concrete paving is completed, the forms shall be removed, and the Contractor shall backfill and grade against the sidewalk in accordance with the Plans.

Forms for concrete may be of lumber or steel. They shall be straight and of sufficient strength to prevent warping or bulging and to retain the concrete accurately in position. All mortar and dirt shall be removed from forms which have been previously used. Forms shall be well staked to the lines and grades given by the Engineer and their upper edges shall conform to the finished surface of the paving. All forms shall be thoroughly wetted immediately before concrete is deposited against them.

Wherever utility appurtenances, i.e. water boxes, sanitary sewer clean-outs, etc., fall within the lines of Sidewalk or Drive Apron construction, the Contractor shall be responsible for assuring those appurtenances are flush with the final surface grade, are free of concrete and are in an operable condition.

Drive Aprons and Sidewalks over which vehicular traffic shall travel (Concrete 6" thick) shall be formed and poured to a depth of six (6") and shall be reinforced with 6x6-W2.9xW2.9. All other sidewalk areas shall be four inches (4") thick.

All Concrete 4" and 6" Thick shall include a 4" subbase of Dense Graded Aggregate (DGA). Refer to Section 03 02 for material and installation requirements.

After being placed, the concrete shall be tamped, screeded and finished to true grade and surface. The finish shall be with a wood float, followed by brooming to a neat and workmanlike surface. Exposed edges shall be neatly rounded to a radius of 1/2 inch, unless otherwise noted on the Plans. The concrete shall be cured as provided in Article 04 01 03 of these Specifications.

Expansion Joints, 1/2 inch wide, shall be provided at intervals of 20 feet and where the new paving abuts curb or old work. The expansion joints shall be filled with 1/2 inch thick cellular compression material to within 1/4 inch of the top of the paving. For sidewalk, surface grooves shall be cut with an approved tool at least 1/4 inch thick at right angles to the line of the sidewalk and at intervals equal to the width of the sidewalk. Where new work abuts existing sidewalk, the surface grooves shall be spaced to conform to the lines of the abutting walk. All joint edges shall be rounded to the radius specified on the Plans.

The finished paving shall be true to the required grades, lines and curvatures. Completed work shall be protected from traffic and the elements. Damaged, broken or cracked work shall be renewed by the Contractor at his own sole cost and expense.

Curb, 4" Concrete, (Sidewalk) 6" Concrete Thick and aprons shall be constructed in accordance with the Construction Details.

Before initial set, the top of the curb and the gutter shall be finished with a wood float to an even, smooth and dense surface. As soon as the forms can be removed, the face of the curb shall be given the same finish. Exposed edges shall be neatly rounded to the radius specified on the Plans. The finished curb shall not vary from the required grades, lines, dimensions and curvatures by more than 1/4 inch at any point. Completed work shall be protected from traffic and the elements and be thoroughly wetted and kept moist for at least one (1) day. Damaged, broken or cracked work shall be replaced by the Contractor.

SECTION 04 04 - CURB RAMPS

04 04 01 DESCRIPTION

Curb ramps shall include the removal of the existing ramps, the preparation of subgrade for and the construction of curb ramps, in accordance with the Plans and Specifications, at the prescribed locations, using the prescribed materials and to the prescribed lines, grades and dimensions. Materials and methods of constructions shall comply with the requirements of Section 04 of these Specifications.

The existing handicap ramp shall be removed at each location shown on the Construction Plan. The removed concrete, wood, metal, asphalt or stone from the previously existing handicap ramp shall be transported to and deposited at an approved facility by the Contractor. Re-grading of the ramp area to match the Construction Plans shall be included. The proposed handicap ramps shall be constructed at each location shown on the Construction Plan and comprised of concrete 4" or 6" Thick. The existing concrete curb and sidewalk shall be removed and replaced per the construction plans to install handicap ramps and adjacent sidewalks consistent with the detail at the locations indicated on the Plans. The curb to be removed shall be sawcut from the existing curb to remain. Sidewalk removal shall extend to the distance necessary to achieve the maximum permissible slope continued to the next existing joint. The removed curb and sidewalk shall be transported to and deposited at an approved facility by the Contractor. The replacement curb shall be as shown on the detail. The replacement sidewalk shall poured to the width indicated on the plans and 4 inches thick. For ramps not located at the sidewalk the ramp shall be constructed as shown on the plan and in accordance with the specified ramp detail. Any grassed area disturbed through the removal and replacement of curb shall be replaced with 4" thick topsoil, seed, & fertilizer.

Ramps constructed within County Rights of Ways shall be constructed as per the county requirements, including the use of county curb.

Each handicap ramp shall include the ramp itself, detectable warning surface (if at a road crossing or driveway crossing), a 4' x 4' landing area or as indicated on the Construction Plans, two 4'x 4' blocks of sidewalk, and up to 15 LF curb as per the detail shown on the plans for curb ramps within the public right-of-way or per the applicable detail if ramp is not a curb ramp but constructed on-site as part of a barrier-free accessible route. The handicap ramp shall be constructed using 4" Thick concrete. If curb is needed behind the handicap ramp for grading purposes (any grades greater than 3:1), the adjacent curb shall be included in construction of the handicap ramp. The ramps constructed within the site shall be built according to the specifications of the details provided on the plan including the installation of handrails as indicated.

04 04 02 MATERIALS

Unless otherwise specified, materials shall be as detailed on the Plans and within these specifications or approved equal.

Truncated domes shall be cast-in-place "ADA In-Line Universal Radius Replaceable Wet Set Composite TWS Unit" or cast-in-place "ADA In-Line Replaceable Wet Set Composite TWS Unit" as shown on the plans and as manufactured by ADA Solutions, Inc (www.adatile.com) or approved equal. Color of units should be brick red.

04 04 03 METHODS OF CONSTRUCTION

Curb Ramps shall be constructed at the locations illustrated on the Plans. The detail of which shall conform to New Jersey Division of Building and Construction Regulations for "Barrier-Free Design" as amended or revised to date, The ramp shall be constructed in full conformity with the detail included on the plans and shall meet the latest PROWAG standards for ramps located within the public right-of-way or ADAAG standards for ramps located outside of the public right-of-way and to the details shown on the Plans.

SECTION 04 05 - CONCRETE REPAIRS

04 05 01 DESCRIPTION

Provide and secure the complete repair of cracks and miscellaneous defects in the locations illustrated on the Plans and/or as specified in the supplemental specifications herein.

04 05 02 GROUTING RANDOM CRACKS

Cracks shall be repaired using Hydro Active Flex LV polyurethane grout in accordance with CFR 177.1680 or approved equal.

Random cracks shall be sealed from the positive side where practical. Surfaces shall be adequately prepared to remove any debris, spalled concrete, and deleterious material which could jeopardize adhesion by grout, epoxy, etc. Surfaces and cracks must be clean and dry before grout injection holes are drilled. Contractor shall submit typical injection hole drilling pattern, hole diameter and grout injection procedures to the Owner's Engineer for review before work commences. An actual demonstration will be required to satisfy the Owner's concerns of contractor procedures to adequately repair cracks.

04 05 03 REPAIR SPALLED CONCRETE

A Materials - Spalled concrete repairs shall be made with Renderoc HBA, two-component polymer modified cementitious, fast setting, patch compound, SIKA Top 122 or 123, or approved equal. Repair material shall be applied in strict accordance with the manufacturer's recommendations, including surface preparation and temperature.

B Surface Preparation - Concrete substrate must be structurally sound. Loose or unsound concrete should be hammered out. Surfaces must be entirely free of oil, grease, paint, corrosion deposits, dust, laitance, or other surface contaminants. They should be prepared by mechanical scarification or sandblasting. All dust or deposits produced during these procedures must be removed, preferably by vacuum cleaner. Embedded steel should be cleaned of corrosion and exposed to 100% of its circumference. Once cleaned, and prior to the repair application, the exposed metal should be coated with Nitoprime Zinc Rich primer or an approved equal.

C Mixing - Renderoc HBA or an approved equal should be mixed on the job site in clean containers. A slow speed drill or mortar mixer should be used for mixing. It is advisable to add the powder to the liquid. Small quantities of Renderoc Liquid or an approved equal may be added or held back to enhance application consistency.

D Priming - Dampen surfaces to be repaired with clean water, but make sure there are no standing puddles. All surfaces should be primed with slurry, using a masonry brush and scrubbed into the substrate. The slurry consists of 2 parts by volume of Renderox HBA powder mixed into 1 part volume of Renderox Liquid. The slurry should be allowed to dry prior to application of the repair mortar.

E Application - While the slurry is still damp, apply by trowel. The maximum thickness of any one layer of Renderox HBA will depend upon its consistency, location and profile of the substrate to which it is applied. Typically, a vertical layer of 3 inches can be achieved, while overhead applications of 1 1/2" can be achieved in any one unsupported application. If forms are used, depths well in excess of these can be achieved in one application. For large and/or deep repairs mechanical anchors, studs, etc., shall be used. When multiple lifts of material are used to achieve desired thickness, each lift should be scratched and reprimed with slurry (priming) prior to the application of subsequent lifts. Initial cure should be achieved before the application of the next lift.

DIVISION 05, UTILITY IMPROVEMENTS

SECTION 05 01 - MANHOLES, INLETS AND CATCH BASINS

05 01 01 DESCRIPTION

Manholes, Inlets, Catch Basins, Yard Drains and Trench Drains shall include purchase of new structures, the excavation for and the construction of these of these structures in accordance with the Plans and Specifications, at the required locations, and to the prescribed lines, grades and dimensions.

Any existing inlet to remain shall be repaired, and all cracks and holes filled with cement mortar, missing bricks or blocks shall be replaced, head bolts installed, ladder rungs added, the inlet cleaned, channels constructed and other work necessary to reconstruct the inlet prior to applying the waterproofing material. The surface shall be cleaned and prepared in accordance with the manufacturer's specifications.

05 01 02 MATERIALS

Concrete shall conform to the requirements of Section 04 of these Specifications except that batching and mixing equipment may be of a size and type suitable for the work to be done, subject to the approval of the Engineer.

Concrete Block

Concrete Block for the construction of manholes, inlets and catch basins shall conform to the requirements of the New Jersey Department of Transportation Standard Specifications, latest revision, Section 910. Concrete Blocks for manholes shall have the required radius and batter.

Brick

Brick shall conform to the NJDOT Standard Specifications, latest revision, Section 910.

Mortar

Mortar shall be 1:2 cement-sand mortar. Mortar materials shall conform to the requirements therefore of Article 4.1.2 of these Specifications.

Iron Castings

Iron Castings shall conform to the requirements of the American Society for Testing Materials Specifications for gray iron casting as amended and revised to date, supplemented as follows:

Castings shall be boldly filleted and arises shall be sharp and perfect. The castings shall be true to pattern in form and dimension, free of pouring faults, sponginess, cracks, blowholes and other defects which affect their strength and value for the service intended. The bearing surfaces of frames, covers, and grates shall be fitted together so as to prevent rocking and the pieces match-marked.

Ladder Rungs

Ladder Rungs shall be fabricated of rolled wrought iron conforming to the current American Society for Testing Materials Designation C-478 therefore and shall be subject to the approval of the Engineer.

05 01 03 METHODS OF CONSTRUCTION

Excavation and backfill shall conform to the requirements for subsurface structure excavation.

Manholes, inlets, catch basins and Trench Drain Channels, shall be constructed in accordance with the details shown on the Plans. Unless otherwise specified or directed, manholes, inlets and catch basins may be constructed of either brick, concrete block, 4000 psi Concrete, or Precast Reinforced Concrete Manhole Sections. The foundations for all manholes, inlets and catch basins shall be concrete as specified on the Plans.

Concrete constructions shall conform to the applicable requirements of Division 4 of these Specifications.

Concrete blocks and bricks shall be laid with vertical joints staggered. Joints shall be not more than 1/2 inch thick and shall be completely filled with mortar. The masonry shall be carried to such a height that a mortar joint not more than 1/2 inch thick will be required for setting the head casting without using split blocks or bricks. Outside walls shall be plastered with a 1/2 inch thick coat of mortar, troweled to a smooth finish.

Reset and New Heads

When so prescribed, the head castings of existing structures shall be taken up and reset to new elevation and new head castings shall be furnished and set on existing structures. The masonry of the existing structures shall be added to or removed as may be necessary to conform to new surface grades and elevations. All work shall be done in conformity with the requirements hereinabove.

Reconstructed Channels

When so prescribed, the channels of present structures shall be reshaped or raised and reshaped as may be necessary to conform to new flow patterns. The channels shall be reconstructed as indicated on the Plans, and all work shall be done in conformity with the requirements hereinabove.

Inlets Converted to Manholes

When so prescribed, existing inlets shall be reconstructed to serve as manholes. The inlet walls shall be removed to the necessary depth and a satisfactory wall transition shall be constructed to suit the dimensions of the specified manhole frames. New or reclaimed manhole frames and covers, as specified, shall be furnished and set on the reconstructed walls. All work shall be done in conformity with the requirements hereinabove.

Existing Castings

When so prescribed, manholes, inlets, catch basins and inlets converted to manholes shall be constructed using existing head castings reclaimed from structures on the Project that are to be abandoned. The castings shall be carefully removed from the existing structures, and all concrete, mortar and other adhering matter shall be removed before the castings are reset.

All curbs, pavements, bases, sidewalks and other surfaces and structures which have been damaged or disturbed in connection with the construction or reconstruction of manholes, inlets and catch basins, or the setting or resetting of head castings, shall be repaired or replaced in a manner satisfactory to the Engineer.

Channel Drains and Grates

Examine areas to receive pre-sloped channel drain system. Notify engineer if areas are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

Install pre-sloped channel drain system in accordance with manufacturer's instructions at locations indicated on the Drawings. Contractor shall provide the necessary pipe as illustrated on the plans and tie channel drain into the proposed 'A' inlet utilizing a 4" HDEP pipe. Excavate trench to ensure proper bedding of concrete beneath and on both sides of channel. Install top of drain system level and to proper elevation. Ensure directional flow arrows located on bottom of channel are pointing in direction of flow, toward catch basin and/or evacuation outlet Ensure catch basin is at required elevation and location to drain system. Apply silicon sealant to seal joints of drain system Install and tape grates before placing concrete. Place concrete beneath and on both sides of drain system. Ensure concrete has a minimum compressive strength of 3,500 psi at 28 days. Concrete shall be as specified in Section 04. Recess top of drain system to be 1/8 inch below concrete finish grade. Protect installed pre-sloped channel drain system from damage during construction.

SECTION 05 02 – STORM DRAINS

05 02 01 DESCRIPTION

Storm Drains include the installation of the new drain pipes shall be of the types and sizes specified on the plans, and shall be constructed to the prescribed lines and grades, at the prescribed locations, and shall include the excavation for, trench restoration and the construction of new pipe drains for the collection and carrying of surface drainage and in accordance with the Plans and Specifications or as directed by the Engineer.

The pipes should be installed in accordance with the details in the Construction Plans. All trench repairs as shown on the details shall be included. All fittings associated with the installed piping shall be included. The cleanouts and fittings shall be installed as shown on the Construction Plans or as directed by the Engineer.

The Contractor shall be responsible for transporting and disposing of the removed materials at an approved facility. All areas disturbed by the removal of pipe shall be returned to original condition. All disconnections and reconnections to existing and proposed drainage structures shall be included.

05 02 02 MATERIALS

Plastic Pipe

Drainage Pipes shall be constructed in accordance with the details in the Plans, and the requirements of Section 601 of NJDOT Standard Specifications as modified and amended as follows under Methods of Construction.

Drainage pipe and fittings shall be either corrugated or smooth interior as specified in the form of proposal, corrugated exterior perforated Polyethylene pipe conforming to current AASHTO Designation M294 utilizing only virgin AASHTO approved resins. The pipe shall be "N-12" as manufactured by Advanced Drainage Systems, Inc., Hi-Q pipe as manufactured by Hancor, Inc. or approved equal. All pipe shall be supplied with bell and spigot ends and provide a silt tight joint.

The prescribed sizes of pipes are nominal inside diameters. Pipes shall be of the size and length as shown on the plans. The product supplied under this specification shall be high density polyethylene corrugated or smooth exterior/smooth interior pipe. Twelve to Thirty-Six inch diameters shall conform to AASHTO M294 Type S.

Coupling bands, if required shall cover at least two (2) full corrugations on each section of pipe.

When gasketed coupling bands are required, the gasket shall be made of closed-cell synthetic expanded rubber meeting the requirements of ASTM D1056, Type 2. The pipe manufacturer shall install gaskets on the coupling band. All coupling bands shall meet or exceed the soil-tightness requirement of the AASHTO Standard Specification for Highway Bridges, Section 23, Paragraph 23.3.1.5.4(e). Pipefittings shall conform to AASHTO M252 or AASHTO M294. Fittings approved by the engineer are also acceptable. Under all circumstances joints shall be silt tight at a minimum.

6" flat drainpipes, shall be multi-flow, having a horizontal installation method per the construction detail as illustrated in the plans. The product shall be multiflow as manufactured by Varicore Technologies, Inc. or approved equal. The Contractor shall submit shop drawings for the proposed underdrain system to be approved by the Engineer prior to construction.

This system shall include all the associated drainpipes, connections of all collection pipes, fasteners, attachments, end caps and all else necessary to complete the drainage system.

The Underdrain System shall also include the purchase and installation of all the ¾" clean drainage stone. This stone shall be sandwiched between two (2) layers of non-woven needle punched geotextile fabric.

The collection system shall be of flexible, prefabricated, rounded rectangular shaped, composite product.

The collection system shall be wrapped with a non-woven geotextile and shall be a non-woven needle-punched construction and consist of long-chain polymeric fibers composed of polypropylene, polyethylene or polyamide. The fibers shall be oriented into a multi-directional stable network whereby they retain their positions relative with each other and allow the passage of water as specified. The fabric shall be free of any chemical treatment or coating, which reduces permeability and shall be inert to chemicals commonly found in soil. The geotextile shall conform to the following minimum average roll values.

Weight	ASTM D-3776	4.0
Tensile Strength	ASTM D-4632	100
Elongation %	ASTM D-4632	50
Puncture, lb	ASTM D-751	50
Mullen Burst, psi	ASTM D-3786	200
Trapezoidal Tear, lb	ASTM D-4533	42
Coefficient of Permeability	ASTM D-4491	.1 cm/sec
Flow Rate, gpm/ft2	ASTM D-4491	100
Permittivity, 1/sec	ASTM D-4491	1.8
Apparent Opening Size	ASTM D-4751	70 Max. US Std Sieve Opening
Seam Strength, lb/ft	ASTM D-4595	100
Fungus	ASTM G-21	No growth

The collection system core shall be made of a high-density polyethylene. The core shall be constructed using interconnected corrugated pipes that define and provide the flow channels and structural integrity of the drain. The geotextile shall function only as a filter. The core of the collection system shall conform to the following physical property requirements.

Thickness, inches	ASTM D-1777	1.0

Flow Rate, gpm/ft*	ASTM D-4716	30
Compressive Strength, psf	ASTM D-1621 (modified sand method)	6000

The underdrain pipes shall meet or exceed these specifications.

The fittings used with the collection system shall be of a "snap together" design. In no case shall any product be joined without the use of the manufacturer's connector designed specifically for the purpose.

Fittings shall be installed in accordance with the manufacturer's recommendations.

Backfill shall be consolidated in accordance with the plans or as directed by the engineer.

Any damaged collection system, or transport pipe shall be replaced or repaired by splicing in an undamaged section of like material at the contractor's expense.

Reinforced Concrete Pipe

Reinforced concrete pipe shall conform to the requirements of the American Society for Testing Materials Designation C-76, as amended and revised to date. Unless otherwise specified herein, reinforced concrete pipe shall be Class III, Wall B, except that reinforced concrete pipe with less than 2 feet of cover shall be Class IV, Wall B.

All reinforced concrete pipe shall have joints which conform to the requirements of the Township Engineer.

Elliptical reinforcing will not be permitted in circular pipe.

Ductile Iron Pipe

All DIP shall be ductile iron pipe (not cement lined) conforming to ANSI A 21.51 (AWWA C 151) of latest revision, with an asphaltic interior coating in accordance with ANSI/AWWA C151/A21.51-8.3, with either mechanical or push-on joints. Unless otherwise specified, the pipe shall be Thickness Class 52. All joints shall be fitted with rubber gaskets in accordance with ANSI/AWWA C111/A21.11-95.

05 02 03 METHODS OF CONSTRUCTION

Excavation and backfill shall conform to the requirements of Section 02 of these Specifications.

The Contractor shall provide adequate equipment and so operate it as to maintain an essentially dry excavation, stable trench bottoms, suitable working conditions and protection from water damage throughout and until the completion of the work.

Pipe shall be laid in straight lines between drainage structures except when otherwise specifically provided or directed by the Engineer. When deviation from a straight line is permitted, the deflection of each joint shall not exceed the manufacturer's recommended maximum for the type of joint and size of pipe being installed. All pipe shall be laid to uniform grades.

No defective or leaking pipe, joints, connections, manholes, inlets, or other parts of the work will be acceptable. All visible leakage of any description, and no matter where located, shall be corrected by the Contractor in a manner satisfactory to the Engineer.

Except when necessary to maintain a flow, storm drains shall not be placed in embankment until the embankment has been constructed and consolidated to proposed finished grade or subgrade, or to an elevation not less than three feet above the proposed top of pipe, whichever is lower. After an embankment has been so constructed, trenches for storm drains shall be excavated as hereinabove specified.

When so required by the Engineer, the Contractor shall flush such newly completed storm drains as may be designated by the Engineer, in order to remove any foreign matter which may have accumulated therein during construction. The Contractor shall furnish all labor, material, equipment and water necessary for flushing and shall provide for the disposal of water used for flushing.

The contractor shall reconstruct, seal all new and existing penetrations as part of the storm pipe replacement at the existing and proposed structures in a manner acceptable to the Engineer. In some cases the penetration of an existing structure may require reconstruction and the contractor shall refer to Section 05 01 for restoration.

The locations of existing pipes and structures shown on the Plans are approximate, and before construction, the Contractor shall determine the exact location of all existing pipes and structures in the vicinity of the proposed work. Connections to existing pipes and structures, which have been abandoned, shall be plugged, demolished or removed as indicated on the plans or as directed by the Engineer.

All areas disturbed by pipe replacement shall be returned to original condition.

Plastic Pipe

Bedding and backfill material shall be clean crushed stone (non-deteriorating) 1" to 1 ½" diameter free of fines. This material shall be placed around the pipe for the distances shown on either side and on top and bottom as shown on the detail or as required. The clean crushed stone material shall be wrapped in filter fabric.

Above the clean crushed stone material, trenches shall be backfilled base course subgrade with clean granular materials selected by the Engineer from materials excavated. Excavated pavement materials shall not be placed in backfills.

All delivered pipe shall be inspected. Damaged pipes will not be accepted. All existing pipe to be removed shall be disposed of at an approved facility.

Underdrain pipe system shall be laid with a slope as illustrated on the plans and install with a 6"-8" course of ¾" clean drainage stone.

The fittings used with the collection system shall be of a "snap together" design. In no case shall any product be joined without the use of the manufacturer's connector designed specifically for the purpose.

Flat drain Fittings shall be installed in accordance with the manufacturer's recommendations.

Backfill shall be consolidated in accordance with the plans or as directed by the engineer.

Any damaged collection system, or transport pipe shall be replaced or repaired by splicing in an undamaged section of like material at the contractor's expense.

Reinforced Concrete Pipe

Each section of pipe shall be solidly bedded in the trench bottom and shall be supported for its full length except where excess excavation has been made for joints. Before making each joint, the ends of the pipes and all joint members shall be thoroughly cleaned. All jointing shall be done in strict accordance with the manufacturer's recommendations and the direction of the Township Engineer. Joints of tongue and groove pipe shall be filled with mortar around their entire circumference. Mortar shall be 1:2 cement-sand.

Concrete cradles over existing pipes shall be constructed where and as directed by the Engineer. All concrete work shall conform to the requirements of Division 4, Section 1, of these Specifications.

05 02 04 SAMPLING AND TESTING

Sampling and testing shall conform to the NJDOT standard specifications for road and bridge construction, latest revision.

SECTION 05 03 - SANITARY SEWERS

05 03 01 DESCRIPTION

Sanitary Sewers shall include the excavation for and the construction of pipelines for the collection and carrying of sanitary sewage in gravity flow systems. The sewers shall be of the types and sizes specified and shall be constructed to the prescribed lines and grades, at the prescribed locations, and in accordance with the Plans and Specifications or as directed by the Engineer. The term "Sanitary Sewer" shall include both mains and service laterals and risers.

05 03 02 MATERIALS

All materials and appurtenances shall conform with the respective manufacturer's requirements for standard, short and random lengths, size, class, description, marking, workmanship, chemical standards, tests, dimensions, strengths, tolerances, and shipment wherever not otherwise specified herein.

Ductile Iron Pipe

Ductile iron pipe (not cement lined) shall conform to ANSI A 21.51 (AWWA C 151) of latest revision, with either mechanical or push-on joints. Unless otherwise specified, the pipe shall be Thickness Class 52.

Ductile Iron Fittings

All ductile iron pipe shall be fitted with gray-iron or ductile-iron fittings, and all such fittings except wye branches shall conform to ANSI A 21.10 (AWWA C 110) of latest revision. Although wye branches are not specifically covered by the aforementioned standard, they shall meet all thickness, and dimensional requirements thereof, and shall be as manufactured by U.S. Pipe and Foundry Company or approved equal. Mechanical joint fittings shall be used with mechanical joint pipe, and either push-on or mechanical joint fittings shall be used with push-on joint pipe.

Poly Vinyl Chloride PVC Pipe and Fittings

Poly Vinyl Chloride (PVC) Pipe and Fittings shall conform to the requirements of American Society for Testing Materials Specifications therefore, as amended and revised to date. Unless otherwise specified herein when the burial depth is less then twelve (12) feet the poly vinyl chloride pipe and fittings shall be non-pressure, single gasketed, SDR 35, Type PSM PVC pipe and when the burial depth is in excess of twelve (12) feet the poly vinyl chloride pipe and fittings shall be non-pressure,

single gasketed SDR-26, ASTM D-3034. Pipe joints shall be elastomeric type conforming to the requirements of the American Society for Testing Materials Specifications, as amended and revised to date. Pipe gaskets shall be rubber and shall conform to the American Society for Testing Materials Specifications for low head-pressure reinforced concrete pipe as amended and revised to date.

Joint lubricant shall conform with the requirements of the pipe manufacturer.

Only PVC adapters to other piping materials shall be used.

Concrete

Class 3000 psi concrete conforming to the requirements of Section 4.1 of the Specifications shall be used in the construction of drop connections at manholes, concrete cradles, pads, plugging pipes and sealing structures. Batching and mixing equipment shall be of a size and type suitable for the work to be done and shall be subject to the approval of the Engineer.

Laterals

Laterals should be constructed with the materials shown on the detail sheet of the Plan.

05 03 03 METHODS OF CONSTRUCTION

Excavation and backfill shall conform to the requirements for subsurface structure excavation.

Existing service connections to the sanitary sewer system are not shown on the Plans. Where new sewer mains are shown to be constructed, the Contractor shall investigate and determine the location of all existing service connections. The Contractor shall provide a Sanitary Sewer Lateral at each existing service connection and additional Laterals at locations designated by the Engineer.

Laterals that are not to be immediately connected shall be securely plugged with an approved type of plug which will provide a watertight seal. The Contractor shall provide for an uninterrupted sewage flow from each new and existing service connection and will be held responsible for any claims arising from his failure to do so. At the end of each day the sewer system is to be reconnected and operational.

The Contractor shall accurately record the lengths of pipe between manholes, wye branch connections stations and directions, lateral lengths, vent locations, and locations of plugs or connections to existing laterals. The rim and invert elevations and pipe slopes should also be recorded. The Contractor shall prepare and provide the Engineer with three (3) copies of as-built drawings showing this information.

Pipe shall be laid in straight lines between manholes except when otherwise specially provided. When deviation from a straight line is permitted, the deflection at each joint shall not exceed the manufacturer's recommended maximum for the type of joint and size of pipe being installed. All pipe shall be laid to uniform grades between manholes.

Each section of pipe shall be solidly bedded in the trench bottom and shall be supported for its full length except where excess excavation has been made for joints.

Before making each joint, the ends of the pipes and all joint members shall be thoroughly cleaned and lubricated when so recommended by the manufacturer. All jointing shall be done in strict accordance with the manufacturer's recommendations and the directions of the Engineer.

No defective or leaking pipe, fittings, joints connections, manholes or other parts of the work will be acceptable. All visible leakage of any description, and no matter where located, shall be corrected by the

Contractor in a manner satisfactory to the Engineer, whether or not the total leakage into the sewer is within the allowable maximum as determined by infiltration tests.

Sanitary sewer infiltration tests shall be made. An air test of 3.5 PSI for 5 Minutes shall be conducted, with an allowable loss of .5 PSI in the 5-minute time frame. The tests shall be made between manholes on the sewer main and all related pipe, and fittings. The sewer main will then be lamped from manhole to manhole. Any and all leaks will be repaired by the Contractor at his own expense. Any and all deflection in the sewer mains deemed unacceptable by the Engineer or his representative, shall be repaired by the Contractor at his own expense. The Contractor shall furnish all labor, materials and equipment necessary to perform these sanitary sewer infiltration tests.

Wye branch connections and service laterals which are not to be immediately connected to flowing lines shall be securely plugged with an approved type of plug which will provide a watertight seal. The Contractor shall accurately record the Station of each wye branch placed and the direction of the wye. He shall also show the location of each wye branch on his copy of the Plans and permanently mark each location with a crosscut on the curb or a hub stake driven at the curb line.

Drop connections at manholes and concrete pads at service risers shall be constructed as shown on the detail sheet of the plans, and at the location shown on the Plans or as directed by the Engineer. Concrete cradles over existing pipes shall be constructed where and as directed by the Engineer. All concrete work shall conform to the requirements of Section 04 01 of these Specifications.

The Contractor shall clean newly completed sewers in order to remove any foreign matters which may have accumulated during construction. The Contractor shall furnish all labor, material, equipment and water necessary for flushing and shall provide for the disposal of water used for flushing.

The locations of existing pipes and structures shown on the Plans are approximate, and before construction, the Contractor shall determine the exact locations of all existing pipes and structures to which connections are to be made. Connections to existing pipes and structures shall be made in a manner satisfactory to the Engineer. Existing pipes and structures which have been abandoned shall be plugged, demolished, grouted or removed, as indicated on the Plans or in the Specifications. Service laterals which have been replaced shall be removed.

Upon completion of the backfilling operation, the Contractor shall provide a trench repair over the entire trench area as per the plans. The Contractor shall maintain the paving until such time as the permanent paving is installed.

SECTION 05 04 – JOINT AND LATERAL TESTING AND SEALING

05 04 01 DESCRIPTION

Joint and lateral seals shall include all work associated with the testing and installation of joint and lateral seals within existing pipelines whether for sanitary sewage or storm drainage for the purpose of sealing the joint. The joint and pipe seals shall be of the types and sizes specified, and shall be constructed in accordance with this specification, at the locations illustrated on the plans and at other locations as directed by the Engineer.

05 04 02 MATERIALS

All materials and procedures shall conform to the respective manufacturer's requirements for sealing pipe joints and lateral connections. Such seals shall also be in compliance with ASTM F2304-03 *Standard Practice for Rehabilitation of Sewers Using Chemical Grouting* and F2452-05 *Standard Practice for Sealing Lateral Connections and lines from the mainline Sewer Systems by the Lateral Packer Method, Using Chemical Grouting*, respectively. The material shall be non-toxic, stable, inert, and permanent

chemical grout designed for the specific grouting application. The chemical grout shall stop infiltration of ground water and exfiltration of sewage in gravity flow sewers by creating a waterproof seal. Contractor shall submit specific product information for each method to Engineer prior to commencement of work.

05 04 03 METHODS OF CONSTRUCTION

The pipeline to be sealed shall be prepared by removing all deleterious deposits from the pipe walls using appropriate cleaning process. Whatever method is adopted, the pipe must be as clean as reasonably possible to provide a reasonable working environment for the operators. Unless otherwise specified in the Supplemental Specifications, the Contractor shall be responsible for eliminating protruding laterals into the service main as part of the per unit cost to seal the lateral.

During pipe cleaning operations the gaps between the joints must be cleared of roots and debris leaving a clean area for "joint filling". The joints are to be filled to the full depth of the gap and rendered flush with the internal surface of the pipe. All surplus material spillage is to be removed from the joint area after sealing.

05 04 04 TESTING

The integrity of each joint shall be tested two (2) times. Prior to sealing the joint(s), the Contractor shall test the static pressure of the joint. The Contractor shall pre-test the joint to determine if the joint requires grouting. The Contractor shall perform a post-sealing static pressure test on the joint. The joint shall be required to maintain the ASTM and Manufacturer's minimum static pressure.

DIVISION 06, SITE IMPROVEMENTS

SECTION 06 01 – TRAFFIC CONTROL and WAYFINDING SIGNS

06 01 01 DESCRIPTION

The Contractor shall install MUTCD approved traffic control sign(s) as specified on the details in the construction plans and in the locations shown on the Construction Plans. The various signs are to include but are not limited to, accessible parking signs, Barrier Free Routes, Accessible Entrance locations, Handicap Loading and Unloading Zones, custom parking signs, and typical traffic control signs, all signs may need to be adjusted in the field. The signage shall be installed to meet the details shown on the Construction Plan. In addition, the contractor will be required to work with the district to provide custom parking signs to match some the current signs being removed in the various alternates.

The signage shall be compliant with the most recent MUTCD standards and shall have the date of manufacture shown on the back of the sign. Any costs associated with the installation of the signage shall be included in the appropriate base or alternate bid.

The installation of traffic control and barrier-free signage shall include the cost of this work complete, in place, all excavation, concrete, backfill, adaptations, restoration material, labor, equipment, installation of signs and all else necessary therefore and all else in connection therewith and incidental thereto.

The Contractor shall relocate any existing sign and post in the locations shown on the plans and in accordance with the details. This item shall include the removal of the sign from its current location and the re-installation of the sign in the location indicated on the Constructed Plan or as directed by the Engineer. This item shall include excavation, materials, backfill, restoration mater, labor, equipment, and installation of signs and all else necessary therefore and all else in connection therewith and incidental thereto. The contractor shall re-install the relocated sign according to the standards outlined for the installation of traffic signage.

06 01 02 MATERIALS

Traffic Control signs shall conform to the requirements of Section 612 of the NJDOT Standard Specifications, modified and amended as follows:

The sign materials shall conform to the requirements of the latest edition of the Manual for Uniform Traffic Control Devices (MUTCD).

Posts for traffic control signs shall be galvanized steel "U" posts conforming to Section 911.02 of the NJDOT Standard Specifications.

06 01 03 METHODS OF CONSTRUCTION

The installation of signs shall conform to the requirements of Section 612 of the NJDOT Standard Specifications, modified and amended as follows:

The signs shall be installed so the bottom edge of the sign is installed seven (7) feet above the finished grade elevation.

Each traffic control signpost shall be constructed with a breakaway sign post support. Street name signposts do not require breakaway supports.

The Contractor shall install signs with the pole set at least three (3) feet below surface. Signage shall be a minimum of seven (7) feet high, measured from the ground to the bottom of the sign. This item does not include the installation of a sign that was previously not existing on the site. All traffic control signage shall

meet the latest MUTCD standards. All traffic signs shall be retro reflective and be mounted on break away posts. Signs shall be installed in the locations shown on the plans.

The Handicapped Parking Sign shall be installed in the Bollard located in front of the parking space(s) shown on the Construction Plan. The Sign and Bollard construction shall match the detail included on the Plan set.

SECTION 06 02 - BOLLARD

PART 1 - GENERAL

06 02 01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and the General Requirements, apply to work of this section.

06 02 02 SCOPE OF WORK

A. The Contractor shall supply all equipment, materials and labor to complete the site improvements as described herein and as shown on the drawings, which includes the following:

1. BOLLARD
2. REMOVEABLE BOLLARD

06 02 03 RELATED SECTIONS

A. Earthwork
B. Pavements
C. Site Concrete
D. Signs

06 02 04 SUBMITTALS

A. Certification

1. General
   a. Certificates of inspection as required by governmental authorities.
   b. Other data substantiating that materials comply with specified requirements.

B. Samples as required in PART 2 - PRODUCTS

C. Shop Drawings - As required in PART 3 - EXECUTION

D. Product Data

1. Copies of manufacturer's latest published product data for materials specified in this Section shall be submitted to the Engineer or Architect for review. No materials are to be delivered to the site prior to review. All manufacturer's Specifications are included herein by reference, as if written out in their entirety.

06 02 05 SUBSTITUTIONS

A. The Contractor shall submit a base bid as per plan.

1. It is the Contractor's responsibility to make every reasonable effort to find the material specified.

B. It is the intent to eliminate post - bid substitutions.

C. In the event that the contract material has become unavailable, the Contractor may offer substitutions to the Engineer or Architect for consideration. If he does so, he must include price clarification for such substitutions. Any substitution must be approved in writing by the Engineer or Architect.

06 02 06 QUALITY ASSURANCE

A. Work under this section must be done by a single firm specializing in the work.

06 02 07 DELIVERY, STORAGE AND HANDLING

A. All materials shall be delivered to the site in original unopened containers clearly indicating manufacturer's name, brand name, and other identifying information.

B. Materials shall be stored in a dry location, off the ground, and in such a manner as to prevent damage or intrusion of foreign matter.

C. All materials which have become damaged or otherwise unfit for use, during delivery or storage shall be replaced at the expense of the Contractor.

06 02 08 PROJECT CONDITIONS

A. Contractor shall determine location of underground utilities and shall perform work in a manner which will avoid possible damage, hand excavating as required.

B. Grade stakes shall be maintained until their removal is mutually agreed upon by all parties concerned.

C. Do not clear, excavate, or construct any items until after all utility lines, backfilling and grading has been completed. Fences and gates must be properly coordinated with pavement installation.

D. Clean-up and Protection

1. Keep pavements and surfaces clean and work area in an orderly condition.
2. Protect all work and materials from damage due to operations by other contractors, trades and trespassers.
3. Repair or replace damaged materials as directed by the Engineer or Architect.

06 02 09 INSPECTION AND ACCEPTANCE

A. When work is completed, including maintenance, Engineer or Architect will, upon request, make an inspection to determine acceptability.

B. Work may be inspected for acceptance in parts agreeable to the Engineer or Architect, provided work offered for inspection is complete.

C. When inspected work does not comply with requirements, replace rejected work and apply to the Engineer or Architect for re-inspection until the area is found to be acceptable.

D. Remove rejected materials promptly from project site.

06 02 10 WARRANTY

A. The Contractor shall guarantee all work under this Section against defects in materials and workmanship for not less than two (2) years from the date of final acceptance by the Engineer or Architect.

PART 2 – PRODUCTS

06 02 11 BOLLARDS

A. 6" (6.625" O.D.) Schedule 40 Pipe as fabricated by Ideal Shield or approved equal.
2525 CLARK ST. DETRIOT, MI 48209
1.866.825.8659
WWW.IDEALSHIELD.COM

1. Finish shall be galvanized.
2. Wall thickness shall be .28" or greater.
3. Length shall be as specified on the plans

B. Bollard Sleeve shall be a (¼") 6" Reflective Bollard Cover as fabricated by Ideal Shield or approved equal.
2525 CLARK ST. DETRIOT, MI 48209
1.866.825.8659
WWW.IDEALSHIELD.COM

1. Final color to be determined and shall be selected from the manufacturer's standard colors.
2. Cover shall have a wall thickness of a minimum .25"
3. Cover shall be domed.
4. Each Sleeve shall include silver reflective tape.

C. Removal Bollard shall be a 6" Removable Locking Bollard, product number REM LOK-06-GALV, as fabricated by Ideal Shield or approved equal.
2525 CLARK ST. DETRIOT, MI 48209
1.866.825.8659
WWW.IDEALSHIELD.COM

1. Finish shall be galvanized.
2. Cover shall have a wall thickness of a minimum .125"
3. Cover shall be domed.
4. Each Sleeve shall include silver reflective tape.
5. Final color to be determined and shall be selected from the manufacturer's standard colors.

PART 3 – EXECUTION

06 02 12 BOLLARD

A. Bollard shall be installed as per manufacturer's specifications and shall be set plumb.
B. Bollard shall be filled with concrete.
C. Any exposed concrete from the footing shall have a smooth and clean wood float finish.
D. The concrete shall be sloped away from the bollard.
E. Bollard sleeve shall be securely fashioned to the steel bollard.
F. Where the bollards are to receive accessible parking signs. Contractor shall cut bollard sleeve in a manner to receive the breakaway post.

SECTION 06 03 – HANDRAILS AND GUARDS

PART 1 - GENERAL

06 03 01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

06 03 02 SUMMARY

B. This Section includes the following as indicated on the drawings:

1. Stainless-steel pipe and tube handrails and railings.
2. Steel pipe and tube handrails and railings.

06 03 03 PERFORMANCE REQUIREMENTS

C. General: In engineering handrails and railings to withstand structural loads indicated, determine allowable design working stresses of handrail and railing materials based on the following:

1. Stainless Steel: ASCE 8, "Specification for the Design of Cold-Formed Stainless Steel Structural Members."
2. Structural Steel: AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."
3. Cold-Formed Structural Steel: AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."

D. Structural Performance of Handrails and Railings: Provide handrails and railings complying with requirements of ASTM E 985 for structural performance, based on testing performed according to ASTM E 894 and ASTM E 935.

E. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections:

1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:

a. Concentrated load of 200 lbf applied at any point and in any direction.
b. Uniform load of 50 lbf/ft. applied horizontally and concurrently with uniform load of 100 lbf/ft. applied vertically downward.
c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails Not Serving As Top Rails: Capable of withstanding the following loads applied as indicated:

a. Concentrated load of 200 lbf applied at any point and in any direction.
b. Uniform load of 50 lbf/ft. applied in any direction.
c. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.

a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guard.

F. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

G. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

06 03 04 SUBMITTALS

H. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected handrails and railings.
2. Grout, anchoring cement, and paint products.

I. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.

3. Provide structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation for all handrails and railings compliant with the current Code (IBC 2018 NJ Edition).

J. Samples for Initial Selection: Short sections of railing or flat, sheet metal samples showing available mechanical finishes.

K. Provide samples as requested by the Owner for each type of railing, handrails and handrail brackets to the post.

L. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

M. Product Test Reports: From a qualified testing agency indicating handrails and railings comply with ASTM E 985, based on comprehensive testing of current products.

06 03 05 QUALITY ASSURANCE

A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in New Jersey and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of handrails and railings that are similar to those indicated for this Project in material, design, and extent.

B. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

C. Source Limitations: Obtain each type of handrail and railing through one source from a single manufacturer.

06 03 05 STORAGE

D. Store handrails and railings in a dry, well-ventilated, weathertight place.

06 03 06 PROJECT CONDITIONS

E. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating handrails and railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

06 03 07 COORDINATION

F. Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

06 03 08 SCHEDULING

G. Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that does not satisfy structural performance requirements.

PART 2 PRODUCTS

06 03 09 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or approved equal:

1. Steel and Stainless-Steel Pipe and Tube Railings:

a. High Point Architectural Metal.
b. Architectural Art Mfg., Inc.
c. Blum: Julius Blum & Co., Inc.
d. Approved equal.

06 03 10 METALS

B. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.

C. Stainless Steel: Grade or type designated below for each form required: Provide all pipes, tubing, castings and plate stainless steel from type 304 stainless for interior railings and type 316 for exterior railings.

D. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:

1. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

a. Black finish, unless otherwise indicated.
b. Galvanized finish for exterior installations and where indicated.
c. Type F, or Type S, Grade A, standard weight (Schedule 40), unless another grade and weight are required by structural loads.

2. Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A, unless another grade is required by structural loads.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
4. Iron Castings: Malleable iron complying with ASTM A 47, Grade 32510.
5. Iron Castings: Gray iron complying with ASTM A 48, Class 30.

E. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

06 03 11 WELDING MATERIALS, FASTENERS, AND ANCHORS

F. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

G. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.

1. For stainless-steel handrails and railings, use fasteners fabricated from Type 304 stainless steel for interior work and Type 316 stainless steel for exterior work.
2. For steel handrails, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.

H. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

1. Provide concealed fasteners for interconnecting handrail and railing components and for attaching them to other work, unless otherwise indicated.
2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

I. Cast-in-Place and Post installed Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Cast-in-place anchors.
2. Chemical anchors.
3. Expansion anchors.

06 03 12 PAINT

J. Shop Primers: Provide primers to comply with applicable requirements in Division 9 Section "Painting."

K. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

L. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.

06 03 13 GROUT AND ANCHORING CEMENT

M. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

N. Interior Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

O. Erosion-Resistant Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

06 03 14 FABRICATION

P. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

Q. Assemble handrails and railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

R. Form changes in direction of railing members as follows:

1. As detailed.
2. By bending.
3. By radius bends of radius indicated.
4. By flush radius bends.
5. By mitering at elbow bends.
6. By inserting prefabricated flush-elbow fittings.
7. By any method indicated above as detailed in the drawings, applicable to change in direction involved.

S. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

T. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

U. Nonwelded Connections: Fabricate handrails and railings by connecting members with concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive where this is manufacturer's standard splicing method.

V. Welded Connections for Aluminum Pipe: Fabricate pipe handrails and railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

W. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.

X. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.

Y. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, and steel plate forming bottom closure.

Z. For removable railing posts, fabricate slip-fit sockets from steel tube whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.

1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.

AA. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

BB. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

CC. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

DD. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.

EE. Fabricate joints that will be exposed to weather in a watertight manner.

FF. Close exposed ends of handrail and railing members with prefabricated end fittings.

GG. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch or less.

HH. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

II. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

06 03 15 FINISHES, GENERAL

JJ. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

KK. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

LL. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not

acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

MM. Provide exposed fasteners with finish matching appearance, including color and texture, of handrails and railings.

06 03 16 STAINLESS-STEEL FINISHES

NN. Remove or blend tool and die marks and stretch lines into finish.

OO. Grind and polish surfaces to produce uniform, directionally textured polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

PP. 180-Grit Polished Finish: Oil-ground, uniform, textured finish.

QQ. 320-Grit Polished Finish: Oil-ground, uniform, smooth finish.

RR. Polished and Buffed Finish: Oil-ground, 180-grit finish followed by buffing.

SS. Bright, Directional Polish: No. 4 finish.

TT. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

06 03 17 STEEL FINISHES

UU. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

VV. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

WW. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

XX. For nongalvanized steel handrails and railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

YY. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed handrails and railings:

1. Exteriors (SSPC Zone 1B): SSPC-SP 6, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 7, "Brush-off Blast Cleaning."

ZZ. Apply shop primer to prepared surfaces of handrail and railing components, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Do not apply primer to galvanized surfaces.
2. Stripe paint edges, corners, crevices, bolts, and welds.

PART 3 – EXECUTION

06 03 18 EXAMINATION

AAA. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

06 03 19 INSTALLATION, GENERAL

BBB. Fit exposed connections together to form tight, hairline joints.

CCC. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

DDD. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

EEE. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.

FFF. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

06 03 20 RAILING CONNECTIONS

GGG. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of handrails and railings.

HHH. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

III. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

06 03 21 ANCHORING POSTS

JJJ. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:

KKK. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:

1. Non-shrink, nonmetallic grout.
2. Non-shrink, nonmetallic grout or anchoring cement.

LLL. Cover anchorage joint with flange of same metal as post, attached to post as follows:

1. Welded to post after placing anchoring material.
2. By set screws.

MMM. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch build-up, sloped away from post.

NNN. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For stainless-steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
2. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

OOO. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

06 03 22 ANCHORING RAILING ENDS

PPP. Anchor railing ends into concrete and masonry with round flanges connected to railing ends and anchored into wall construction with post installed anchors and bolts.

QQQ. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces.

1. Weld flanges to railing ends.
2. Connect flanges to railing ends using nonwelded connections.

06 03 23 ATTACHING HANDRAILS TO WALLS

RRR. Attach handrails to wall with manufactured machined wall brackets. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface.

SSS. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

TTT. Secure wall brackets to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
4. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
5. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

06 03 24 CLEANING

UUU. Clean aluminum and stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

VVV. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.

WWW. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

XXX. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

06 03 25 PROTECTION

YYY. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

ZZZ. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

SECTION 06 04 - AUDIO/VIDEO DOCUMENTATION SURVEY

06 04 01 The Contractor shall provide all labor, material and equipment to provide a pre-construction color audio/video recording of the job site including parking lots, driveways, proposed pipelines, easements and fields within project site and within the municipal, county, and state rights of way and all other features that may be affected by construction. The audio/video recording shall also be used to verify that the laydown locations are restored to at least pre-construction conditions. No post construction audio/video documentation survey is required.

01 02 01 A Coverage includes, but is not limited to all existing roadways, sidewalks, curbing, driveways, structures, buildings, headwalls, retaining walls, culverts, ditches, landscaping, trees, shrubs, signing and monumentation located within the right of way.

01 02 01 B Distance from the camera lens to the ground shall not be less than twelve (12) feet to insure proper perspective.

06 04 02 SUBMITTALS

The Contractor shall submit to the Engineer:

Name and Address of the recording firm.
Copy of sample tape
Manufacturer of tapes
3 Letters of reference

An original and one copy of the audio/video recording shall be made. The original shall become the property of the Engineer. The audio/video recording must be delivered within five (5) working days after recording is complete, with written documentation and information retrieval procedures.

Owner or Engineer reserves the right to reject audio/video recording due to poor quality, unintelligible audio, uncontrolled pan and zoom. Re-recording shall be at the Contractors expense.

06 04 03 EXPERIENCE

All recordings shall be performed by a professional audio/video recording firm knowledgeable in construction practices and experienced in the implementation of established inspection procedures.

06 04 04 EQUIPMENT

Only broadcast quality camera capable of producing NTSC-500 lines or better shall be used. Recorders must be of professional or industrial grade only, as specified by the National Standard Code.

A DVD or electronic version of the video file must be submitted.

06 04 05 PREPARATION

The project site and the public right of way shall be surveyed and marked by the Contractor before recording begins.

06 04 06 PERFORMANCE

All recording shall be done during normal business hours. Recording shall not be performed in inclement weather.

All information appearing on the audio/video recording must be continuous and run simultaneously by computer generated transparent digital information. Editing or overlaying of this information at a later date will not be permitted. Audio/video synchronization must be accurate to within 1/7 of a second.

Each audio/video recording must begin with the Owners name, Contractor's name, Contract name and number, Date and Location information. i.e. name of street, direction of travel, viewing side, etc.

A Continuous digital information at a minimum shall be as follows:

Upper left corner:	Lower left corner:
Name of Contractor	Route of travel
Day, Date and Time	Viewing side
	Street address

B Audio description shall be recorded simultaneous with the video recording. Special commentary shall be provided for existing buildings, sidewalks, foundations, trees, shrubbery etc. The street address shall be audibly described on the tape.

C Audio/video recordings shall be labeled with the following information:

Audio/video recording Number
Owners Name
Recording Date
Project Title and Number
Location and Standing Limit of audio/video recording

C Access and haul routes shall be recorded prior to their use. This will be a continuing requirement if changes in access and haul routes occur.

E Particular attention shall be paid to existing damaged areas. The nature and extent of such damages shall be documented to the extent that it maximizes defensible material in case of potential damage claims after construction.

F Particular attention shall be paid to existing areas in which locations will be subject to laydown/staging work. The laydown work shall be placed in the original location. The Contractor shall record the proposed laydown/staging location.

06 04 07 MASTER INDEX

To facilitate rapid retrieval of the survey data, an organized and detailed index of the contents of each tape shall be prepared. This master index shall be updated as new recordings are made.

SECTION 06 05 – SITE FURNISHINGS

06 05 01 DESCRIPTION

The Contractor shall install the proposed Permit and Payment Drop Box in the locations shown on the plans and as directed by the engineer and in accordance with the details for the proposed.

06 05 02 MATERIALS

The Permit and Payment Drop Box shall be items 6900B-10 as manufactured by Architectural Mailboxes and 4350 as manufactured by Salsbury Industries, respectively, or approved equal. The Payment Drop Box shall be surface mounted and shall include pedestal item 4365 as manufactured by Salsbury Industries or approved equal.

06 05 03 METHODS OF CONSTRUCTION

The Permit and Payment Drop Box shall be installed in accordance with the manufacturer guidelines.

DIVISION 07, LANDSCAPING

SECTION 07 01 – TOPSOIL AND SEED

07 01 01 DESCRIPTION

Topsoil and Seed shall include the furnishing and placing of a four (4") inch thick bed of topsoil, seeding and fertilization of all disturbed areas and in locations as identified on the plans and other matter as herein specified, in the quantities required in accordance with the Plans and Specifications.

The Contractor shall guarantee all seeding installed under this Contract for a period of two (2) years after the Engineer's Final Acceptance of all seeding, at no additional cost to the Owner.

The Contractor shall replace or overseed any Seed that is dead or have failed to thrive, whether due to natural causes or vandalism, or that are, in the opinion of the Engineer or Landscape Architect, unhealthy, unsightly, or inadequate or improper maintenance. All the above mentioned material will be removed by the Contractor within ten (10) days of notification by the Engineer or Landscape Architect.

07 01 02 MATERIALS

Topsoil and Bio-Retention Soil

Topsoil, existing or imported, shall have been tested by a certified independent soil testing laboratory. A laboratory test shall be included for each source of topsoil. These test results shall be submitted to the Engineer for review and approval prior to importing the topsoil.

The topsoil test shall determine the presence of a minimum of the following:

1.) Phosphorous
2.) Potassium
3.) Magnesium
4.) Calcium
5.) Sodium
6.) Nitrate - Nitrogen
7.) Sulfur
8.) Zinc
9.) Manganese
10.) Copper
11.) Iron
12.) Boron
13.) % organic matter (by rapid dichromatic oxidation)
14.) Soil pH
15.) Buffer pH (if pH < 6.4)
16.) Excess carbonate (if pH > 6.4)
17.) Soluble salts (electrical conductivity)
18.) Cation Exchange Capacity (CEC)
19.) Percent base saturation
20.) Mechanical analysis (sand, silt and clay content)
(as determined by the Buoyoucos Hydrometric Method)

Topsoil shall contain at least 3% organic matter determined by loss on ignition of moisture free samples. The acidity range shall be pH 5.0 to 7.0 inclusive. The mechanical analysis of the soil shall be:

# Sieve Analysis	mm	% Volume
#10 Gravel	(>2.0mm)	<6%
#18 Very Coarse Sand	(2.0 - 1.0mm)	
#35 Coarse Sand	(1.0 - 0.5mm)	
#60 Medium Sand	(0.5 - 0.25mm)	45 - 75
#140 Fine Sand	(0.25 - 0.10mm)	
#200 Very Fine Sand	(0.10 - 0.05mm)	
Silt	(0.05 - 0.002mm)	5 - 25
Clay	(<0.002mm)	5 – 20

All topsoil, both newly furnished and stockpiled (if any), shall be natural topsoil, sandy loam (max. 65% sand, per USDA soil textural triangle) free from subsoil, and obtained from an area which has never been stripped. Topsoil shall be of uniform quality, free from hard clods, stiff clay, hard pan, stones larger than 1/2", lime, cement, ashes, slag, concrete, tar residues, tarred paper, boards, chips, sticks or any other undesirable material.

Topsoil must also be free of plants or plant parts of Bermudagrass, Quackgrass, Johnsongrass, Mugwort, Nutsedge, Poison Ivy, Canadian Thistle, etc..

Topsoil shall not contain toxic substances harmful to plant growth, i.e. pesticide residues and shall comply with NJDEP Site Remediation Program standards for "Clean" soil.

No topsoil shall be shredded, screened, mixed or worked in a wet or frozen state.

Submit sample of topsoil along with Certified Soil Test Analysis for acceptance prior to transport of topsoil to site. Location of topsoil source shall be provided.

Topsoil which has been stripped from the site of the work may be used for planting provided it meets this specification and is tested and treated in accordance therewith. All topsoil required in excess of that obtained from the site shall be furnished by the Contractor. Use of onsite material shall in no way relieve the Contractor from the requirements of the Specification and the performance guarantee.

All Topsoil, Imported utilized on site shall be thoroughly blended with existing topsoil.

Delivery of any Topsoil, Imported in a very wet or frozen condition will not be accepted.

Delivery of the topsoil, Imported to the site shall be monitored by the Engineer to determine conformance to the specifications. At the direction of the Engineer, and Topsoil, Imported, which does not conform to the Specifications, shall be rejected, removed and replaced with the specified Topsoil, Borrow at the Contractor's expense.

Bio Retention Soil Shall be as manufactured by Laurel Valley Soils or approved equal.

Bio Retention Soil be certified clean and shall be 85 to 95% sand, with no more than 25% of the sand as fine or very fine sands; no more than 15% silt and clay with 2% to 5% clay content. The entire mix must then be amended with 3 to 7% organics, by weight.

The Bio Retention soil bed material shall be free of contaminants and have a recommend PH between 5.5 to 6.5.

For the calculation of runoff retention, the porosity, the field capacity and the wilting point of the soil bed material must be obtained either from a published research article or tested in accordance with the ASTM D-6836 method or the Soil Survey Investigations Report No. 42, Kellogg Soil Survey Laboratory Methods Manual, published by NRCS.

The soil bed material must be placed in lifts not to exceed 6 inches. Additional materials may be necessary to account for settling over time.

Soil Amendments

Applications of the following amendments shall be determined by the soil test recommendations and in seeded areas only.

Lime: Material shall be ground or pulverized limestone which contains at least 50% total oxides, i.e. calcium oxide plus magnesium oxide. Limestone shall be ground to such fineness that at least 50% will pass through a 100-mesh sieve and 98-100% will pass through a 20-mesh sieve. Granular or pelletized lime may be used but it must follow the same specifications as above prior to being granulated or pelletized. Applications shall be determined by soil test recommendations and in seeded areas only.

Aluminum Sulfate: Commercial grade.

Peat Moss: Type 1 sphagnum peat moss; finely divided with a pH of 3.1 to 5.0.

Sedge Peat: Decomposed peat containing no identifiable fibers.

Leaf Compost: Screened and free of trash.

Pine Bark: Potting grade pine bark with no particle size larger than 1/2" and less than 10% wood fiber.

Bone Meal: Finely ground and with a minimum analysis of 2% nitrogen and 20% available phosphoric acid.

Sand: Clean washed sand free of toxic materials.

Perlite: Conforming to the National Bureau of Standards PS 23.

Vermiculite: Horticultural grade, free of toxic substances.

Sawdust: Rotted sawdust, free of chips, stones, sticks soil or toxic substances and with 7.5 pounds nitrogen uniformly mixed into each cubic yard of sawdust.

Manure: Well rotted, unleached stable or cattle manure containing not more than 25% by volume of straw, sawdust or other bedding materials and containing no chemicals or ingredients harmful to plants.

Commercial Fertilizer

Contractor to provide Manufacturer's or vendor's certified analysis of fertilizer materials.

All fertilizer shall be granular pills, packets, pellets or liquid with 35% to 80% of the total nitrogen in a slow-release form, formulated for mixing into soils, and certified by the manufacturer to provide controlled release of nitrogen continuously for a period of no more than 12 months. Commercial fertilizer must be consistent with, and be applied in accordance with, Federal and State fertilizer laws.

All fertilizers shall be uniform in composition, free flowing and suitable for application with approved equipment. Fertilizers shall be delivered to the site fully labeled according to applicable State fertilizer laws and shall bear the name, trade name or trademark, and warranty of the producer and furnished to the Engineer at the time of delivery. Application rates and ratios shall be determined by soil test recommendations.

Weed Control

Any herbicide used must be approved by Federal and State Authorities for use in this area.

Contractor shall submit brand name and content of broad-leafed herbicide to be used to Engineer for approval prior to any weed control applications.

Application rates shall be as appropriate for amount of weed control required and shall be as per

manufacturer's recommendations.

Contractor shall post warning flags in all areas treated with weed control.

Application shall not occur during times when the general public might be subject to exposure.

Seed

Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by the Official Seed Analysts of North America.

Seed shall match the composition of the "Tall Fescue" sod mix as supplied by Tuckahoe Turf Farms, or approved equal, seed mix is as follows:

SEED MIXTURE
30% Penn RK4 Turf Type Fescue
30% Rebel IV Turf Type Tall Fescue
30% Justice Turf Type Tall Fescue
5% Wildwood Kentucky Bluegrass
5% Brooklawn Kentucky Bluegrass

Each shipment of the grass seed shall be accompanied by an analysis of its composition, purity and germination, certified by the seed house, and furnished to the Engineer at the time of delivery for his approval. A submittal outlining the precise seed varieties, manufacturer and seed ratings are to be submitted at the start of construction.

Bio-Retention Area should be over seeded with Retention Basin Wildlife Mix Model Ernmx-#127 as manufactured by Ernst Seed or approved equal.

Mulch

Mulch for Seeded Areas

Straw shall be free of rot, mildew, noxious weed seeds and shall be small-grained, such as wheat or barley.

Cellulose fiber mulch shall consist of specially prepared cellulose processed into a uniform fibrous physical state. The fiber mulch, including dye, shall contain no germination or growth inhibiting factors. The mulch material shall be manufactured and processed in such a manner that the cellulose fiber mulch will remain in uniform suspension in water under agitation and will blend with seed, fertilizer and other additives to form a homogeneous slurry. The mulch shall cover and hold seed in contact with the soil without inhibiting the growth of seedlings.

Prefabricated wood shaving mat shall be woven and may contain light weight plastic netting on one or both sides.

Stabilizing Materials

Mulch anchoring tool is a tractor-drawn implement designed to punch and anchor mulch into the soil surface a minimum of 2".

Cellulose fiber may be used for anchoring straw. The fiber binding shall be applied at a net dry weight of 750 pounds per acre. The cellulose fiber may be mixed with water. The mixture shall contain a maximum of 50 pounds of cellulose fiber per 100 gallons of water.

Liquid Mulch Binder

Binder shall be non-asphaltic liquid concentrate diluted with water forming a transparent, 3-dimensional,

film-like crust permeable to air and water and containing no agents toxic to seed germination.

Applications of liquid mulch binder shall be heavier at the edges of mulched areas where wind catches the mulch.

Liquid mulch binder shall be applied uniformly at a rate of 6 gal./ac.

Mulch Netting: Stake light weight plastic netting over the mulch according to manufacturer's recommendations. Stakes shall be driven to ground level or removed once seed is established.

Water

Shall be provided at the Contractors expense and shall be applied in accordance with these specifications. If a source of water is available onsite, contractor must request permission from owner or engineer prior to use of existing water source on-site.

07 01 03 METHOD OF CONSTRUCTION

Excavation and grading shall be done in conformance with Division 2, Sections 3, 3a, 8, or 16 as applicable of the Specifications.

Scarify the area to be topsoiled to improve the bond between slope and topsoil. Remove from the scarified area stones 2 inches or larger in any dimension and other debris such as wires, cables, tree roots, pieces of concrete, clods, and lumps. For slopes of 2H:1V or steeper, create ridges (such as by a dozer track) in the subsoil surface parallel to the bottom of the slope.

All valve boxes, curb stops, cleanouts, vents and miscellaneous castings and appurtenances shall be set to finish grade prior to placing topsoil. All areas shall be brought to final grade with the required amount of topsoil.

Ensure that ground areas are not damaged by the delivery, handling, or storage of materials; by washouts due to drainage diversion; by workers; or by equipment. Repair such damage by grading, fertilizing, seeding, and mulching as specified in accordance with NJDOT Standard specifications 806.03.01.

Two samples (minimum) shall be provided for every acre. Results of the tests shall be furnished by the Contractor to the Engineer prior to commencement of seeding. All additives necessary to meet the topsoil requirements shall be added in a manner satisfactory to the Engineer.

Spreading of Topsoil

After the Engineer has approved the prepared surface elevations, spread topsoil and smooth to grade to produce the required thickness. For slopes of 2H: 1V or steeper, create ridges (such as by a dozer track) in the topsoil surface parallel to the bottom of the slope to hold the seed in place and to retain moisture.

A minimum of 6" of topsoil shall be spread or respread over prepared subgrade.

Spread topsoil to the minimum depth required to meet lines, grades and elevations shown, after light rolling and natural settlement. Add specified soil amendments based upon the certified lab test results and mix (by disc or other mechanical means) thoroughly into the topsoil.

Spreading of topsoil shall be performed in such a manner that seeding can proceed with a minimum of additional soil preparation and tillage.

Any irregularities in the surface resulting from topsoiling or other operations shall be corrected in order to prevent the formation of depressions or water pockets.

Topsoil shall not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or in any condition that may otherwise be detrimental to proper grading and/or seeding.

If topsoil is not being installed immediately storage of Topsoil shall be performed in accordance with NJDOT Standard specifications section 202.03.03B.

Fine Grading

Fine grade **areas** to smooth even surface with loose, uniformly fine texture. Roll, rake and drag lawn areas, remove ridges and fill depressions as required to meet finished grades, and provide positive drainage as directed in the field by the Landscape Architect. Limit fine grading to areas which can be planted immediately after grading.

Seeding work shall proceed only after rough grading has been completed and the finish grade is within ¼" of the final finish grade.

Preparation of Unchanged Grades for Lawn

Where **LAWN** is to be planted in areas that have not been altered or disrupted by excavating, grading or stripping operations, prepare soil for planting as follows:

Prior to preparation of unchanged areas, remove existing grass, vegetation and turf. Dispose of such material properly; do not turn over into soil being prepared for lawns.

Till soil to a depth of 6" and apply soil amendments as recommended by soil test analysis. Remove high areas, fill in depressions and till soil to a homogeneous mixture of fine texture, free of lumps, clods, stones over 1/2", roots and other extraneous matter.

Apply commercial fertilizer at rates recommended by the certified lab test results and thoroughly mix into top 4" of soil. Delay application of fertilizer if lawn planting will not follow within a few days.

The appropriate fertilizer shall be thoroughly mixed into the topsoil areas to be seeded at the rate and type established by the certified soil test. The lawn areas shall then be carefully raked and brought to an even smooth grade, and made ready for seeding.

Delay application of fertilizer if lawn planting will not follow within a few days. All stones, debris or vegetation 1" or more in diameter brought to the surface shall be collected and removed by the Contractor. The finished grade shall be even, smooth and free of any depressions or mounds.

Seeding New Lawns

Preparation of Subgrade

Work shall proceed only after rough grading has been completed and the subgrade is within 1/10 of 1' (1.25") of the final subgrade elevation.

If the subgrade area develops volunteer weed growth, the growth must be eliminated at this phase with glyphosate- 2 treatments, 4 weeks apart.

Grades which have been previously established in conformance with the drawings shall be maintained in a true and even grade.

Loosen subgrade of the areas to a minimum depth of 6". Remove all stones over 1", sticks, roots, rubbish and other extraneous matter. Limit preparation to areas which will be planted promptly after preparation. Subgrade shall be inspected and approved by the Engineer after tilling and prior to any spreading of topsoil.

Limestone shall be spread and worked into the subsoil at an application rate determined by soil test analysis. Through use of a rototiller or an approved cultivator, any lime spread over the surface shall be worked into the top 4"

to 6" of topsoil.

Initial Seeding Procedures for lawn areas- (Broadcast seeding will not be permitted.)

Prior to seeding operations, the Engineer shall inspect and approve final grading and topsoil preparation.

If and where directed by the engineer, apply Glyphosate type as directed on label and at appropriate concentrations to kill existing undesirable vegetation.

After the above is completed and approved by the Engineer, the area shall be seeded at a rate of six (6) pounds per thousand (1000) square feet. Seeding operations shall be performed between March 15 and May 15 or between August 15th and September 30. The seeding time frame may be extended or reduced according to the prevailing weather conditions, Engineers approval and/or per the grower's recommendations. Seeding shall not be performed on frozen ground or when temperature is 32 degrees or colder.

No seeding shall be permitted after a rain (unless surface of ground is loosened) or when the velocity of the wind exceeds 5 MPH. Extreme care shall be exercised during seeding and raking so that no change in grade is made and so that seed is not raked from one area to another.

Sow lawn seed using a slit seeder or drill seeder. Distribute seed evenly over entire area by sowing equal quantity in 2 directions at right angles to one another. Hydroseeding will be permitted by the Engineer or Landscape Architect

Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage. Moisten prepared areas before planting, if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create muddy soil condition.

Sow not less than the quantity of seed specified or scheduled.

Protect seeded LAWN against erosion by spreading mulching material after completion of seeding operations. Spread uniformly to form a continuous blanket of not less than 1 1/2" loose measurement over seeded areas.

Newly seeded areas shall be lightly rolled with a two hundred pound hand roller. The completed area shall have a smooth even appearance.

Protect seeded slopes against erosion with erosion netting or other methods acceptable to the Engineer.

Anchor mulch with stabilizing material. Take precautions to prevent damage, or staining, of construction or other plantings adjacent to mulched areas.

In the absence of rain, the newly seeded areas shall be watered 2-3 times daily at 10:00 a.m., 12:00 p.m. and/or 2:00 p.m.

If the area develops volunteer weed growth, the growth must be eliminated at this phase with glyphosate- 2 treatments, 4 weeks apart.

Grades which have been previously established in conformance with the drawings shall be maintained in a true and even grade.

07 01 04 MAINTENANCE OF SEEDED AREAS

The Contractor shall be responsible for the continued maintenance of the seeded lawn areas and shall not be considered for Final Acceptance until a full vigorous stand of turf exists, final overseeding has germinated and at least three (3) successful mowings have been conducted. Re-working and re-seeding with the same seed mixture applied at the same rate as originally specified, of any area which fails to show a uniform stand of grass, shall be repeated, at

the Contractor's expense, until all areas are covered with a satisfactory stand of grass, and the lawn is accepted. The following activities are to be continuous until the time of Final Acceptance, and shall include, but not be limited to:

General **Seeded** Lawn Area Maintenance

- Proper and adequate watering
- Re-filling of rain-washed gullies and rutted areas
- Re-fertilization and lime applications as recommended by soil test analysis
- Weed, fungus and pest control

The Contractor's responsibilities for maintenance of **seeded areas** shall include, but not be limited to, the following:

- Re-seeding of any bare areas
- If seeded in the fall, or if not acceptable at that time, continue maintenance the following spring until acceptable lawn is established.
- Apply subsequent fertilizer applications as recommended by soils test analysis.
- Re-fertilization and lime applications as recommended by soil test analysis
- If seeded in the fall, or if not acceptable at that time, continue maintenance the following spring until acceptable lawn is established.
- Mowing and Miscellaneous Maintenance of Seeded Lawn Areas
- Mow to a height of 2" - 3" when grass attains a height of 4" or when growth tends to smother new seedlings. Do not remove more than 1/3 of the blade of grass at any one time.
- Mowing operations shall include trimming around all obstacles, raking excessive grass clippings and removing debris from walks, curbs and parking areas. String trimmers shall not be used around plant material.
- Edging of all sidewalks, curbs and other paved areas, as well as the limit of seed edge, shall be performed once every other mowing. Debris from edging operations shall be removed and the areas swept clean.
- **Maintenance Period for Seeded Lawn Areas** - The maintenance period shall extend for 60 days after Final Acceptance, while turf is actively growing. This shall include not less than eight (8) weekly mowing

SECTION 07 02 – PLANTING

07 02 01 DESCRIPTION

Planting shall include the furnishing, preparation of beds and pits and installation of all landscape materials and other matter as herein specified, in the quantities required, and in accordance with the Plans and Specifications.

The Contractor shall guarantee all plant material installed under this Contract for a period of two (2) years after the Landscape Architects/Engineers final acceptance of all planting at no additional cost to the Owner.

07 02 02 GENERAL

All plant material shall meet or, if indicated on the plant list, exceed the standards set forth in the current issue of American Standard for Nursery Stock published by the American Horticulture Industry Association (ANSI-Z60.1). Height, spread and caliper sizes shall be as indicated on the plant list. All plants shall equal or exceed measurements specified in the plant list which are the minimum acceptable.

Nomenclature will be in accordance with Hortus III by L.H. Bailey.

Contractor shall perform topsoil testing in accordance with Division 7, Section 1, submit results to Landscape Architect/Engineer for review.

Submittals shall be provided for all manufactured items including but not limited to; fertilizer, herbicide, Mycorrhizal Fungal Inoculant, Mulch, Peat moss, All other soil amendments, as determined by soil testing.

Prior to the commencement of work, the contractor shall provide the Landscape Architect or Engineer with an itemized schedule of values for each of the various types of plant materials, to serve as a basis for any substitutions, additions, deletions, etc.

It is the Contractor's responsibility to make every reasonable effort to find the material specified. The Contractor shall furnish quantities necessary to complete the planting as shown on the plans.

In the event that the contract material has become unavailable, the Contractor may offer substitutions to the Landscape Architect or Engineer for consideration. If he does so, he must include price clarification for such substitutions. Any substitution must be approved in writing by the Engineer or Landscape Architect.

07 02 03 QUALITY ASSURANCE

Landscape work must be done by a single firm specializing in landscape work.

Source Quality Control

General: Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.

Analysis and Standards (Topsoil Amendments): Package standard product with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

Trees, Shrubs and Other Plant Material

Contractor shall provide healthy, vigorous stock grown in a recognized nursery in accordance with good horticultural practice and free of disease, insects, larvae, eggs and defects such as knots, sunscald, injuries, abrasions or disfigurement.

All plant material shall come from sources within the same USDA / Agricultural Research Service Plant Hardiness Zone as the Project Site and within 200 miles of the Project Site. Any material from sources outside this zone is not acceptable.

Balled and burlapped plants shall be dug with firm rootballs free of noxious weeds. There shall be no excess soil on the top of the rootball or around the trunk.

Rootball sizes shall be accordance with American Standard for Nursery Stock unless specifically noted.

Container grown stock shall be used only when specified and shall conform to standard set forth in with the standards set forth by these specifications.

At least 10% of each variety of trees and shrubs shall be labeled with a securely attached, waterproof tag bearing legible designation of botanical and common name.

Caliper and Height Measurement of Balled and Burlapped Material

In size grading of single trunk trees, caliper shall take precedence over height.

Caliper of trunk shall be taken at 6" above the ground level for trees up to and including 4" caliper size, and 12" above the ground level for larger trees.

For multi-stemmed trees, at least one trunk must meet caliper size.

In all cases, Contractor shall make every effort to meet both caliper and height standards specified on the plans and in the schedules.

Container Grown Stock

The size of container grown shrubs shall be measured by the height and width of the plant.

Container grown trees shall be measured by the same standards as listed above.

Herbaceous perennials shall be measured by pot size, not top growth.

The root system of container grown plants shall be well developed and well distributed throughout the container such that the roots visibly extend to the inside face of the container.

Plants shall be measured before pruning with branches in normal position. Necessary pruning shall be done at time of planting.

When formal arrangements or consecutive order of trees or shrubs is shown, stock shall be selected for uniform height and spread and labeled by number to assure symmetry in planting.

When all plant material has been selected and pre-tagged by the Landscape Contractor, the Landscape Architect or Engineer shall be notified in order to schedule his nursery inspection with a minimum of 3 days advance notice.

The Contractor shall accompany the Landscape Architect or Engineer on all inspections.

The Contractor shall have located sufficient alternate choices to prevent loss of time in the event that some trees fail to meet with the approval of the Landscape Architect.

All trees must be approved in the field by the Landscape Architect or Engineer before digging begins.

Field collected plant material shall not be used unless nursery grown stock is not available, and then only when authorized in writing by the Landscape Architect/Engineer. Collected stock shall have rootballs in accordance with (ANSI-Z60.1).

07 02 04 DELIVERY, STORAGE AND HANDLING

Deliver packaged materials in containers bearing weight, analysis and name of manufacturer.

Protect materials from deterioration during delivery and while stored at the site.

Trees and Shrubs

The Contractor shall provide freshly dug plant material.

Trees and shrubs shall not be bent or tied in such a manner as to damage bark, break branches or destroy natural shape. Damaged material will be rejected.

Protective covering shall be provided during delivery.

Roots of bare root material shall be protected during delivery and handling to guard against drying out and damage.

Bare root plants, if specified, shall be puddled immediately after digging by immersing the roots in a thick mixture of clay and water so as to completely coat the roots.

If planting is delayed for more than 5 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture. All container grown plants shall be grouped and watered daily until planting. Deliver trees and shrubs after preparations for planting have been completed, and plant immediately.

Do not remove container grown stock from containers until planting time.

The Contractor shall, in loading and unloading or handling plants, exercise the utmost care to prevent injuries to the branches or roots.

The solidity of the rootball shall be carefully preserved. Plants delivered with broken rootballs will be rejected.

07 02 05 PROJECT CONDITIONS

Contractor shall coordinate with Engineer's Phasing Schedule in order to proceed with, and complete, landscape work as rapidly as portions of the site become available (working within seasonal limitations for each kind of landscape work required).

Contractor shall determine location of underground utilities and shall perform work in a manner which will avoid possible damage, excavating by hand if required.

When conditions detrimental to plant growth are encountered such as rubble fill, adverse drainage conditions or obstructions etc., the Contractor shall notify the Landscape Architect or Engineer immediately.

Should planting of trees and shrubs occur after lawn work, lawn areas shall be protected and damage to lawns resulting from planting operations shall be promptly repaired.

During landscape work keep pavements clean and work area in an orderly condition.

Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades, and trespassers.

Treat, repair or replace damaged landscape work as directed by Landscape Architect/Engineer.

07 02 06 INSPECTION AND ACCEPTANCE

When landscape work is completed, including maintenance, Engineer and Landscape Architect will, upon request, make an inspection to determine acceptability.

Landscape work may be inspected for acceptance in parts agreeable to Landscape Architect and Engineer, provided work offered for inspection is complete, including maintenance.

When inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected by Landscape Architect/Engineer and found to be acceptable. Remove rejected plantings and materials promptly from project site.

The Contractor shall replace any trees, shrubs or plants that are dead or that are, in the opinion of the Landscape Architect or Engineer, unhealthy, unsightly or have lost their design value or natural shape because of dead branches, excessive pruning, or inadequate or improper maintenance. All the above mentioned material will be removed immediately upon direction of the Landscape Architect or Engineer and replacement planting is to be done no later than the succeeding season.

07 02 07 MATERIALS

Plant Materials

Provide deciduous tree of height and caliper scheduled or shown and with branching configuration recommended by ANSI-Z60.1 for type and species indicated.

Provide single stem trees except where otherwise specified.

Provide balled and burlapped material unless otherwise specified.

Provide shrubs of height and/or spread scheduled or shown and with not less than the minimum number of canes required by ANSI-Z60.1 for type and height indicated.

Provide balled and burlapped material unless otherwise indicated.

Provide Coniferous and Broadleafed Evergreens of sizes scheduled or shown and which meets or exceeds ANSI-Z60.1 standards.

Dimensions specified indicate minimum spread for spreading and semi-spreading type evergreens, and height for other types of evergreens such as globe, cone, dwarf, pyramidal, broad upright and columnar.

Provide quality evergreens with well balanced form complying with requirements for other size relationships to the primary dimension indicated.

Provide balled and burlapped material unless otherwise indicated.

Provide container grown (Ornamental Grasses and Perennials) material conforming to ANSI-Z60.1 specification for container grown stock.

Planting Backfill Mixture

Planting backfill mixture shall be the existing native topsoil, or 'A' Horizon.

If existing native topsoil is determined to be unsuitable, an approved imported topsoil with similar soil characteristics to the native topsoil may be used, if and where directed by Landscape Architect. Contractor shall provide Certified Soil Analysis of imported topsoil for review and approval. Unsuitable excavated material is to be removed from the site and disposed of at the Contractor's sole expense.

Topsoil mixture for backfilling planted areas shall consist of five (5) parts by volume of topsoil thoroughly mixed with one (1) part of peat moss or humus. The planting backfill mixture shall be thoroughly mixed by hand or rotary mixer to the satisfaction of the Landscape Architect or Engineer or his representative.

Mycorrhizal inoculants shall be added to all planting backfill in granular, powder or liquid form. The species formulation used in the inoculant shall be diverse and have been proven to be effective over wide ranges of plant species, pH, and soil types. It shall be applied according to the manufacturer's recommendations.

Soil Amendments

A. Lime: Material shall be ground or pulverized limestone which contains at least 50% total oxides, i.e. calcium oxide plus magnesium oxide. Limestone shall be ground to such fineness that at least 50% will pass through a 100-mesh sieve and 98-100% will pass through a 20-mesh sieve. Granular or pelletized lime may be used but it must follow the same specifications as above prior to being granulated or pelletized. Applications shall be determined by soil test recommendations.

B. Aluminum Sulfate: Commercial grade.

C. Peat Moss: Type 1 sphagnum peat moss; finely divided with a pH of 3.1 to 5.0.

D. Sedge Peat: Decomposed peat containing no identifiable fibers.

E. Leaf Compost: Screened and free of trash.

F. Pine Bark: Potting grade pine bark with no particle size larger than 1/2" and less than 10% wood fiber.

G. Bone Meal: Finely ground and with a minimum analysis of 2% nitrogen and 20% available phosphoric acid.

H. Sand: Clean washed sand free of toxic materials.

I. Perlite: Conforming to the National Bureau of Standards PS 23.

J. Vermiculite: Horticultural grade, free of toxic substances.

K. Sawdust: Rotted sawdust, free of chips, stones, sticks soil or toxic substances and with 7.5 pounds nitrogen uniformly mixed into each cubic yard of sawdust.

L. Manure: Well rotted, unbleached stable or cattle manure containing not more than 25% by volume of straw, sawdust or other bedding materials and containing no chemicals or ingredients harmful to plants.

Fertilizer

Commercial fertilizer must be consistent with, and be applied in accordance with, Federal and State fertilizer laws. All fertilizer shall be granular pills, packets, pellets or liquid with 35% to 80% of the total nitrogen in a slow release form, formulated for mixing into soils, and certified by the manufacturer to provide controlled release of nitrogen continuously for a period of no more than 12 months.

For trees and shrubs: Fertilizer shall be a complete fertilizer with a minimum analysis of 10% nitrogen, 6% phosphorous and 4% potassium. Fertilizers with a ratio of 4-1-2 (i.e. 24% nitrogen, 6% phosphorous and 12% potassium) shall be used for woody plants. Available product include but are not limited to: Forikote, NPK 18-6-12, as manufactured by Florikan; Sustane + Sumicoat, 16-4-8, as manufactured by Sustane Natural Fertilizer, Inc.; or approved equal.

For perennials, annuals and bulbs: Fertilizer shall be a complete fertilizer that is slow released.

All fertilizers shall be uniform in composition, free flowing and suitable for application with approved equipment. Fertilizers shall be delivered to the site fully labeled according to applicable State fertilizer laws and shall bear the name, trade name or trade mark, and warranty of the producer. Application rates shall be determined by soil test recommendations.

Weed Control

Any herbicide used must be approved by Federal and State Authorities for use in this area.

Contractor shall submit brand name and content of broad-leafed herbicide to be used to Landscape Architect or Engineer for approval prior to any weed control applications.

Application rates shall be as appropriate for amount of weed control required and shall be as per manufacturer's recommendations.

Contractor shall post warning flags in all areas treated with weed control.

Application shall not occur during times when the general public might be subject to exposure.

Mulch

Material shall be composted, shredded hardwood (or pine bark with less than 10% sapwood), dark brown in color, or approved equal.

Material shall be uniform in size, free of foreign matter and suitable for topdressing of trees, shrubs or perennials.

Samples shall be submitted to Landscape Architect or Engineer for approval prior to purchase and delivery.

Guying and Staking

Wood stakes shall be 2"x2" hardwood stakes, or approved equal, for vertical staking of trees. See tree staking detail for lengths and quantity of stakes.

Flat Woven webbing may be used instead of wire and hose for guying. Fasten trees to stakes using ¾" wide, flat polypropylene material such as Arbortie™, or approved equal, that is knotted around or nailed to stakes. Any knot around the tree truck or branches must be expandable.

Wire (for guying and staking) Tree staking wire shall be 12 gauge galvanized steel, or approved equal, double strand, twisted.

Hose shall be corded rubber, uniform in color and not less than 1/2" inside diameter.

Anti-Desiccant

Anti-desiccant shall be emulsion type, film forming agent designed to permit transpiration but retard excessive loss of moisture from plants.

Deliver in Manufacturer's fully identifiable containers and mix in accordance with Manufacturer's instructions.

07 02 08 EXECUTION

Tree and Shrub Planting & Transplanting

No tree planting operations shall take place until placing of topsoil has been completed.

Locations of plant material shown on plans are approximate. Final locations will vary from plan and shall be determined in the field under the direction of the Landscape Architect/Engineer.

Contractor shall provide pre-marked, color-coded flags for all shade trees, evergreen trees and flowering trees, with abbreviations that correspond with the Plant List. Landscape Architect or Engineer shall place the color-coded flags to indicate plant locations.

All transplanting shall be performed in strict accordance with the ANSI A300 Part 6 most current version, which are incorporated herein by reference.

For shrub mass planting, the entire bed subgrade shall be tilled 6" deep. Remove any stones over 1", sticks, roots, rubbish and any other extraneous matter. If the soil is heavy clay and silt, organic matter should be added based upon soil test recommendations.

Under no circumstances shall the Contractor pre-dig tree or shrub pits.

Upon final approval by the Landscape Architect or Engineer of tree placement, the Contractor shall paint a

circle around the ball of the tree, move tree and excavate tree pit.

Excavation of Tree and Shrub Pits

Walls of tree pits shall be dug so that they are vertical or sloping outward in heavy soils, and scarified. Excavation shall be slightly raised in the center to provide proper drainage.

Tree pits must be a minimum of 2' greater in diameter than the ball of the tree or the spread of its roots.

Shrub pits and trenches must be a minimum of 1' greater in diameter than the ball of the shrub or the spread of its roots.

The depth of the tree and shrub pit shall be as deep as necessary to accommodate the ball of the tree so that it will not be necessary to raise or lower the plant material to bring it to the required grade. Tree pits shall be deep enough to allow 1/8 of the ball of the tree to be above finished grade. Plants shall rest on undisturbed existing soil or well-compacted backfill.

Dispose of subsoil removed from planting excavations. Do not mix with planting soil or use as backfill.

When pits have been dug, the Contractor shall partially fill with water a representative number of pits in each area to determine that there is adequate percolation in the subgrade at each pit. If not, notify the Landscape Architect or Engineer immediately.

Tree and Shrub Placement

Place tree or shrub in pit by carrying the ball and then lowering it into the pit. Never lift trees by their trunk or branches.

Set balled and burlapped (B&B) stock on bottom of pit, plumb and in the center of the pit, with the most desirable side facing the prominent view.

Prior to placing trees in the pit remove bottom of wire basket prior to placement in the pit. Upon placement in the pit, remove wire basket entirely, then cut and remove rope from the top 50% of rootball and pull burlap back to the edge of the rootball. Remove as much burlap, woven products and twine as possible. All plastic or synthetic film must be removed from rootball. Cut all twine away from canes.

For shrubs remove containers from all container grown shrubs, prior to placing material into the pit and slash the edges of the rootball from top to bottom, at least 1" deep, making 4-5 cuts. The slashing of roots may not be required for containers pre-treated with copper coating.

Set shrub straight and in the center of the pit with the most desirable side facing the prominent view.

Backfilling Tree and Shrub Pits

Tree and Shrub pits shall be backfilled with topsoil mixture as specified in 7.3.8.

Trees and shrubs must remain straight throughout backfilling.

Place backfill around base and sides of rootball, working each layer to settle backfill and eliminate air pockets and voids. When backfill is 2/3 completed, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Place final layer of backfill, tamp firmly and water again until no more water is absorbed.

Never cover top of rootball with soil.

Form a soil saucer above finished grade around the outer rim of tree and shrub pit.

Mulch top of rootball and saucer to a depth of 3" with shredded hardwood bark mulch. Do not place mulch against trunk.

Pruning of Trees and Shrubs

Prune, thin out and shape trees and shrubs in accordance with standard horticultural practice.

Pruning shall be restricted to corrective pruning to improve form only. This includes structure, dead, damaged, diseased and/or conflicting branches.

Do not cut main leader unless directed by Landscape Architect or Engineer to do so. Remove only injured or dead branches from flowering trees, if any.

If side branches are cut to balance tree, make all cuts back to a lateral branch or bud.

Prune out any dead or broken branches.

Final pruning shall be done after trees and shrubs are in place.

Remove and replace excessively pruned stock resulting from improper pruning.

Remove all tags, labels, strings and wire from tree unless otherwise directed by Landscape Architect or Engineer.

After final pruning, apply anti-desiccant where appropriate using power spray to provide an adequate film over trunks, branches, stems, twigs and foliage.

Tree Staking (Trees Under 6" Cal.)

Staking shall be completed as soon as possible after planting of tree. Number of stakes shall be as shown on the tree staking detail on the drawings.

Space tree stakes evenly and vertically on the outside of the rootball and drive firmly into the ground. Stakes shall be driven at an angle and drawn inward to **vertical**.

Cut pieces of hose long enough to loop around trunk.

Place hose around trunk at the height required to provide optimum support. Thread the wire through the hose and pull both ends horizontally 2' beyond stake.

Twist the wires together starting at the rubber hose. Wind both ends of the wires around the stake twice then twist wire back on itself to hold securely. Cut off excess wire. Wire shall be 3" min. from the top of the stake.

Tree Guying (Evergreen Trees)

Guying shall be completed as soon as possible after planting of tree. Number of stakes shall be as shown on the tree staking detail on the drawings.

Cut pieces of hose long enough to loop around trunk.

Space steel angles evenly around, and 18" from the outside of tree pit and drive firmly into the ground allowing the end of the angle to project 6" above grade.

Place hose around trunk just above lowest stout branch at 2/5 to 3/5 the height of the tree.

Twist the wires together starting at the rubber hose. Wind both ends of the wire through the hole in the steel angle and twist wire back on itself to hold securely. Cut off excess wire.

Planting and Transplanting of Herbaceous plant materials

Preparation of Planting Beds

The entire bed subgrade shall be tilled 8" deep. Remove any stones over 1", sticks, roots, rubbish and any other extraneous matter.

Dig beds not less than 8" deep and mix with soil amendments and fertilizer as recommended by soil test analysis.

Spread planting soil mixture to a minimum depth required to meet lines, grades and elevations shown, after light rolling and settlement as follows:

Place approximately 1/2 the total amount of planting soil required and work into the top of the loosened subgrade to create a transition layer.

Place remainder of planting soil.

Mulch entire planting bed with 2" shredded hardwood bark mulch.

Placing Plants

Before planting, biodegradable pots shall be split and non-biodegradable pots shall be removed. Root systems of all potted plants shall be split or crumbled.

Plants shall be installed so that the roots are surrounded by soil below the mulch.

Potted plants shall be set so that the top of the pot is even with finished grade.

Roots of bare root plants shall be covered to the crown.

The entire bed shall be thoroughly watered.

Treat the mulched and planted bed with a pre-emergent herbicide only as directed by the Landscape Architect or Engineer. Apply only when foliage is dry to prevent foliar burn.

Watering

All material shall be thoroughly watered at one (1) week intervals throughout the summer as follows:

A hose without a nozzle should be inserted into the soil just beyond the rootball and water allowed to run at a moderate rate until it bubbles to the surface. Remove hose and place at a new location, diametrically opposite, and allow the water to run until the earth saucer is filled to the brim. If this water is absorbed before 15 minutes have elapsed, the procedure should be repeated immediately, and again for as many times as necessary, until the saucer retains water for more than 15 minutes.

During the month commencing with the third week in August and ending with the third week in September, the interval between waterings shall be extended to 2 weeks in order to allow the buds to harden. After the third week in September, watering shall be resumed on a weekly basis until frost.

Maintenance of all plant materials

Maintenance shall begin immediately after planting.

Contractor shall maintain trees until final acceptance by Landscape Architect or Engineer, but in no case

less than 60 days after completion.

Maintain trees and shrubs by pruning, cultivation and weeding as required for healthy growth in conformance with standard horticultural practice.

Contractor shall restore planting saucers, tighten and repair stake and guy supports and reset trees as required.

Spray trees and shrubs as necessary to keep material free of insects and disease.

Contractor shall maintain herbaceous materials as follows:

If a timed-release fertilizer has been incorporated during plant installation, no more fertilizer need be applied during the first growing season.

After the first growing season fertilize perennials with a slow release fertilizer or any 50% organic fertilizer, or mulch perennials with compost 1" deep.

Cut all deciduous perennials flush to the ground March 1, if not done the previous fall, to allow new growth to develop freely.

Ornamental grasses shall be cut back only in the spring unless otherwise directed by Landscape Architect.

Mulch perennial bed once, in early spring, at 1/2" to 1" depth. If soil is bared in late fall, remulch lightly after ground is frozen to protect perennials.

Inspect and treat for insect and disease problems.

DIVISION 09, STRUCTURAL

SECTION 09 01 – STRUCTURAL EARTHWORK

09 01 01 GENERAL

The following section applies to structural earthwork, earthwork conducted for the building slab, foundations and other structures where soil bearing of structural loads will occur.

09 01 02 STRIPPING OF TOPSOIL

On all areas where grading is to be performed, including the areas within the lines of building construction, the topsoil shall be carefully removed and spread either on areas already graded and prepared for topsoil or in stockpiles conveniently located on the areas which are subsequently to receive application of topsoil.

Any clearing required on the site shall conform to Division 2, Section 1 of these specifications. Clearing shall be performed only to the limits shown on the plans. The Contractor is responsible for removal of all debris resulting from the removal of trees including, but not limited to, stumps, roots, trunks, branches, leaves, etc.

09 01 03 FOUNDATION EXCAVATION

After stripping topsoil, the then existing surfaces shall be excavated or filled to elevations and slopes indicated on the drawings. Existing soils under all structures shall be excavated as shown on the plans on the site and disposed of.

09 01 04 SUBSTRUCTURE FILL & COMPACTION

The contractor shall supply all the necessary Select Borrow Excavation/Structural Fill required to achieve the proposed finished grades for the building. Select compacted borrow material shall be used to attain the proposed footing or subgrade levels where insufficient existing material exists in the areas of proposed structures.

Select Borrow Excavation/Structural Fill shall be certified clean, well graded granular material and shall be in general conformance with NJDOT gradation designation I-10, Borrow Excavation Bridge Foundation and conform with the provided geotechnical report.

Select borrow shall be placed in maximum eight (8) inch thick lifts and compacted to not less than 95% of maximum standard dry density (unless otherwise noted), ASTM D698-78 below and above footing founding levels.

Unless noted otherwise on the Plan, or in the geotechnical report (if supplied) at least four (4) inch thick crushed stone or course gravel base course shall be provided beneath floor slabs.

09 01 05 BACKFILL AND COMPACTION

Backfill at structural walls shall be a clean well graded granular material and shall have no more than 15% by weight passing the 200 sieve. Backfill shall be placed in maximum 8" thick lifts and compacted to not less than 95% of maximum standard dry density (unless otherwise noted), ASTM D698-78 using light walk-behind compactors to avoid putting excessive pressure on retaining walls and foundation.

09 01 06 EMBANKMENT AND COMPACTION

In areas requiring fill other than Substructure Fill and Backfill as defined above, embankment shall be suitable, on site, clean sand fill, or suitable borrow material, approved by the Engineer. Material shall be compacted in maximum eight (8) inch thick layers to 95% maximum density at a moisture content within 2% of optimum (unless otherwise noted).

09 01 07 DEWATERING

The Contractor shall pump out or otherwise remove any water which may be found in the excavation, and he shall

provide all pipe underdrains, dams, flumes, or other works necessary to keep the excavation entirely clear of water while the foundations are being laid and the masonry constructed. Newly laid masonry shall be protected from injury by fluming, pumping, bailing, well pointing, or by other approved methods. The Contractor shall at all times have upon the work site sufficient dewatering equipment ready for immediate use. (Contractor to refer to geotechnical report for additional information.)

09 01 08 SHEATHING AND BRACING

The Contractor shall keep the excavation properly and adequately sheathed and braced at all times during the progress of the work, in order to prevent accidents, caving of the sides of the excavation and damage to the structures. Such sheathing and bracing shall be included in the contract price for the item to which the work pertains, and the Contractor will be held responsible for any damage due to failure or insufficiency of the sheathing or bracing.

09 01 09 UNDERGROUND UTILITIES AND APPURTENANCES

Earthwork for underground utilities and appurtenances shall be in accordance with Division 2 of the Specifications.

SECTION 09 02 – STRUCTURAL CONCRETE

09 02 00 GENERAL

Work on the reinforced concrete footings and foundations shall conform to all requirements of ACI 301-16 "Specifications for Structural Concrete" published by the American Concrete Institute, Farmington Hills, Michigan except as modified by these Contract Documents"

For other concrete work see Division 4.

09 02 01 FORMWORK AND FORMWORK ACCESSORIES

Use commercially manufactured sleeves, inserts, anchors and other embedded items suitable where required. Show aforementioned items in shop drawings and submit manufacturer's product data.

09 02 03 REINFORCEMENT AND REINFORCEMENT SUPPORTS

Use deformed billet steel bars complying with ASTM A615 Grade 60, unless otherwise shown.

Use black annealed steel 16 gage tire wire conforming to ASTM A853.

Devices for spacing, supporting and fastening reinforcement in place shall conform to the following:

Use CRSI recommended Class 3 rebar supports for carbon steel reinforcement,

Do not use brick, wood or other non-complying materials

For slabs on grade, use sand plates or horizontal runners where base material will not support chair legs

09 02 04 CONCRETE MIXTURES

All structural concrete used in footings and foundations shall conform to the following Exposure Classes S1, F2, W1, C1.

All structural concrete used in footing and foundations shall develop a minimum f'c = 4500 psi with a total air content of 6.0% for a maximum aggregate size either ¾ inch or 1 inch.

09 02 05 HANDLING, PLACING & CONSTRUCTING

All footings shall bear on undisturbed natural soil or properly compacted controlled fill installed atop the native soils. The footings shall bear on soil capable of supporting the bearing pressure of shown on the Plan. Contractor shall verify this capability in the field. Footing depths shown on the Plans are to be considered minimum; footing depths shall be deeper if required to provide the support indicated above.

Where pipes, conduits, sleeves, etc. pass beneath footings, said items, etc. shall be encased solid on all sides with a minimum of 6" thick concrete. When construction of footings precedes placement of said items, etc. the item installer shall be responsible for encasing said item, etc. as noted herein, No item, etc, shall be located beneath piers, beam bearing pilasters, column footings, etc, except as specifically detailed on the Plans.

If encountered, remove areas of unsuitable materials including topsoil, roots, vegetation, fill or backfill, unsuitable soils to a distance five (5) feet beyond the beyond the limits of construction for greenhouse building area. Remove any existing improvements and related backfill or adequately protect those planned to remain.

Unsuitable materials and unstable areas shall be removed and replaced with controlled fill or crushed stone. consisting of clean 3/4" inch crushed stone or washed gravel.

Supply and install all fill necessary to reach the design subgrade level. Fill shall be controlled compacted material that is spread layers eight (8") inch or less in loose thickness and uniformly compacted to at least 95 percent of maximum dry density as determined by the ASTM D1557 test procedure.

Maintain relatively dry excavations at all times during construction.

No fill materials shall be placed, spread or rolled while ground or fill is frozen or thawing, or during periods of precipitation. Following precipitation interruptions of fill work, fill operations shall not be resumed until the moisture content and density of all materials are checked by the Engineer. Corrective action will be required where the Engineer's inspection (or tests required of the Contractor by the Engineer) show support values are less than those specified. All required corrections shall be the responsibility of the Contractor.

No concrete that has partially hardened shall be deposited, nor shall retempered concrete be used.

All exposed concrete surfaces shall be smooth-rubbed finish. All formed concrete not exposed shall have an as-cast surface finish – 1.0 except as otherwise noted.

Construct all concrete aprons, door pads, sidewalks and other walking surfaces shown on the Plans or otherwise specified in these Specifications. Unless otherwise noted, such items shall not be less than 4 inches thick and shall be broomed finished

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Do not start concrete production until data has been reviewed and approved by the engineer.

C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

D. Welding Certificates: Copies of certificates for welding procedures and personnel.

E. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

F. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Cementitious materials and aggregates.
2. Form materials and form-release agents.
3. Steel reinforcement and reinforcement accessories.
4. Admixtures.
5. Curing materials.
6. Floor and slab treatments.
7. Vapor retarders.
8. Epoxy joint filler.

9. Joint-filler strips.
10. Repair materials.
11. Form liners
12. Reglets
13. Vapor retarder/barrier

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for formwork and shoring and reshoring installations that are similar to those indicated for this Project in material, design, and extent.

C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.

D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548. Contractor shall provide a storage box for concrete cylinders.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

F. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

G. ACI Publications: Comply with the following, unless more stringent provisions are indicated:

1. ACI 301, "Specification for Structural Concrete."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials." CRSI

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1. Before submitting design mixes, review concrete mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixes.
c. Ready-mix concrete producer.
d. Concrete subcontractor.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1, or better.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of the exposed concrete surface.
2. Furnish ties that, when removed, will leave holes not larger than 1 inch (25 mm) in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

B. Joint Dowel Bars: Plain-steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.

C. All hooks, unless otherwise noted, shall conform to "ACI Standard Hooks".

D. Tie-wire shall not be less than 16 gauge wire

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I/II.

B. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:
1. Nominal Maximum Aggregate Size: 3/4 inch.

C. Fly Ash : ASTM C618, Type F

D. Water: Potable and complying with ASTM C 94.

2.5 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

F. Water-Reducing and Retarding Admixture" ASTM C 494, Type D.

2.6 VAPOR BARRIER SYSTEM

A. Vapor Barrier System: ASTM E 1745, Class A, polyolefin sheet, not less than 10 mil.

B. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a No. 4 sieve and 10 to 30 percent passing a No. 100 sieve; meeting deleterious substance limits of ASTM C 33 for fine aggregates.

C. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.7 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Solvent-Borne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

G. Products: Subject to compliance with requirements, provide one of the following or approved equal:

1. Evaporation Retarder:

    a. Sure Film; Dayton Superior Corporation.
    b. Eucobar; Euclid Chemical Co.
    c. E-Con; L&M Construction Chemicals, Inc.
    d. Confilm; Master Builders, Inc.
    e. Waterhold; Metalcrete Industries.
    f. Rich Film; Richmond Screw Anchor Co.
    g. SikaFilm; Sika Corporation.
    h. Finishing Aid; Symons Corporation.

2. Clear, Solvent-Borne, Membrane-Forming Curing Compound:

    a. Nitocure S; Fosroc.
    b. Cure & Seal 309; Kaufman Products Inc.
    c. L&M Dress & Seal 18; L&M Construction Chemicals, Inc.
    d. CS-309; W. R. Meadows, Inc.
    e. Seal N Kure; Metalcrete Industries.
    f. Rich Seal 14 percent UV; Richmond Screw Anchor Co.
    g. Kure-N-Seal; Sonneborn, Div. of ChemRex, Inc.
    h. Clear Seal 150; Tamms Industries Co., Div. of LaPorte Construction Chemicals of North America, Inc.

3. Clear, Waterborne, Membrane-Forming Curing Compound:

    a. Safe Cure and Seal; Dayton Superior Corporation.
    b. Aqua Cure VOX; Euclid Chemical Co.
    c. Dress & Seal WB; L&M Construction Chemicals, Inc.
    d. Vocomp-20; W. R. Meadows, Inc.
    e. Metcure; Metalcrete Industries.
    f. Cure & Seal 150E; Nox-Crete Products Group, Kinsman Corporation.
    g. Cure & Seal 14 percent E; Symons Corporation.
    h. Seal Cure WB 150; Tamms Industries Co., Div. of LaPorte Construction Chemicals of North America, Inc.

2.8 RELATED MATERIALS

A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.0217-inch- thick galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.9 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.

4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Topping: Traffic-bearing, cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5700 psi at 28 days when tested according to ASTM C 109/C 109M.

2.10 CONCRETE MIXES

A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:

1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.

C. Footings and Foundation Walls: Proportion normal-weight concrete mix as follows:
1. Compressive Strength (28 Days): 4000 psi.
2. Maximum Slump: 3 inches.
3. Maximum Slump for Concrete Containing High-Range Water-Reducing Admixture: 8 inches after admixture is added to concrete with site-verified 2- to 3-inch slump.

D. Slab-on-Grade: Proportion normal-weight concrete mix as follows:
1. Compressive Strength (28 Days): 4000 psi.
2. Maximum Slump: 4 inches.

E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.

F. Maximum Water-Cementitious Materials Ratio: 0.40 for concrete required to have low water permeability. This includes elevator pits and basement walls.

G. Maximum Water-Cementitious Materials Ratio: 0.40 for concrete exposed to deicers or subject to freezing and thawing while moist. This includes exterior slabs and walls.

H. Maximum Water-Cementitious Materials Ratio: 0.40 for corrosion protection of steel reinforcement in concrete exposed to chlorides from deicing chemicals, salt, saltwater, brackish water, seawater, or spray from these sources.

I. Maximum Water-Cementitious Materials Ratio: 0.40 for all interior slabs.

J. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5 percent, unless otherwise indicated:

1. Air Content: 5.5 percent for 1-1/2-inch- nominal maximum aggregate size.
2. Air Content: 6 percent for 1-inch- nominal maximum aggregate size.
3. Air Content: 6 percent for 3/4-inch- nominal maximum aggregate size.

K. Do not air entrain concrete to trowel-finished interior floors and suspended slabs. Do not allow entrapped air content to exceed 3 percent.

L. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

M. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixes where indicated.

2.11 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Only when specifically approved by the Architect. Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch for surfaces exposed to view.
2. Class C, 1/2 inch all other surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

1. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Do not chamfer corners or edges of concrete.

J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor bolts, accurately located, to elevations required.
2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.

B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:

1. At least 70 percent of 28-day design compressive strength.

C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

A. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and reshoring.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR BARRIER SYSTEM

A. Vapor Barrier System: Place, protect, and repair vapor-barrier sheets according to ASTM E 1643 and manufacturer's written instructions. Lap joints 6 inches minimum and seal with manufacturer's tape.

3.6 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor barrier. Repair damage and reseal vapor barrier before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-third of concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete as soon as possible when cutting action will not dislodge aggregate or otherwise damage surface usually 1 to 2 hours depending on mix design, environmental conditions, etc. and before concrete develops random contraction cracks, typically 1 to 2 hours depending on mix design, environmental conditions, etc.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated.

1. Use dowel sleeves or lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by Architect.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation. Limit Free-Fall to a height of five (5) feet.

D. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.

1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to

lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

G. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.

1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
2. Do not apply rubbed finish to smooth-formed finish.

C. Rubbed Finish: Apply the following to smooth-formed finished concrete:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.

1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of

trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system
2. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface:

    a. For thin-set flooring or resilient floor covering: Specified overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness, F(L) 17.

    b. For carpet floors: Specified overall values of flatness, F(F) 25; and levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and levelness, F(L) 15.

E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs where indicated by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.12 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid epoxy joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage and pay for a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
7. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.

a. Cast and field cure one set of four standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39; test two laboratory-cured specimens at 7 days and two at 28 days.

a. Test two field-cured specimens at 7 days and two at 28 days.
b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.

C. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

D. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

E. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.

F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

END OF SECTION 03300

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes structural steel.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer structural steel connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated.

B. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for structural steel connections.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

C. Shop Drawings detailing fabrication of structural steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
3. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.
4. Include Shop Drawings signed and sealed by a qualified professional engineer responsible for their preparation.

D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Mill test reports signed by manufacturers certifying that their products, including the following, comply with requirements.

1. Structural steel, including chemical and physical properties.

2. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
3. Direct-tension indicators.
4. Shop primers.
5. Nonshrink grout.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.

C. Comply with applicable provisions of the following specifications and documents:

1. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
2. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
3. AISC's "Seismic Provisions for Structural Steel Buildings."
4. ASTM A 6 (ASTM A 6M) "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."
5. Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.

E. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel."

1. Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
2. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.7 SEQUENCING

A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 MATERIALS AS INDICATED.

A. Structural Steel Shapes, Plates, and Bars: As follows:

1. Carbon Steel: ASTM A 36.
2. High-Strength, Low-Alloy Columbium-Vanadium Steel: ASTM A 992, Grade 50.
3. High-Strength, Low-Alloy Structural Steel: ASTM A 588, Grade 50, corrosion resistant.

B. Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B.

C. Hot-Formed Structural Steel Tubing: ASTM A 501.

D. Steel Pipe: ASTM A 53, Type E or S, Grade B.

1. Weight Class: Standard unless indicated otherwise.
2. Finish: Black, except where indicated to be galvanized.

E. Carbon-Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.

F. High-Strength Steel Castings: ASTM A 148, Grade 80-50.

G. Shear Connectors: ASTM A 108, Grade 1015 through 1020, headed-stud type, cold-finished carbon steel, AWS D1.1, Type B.

H. Anchor Rods, Bolts, Nuts, and Washers: As follows:

1. Unheaded Rods: ASTM A 36.
2. Headed Bolts: ASTM A 307, Grade A; carbon-steel, hex-head bolts; and carbon-steel nuts.
3. Headed Bolts: ASTM A 325, Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts. Use where high strength bolts are indicated.
4. Washers: ASTM A 36.

I. Nonhigh-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A; carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers.

1. Finish: Hot-dip zinc-coating, ASTM A 153, Class C.

J. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Hot-dip zinc-coating, ASTM A 153, Class C.

K. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Mechanically deposited zinc coating.

L. Welding Electrodes: Comply with AWS requirements.

2.2 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds and repair painting galvanized steel, with dry film containing not less than 93 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20.

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

2.4 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

1. Camber structural steel members where indicated.
2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until steel has been erected.
3. Mark and match-mark materials for field assembly.
4. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
5. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.
6. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.

B. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust, scale, seam marks, roller marks, rolled trade names and roughness.

1. Remove blemishes by filling or grinding, or by welding and grinding, prior to cleaning, treating, and shop priming.
2. Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.

C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded.

D. Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.

E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's printed instructions.

F. Holes: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on Shop Drawings.

1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.5 SHOP CONNECTIONS

A. Shop install and tighten high-strength bolts according to RCSC's Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated.
2. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.

B. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
2. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

2.6 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed-on fireproofing.
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:

1. SPC-SP 3 "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply 2 coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Apply a 1-coat, nonasphaltic primer complying with SSPC's "Painting System Guide No. 7.00" to provide a dry film thickness of not less than 1.5 mils.

2.7 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated for galvanizing according to ASTM A 123.

2.8 SOURCE QUALITY CONTROL

A. The Contractor will employ and pay for an independent testing and inspecting agency to perform shop inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
2. Provide testing agency with access to places where structural steel Work is being fabricated or produced so required inspection and testing can be accomplished.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

D. Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Direct-tension indicator gaps will be verified to comply with ASTM F 959, Table 2.

E. In addition to visual inspection, shop-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.

B. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

B. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

    a. Comply with manufacturer's instructions for proprietary grout materials.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

1. Maintain erection tolerances of architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

E. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.

F. Do not use thermal cutting during erection.

G. Finish sections thermally cut during erection equal to a sheared appearance.

H. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. Install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.

B. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated.
2. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.

C. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

1. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

3.5 FIELD QUALITY CONTROL

A. Owner will employ and pay for an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. Additional testing will be performed to determine compliance of corrected Work with specified requirements. Contractor will reimburse Owner for the costs of these additional tests.

D. Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Direct-tension indicator gaps will be verified to comply with ASTM F 959, Table 2.

E. In addition to visual inspection, field-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

3.6 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A 780.

END OF SECTION 05120

SECTION 05521 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following as indicated on the drawings:

1. Stainless-steel pipe and tube handrails and railings.
2. Steel pipe and tube handrails and railings.

1.3 PERFORMANCE REQUIREMENTS

A. General: In engineering handrails and railings to withstand structural loads indicated, determine allowable design working stresses of handrail and railing materials based on the following:

1. Stainless Steel: ASCE 8, "Specification for the Design of Cold-Formed Stainless Steel Structural Members."
2. Structural Steel: AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."
3. Cold-Formed Structural Steel: AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."

B. Structural Performance of Handrails and Railings: Provide handrails and railings complying with requirements of ASTM E 985 for structural performance, based on testing performed according to ASTM E 894 and ASTM E 935.

C. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections:

1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:

a. Concentrated load of 200 lbf applied at any point and in any direction.
b. Uniform load of 50 lbf/ft. applied horizontally and concurrently with uniform load of 100 lbf/ft. applied vertically downward.
c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails Not Serving As Top Rails: Capable of withstanding the following loads applied as indicated:

a. Concentrated load of 200 lbf applied at any point and in any direction.
b. Uniform load of 50 lbf/ft. applied in any direction.

c. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.

a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guard.

D. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected handrails and railings.
2. Grout, anchoring cement, and paint products.

B. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.

1. Provide structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation for all handrails and railings compliant with the current Code (IBC 2018 NJ Edition).

C. Samples for Initial Selection: Short sections of railing or flat, sheet metal samples showing available mechanical finishes.

D. Provide samples as requested by the Owner for each type of railing, handrails and handrail brackets to the post.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Product Test Reports: From a qualified testing agency indicating handrails and railings comply with ASTM E 985, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in New Jersey and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of handrails and railings that are similar to those indicated for this Project in material, design, and extent.

B. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

C. Source Limitations: Obtain each type of handrail and railing through one source from a single manufacturer.

1.6 STORAGE

A. Store handrails and railings in a dry, well-ventilated, weathertight place.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating handrails and railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.9 SCHEDULING

A. Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that does not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or approved equal:

1. Steel and Stainless-Steel Pipe and Tube Railings:

    a. High Point Architectural Metal.
    b. Architectural Art Mfg., Inc.
    c. Blum: Julius Blum & Co., Inc.
    d. Approved equal.

2.2 METALS

A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.

B. Stainless Steel: Grade or type designated below for each form required: Provide all pipes, tubing, castings and plate stainless steel from type 304 stainless for interior railings and type 316 for exterior railings.

C. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:

1. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

    a. Black finish, unless otherwise indicated.
    b. Galvanized finish for exterior installations and where indicated.
    c. Type F, or Type S, Grade A, standard weight (Schedule 40), unless another grade and weight are required by structural loads.

2. Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A, unless another grade is required by structural loads.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
4. Iron Castings: Malleable iron complying with ASTM A 47, Grade 32510.
5. Iron Castings: Gray iron complying with ASTM A 48, Class 30.

D. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

2.3 WELDING MATERIALS, FASTENERS, AND ANCHORS

A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.

1. For stainless-steel handrails and railings, use fasteners fabricated from Type 304 stainless steel for interior work and Type 316 stainless steel for exterior work.
2. For steel handrails, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.

C. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

1. Provide concealed fasteners for interconnecting handrail and railing components and for attaching them to other work, unless otherwise indicated.
2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

D. Cast-in-Place and Postinstalled Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Cast-in-place anchors.
2. Chemical anchors.
3. Expansion anchors.

2.4 PAINT

A. Shop Primers: Provide primers to comply with applicable requirements in Division 9 Section "Painting."

B. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

C. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.

2.5 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

B. Interior Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

C. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble handrails and railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Form changes in direction of railing members as follows:

1. As detailed.
2. By bending.
3. By radius bends of radius indicated.
4. By flush radius bends.
5. By mitering at elbow bends.
6. By inserting prefabricated flush-elbow fittings.
7. By any method indicated above as detailed in the drawings, applicable to change in direction involved.

D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

E. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

F. Nonwelded Connections: Fabricate handrails and railings by connecting members with concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive where this is manufacturer's standard splicing method.

G. Welded Connections for Aluminum Pipe: Fabricate pipe handrails and railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.

I. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.

J. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, and steel plate forming bottom closure.

K. For removable railing posts, fabricate slip-fit sockets from steel tube whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.

1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.

L. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

M. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

N. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

O. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.

P. Fabricate joints that will be exposed to weather in a watertight manner.

Q. Close exposed ends of handrail and railing members with prefabricated end fittings.

R. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch or less.

S. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

T. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.7 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of handrails and railings.

2.8 STAINLESS-STEEL FINISHES

A. Remove or blend tool and die marks and stretch lines into finish.

B. Grind and polish surfaces to produce uniform, directionally textured polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. 180-Grit Polished Finish: Oil-ground, uniform, textured finish.

D. 320-Grit Polished Finish: Oil-ground, uniform, smooth finish.

E. Polished and Buffed Finish: Oil-ground, 180-grit finish followed by buffing.

F. Bright, Directional Polish: No. 4 finish.

G. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.9 STEEL FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

C. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

D. For nongalvanized steel handrails and railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

E. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed handrails and railings:

1. Exteriors (SSPC Zone 1B): SSPC-SP 6, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 7, "Brush-off Blast Cleaning."

F. Apply shop primer to prepared surfaces of handrail and railing components, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Do not apply primer to galvanized surfaces.
2. Stripe paint edges, corners, crevices, bolts, and welds.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

D. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of handrails and railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:

B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:

1. Nonshrink, nonmetallic grout.
2. Nonshrink, nonmetallic grout or anchoring cement.

C. Cover anchorage joint with flange of same metal as post, attached to post as follows:

1. Welded to post after placing anchoring material.
2. By set screws.

D. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch build-up, sloped away from post.

E. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For stainless-steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
2. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

F. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.5 ANCHORING RAILING ENDS

A. Anchor railing ends into concrete and masonry with round flanges connected to railing ends and anchored into wall construction with postinstalled anchors and bolts.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces.

1. Weld flanges to railing ends.
2. Connect flanges to railing ends using nonwelded connections.

3.6 ATTACHING HANDRAILS TO WALLS

A. Attach handrails to wall with manufactured machined wall brackets. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface.

B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
4. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
5. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

3.7 CLEANING

A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.

C. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

D. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.8 PROTECTION

A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05521

SECTION 06100 – ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Shear wall panels.
4. Rooftop equipment bases and support curbs.
5. Wood blocking and nailers.
6. Wood furring.
7. Wood sleepers.
8. Plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of process and factory-fabricated product.
2. For preservative-treated wood products.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Shear panels.
5. Power-driven fasteners.
6. Post-installed anchors.
7. Metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: 15 percent.
2. Dimension Lumber: 15 percent for 2-inch nominal thickness or less

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, are to meet or exceed those indicated. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 PRESERVATIVE TREATMENT

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATMENT

A. General: Provide fire-retardant-treated materials for all Building Type 2C Non-Combustible Buildings. Materials are to comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
2. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

E. Application: Treat items indicated on Drawings, and the following:

1. Framing for raised platforms.
2. Framing for stages.
3. Concealed blocking.
4. Framing for non-load-bearing partitions.
5. Framing for non-load-bearing exterior walls.
6. Roof construction.
7. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions by Grade: Construction or No. 2

1. Application: Interior partitions not indicated as load bearing.
2. Species:

a. Southern pine or mixed southern pine; SPIB.
b. Northern species; NLGA.
c. Eastern softwoods; NeLMA.
d. Western woods; WCLIB or WWPA.

B. Framing Other Than Non-Load-Bearing Partitions by Grade: Construction or No. 2

1. Application: Framing other than interior partitions not indicated as load bearing.
2. Species:

a. Hem-fir (north); NLGA.
b. Southern pine; SPIB.
c. Douglas fir-larch; WCLIB or WWPA.
d. Southern pine or mixed southern pine; SPIB.
e. Spruce-pine-fir; NLGA.

f. Douglas fir-south; WWPA.
g. Hem-fir; WCLIB or WWPA.
h. Douglas fir-larch (north); NLGA.
i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

C. Framing Other Than Non-Load-Bearing Partitions by Performance: Any species and grade with a modulus of elasticity of at least 1,500,000 psi and an extreme fiber stress in bending of at least 1000 psi for 2-inch nominal thickness and 12-inch nominal width for single-member use.

1. Application: Framing other than interior partitions not indicated as load-bearing.

D. Exposed Framing: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

1. Species and Grade: As indicated above for load-bearing construction of same type.

2.5 SHEAR WALL PANELS

A. Wood-Framed Shear Wall Panels: Prefabricated assembly consisting of wood perimeter framing, tie downs, and Exposure I, Structural I plywood or OSB sheathing.

B. Steel-Framed Shear Wall Panels: Prefabricated assembly consisting of cold-formed galvanized-steel panel, steel top and bottom plates, and wood studs.

C. Allowable design loads, as published by manufacturer, are to meet or exceed those of products of manufacturers listed. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.6 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

C. Concealed Boards: **15** percent maximum moisture content

1. Mixed southern pine or southern pine; No. **2** grade; SPIB.
2. Eastern softwoods; No. **2** Common grade; NeLMA.
3. Northern species; No. **2** Common grade; NLGA.
4. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

2.7 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.8 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide STAINLESS STEEL nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 appropriate for the substrate.

2.9 METAL FRAMING ANCHORS

A. Allowable design loads, as published by manufacturer, are to meet or exceed those **of basis-of-design products** Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors are to be punched for fasteners adequate to withstand same loads as framing anchors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653 G60 coating designation.

1. Use for interior locations unless otherwise indicated.

C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber.

2.10 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets:

1. Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.
2. Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
3. Self-adhering sheet consisting of 64mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene-film reinforcement, and with release liner on adhesive

side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, stainless steel sheet, bonded to a high-density polyethylene film, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

C. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

2.11 INSTALLATION

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking and similar supports to comply with requirements for attaching other construction.

D. Install shear wall panels to comply with manufacturer's written instructions.

E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

2.12 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from the weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06100

SECTION 06402 - INTERIOR ARCHITECTURAL WOODWORK

1.1 GENERAL

A. Interior architectural woodwork includes all interior wood work, cabinets, casework, shelves, counters wood furring, blocking, shims, and hanging strips unless concealed within other construction prior to woodwork installation.

B. Submittals: In addition to product data, submit the following:

1. Shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
2. Samples of lumber and panel products for each species and cut indicated for transparent finish, and each material indicated for opaque finish, with one-half of exposed surfaces finished.
3. Samples of laminate-clad panel products, for each type, color, pattern, and surface finish.
4. Samples of thermoset decorative-overlay surfaced panel products, for each type, color, pattern, and surface finish.
5. Samples of solid surfacing materials.

C. AWI Quality Standard: Comply with "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute.

D. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet-work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.2 PRODUCTS

A. Woodwork Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by one of the following:

B. Panel Products: As follows:

1. Hardboard: AHA A135.4.
2. Particleboard: ANSI A208.1, Grade M-2.
3. Softwood Plywood: PS 1.
4. Hardwood Plywood and Face Veneers: HPVA HP-1.

C. High-Pressure Decorative Laminate: NEMA LD 3.

D. Thermoset Decorative Overlay: Decorative surface of thermally fused polyester or melamine-impregnated web, bonded to specified substrate and complying with ALA 1992.

E. Fire-Retardant-Treated Materials: Where indicated, use materials pressure impregnated with Exterior or Interior Type A fire-retardant chemical to comply with AWPA C20. Kiln-dry material after treatment. Discard material that does not comply with referenced woodworking standard.

F. Fire-Retardant Particleboard: Panels made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame spread of 25 or less and smoke developed of 25 or less per ASTM E 84.

G. Cabinet Hardware: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Door Hardware."

1. Cabinet Hardware Schedule: Match hardware used in manufacturer made units. See Specification Section 08710.
2. Hardware Standard: Comply with BHMA A156.9 for items indicated by reference to BHMA numbers or referenced to this standard.
3. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA code number indicated.

    a. Chromium Wire Brushed: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

4. For concealed hardware provide manufacturer's standard finish that complies with product class requirements of BHMA A156.9.

H. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

I. Fabrication, General: Complete fabrication, including assembly and finishing, before shipment to Project site to maximum extent possible. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Backout or groove backs of flat trim members, kerf backs of other wide, flat members, except for members with ends exposed in finished work.
2. Assemble casings in plant except where limitations of access to place of installation require field assembly.
3. Shop-cut openings, to maximum extent possible. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges with a water-resistant coating.

J. Laminate-Clad Cabinets (Plastic-Covered Casework): As follows:

1. AWI Type of Cabinet Construction: Flush overlay.
2. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

    a. Horizontal Surfaces Other than Tops: GP-50, 0.050-inch (1.270-mm) nominal thickness.
    b. Vertical Surfaces: GP-50, 0.050-inch (1.270-mm) nominal thickness.
    c. Edges: Same thickness matching laminate in color, pattern, and finish to vertical and horizontal surfaces.

3. Materials for Semi-exposed Surfaces: Provide surface materials indicated below:

    a. Surface Material: High-pressure decorative laminate, Grade GP-28.

4. Colors, Patterns, and Finishes: Provide colors and textures of laminate surfaces complying with the following:

   a. Match manufacturer's made furniture unit in the same room.
   b. Match color, pattern, and finish indicated by reference to laminate manufacturer's standard designations.
   c. Provide Architect's selections from laminate manufacturer's full range of colors and finishes.

5. Provide dust panels of ¼-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers except where located directly under tops.

K. Countertops: As follows:

1. Type of Top: High pressure decorative laminate as follows:

   a. Grade: GP-50, 0.050-inch (1.270-mm) nominal thickness
   b. Colors, Patterns, and Finishes: Provide colors and textures of laminate surfaces complying with the following

      1) Match manufacturer's made furniture unit in the same room from the laminate manufacturer's standard

   c. Edge treatment: Solid hardwood matching the wood furniture in the same room or PVC mold edge as noted on the drawings for construction and details.

1.3 EXECUTION

A. Preparation: Condition woodwork to average prevailing humidity conditions in installation areas, and examine and complete work as required, including back priming and removal of packing, before installing.

B. Install woodwork to comply with AWI Section 1700 for the same grade specified above for type of woodwork involved.

1. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
2. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

C. Standing and Running Trim: Install with minimum number of joints, using full-length pieces to the greatest extent possible. Stagger joints in adjacent and related members. Fill gaps, if any, between top of base and wall with plastic wood filler and sand smooth.

D. Tops: Anchor securely to base units. Seal space between backsplash and wall.

END OF SECTION 06402

SECTION 06651 - SOLID SURFACE WINDOWSILLS AND COUNTERTOPS

1.1 SUMMARY

A. Section Includes solid surfacing fabrication including but not limited to the following:

1. Solid surface material countertops.
2. Solid surface material backsplashes.
3. Solid surface material end splashes.
4. Solid surface material apron fronts.
5. Solid surface material sinks.
6. Solid Surface windowsill and Apron.

1.2 SUBMITTALS

A. Product Data: For countertop materials and sinks.

B. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section 01300. Indicate plans, sections, dimensions, component sizes, edge details, thermosetting requirements, fabrication details, attachment provisions, sizes of furring, blocking, including concealed blocking and coordination requirements with adjacent work. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacles and other items installed in the solid surface.

C. Samples: For each type of material exposed to view.

1.01 QUALITY ASSURANCE

A. Qualifications:

1. Installers: Provide work of this Section executed by competent installers with minimum 5 years' experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

B. Mock-Ups:

1. Prior to final approval of Shop Drawings, erect 1 full size mock-up of each component at Project site demonstrating quality of materials and execution for Architect review.
2. Should mock-up not be approved, rework or remake until approval is secured. Remove rejected units from Project site.
3. Approved mock-up will be used as standard for acceptance of subsequent work.
4. Approved mock-ups may remain as part of finished work.

1.02 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements: Deliver no components to Project site until areas are ready for installation.

B. Storage and Handling Requirements:

1. Store components indoors prior to installation.
2. Handle materials to prevent damage to finished surfaces.

1.03 WARRANTY

A. Manufacturer Warranty: Provide manufacturer's standard warranty for material only for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Architect and at no expense to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer List: Products of the following manufacturers are acceptable subject to conformance to requirements of the Drawings, Schedules and Specifications:
1. Corian;
2. Meganite;
3. Wilsonart Contract;
4. Or approved equal

2.2 SOLID SURFACE COUNTERTOP MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
1. Type: Provide Standard type unless Special Purpose type is indicated.
2. Colors and Patterns: As selected by Architect from manufacturer's full range.

B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.3 COUNTERTOP FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

B. Configuration:

1. Front: Eased square edge with separate apron
2. End Splash: Matching backsplash.

C. Countertops: 1-inch-thick, solid surface material with radius edge built up with same material].

D. Joints: Fabricate countertops without joints.

2.4 INSTALLATION MATERIALS

A. Adhesive: Product recommended by solid surface material manufacturer.

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.
2. Verify actual site dimensions and location of adjacent materials prior to commencing work.
3. Examine cabinets upon which counter tops are to be installed. Verify cabinets are level to within 1/8" in 10' - 0".
4. Notify Architect in writing of any conditions which would be detrimental to installation.

B. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

A. Install components plumb, level, rigid, scribed to adjacent finishes in accordance with reviewed Shop Drawings and Product installation details.

B. Fabricate field joints using manufacturer's recommended adhesive, with joints being inconspicuous in finished work. Exposed joints/seams are not permitted. Keep components and hands clean when making joints. Reinforce field joints as specified herein. Cut and finish component edges with clean, sharp returns.

C. Route radii and contours to template. Anchor securely to base component or other supports. Align adjacent components and form seams to comply with manufacturer's written recommendations using adhesive in color to match work. Carefully dress joints smooth, remove surface scratches and clean entire surface.

D. Install countertops/sills with no more than 1/8" sag, bow or other variation from a straight line.

E. Seal between wall and components with joint sealant as specified herein and in Section 07920, as applicable.

F. Provide endsplashes as indicated on Drawings. Adhere to countertops using a standard color-coordinated silicone sealant. Adhere applied sidesplashes to countertops using a standard color-matched silicone sealant. Provide sidesplashes at walls and adjacent millwork. Fabricate radius

cove at intersection of counters with backsplashes to dimensions shown on reviewed Shop Drawings. Adhere to countertops using manufacturer's standard color-coordinated joint adhesive.

G. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Ensure components are clean on date of Substantial Completion of the Work.

3.3 REPAIR

A. Repair minor imperfections and cracked seams and replace areas of severely damaged surfaces in accordance with manufacturer's instructions.

3.4 SITE QUALITY CONTROL

A. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Architect at no cost to Owner.

3.5 CLEANING

A. Remove excess adhesive and sealant from visible surfaces.

B. Clean surfaces in accordance with manufacturer's instructions.

3.6 PROTECTION

A. Provide protective coverings to prevent physical damage or staining following installation for duration of construction phase.

B. Protect surfaces from damage until date of Substantial Completion of the Work.

END SECTION 06651

SECTION 07132 – PRE-APPLIED SHEET MEMBRANE WATERPROOFING

PART 1 - GENERAL

1.01. SUMMARY

A. This Section includes requirements for providing labor, materials, tools, and equipment to complete the Work as shown on the Drawings Architectural Division and as specified herein including, but not limited to, the following:

1. Pre-applied sheet membrane waterproofing that forms an integral bond to poured concrete for the following applications:

a. Vertical applications: Membrane applied against soil retention system prior to concrete foundation wall placement (Henry Blueskin Pre-seal 320) or membrane applied to poured concrete foundation walls (Henry WP-200 or approved equal).
b. Horizontal applications: Membrane applied on prepared subbase prior to concrete slab placement (Henry Blueskin Pre-Seal 435 or approved equal).

B. Pre-applied sheet membrane waterproofing must meet the following standards:

1. A single source manufacturer must warrant pre-applied sheet waterproofing components.
2. Pre-applied fully bonded polypropylene sheet waterproofing comprised of polypropylene film with a heat bonded dimple surfaced geotextile, used to form a mechanical and chemical bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete; having the following typical properties:

a. Resistance to Hydrostatic Head (ASTM D5385): 231 ft. (70.4m)
b. Puncture Resistance (ASTM E154)
c. Lateral Migration Resistance (ASTM D5385 Modified): 231 ft. (70.4m)
d. Lap Peel Adhesion (ASTM D1876): 6.9lbs/in (1200 N/m)
e. Permeance (ASTM E96): <0.1 Perms
f. Peel Adhesion to Concrete (ASTM D903): 5 lbs/in (875 N/m)

1.02. ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meetings: A pre-applied pre-construction meeting must be completed to provide requirements and coordination for the waterproofing and subsequent warranty prior to the pre-applied waterproofing installation to maintain warranty eligibility. The pre-applied waterproofing pre-construction meeting is mandatory and must be attended by the Waterproofing Manufacturer Representative, General Contractor, Installing Contractor, Waterproofing Manufacturer's Qualified Inspector, Concrete/Shotcrete Contractor, Construction Manager, Owner's Representative and trades with associated scopes of work that directly affect the pre-applied waterproofing application or long-term ability to maintain a watertight assembly.

B. Pre-applied waterproofing installations require independent inspection by a Waterproofing Manufacturer's Qualified Inspector at the expense and coordination of the Contractor. Independent inspections include, but are not limited to, the following:

1. Monitor waterproofing installation and compliance with project specific requirements, Waterproofing Manufacturer's published literature and site specific details.

C. The Contractor shall hire a Waterproofing Manufacturer's Qualified Inspector Independent Inspections:

1. Waterproofing Manufacturer's Qualified Inspector to produce reports and digital photographs documenting each inspection. Failure to provide Waterproofing Manufacturer's Qualified Inspector independent inspections will result in delay or rejection of warranty request.

a. Waterproofing membrane installation start
b. Periodic intervals to verify continued compliance with project specific requirements, Waterproofing Manufacturer's published literature and site specific details
c. Waterproofing seam integrity.
d. Final inspection prior to concrete or backfill placement against the waterproofing, including at grade terminations and transition details

1.03. SUBMITTALS

A. Provide the following requested information in accordance with Section 01300 – Submittals.

B. Action Submittals:

1. Product Data:

a. Waterproofing Manufacturer's guide specification
b. Waterproofing Manufacturer's technical data sheets
c. Waterproofing Manufacturer's standard details
d. Evidence that the waterproofing assembly meets specified requirements
e.

2. Certificates:

a. Product certification stating that assembly components are supplied and warranted by a single source Waterproofing Manufacturer.
b. Statement that Installing Contractor is authorized by Waterproofing Manufacturer to complete Work as specified
c. Qualifications of the Contractor hired independent qualified inspector.

1.04. QUALITY ASSURANCE

A. Single Source Responsibility:

1. Obtain waterproofing and auxiliary materials from a single Waterproofing Manufacturer regularly engaged in the manufacturing and supply of the specified products.
2. Verify product compliance with federal, state, and local regulations.

B. Manufacturer's Qualifications:

1. Waterproofing Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:

a. Waterproofing system shall be supplied by a Waterproofing Manufacturer with a minimum of 20 years of experience in the production and sales of waterproofing.

C. Installer's Qualifications:

1. Waterproofing Installing Contractor:

a. Only authorized Installing Contractor(s) shall install the waterproofing assembly.
b. Installing Contractor(s) must have at least three (3) years of experience in Work as described in this section.
c. Perform Work in accordance with the Waterproofing Manufacturer's published literature and as specified in this section.
d. Maintain one (1) copy of the Waterproofing Manufacturer's instructions on site.
e. Allow the Waterproofing Manufacturer representative site access during installation.
f. Contact the Waterproofing Manufacturer a minimum of two weeks prior to scheduling a meeting.

1.05. MOCK-UPS

A. Mock-ups:

1. Provide a mock-up to verify selections made under submittals and to set quality standards for materials and execution in accordance with Section.

1.06. DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials: Deliver materials to the jobsite in undamaged and clearly marked containers and/or wrapping indicating the name of the Waterproofing Manufacturer and product.

B. Storage of Materials:

1. Store materials as recommended by the Waterproofing Manufacturer and conform to applicable safety regulatory agencies. Refer to all applicable data including, but not limited to, SDS sheets, Product Data sheets, product labels, and specific instructions for personal protection.
2. Keep solvents away from open flame or excessive heat.
3. Store rolled materials on end.
4. Product requirements may vary. Refer to Waterproofing Manufacturer's published literature.

C. Handling: Product requirements may vary. Refer to Waterproofing Manufacturer's published literature.

1.07. SITE CONDITIONS

A. Environmental Requirements:

1. Do not perform Work during rain or inclement weather.
2. Product requirements may vary. Refer to Waterproofing Manufacturer's published literature.

B. Protection:

1. It is the responsibility of the Installing Contractor to protect all surfaces not included in scope of Work from damage.
2. It is the responsibility of the General Contractor to organize and protect installed waterproofing components from damage by other trades.

C. Complete preparation Work prior to installing the waterproofing assembly.

1.08. WARRANTY

A. Single Source Warranty:

1. Installing Contractor Warranty:

a. Installing Contractor must warrant the installation; provide material and labor costs for repair in the event of a leak as a result of faulty workmanship for a period of two (2) years from the date of Substantial Completion.

2. Manufacturer's Single Source Warranty:

a. Material warranty:

1. Installing Contractor must be an authorized Installing Contractor.
2. Manufacturer must warrant the material against product defect for a period of ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01. MANUFACTURERS

A. The Basis of Design for this system is Henry Company. Approved equal manufacturers will be considered in accordance with Specification Section 01300 – Submittals.

2.02. MATERIALS

Obtain waterproofing and auxiliary materials as a single-source from the Waterproofing Manufacturer to ensure compatibility, warranty, and compliance with the following requirements:

1. Pre-applied fully bonded polypropylene sheet waterproofing membrane comprised of polypropylene film with a heat bonded dimple surfaced geotextile, used to form a mechanical and chemical bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete; having the following typical properties:

    a. Resistance to Hydrostatic Head (ASTM D5385): 231 ft. (70.4m)
    b. Puncture Resistance (ASTM E154)
    c. Lateral Migration Resistance (ASTM D5385 Modified): 231 ft. (70.4m)
    d. Lap Peel Adhesion (ASTM D1876): 6.9lbs/in (1200 N/m)
    e. Permeance (ASTM E96): <0.1 Perms
    f. Peel Adhesion to Concrete (ASTM D903): 5 lbs/in (875 N/m)

A. Blind Side Concrete Vertical Walls: Primary Assembly Products:

1. Pre-Applied Sheet Waterproofing; choose from the following:

    a. Pre-applied fully bonded polypropylene sheet waterproofing membrane comprised of polypropylene film with a heat bonded dimple surfaced geotextile, used to form a mechanical and chemical bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete; having the following typical properties:
        1. Basis of Design: Henry Blueskin PreSeal™ 320 or approved equal.
        2. Color: White
        3. Thickness (ASTM D37367): 32 mils (0.81mm)
        4. Resistance to Hydrostatic Head (ASTM D5385): 231 ft. (70.4m)
        5. Lateral Migration Resistance (ASTM D5385 Modified): 231 ft. (70.4m)
        6. Water Absorption (ASTM D570): 0.4%
        7. Elongation (ASTM D412): 45%
        8. Tensile Strength (ASTM D412): 1400 psi (9.7 MPa)
        9. Lap Peel Adhesion (ASTM D1876): 6.9lbs/in (1200 N/m)
        10. Puncture Resistance (ASTM E154): 110 lbs (490 N)

11. Peel Adhesion to Concrete (ASTM D903): 5 lbs/in (875 N/m)
12. Low Temperature Flexibility (ASTM D1970): Unaffected at -20 °F (-29 °C)

B. Backfilled Vertical Wall:

1. WP-200 Sheet

a. Primary sheet applied self-adhered waterproofing membrane shall be Blueskin® WP200 manufactured by Henry (or approved equal), 1.5mm (60 mils) SBS modified bitumen, self-adhering sheet membrane with a cross-laminated polyethylene film, and having the following physical properties:

1. Thickness: 1.5 mm (60 mils) min.
2. Flexibility: Pass @ -40 degrees C to ASTM D1970
3. Vapour permeance: 2.8 ng/Pa.s.m² (0.05 perms) to ASTM E96
4. Tensile strength (membrane): 2.24 MPa to ASTM D412,
5. Tensile strength (film): 34.5 MPa to ASTM D882,
6. Elongation: 300% to ASTM D412,
7. Puncture resistance: 222 N min. to ASTM E154.

2. PRIMER

a. Primer for self-adhering membranes at temperatures above 25 degrees F shall be Aquatac™ Primer manufactured by Henry or approved equal, a polymer emulsion based adhesive, quick setting, having the following physical properties:

1. Color: Aqua;
2. Weight: 8.7 lbs/gal;
3. Solids by weight: 53%;
4. Water based, no solvent odours
5. Drying time (initial set): 30 minutes at 50% RH and 70 degrees F;
6. Water Vapor Permeance (ASTM E96): <0.1 Perms

C. Underslab Horizontal:

a. Pre-applied fully bonded polypropylene sheet waterproofing membrane comprised of polypropylene film with a heat bonded dimple surfaced geotextile, used to form a mechanical and chemical bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete; having the following typical properties:

1. Basis of Design: Henry Blueskin PreSeal™ 435 or approved equal.

2. Color: White
3. Thickness (ASTM D37367): 43.5 mils (1.1mm)
4. Resistance to Hydrostatic Head (ASTM D5385): 231 ft. (70.4m)
5. Lateral Migration Resistance (ASTM D5385 Modified): 231 ft. (70.4m)
6. Water Absorption (ASTM D570): 0.6%
7. Elongation (ASTM D412): 70%
8. Tensile Strength (ASTM D412): 1900 psi (14.4 MPa)
9. Lap Peel Adhesion (ASTM D1876): 6.9lbs/in (1200 N/m)
10. Puncture Resistance (ASTM E154): 225 lbs (1000 N)
11. Peel Adhesion to Concrete (ASTM D903): 5 lbs/in (875 N/m)
12. Low Temperature Flexibility (ASTM D1970): Unaffected at -20 °F (-29 °C)
13. Water Vapor Permeance (ASTM E96): <0.1 Perms

D. Assembly Auxiliary Materials:

1. Waterstop; chose from the following:

   a. Preformed adhesive hydrophilic waterstop designed to swell in the presence of water, providing a watertight seal in cold joints on concrete structures, having the following properties:

      1. Basis of Design: Henry Hydro-Flex Waterstop or approved equal.
      2. Rain or wet conditions: Swells into unconsolidated concrete surfaces upon contact with water.

   b. Non-swelling preformed joint sealant that provides a lasting, watertight bond to both fresh and cured concrete surfaces, having the following properties:

      1. Basis of Design: Henry Synko-Flex® Waterstop or approved equal.
      2. Rain or wet conditions: Does not rely on swelling to achieve a watertight seal

2. Tape; choose from the following:

   a. Double-sided, ready-to-use acrylic adhesive tape for fastening pre-applied waterproofing membranes to vertical surfaces and adhering pre-applied waterproofing membrane seams, having the following properties:

      1. Basis of Design: Henry Blueskin PreSeal™ Tape 50S or approved equal.
      2. Color: Blue Acrylic adhesive

   b. Reinforced acrylic detailing tape used to seal pre-applied waterproofing corners, edges, penetrations and seams for vertical and horizontal applications, having the following properties:

1. Basis of Design: Henry Blueskin PreSeal™ Tape 120V or approved equal.
2. Color: White with non-woven facer

3. Sealant:

   a. Moisture cure, medium modulus polymer modified sealing compound, having the following typical properties:

      1. Basis of Design Product: Henry 925 BES Sealant or approved equal.

4. Drainage Composite:

   a. Two-part prefabricated geo-composite drain board consisting of a formed polystyrene core covered on one side with a woven or non-woven polypropylene filter fabric:

      1. Basis of Design: Henry® DB200 or approved equal.

PART 3 - EXECUTION

3.01. EXAMINATION

A. It is the Installing Contractor's responsibility to verify the substrate is in accordance with Waterproofing Manufacturer requirements and as specified in this Section prior to installation of pre-applied waterproofing. Commencement of the Work or any parts thereof, indicates installer acceptance of the substrate.

1. Substrates must be sound and solid to eliminate movement during concrete pour.
2. Substrates must be continuous, regular and smooth.
3. Substrate gaps or voids: one-half (0.5) inch wide gap maximum
4. Grout around penetrations for stability.
5. Horizontal substrates:

   a. Substrates must be free of loose aggregate and sharp protrusions.
   b. Avoid curved or rounded substrates.
   c. Installations over compacted earth or crushed stone:

      1. Verify pre-applied waterproofing is suitable for application over compacted earth or crushed stone. Refer to product specific technical data sheet.
      2. Ensure substrate is well compacted to avoid displacement due to traffic or concrete pour.

d. Pre-applied waterproofing can be applied to dry or damp surfaces on horizontal substrates.
e. Remove standing water.

6. Vertical Substrates:

a. Provide membrane support.

1. Acceptable substrates: sheet piling, concrete, plywood, insulation, drain board or other approved facing to sheet piling.

a. Verify pre-applied waterproofing is suitable for application directly over sheet piling where applicable. Pre-applied waterproofing membrane may require substrate preparation to create a smooth surface such as plywood or drain board.

b. Shuttering/formwork must be clean and free of frost, oil, grease, dirt, excess mortar, release agents or other contaminants.

7. Applications using waterstops that swell into unconsolidated concrete surfaces upon contact with water require 2" minimum concrete coverage on all sides.

3.02. PREPARATION

A. Do not apply waterproofing components until substrate and environmental conditions are in accordance with Waterproofing Manufacturer's product specific TDS, and as specified in this Section.

B. Surfaces must be sound, clean, and free of oil, grease, dirt, excess mortar, frost, laitance, loose and flaking particles, or other contaminants.

3.03. INSTALLATION

A. Verify substrate is ready to receive the waterproofing in accordance with the Waterproofing Manufacturer's TDS and guide specification.

B. Air and substrate temperature limitations:

1. Do not perform Work when ambient (air) and substrate temperatures are below 32 °F (0 °C).

C. Detailing/Flashing:

1. Install detailing and flashings per Waterproofing Manufacturer's details.

D. Waterproofing Assembly Installation:

1. Vertical substrates:

a. Install waterproofing membrane with polypropylene film side facing existing substrate, dimpled surface geotextile side facing the installer.
b. Where vertical securement is required, select from the following methods:

1. Tape:

a. Secure membrane with double sided tape.

2. Mechanical attachment:

a. Secure membrane at selvedge with small, low profile, non-rusting, substrate appropriate fasteners to create a smooth and flat membrane seam.

c. Verify waterproofing is clean, dry and free from contaminants prior to subsequent membrane installations; wipe with damp cloth if necessary.
d. Overlap membrane seams two (2) inches.
e. Remove plastic release liner at selvedge and firmly press overlapping membrane into place to adhere membrane seams.
f. Seal membrane seams in accordance with Waterproofing Manufacturer details.

2. Horizontal substrates:

a. Install waterproofing membrane with polypropylene film side facing existing substrate, dimpled surface geotextile side facing the installer.
b. Extend pre-applied waterproofing twenty-four (24) inches beyond base slab to create a trafficable space and minimize membrane soiling or damage.
c. Verify waterproofing is clean, dry and free from contaminants prior to subsequent membrane installations; wipe with damp cloth if necessary.
d. Stagger end laps to avoid layer build up.
e. Overlap membrane seams two (2) inches.
f. Remove plastic release liner at selvedge and firmly press overlapping membrane into place to adhere membrane seams.
g. Seal membrane seams in accordance with Waterproofing Manufacturer details.

E. Waterstop Installation:

1. Install waterstop in accordance with Waterstop Manufacturer requirements.
2. Refer to product specific published literature for installation instructions.
3. Applications using waterstops that swell into unconsolidated concrete surfaces upon contact with water require 2" minimum concrete coverage on all sides.

3.04. CLEANING

A. As the Work proceeds, and upon completion, promptly clean up and remove from the premises all rubbish and surplus materials resulting from the foregoing Work.

B. Clean soiled surfaces, spatters, and damage caused by Work of this Section.

C. Check area to ensure cleanliness and remove debris, equipment, and excess material from the site.

END OF SECTION

SECTION 07190 - VAPOR BARRIER

PART 1 – GENERAL

1.1 SUMMARY

A. Products supplied under this section:
   1. Vapor barrier, seam tape, mastic, pipe boots, detail strip for insulation under concrete slabs.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM E 1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
   2. ASTM E 164-99 (2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
   3. ASTM E 96-05 Standard Test Methods for Water Vapor Transmission of Materials.
   4. ASTM F 1249-06 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
   5. ASTM E 1643 Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. American Concrete Institute (ACI):
   1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.3 SUBMITTALS

A. Quality control/assurance:
   1. Full set of test results as per paragraph 8.3 of ASTM E 1745.
   2. Manufacturer's samples, literature.
   3. Manufacturer's installation instructions for placement, seaming and penetration repair instructions.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Vapor barrier must have all of the following qualities:
   1. Permeance as tested after conditioning of less than 0.03 Perms [grains/(ft^2 · hr · inHg)] as tested in accordance with ASTM E 1745 Paragraphs 7.1.2-5.
   2. Other performance criteria:
      a. Strength: ASTM E 1745 Class A.
      b. Minimum thickness of the plastic retarder material: 10 mils.

B. Vapor barrier products:
   1. Basis of Design: Stego Wrap Vapor Barrier (10-mil) by Stego Industries LLC. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

2.1 ACCESSORIES

A. Seam tape:
1. Stego Tape by Stego Industries LLC.
2. Or approved equal.

B. Vapor-proofing mastic:
1. Stego Mastic by Stego Industries LLC.
2. Or approved equal.

PART 3 – EXECUTION

3.1 PREPARATION

A. Ensure that base material is approved by the manufacturer's recommendations.
1. Level and compact base material.

B. Pre-Construction / Installation:
1. Host an onsite pre-construction / installation meeting with the Construction Manager and manufacturer's representative.

3.1 INSTALLATION

A. Install vapor barrier retarder in accordance with manufacturer's instructions and ASTM E 1643.
1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement.
2. Lap vapor barrier over footings and/or in recessed haunches for a continuous installation. Seal the vapor barrier to the foundation walls.
3. Overlap joints 6 inches and seal with manufacturer's tape.
4. Seal all penetrations (including pipes) per manufacturer's instructions.
5. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
6. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all sides with tape.

B. A manufacturer's inspection prior to placing the concrete is required. Provide a field report confirming that the installation is completed per the warranty requirements and manufacturer's installation requirements.

END OF SECTION

SECTION 07200 - WATER REPELLENTS (For Brick Veneer & Concrete Masonry Unit)

1.1 GENERAL

A. Submit Product Data for each product specified.

B. Warranty: 5-Year Manufacturer's Authorized Warranty. The water repellent test should be done before the application to determine the material needed to coat the surface.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

1. SIKA – Sikagard – 277 Enviroseal
   (Formerly MasterProtect H 177 by Master Builders Solutions)
2. MAB - Modac Products Company - Siloxane 40
3. STO Concrete Restoration Division - STO Penetration Sealer CR650
4. Chemprobe Technologies, Inc. - Chemprobe Prime-A-Pell H20 for Brick

B. Siloxanes: Penetrating water repellent. Alkylalkoxysiloxanes that are oligomerous with alcohol, ethanol, mineral spirits, water, or other solvent carrier.

1. With more than 8.3-lb/gal. (400-g/L) VOCs.

C. Silane/Siloxane Blends: Consisting of silanes and siloxanes blended to achieve a particular penetration and protection on a specific substrate.

1. With more than 8.3-lb/gal. (400-g/L) VOCs.

1.3 EXECUTION

A. **A preconstruction on site meeting is required** with the manufacturer's representative to verify the existing conditions, moisture test and sample area completed prior to the preconstruction meeting conform to the manufacturer's installation requirements and warranty.

B. Preparation: Clean substrate and test for moisture content according to repellent manufacturer's written instructions.

1. Concrete Masonry Unit: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of water repellents.
2. Clay Brick Masonry: Clean clay brick masonry per ASTM D 5703.

C. Test for pH level, according to water repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.

D. Protect Adjoining Work: Cover nearby surfaces of aluminum and glass. Cover live plants and grass.

E. Coordination with Sealants: Do not apply water repellent until sealants have been installed and cured.

F. Application: Apply at the end of the project after the masonry has been completed for a minimum of six (6) months. If the Substantial Completion date is prior to this, the Contractor shall re-mobilize and complete this scope following the Substantial Completion date. Comply with manufacturer's written instructions. Apply a mist coat and a heavy-saturation coat using low-pressure spray equipment. Apply a second coat per manufacturer's written instructions.

G. Remove protective coverings from adjacent surfaces and other protected areas.

H. Clean adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses per manufacturer's written cleaning instructions. Repair damage caused by water-repellent application.

I. LOCATION: The following areas are to be coated by this product.

1. All new brick, CMU and Cast Stone veneer work
2. All existing masonry areas as shown on the Contract Drawings.

END OF SECTION 07200

SECTION 07210-BUILDING INSULATION

1.1 GENERAL

A. Submittals: Product Data for each type of insulation product specified.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated as determined by testing identical products per NFPA 285, ASTM E 84, ASTM E 119, or ASTM E 136 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1.2 PRODUCTS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thickness, widths and lengths.

B. For below slab insulation: Extruded-Polystyrene Board Insulation: ASTM C 578 for type indicated below:

1. Under Slab Type IV, 1.60-lb/cu. ft. (26-kg/cu. m) minimum density.

C. For masonry cavity insulation: Board Insulation: Polyisocyanurate Foam – Board Insulation: ASTM C 1289, foil faced, Type I, Class 1 or 2. Do not tape the Board joints. Leave joints open for vapor permeability.

1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

D. For all interior walls: Unfaced Mineral-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing) of type described below:

1. Mineral-Fiber Type: Fibers manufactured from glass. Interior Walls = 3 5/8" R=13; Exterior Walls = 6" R=21; Attic Space = R-49.
2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

E. For use as fire stop at openings between edge of slab and exterior wall panels: Provide a fire tested assembly where required. Slag-Wool-Fiber Board Safing Insulation: Semirigid boards designed and produced by combining slag-wool fibers with thermosetting resin binders to comply with ASTM C 612, Type IA and IB; nominal density of 4 lb/cu. ft. (64kg/cu. m); passing ASTM E 136 for combustion characteristics; thermal resistivity of 4 deg. F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).

1. Calking Compound: Material approved by manufacturer of safing insulation for sealing joint between foil backing of safing insulation and edge of concrete floor slab against penetration of smoke.
2. Safing Clips: Galvanized steel safing clips approved by manufacturer of safing insulation for holding safing insulation in place.

F. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of hooding insulation, of thickness indicated, securely in position indicated with self-locking washer in place; and complying with the following requirements:

1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
2. Spindle: Copper-coated low carbon steel, fully annealed, 0.105 inches (2.67 mm) in diameter, length to suit depth of insulation indicated.

1.3 EXECUTION

A. Installation, General: Comply with insulation manufacturer's written instructions applicable to products and application indicated.

1. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.
2. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
3. Apply single layer of insulation to produce thickness indicated.
4. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.
5. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant.
6. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:
   a. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
   b. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
7. Install insulation in curtain-wall construction where indicated on Drawings according to curtain-wall manufacturer's written instructions.
8. Retain insulation in place by metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated between insulation and glass.
9. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.
10. Stuff glass-fiber, loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
11. Attic insulation board should be a tight fit at the bottom of the rafters. Apply thermo-ply sheathing under insulation board to act as vapor barrier and insulation board support.
12. In between bathroom walls and cavity walls where there is no gypsum wall board sheathing on the inside face, provide horizontal metal straps between studs at 48" on center to hold insulation in place.

B. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to written instructions of insulation manufacturer.

C. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors.

D. Place loose-fill insulation into spaces and onto surfaces as shown, either by pouring or by machine blowing to comply with ASTM C 1015.

E. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 for surface-burning characteristics, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

END OF SECTION

SECTION 07211 – CONTINUOUS INSULATION XCI FOIL WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Continuous Insulation XCI Foil wall panels.

1.2 SYSTEM DESCRIPTION

A. NFPA 285 Exterior Wall Assembly – Concrete Masonry:

1. Base Wall System: Concrete Masonry Wall.
2. Approved Exterior Finish:

a. Masonry: Brick veneer anchors, standard types, installed 16 inches o.c. vertically. Maximum 2-inch air gap between exterior insulation and brick. Standard nominal 4 inches thick or greater, clay brick.

3. Panel Thickness: 1.5 inches maximum.
4. Weather Resistive Membrane Applied to CMU Backup Wall: Acceptable products are:
   a. Henry:
      1) Air Bloc 17
      2) Air Bloc 31
      3) Or approved equal

1.3 DESIGN REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Physical properties (Foam Core):

1. Water Absorption: ASTM C 209, less than 0.05 percent by volume.
2. Compressive Strength: ASTM D 1621; Grade 3, 25 psi (172 kPa).
3. Dimensional Stability: ASTM D 2126, 2 percent linear change (7 days).
4. Moisture Vapor Permeance: ASTM E 96, less than 0.05 perm (2.875ng/(Pa•s•m2)).
5. Service Temperature: Minus 100 degrees to 250 degrees F (Minus 73 degrees C to 122 degrees C).

C. Continuous Insulation XCI Foil wall panels shall meet the continuous insulation standards of ASHRAE 90.1-2010, IECC 2012 and IBC Chapter 26.

D. Basis of Design: Hunter Panels XCI Foil evaluated and listed under ESR-3174. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals. Tests includes the following:

1. Foam core flame spread index of 75 or less and smoke developed of 450 or less when tested in accordance with ASTM E 84 or UL 723.
2. Classified as Type I in accordance with ASTM C 1289.

3. DRJ Technical Evaluation Report #1402-02.

E. Basis of Design: Hunter Panels XCI Foil evaluated and listed under Miami Dade Product Control – Notice of Acceptance NOA No. 14-0501.01. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on wall panels and fasteners to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be a company that regularly manufactures and assembles specified insulation in house with no outside fabrication operations.

B. Pre-Installation Meeting: Convene minimum one week prior to commencing Work of this section. Review installation procedures and coordination required with Related Work and include the following:

1. Participants: Authorized representatives of the General Contractor, Construction Manager, Installer, and Manufacturer.
2. Review wall assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.
3. Review continuous insulation wall panels installation methods and procedures related to application, including manufacturer's installation guidelines.
4. Review firestopping requirements and weather resistive membrane requirements and placement locations.
5. Review field quality control procedures.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Good construction practice dictates that all insulations should be protected from moisture and direct sunlight during job-site storage. Panels should be double packaged in a UV resistant polyethylene bag. The moisture resistant package is designed for protection from the elements during flatbed shipment from our factories to the jobsite. Outdoor storage for extended periods of time requires waterproof tarpaulins and elevated storage above ground level a minimum of 2". Additionally, we recommend slitting the bundle packaging vertically down the center of the two short sides to prevent moisture accumulation within the package.

1.7 SEQUENCING

A. Coordinate with the installation of vapor retarders and air seal materials.

B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Insulating panels shall be XCI products produced by Hunter Panels (or approved equal).

B. Approved equal manufacturers will be considered in accordance with specification section 01300 "Submittals."

2.2 BOARD INSULATION

A. Board Insulation with Foil Facer: must comply with ASTM C 1289. Panels are a high thermal resistive rigid insulation panel composed of a closed cell polyisocyanurate foam core bonded to an impermeable foil facer.

1. Type: ASTM C 1289, Type I
   a. Grade 3 (25 psi).

2. Panel Size:
   a. as needed

3. Thickness / R Value: ASTM C 518 at 75 degrees F (23.9 degrees C).
   a. 1.6 inches (41 mm) / R Value 10.1

2.3 PANEL FASTENERS

A. Panel fasteners shall be corrosion resistant type as approved panel manufacturer. Length of fasteners shall be as recommended by the panel manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until exterior walls have been properly prepared.

B. Verify that all exterior wall assembly construction has been completed to the point where the insulation may correctly be installed.

C. Verify that mechanical and electrical services in walls have been installed and tested and, if appropriate, verify that adjacent materials and finishes are dry and ready to receive insulation.

D. If wall assembly preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in exterior spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within plane of insulation.

E. Fasten insulation as recommended by the manufacturer panel installation guide. Provide base support for the insulation panels as required for the exterior cladding to be installed over the panels.

F. Exposed insulation must be protected from open flame and kept dry at all times.

G. Exterior wall insulation is not intended to be left exposed for extended periods of time in excess of 45-60 days without adequate protection. If extended exposure is anticipated all exposed foam surfaces including corners, window and door openings, should be taped with a compatible waterproof tape.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Cover the top and edges of unfinished roof panel work to protect it from the weather and to prevent accumulation of water in the cores of the panels.

C. Do not leave panels exposed to moisture. Wet panels shall be removed or allowed to completely dry prior to application of vapor barrier and/or roof covering.

D. Repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07270 - FIRESTOPPING

1.1 GENERAL

A. Provide this firestopping for **ALL** walls. System Performance Requirements: Provide firestopping assembly test systems with products that are produced and installed to resist the spread of fire and smoke. The system shall resist the passage of smoke and other gases.

1. Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than the fire-resistance rating of the constructions penetrated.
2. Provide through-penetration firestop systems with T ratings as well as F ratings, as determined per ASTM E 814.
3. Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E 119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
4. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
5. For firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450, as determined per ASTM E 84.
6. Provide penetration firestopping with mold and mildew resistance rating of one (1) or less as tested per ASTM G21

B. Submittals: Provide a complete tested assembly of products with a specific tested assembly system. In addition, provide product data for each type of product in the assembly. Submit the following:

1. Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.
2. Shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration firestop system, and each kind of construction condition penetrated and kind of penetrating item along with design designation of qualified testing and inspecting agency.
3. Product certificates signed by manufacturers of firestopping products certifying compliance of their products with specified requirements.
4. Product test reports from a qualified testing and inspecting agency evidencing compliance of firestopping with requirements based on comprehensive testing of current products. Test reports must indicate T and F ratings and all system performance requirements.

C. Fire-Test-Response Characteristics: Provide firestopping that complies with the following requirements and those specified under the "System Performance Requirements" paragraph:

1. Firestopping tests are performed by a qualified testing and inspecting agency, including UL, Warnock Hersey, or an approved equal agency performing testing and follow-up inspection services, that is acceptable to authorities having jurisdiction.
2. Through-penetration firestop systems are identical to those tested per ASTM E

814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly.

3. Fire-resistive joint sealant systems are identical to those tested for fire-response characteristics per ASTM E 119 under conditions where the positive furnace pressure differential is at least 0.01 inch of water, as measured 0.78 inch from the face exposed to furnace fire.
4. Ratings of Firestopping: As indicated by reference to designations of UL in their "Fire Resistance Directory" or by another qualified testing and inspecting agency.

1.2 PRODUCTS

A. Through-Penetration Firestop Systems: Comply with the following requirements in providing system components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating firestops under conditions of service and application, based on testing and field experience. Subject to compliance with requirements provide products manufactured by Hilti, 3M Fire Protection Products, STI – Specified Technologies, Inc., or approved equal.

1. Accessories: Provide the following components for each firestopping system as needed to install fill materials and to comply with "System Performance Requirements" paragraph:

a. Permanent forming/damming/backing materials including the following:

1) Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
2) Joint fillers for joint sealants.

b. Temporary forming materials.
c. Substrate primers.
d. Collars.
e. Steel sleeves.

2. Fill Materials: Provide through-penetration firestop systems composed of the fill materials indicated below:

a. Endothermic, Latex Compound Sealant: Single-component, endothermic, latex formulation.
b. Intumescent, Latex Sealant: Single-component, intumescent, latex formulation.
c. Intumescent Putty: Nonhardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.
d. Intumescent Wrap Strips: Single-component, elastomeric sheet with aluminum foil on one side.
e. Job-Mixed Vinyl Compound: Prepackaged vinyl-based powder product for mixing with water at Project site to produce a paintable compound, passing ASTM E 136, with flame-spread and smoke-developed ratings of zero per ASTM E 84.
f. Mortar: Prepackaged dry mix composed of a blend of inorganic binders,

fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogenous mortar.

g. Pillows/Bags: Re-usable, heat-expanding pillows/bags composed of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.

h. Silicone Foam: Two-component, silicone-based liquid elastomer that, when mixed, expands and cures in place to produce a flexible, nonshrinking foam.

i. Silicone Sealant (ASTM E814 UL 14779) Standard Test Method for Fire Tests of Penetration Firestop Systems: Neutral-curing, single-component, silicone-based, intumescent, neutral-curing sealant.

j. Solvent-Release-Curing Intumescent Sealant: Solvent-release-curing, single-component, synthetic-polymer-based sealant.

k. Mineral Wool Insulation (ASTM C 518): 4 pcf actual density; .23 BTU in/hr SF 24°F; 4.3 R value; 0 Flame; 0 Smoke Developed.

l. Drop-In Firestop Devices: Factory-assembled devices for use with combustible or noncombustible penetrants in cored holes within concrete floors. Device shall consist of galvanized steel sleeve lined with an intumescent strip, an extended rectangular flange attached to one end of the sleeve for fastening to concrete floor, and neoprene gasket.

B. Fire-Resistive Elastomeric Joint Sealants: Chemically curing, elastomeric sealants of base polymer indicated complying with ASTM C 920 requirements and requirements specified in this Section applicable to fire-resistive joint sealants.

1. Sealant Colors: Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

2. Single-Component, Neutral-Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, G, A, and (as applicable to joint substrates indicated) O.

   a. Additional capability, when tested per ASTM C 719, to withstand the following percentage changes in joint width as measured at time of installation and still comply with other requirements of ASTM C 920:

      1) 100 percent movement in extension and 50 percent movement in compression for a total of 150 percent movement.

3. Multicomponent, Nonsag, Urethane Sealant: Type M; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, A, and (as applicable to joint substrates indicated) O.

   a. Additional capability, when tested per ASTM C 719, to withstand the following percentage changes in joint width as measured at time of installation and still comply with other requirements of ASTM C 920:

      1) 50 percent movement in both extension and compression for a total of 100 percent movement.

4. Single-Component, Nonsag, Urethane Sealant: Type S; Grade NS; Class 25; and

Uses NT, M, A, and (as applicable to joint substrates indicated) O.

1.3 EXECUTION

A. Install through-penetration firestops in **ALL** walls to comply with the "System Performance Requirements" paragraph and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

B. Install fire-resistive joint sealant to comply with the "System Performance Requirements" paragraph, with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.

END OF SECTION 07270

SECTION 07464 – FIBER CEMENT SIDING

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Fiber Cement Panel Siding.
B. Fiber Cement Architectural Panel Siding.
C. Trim, Fascia, Molding, Soffit and Accessories.

1.3 REFERENCE STANDARDS

A. ASCE 7, Minimum Design Loads for Buildings and Other Structures, Current Edition.
B. ASTM C1185, Standard Test Methods for Sampling and Testing Fiber-Cement Flat Sheet, Roofing and siding Shingles, and Clapboards; 2023.
C. ASTM C1186., Standard Specification for Flat Fiber-Cement Sheets; 2022, with 2023 Editorial Revision.
D. ASTM D3359, Standard Test Methods for Rating Adhesion by Tape Test; 2023.
E. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
F. ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.
G. ASTM E136, Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2022.
H. ASTM E330/E330M, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2021.
I. ICC-ES Evaluation Reports ESR-1844, ESR-2290 and ESR-2273 (IBC, IRC, CBC, CRC); Current Editions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:
    a. A minimum of 2-weeks prior to the commencement of the Work of this section, conduct a preliminary pre-installation conference at project site.
    b. Meet with Owner, Architect, and Installer, and Subcontractors completing related work.
    c. Review the Following:
        i. Methods and procedures to complete the Work.
        ii. Substrate and installation requirements.
        iii. Temporary protection requirements.
        iv. Repair procedures.
        v. Schedule.
        vi. Other pertinent topics.
    d. Provide record of discussion with meeting minutes distributed to all attendees.

1.5 SUBMITTALS

A. See Section 01300 - Submittals.
B. Product Data:
    a. Manufacturer's product data sheets.
    b. Manufacturer's storage and handling requirements.

c. Manufacturer's preparation instructions.
d. Manufacturer's installation instructions.
e. Manufacturer's operation and maintenance instructions.

C. Shop Drawings:
   a. Provide detailed drawings showing dimensions, layout, joints, construction details, and attachments.
   b. Indicate atypical non-standard applications outside of manufacturer's standard details and specifications.

D. Selection Samples:
   a. Provide one complete set of color material sample representing manufacturer's full range of available colors and patterns for each finish product specified.

E. Verification Samples:
   a. Provide one sample, minimum 4-inch x 6-inch (100 mm x 150 mm) representing selected product, color, texture, and patterns for each finish product specified.

F. Installers qualification statement: Provide a certification from the manufacturer for the installation contractor.

G. Warranty:
   a. Contractor shall provide a two (2) year NDL leak proof warranty for all work from the date of Substantial Completion.
   b. Manufacturer's executed written warranty, completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in work specified in this section with a minimum of 5-years of experience with installation of products of this type.

B. Mock-up:
   a. Mock-Up: Build field sample corner wall mock-up for evaluation of surface preparation techniques, installation workmanship, and to verify selections made from sample submittals to demonstrate aesthetic effects and set quality standards for fabrication and installation.
      i. Minimum 48-inches wide x 60-inches high or similar area as fits the layout of the building exterior.
      ii. Include outside corner on one end of mockup and inside corner on the other end.
      iii. Approval of mock-up does not constitute approval of deviations from the Contract Documents unless approved in writing.
      iv. Approved mock-up **may not** remain as a part of the completed work.
   b. Provide a minimum of 5-**days** notification to Architect, Installer, and Manufacturer's Representative prior to application of mock-up for review.
   c. Obtain approval of mock-up from Architect prior to commencement of Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store siding flat on a smooth level surface and carry on its side.
C. Protect edges and corners from chipping.
D. Store materials under dry, waterproof, well-ventilated cover, elevated above grade, and kept dry prior to installation.
E. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of the Authorities Having Jurisdiction.
F. Protect materials from damage, dust, or other detrimental conditions.

1.8 FIELD CONDITIONS

A. Maintain environmental conditions including temperature, humidity, and ventilation in accordance with the limits indicated in the manufacturer's written instructions.
B. Do not install products in conditions outside of the manufacturer's stated limits.

1.9 WARRANTY

A. Manufacturer's Limited, Non Pro-rated Product Warranty:
    a. Plank, Soffit, and Trim: 30-year Warranty.
    b. Color-Plus Finish: 15-year Warranty.
    c. When installed and maintained in accordance with manufacturer's written requirements, warranty for 15-years from date of purchase covering peeling, cracking, and chipping.
B. Installers Warranty:
    a. Provide **2-year** installers warranty covering workmanship for work of this Section from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: James Hardie Building Products, Inc.; Hardie Panel and Hardie Architectural Panel.
B. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.
C. All materials are to come factory finished painted.

2.2 FIBER CEMENT – VERTICAL PANEL SIDING

A. Fiber Cement Panel Siding:
    a. Type A, Grade II, ASTM C1186.
    b. Non-combustible Material, ASTM E136.
    c. Flame Spread Index: 0, ASTM E84.
    d. Smoke Developed Index: <5, ASTM E84.
B. Vertical Siding Panel - Type: Owner to select from Manufacturer's samples.
C. Color: Provide material samples (not printed information) to the Owner for color selection. Manage all color selections in a color selections log.
D. Product:
    a. Basis-of-Design: Hardie Panel Siding.

b. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

2.2 FIBER CEMENT – HORIZONTAL LAP SIDING

A. Fiber Cement Horizontal Lap Siding:
   a. Type A, Grade II, ASTM C1186.
   b. Non-combustible Material, ASTM E136.
   c. Flame Spread Index: 0, ASTM E84.
   d. Smoke Developed Index: <5, ASTM E84.
B. Type: Owner to select from Manufacturer's samples
C. Color: Provide material samples (not printed information) to the Owner for color selection. Manage all color selections in a color selections log.
D. Product:
   a. Basis-of-Design: HardiePlank.
   b. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

2.4 FIBER CEMENT NON-VENTED SOFFIT PANELS

A. Type A, Grade II, ASTM C1186.
B. Non-combustible Material, ASTM E136.
C. Flame Spread Index: 0, ASTM E84.
D. Smoke Developed Index: <5, ASTM E84.
E. Thickness: 1/4-inch (6 mm).
F. Type: Owner to select from Manufacturer's samples
G. Color: Provide material samples (not printed information) to the Owner for color selection. Manage all color selections in a color selections log.
H. Product:
   a. Basis-of-Design: HardiePlank.
   b. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

2.5 FIBER CEMENT VENTED SOFFIT PANELS

A. Type A, Grade II, ASTM C1186.
B. Non-combustible Material, ASTM E136.
C. Flame Spread Index: 0, ASTM E84.
D. Smoke Developed Index: <5, ASTM E84.
E. Net Free Ventilation: 5-square inches per linear foot (10583 sq. mm per linear meter).
F. Thickness: 1/4-inch (6 mm).
G. Type: Owner to select from Manufacturer's samples.
H. Color: Provide material samples (not printed information) to the Owner for color selection. Manage all color selections in a color selections log.
I. Product:
   a. Basis-of-Design: HardiePlank.

b. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

2.7 ACCESSORIES

A. HardieTrim Trim Boards. (Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.)
   a. Type A, Grade I, ASTM C1186.
   b. Flame Spread Index: 0, ASTM E84.
   c. Smoke Developed Index: <5, ASTM E84.
   d. Batten Board: 2-1/2 inch (63 mm) width.
   e. Color: Provide material samples (not printed information) to the Owner for color selection. Manage all color selections in a color selections log.
   f. Length: 12-feet (3658 mm).

B. Seam Tape: HardieWrap. (Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.)
C. Flashing:
   a. HardieWrap Flashing Tape or approved equal.
   b. HardieWrap Flex Flashing Tape or approved equal.
D. Fasteners:
   a. Wood Framing Fasteners: Stainless Steel ring shanked nails.

2.8 FINISHES

A. Factory Primer: Provide factory applied universal primer.
   a. Primer: Factory primed by manufacturer.
B. Factory Finish: Manage color selections with the Owner and provide all material factory finished.
   a. Factory applied finish is finish applied by the same company and in the same facility that manufactures the siding substrate.
   b. Require factory applied finish by fiber cement manufacturer applied in controlled environment within manufacturer's facility utilizing multi-coat, heat cured finish within one manufacturing process.
   c. Each finish color to have documented color match to Delta E of 0.5 or better between product lines, manufacturing lots, or production runs as measured by photospectrometer and verified by third party.
   d. Provide factory applied finish protection prior to transit to site. Remove finish protection after installation.
   e. Accessories: Provide complete finishing system including pre-packaged touch-up kit provided by manufacturer.
   f. Provide quantities as recommended by manufacturer.
C. Attic Stock: Provide the Owner with a minimum of 1-gallon unopened of factory paint finish in each color selected.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. Examine substrate, clean and repair to eliminate conditions detrimental to installation.
C. Do not commence with the Work until unacceptable conditions are remedied.
D. Verify that weather barrier is installed over substrate and ready to receive the Work.
E. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation prior to commencement of Work.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using methods recommended by manufacturer's written requirements.
C. Protect surrounding work areas and surface during installation.
D. Repair punctures or tears in weather barrier prior to installation of siding.

3.3 WEATHER BARRIER

A. Provide air-moisture weather barrier installed with penetration and junction flashing in accordance with manufacturer's written requirements, codes, and the Authorities Having Jurisdiction.

3.4 INSTALLATION – PANEL SIDING

A. Install in strict accordance with manufacturer's written installation instructions at locations shown on Drawings.
B. General:
    a. Protect siding from Work of other trades.
    b. Surfaces to be dry prior to installation of weather barriers and siding.
    c. Reference trim details on Drawings.
    d. Touch-up paint cut edges prior to installation.
C. Flashing:
    a. Install above door and window trim and casings.
    b. Install above horizontal trim in field of siding.
    c. Install around all louvers, electrical devices and wall penetrations.

3.5 INSTALLATION OF SOFFIT AND VENTED PANELS

A. Install in strict accordance with manufacturer's written installation.
B. Panels may be installed as soffit or ceiling over wood or steel framing.
C. Provide additional framing as necessary to ensure proper fastening of siding.

3.6 INSTALLATION OF TRIM BOARDS

A. Install in strict accordance with manufacturer's written installation instructions.
B. Install flashing around all wall openings.

3.7 FINISHING

A. Finish in accordance with paint manufacturer's written application instructions.
B. Finish unprimed siding with a minimum of one coat of manufacturer approved primer and one coat of 100 percent **latex** exterior grade topcoat or two coats of manufacturer approved high quality alkali resistant 100 percent **latex** exterior grade topcoat within 90-days of installation.
C. Finish factory primed siding with a minimum of one coat of manufacturer approved high-quality 100 percent **latex** exterior grade paint within 180-days of installation.

3.8 CLEANING

A. See Section 01700, Project Closeout.
B. Clean siding in accordance with manufacturer's written instructions using materials and methods acceptable to manufacturer.

3.9 PROTECTION

A. Protect installed products until date of Substantial Completion.
B. Touch-up, repair or replace damaged areas prior to date of Substantial Completion.

END OF SECTION

SECTION 07620 – SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including the Conditions of the Contract and Division 01 Specification Sections apply to this section.

1.2 SUMMARY

A. Provide all labor, equipment, and materials to fabricate and install the following.

1. Edge strip and flashing.
2. Expansion joint and area divider covers.
3. Copings, fascia, trim and edge metal.
4. Gutters and downspouts.

B. It shall be the Contractor's responsibility to respond immediately to correction of roof leakage during construction. A four (4) hour time limit shall be given from the time of notification of emergency conditions. In the event of water penetration during rain or a storm, the Contractor shall provide for repair of the building contents and interior including, but not limited to, all interior contents, furnishings, equipment, building systems and finishes. If the Contractor does not respond or cannot be contacted, the Owner will affect repairs or emergency action and the Contractor shall be back charged for all expenses and damages.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc-Iron Alloy-Coated (galvannealed) by the Hot-Dip Process.
2. ASTM A792 Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip Process.
3. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
4. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
5. ASTM D692 Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.

B. Warnock Hersey International, Inc., Middleton, WI (WH)

C. Factory Mutual Research Corporation (FMRC)

D. Underwriters Laboratories (UL)

E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

1. Architectural Sheet Metal Manual

F. National Roofing Contractors Association (NRCA).

1. Roofing and Waterproofing Manual

G. Single Ply Roofing Institute (SPRI).

1. Wind Design Guide for Use with Low Slope Roofing

1.4 SUBMITTALS FOR REVIEW

A. Product Data:

1. Provide manufacturer's specification data sheets for each product.
2. Metal material characteristics and installation recommendations.
3. Submit color chart prior to material ordering and/or fabrication so that equivalent colors to those specified can be approved.

B. Samples: Submit two (2) samples, illustrating typical metal edge, coping, gutters, fascia extenders for material and finish.

C. Shop Drawings:

1. For manufactured and shop fabricated gravel stops, fascia, scuppers, and all other sheet metal fabrications.
2. Indicate material profile, jointing pattern, jointing details, fastening methods, flashing, terminations, and installation details.
3. Indicate type, gauge and finish of metal.

D. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner.

1.5 SUBMITTALS FOR INFORMATION

A. Design and Test Reports: Provide the following certified test reports from an independent testing laboratory:

1. Independent laboratory testing report for system design load and seam integrity.
2. Professional engineer's documentation that system incorporates sufficient allowance for stress and movement.
3. A letter from an officer of the manufacturing company certifying that the materials furnished for this project are the same as represented in tests and supporting data.
4. Manufacturer's verifications that the panels are factory roll-formed.
5. UL 1897: Test report must be submitted for windstorm rating no less than that specified in Design and Performance Criteria article. The proposed roof system must have approval over specified substrate with steel framing spaced no further apart than as specified.

B. Mill production reports certifying that the steel thicknesses are within allowable tolerances of the nominal or minimum thickness or gauge specified.

C. Qualification Data for Installer. Refer to Quality Assurance Article below.

D. Certification of work progress inspection. Refer to Quality Assurance Article below.

E. Certifications:

1. Submit roof manufacturer's certification that metal fasteners furnished are acceptable to roof manufacturer.
2. Submit roof manufacturer's certification that metal furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

1.6 CONTRACT CLOSEOUT SUBMITTALS

A. General: Comply with Requirements of Section 01700 – Contract Closeout.

B. Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.

C. Roofing Maintenance Instructions. Provide a manual of manufacturer's recommendations for maintenance of installed roofing systems.

D. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.7 QUALITY ASSURANCE

A. Engage an experienced roofing contractor specializing in sheet metal flashing work with a minimum of five (5) years' experience.

B. Maintain a full-time supervisor/foreman who is on the job-site at all times during installation. Foreman must have a minimum of five (5) years' experience with the installation of similar system to that specified.

C. Source Limitation: Obtain components from a single manufacturer. Secondary products which cannot be supplied by the specified manufacturer shall be approved in writing by the primary manufacturer prior to bidding.

D. Upon request fabricator/installer shall submit work experience and evidence of financial responsibility. The Owner's representative reserves the right to inspect fabrication facilities in determining qualifications.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.

B. Stack pre-formed and pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials which may cause discoloration or staining.

1.9 PROJECT CONDITIONS

A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for pre-formed metal edge system.

1.10 DESIGN AND PERFORMANCE CRITERIA

A. Thermal expansion and contraction:

1. Completed metal edge flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.

B. ANSI/SPRI ES-1 tested and approved.

1.11 WARRANTIES

A. Owner shall receive one (1) warranty from manufacturer of roofing materials covering all of the following criteria. Multiple warranties are not acceptable.

1. Pre-finished metal material shall require a written 20-year non-prorated warranty covering fade, chalking and film integrity. The material shall not show a color change greater than 5 NBS color units per ASTM D-2244 or chalking excess of 8 units per ASTM D-659. If either occurs material shall be replaced per warranty, at no cost to the Owner.
2. Changes: Changes or alterations in the edge metal system without prior written consent from the manufacturer shall render the system unacceptable for warranty(ies).
3. Warranty shall commence on date of substantial completion or final payment, whichever is agreed by contract.
4. The Contractor shall provide the Owner with a notarized written warranty assuring that all sheet metal work including caulking and fasteners to be watertight and secure for a period of two years from the date of final acceptance of the building. Warranty shall include all materials and workmanship required to repair any leaks that develop, and make good any damage to other work or equipment caused by such leaks or the repairs thereof.
5. Installing roofing contractor shall be responsible for the installation of the edge metal system in general accordance with the membrane manufacturer's recommendations.
6. Installing contractor shall certify that the edge metal system has been installed per the manufacturer's printed details and specifications.
7. One manufacturer shall provide a single warranty for all accessory metal for flashings, metal edges and copings, along with the warranty for metal roof areas, membrane roof areas, and any transitions between two different material types.

PART 2 PRODUCTS

2.1 PRODUCTS, GENERAL

A. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1.

B. Substitutions: Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

1. Proposals shall be accompanied by a copy of the manufacturer's standard specification section. That specification section shall be signed and sealed by a professional engineer licensed in the state in which the installation is to take place. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.
2. Include a list of three (3) projects of similar type and extent, located within a one-hundred-mile radius from the location of the project. In addition, the three projects must be at least five (5) years old and be available for inspection by the Architect, Owner or Owner's Representative.
3. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.
4. The Owner's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

2.2 ACCEPTABLE MANUFACTURERS

A. The design is based upon sheet metal flashing and trim systems engineered and manufactured by or approved equal:

1. Provide edge metal components manufactured by roofing system manufacturer.

2.3 MATERIALS

A. General: Product designations for the materials used in this section shall be based on performance characteristics of the R-MER Edge Coping and R-Mer Force Fascia Systems manufactured by the Garland Company, or approved equal and shall form the basis of the contract documents. Substitutions will be approved in accordance with Specification Section 01300.

B. Materials:

1. Exposed base metal material:

a. Exposed base metal material for copings, fascia, and trim components: Aluminum, ASTM B209, alloy 3105-H14, in thickness of .050" nom.

2. Unexposed base metal material:

   a. Flash-less Snap-On Fascia Extruded Base Anchor and Anchor Splice Plates: 6005A-T61 extruded aluminum

3. Components for Flashless metal edge system

   a. Compression Seal for top of anchor: TPE thermoplastic elastomer.
   b. Sealant for Flange: Single-component high performance 100% solids, interior and exterior polyether joint sealant

4. Minimum gauge of aluminum to be .050 minimum and as specified in accordance with Architectural Sheet Metal Manual, Sheet Metal and Air Conditioning Contractor's National Association, Inc. recommendations.

C. Coping

1. Cover and Splice Plate: .050" aluminum with concealed 6 inch splice plates.
2. Anchor Chair: 16 gauge G-90 galvanized steel.
3. ANSI/SPRI ES-1 approved.
4. FM certified assemblies.

D. Scuppers and Downspouts

1. All exposed collector boxes and downspouts to be post painted, color to match perimeter edge metal or as selected by architect.
2. Scupper collector boxes minimum .063 aluminum. All joints welded.
3. Downspouts to be 4"x 4" x .125 extruded aluminum.
4. Through-wall scupper sleeves shall be 16 oz lead coated copper, with integral flashing flange, fabricated to fit contour and profile of roof/wall at location of scupper opening. All joints shall be fully soldered or welded.

E. Gutters: Field roll formed in continuous lengths between downspout locations.

1. Aluminum, ASTM B209, alloy 3105-H14, in thickness of .050" nom.
2. Gutter Straps: 0.125" nom.
3. Gutter Hangers: 0.25" nom.
4. Sealant: Single component 100% solids polyether joint sealant.

F. Finishes:

1. Exposed surfaces for coated panels:

   a. Steel Finishes: fluorocarbon finish. Epoxy primer baked both sides, .2-.25 mils thickness as approved by finish coat manufacturer. Weathering finish as referred by National Coil Coaters Association (NCCA).

Property	Test Method	Fluorocarbon*
Pencil Hardness	ASTM D-3363 NCAA II-2	HB-H
Bend	ASTM D-4145	O-T NCAA II-19
Cross- Hatch	ASTM D-3359	no loss of adhesion
Gloss (60° angle)	ASTM D-523	25+/-5%
Reverse Impact	ASTM D-2794	no cracking or loss of adhesion
Nominal Thickness primer 0.2 mils topcoat 0.8 mils TOTAL 1.0 mils	ASTM D-1005	

*Subject to minimum quantity requirements

b. Include optional Aluminum Anodized finish for all exposed metal to match existing finishes.

c. Finish color to be selected by Owner from Manufacturer's full range of standard and premium color options.

2. Exposed and unexposed surfaces for mill finish flashing, fascia, and coping cap, shall be as shipped from the mill.

2.4 RELATED MATERIALS AND ACCESSORIES

A. Metal Primer: Zinc chromate type.

B. Plastic Cement: ASTM D 4586

C. Sealant: Specified in Section 07920 or on drawings.

D. Underlayment: ASTM D2178, No15 asphalt saturated roofing felt.

E. Fasteners:

1. Corrosion resistant screw fastener as recommended by metal manufacturer. Finish exposed fasteners same as flashing metal.
2. Fastening shall conform to Factory Mutual 1-90 requirements or as stated on section details, whichever is more stringent.

F. Downspout are to be 4" x 4" x 1/8" aluminum with welded joints and miters post painted to match the perimeter edge metal or a color selected from the standard color chart.

G. Downspout Anchorage Devices. See drawings for location of attachment (spaced at 6' on center maximum) and material type.

H. Metal trim for miscellaneous detailing .050 mill finished aluminum or kynar or approved equal finished to match selected coping, gutter, or edge metal colors.

I. Scupper boxes are to be welded and post painted.

J. Expansion joints: .050 aluminum steel sheet metal formed to allow for expansion as shown on drawings or approved equal. Ends to be closed and sloped to meet perimeter metal.

PART 3 - EXECUTION

3.1 EXECUTION, GENERAL

A. Refer to Division 07 Section Common Work Results for Thermal and Moisture Protection.

3.2 PROTECTION

A. Isolate metal products from dissimilar metals, masonry or concrete with bituminous paint, tape, or slip sheet. Use gasketed fasteners where required to prevent corrosive reactions.

3.3 GENERAL

A. Secure fascia to wood nailers at the bottom edge with a continuous cleat.

B. Fastening of metal to walls and wood blocking shall comply with SMACNA Architectural Sheet Metal Manual, and manufacturer's recommendations whichever is the most stringent standard.

C. All accessories or other items essential to the completeness of sheet metal installation, whether specifically indicated or not, shall be provided and of the same material as item to which applied.

D. Allow sufficient clearances for expansion and contraction of linear metal components.

E. Secure metal using fasteners as required by the system. Exposed face fastening will be rejected.

3.4 INSPECTION

A. Verify that curbs are solidly set and nailing strips located.

B. Perform field measurements prior to fabrication.

C. Coordinate work with work of other trades.

D. Verify that substrate is dry, clean and free of foreign matter.

E. Commencement of installation shall be considered acceptance of existing conditions.

3.5 MANUFACTURED SHEET METAL SYSTEMS

A. Furnish and install manufactured fascia, fascia extender and coping cap systems in strict accordance with manufacturer's printed instructions.

B. Provide factory-fabricated accessories including, but not limited to, fascia extenders, miters, scuppers, joint covers, etc. Refer to Source limitation provision in Part 1.

3.6 SHOP-FABRICATED SHEET METAL (ACCESSORY TRIM)

A. Metal work shall be shop fabricated to configurations and forms in accordance with recognized sheet metal practices. Fabricate scuppers as shown of drawing

B. Hem exposed edges.

C. Angle bottom edges of exposed vertical surfaces to form drip.

D. Lap corners with adjoining pieces fastened and set in sealant.

E. Install sheet metal to comply with referenced SMACNA and NRCA standards.

3.7 FLASHING MEMBRANE INSTALLATION

A. Through Wall Scupper

1. Install lead coated copper scupper box in a one-quarter (1/4) inch bed of mastic. Assure all box seams are soldered and have minimum four (4) inch flange. Make sure all corners are closed and soldered.
2. Prime metal edge at a rate of one-hundred (100) square feet per gallon and allow to dry.
3. Fabricate scupper cover to wrap new lead coated copper scupper boxes on the outside. See detail for exact requirements

B. Flash-less Snap-On Fascia Detail with Extruded Aluminum Base Anchor

1. Position base ply of the Modified Roofing membrane over the roof edge covering nailers completely, fastening eight (8) inches on center. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations. Cap sheet shall stop at the edge of the roof and shall not turn over the edge of the nailer.
2. Prior to installing the base anchor, assure a level plane is present. If not, shim the roof edge surface as required.
3. Extruded base anchor: Apply two 1/4" beads of Green-Lock Sealant XL or approved equal on the bottom surface of the top flange of the extruded anchor.
4. Set the extruded anchor on the edge and face fasten through pre-punched slots every 18 inches o.c. for 5.75 inch face fascia, and 18 inches o.c. staggered for any fascia size greater than 5.75 inches. Begin fastening 6 inches from ends.
5. Install Green-Lock Sealant XL or approved equal at the ends of the base frame to prevent water from running between base anchor joints.

6. Install compression seals every 40 inches on center in the slots located at the top of the extruded anchor.
7. Install fascia cover setting the top flange over the top flange and compression seals of the base anchor. Assure compression seals are in place during this process. Beginning on one end and working towards the opposite end, press downward firmly (do not rotate) until "snap" occurs and cover is engaged along entire length of miter.
8. Install splice plate at each end of the base anchor and fascia cover prior to the installation of the next adjacent ten-foot piece.

C. Slip Flashing / Counterflashing Detail
1. Install new slip flashing under existing metal and terminate with fasteners 8" on center incorporating neoprene washers.
2. All slip flashing shall be fabricated to mirror the substrate to which they are attached and include a hemmed drip edge.
3. Install new stainless-steel counterflashing manufactured for use in the existing reglet and snap into place

D. Pitch Pocket
1. All pitch pockets are to be fabricated a minimum of 4" high and shall be fabricated from 16 oz. copper, lead coated copper or stainless. All pitch pockets shall have closed corners and be soldered. Field soldering is required for the fourth corner.

E. Coping Detail
1. Install miters first.
2. Position base flashing of the Built-Up and/or Modified Roofing membrane over the wall edge covering nailers completely, fastening eight (8) inches on center. Install membrane and cap sheet with proper material and procedure according to manufacturers' recommendations.
3. Install minimum twelve (12) inch wide anchor chair at 30" on center.
4. Install 8" wide splice plate by centering over 12" wide anchor chair. Apply two beads of sealant to either side of the splice plate's center. Approximately 2" in from the coping cap joint. Install Coping Cap by hooking outside hem of coping on outside face of anchor chair. Press downward on inside edge of coping until "snap" occurs and hem is engaged on the entire chair.

F. Gutters & Downspouts
1. Gutter material: .050" aluminum, color to match copings and fascia
2. Gutters are to be continuous length
3. Gutter brackets are to be a minimum 3/16" x 1" aluminum.
4. Gutters are to be supported by brackets spaced 36" on center. Gutters shall be further supported by spacers every 36" and spaced alternately with the brackets
5. 4' x 4" x 1/8" aluminum downspouts welded and post painted are to be attached to the structure a minimum of 6' on center or as detailed on the drawings
6. Drip edge to be .050 aluminum, kynar (or approved equal) finished matching color, to be set in a bed of asphalt roof cement and nailed every 6" on center in two rows, staggered "W" pattern. Prime flange with specified asphalt primer. Strip in flange with modified base flashing ply and modified cap sheet, set in specified adhesive.

3.8 CLEANING

A. Clean installed work in accordance with the manufacturer's instructions.

B. Replace damaged work than cannot be restored by normal cleaning methods.

3.9 CONSTRUCTION WASTE MANAGEMENT

A. Remove and properly dispose of waste products generated. Comply with requirements of authorities having jurisdiction

3.10 FINAL INSPECTION

A. The Contractor shall inspect the work and flashing of roof penetrations, walls, curbs and other equipment. The Contractor shall provide a list all items requiring correction or completion and furnish copy of list to the Construction Manager and the Architect.

B. The Contractor shall repair or replace deteriorated or defective work found at the time of the above inspection as required to a produce an installation which is free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

C. The Contractor shall notify the Architect and Construction Manager upon completion of corrections.

D. Following the final inspection, the Contractor shall provide written notice of acceptance of the installation from the roofing system manufacturer with its Project Closeout documents.

3.11 DEMONSTRATION AND TRAINING

A. At a time and date agreed to by the Owner, instruct the Owner's facility manager, or other representative designated by the Owner, on the following procedures:

1. Troubleshooting procedures.
2. Notification procedures for reporting leaks or other apparent roofing problems.
3. Maintenance.
4. The Owner's obligations for maintaining the warranty in effect and force.
5. The Manufacturer's obligations for maintaining the warranty in effect and force.

END OF SECTION

SECTION 07842 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes fire-resistive joint systems for the following:

1. Floor-to-floor joints.
2. Floor-to-wall joints.
3. Head-of-wall joints.
4. Wall-to-wall joints.
5. Perimeter fire-resistive joint systems consisting of floor-to-wall joints between perimeter edge of fire-resistance-rated floor assemblies and exterior curtain walls.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed.

B. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join, and with movement capabilities and L-ratings indicated as determined by UL 2079.

1. Load-bearing capabilities as determined by evaluation during the time of test.

C. Perimeter Fire-Resistive Joint Systems: For joints between edges of fire-resistance-rated floor assemblies and exterior curtain walls, provide systems of type and with ratings indicated below and those indicated in the Fire-Resistive Joint System Schedule at the end of Part 3, as determined by NFPA 285 and UL 2079.

1. UL-Listed, Perimeter Fire-Containment Systems: Integrity ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.
2. OPL-Listed, Perimeter Fire-Barrier Systems: F-ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.

D. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: For each fire-resistive joint system.

C. Qualification Data: For Installer.

D. Field quality-control test reports.

E. Evaluation Reports: Evidence of fire-resistive joint systems' compliance with ICBO ES AC30, from the ICBO Evaluation Service.

F. Research/Evaluation Reports: For each type of fire-resistive joint system.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.

C. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.
2. Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:

a) Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
b) Fire-resistive joint systems correspond to those indicated by referencing system designations of the qualified testing and inspecting agency.

D. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

E. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, fire-resistive joint systems that may be incorporated into the Work include, but are not limited to, those systems indicated in the Fire-Resistive Joint System Schedule at the end of Part 3.

B. Products: Subject to compliance with requirements, provide one of the fire-resistive joint systems indicated for each application in the Fire-Resistive Joint System Schedule at the end of Part 3.

2.2 FIRE-RESISTIVE JOINT SYSTEMS

A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.

B. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.

B. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect fire-resistive joint systems and prepare inspection reports.

B. Testing Services: Inspecting of completed installations of fire-resistive joint systems shall take place in successive stages as installation of fire-resistive joint systems proceeds. Do not proceed with installation of joint systems for the next area until inspecting agency determines completed work shows compliance with requirements.

1. Inspecting agency shall state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.

C. Remove and replace fire-resistive joint systems where inspections indicate that they do not comply with specified requirements.

D. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and fire-resistive joint systems comply with requirements.

3.3 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

A. Designation System for Joints in or between Fire-Resistance-Rated Constructions: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHBN.

B. Designation System for Joints at the Intersection of Fire-Resistance-Rated Floor or Floor/Ceiling Assembly and an Exterior Curtain-Wall Assembly: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHDG:

C. Floor-to-Floor Fire-Resistive Joint Systems FRJS-<#>:

1. UL-Classified Systems: FF-D-1005
2. Assembly Rating: 1 hour.
3. Nominal Joint Width: As indicated.
4. Movement Capabilities: Class III - 30 percent compression or extension.
5. L-Rating at 400 deg F (204 deg C): Less than 3.0 cfm/lin. ft. (0.01524 cu. m/s x sq. m).

D. Floor-to-Wall Fire-Resistive Joint Systems FRJS-<#>:

1. Available UL-Classified Systems: FW-D-1001.
2. Assembly Rating: 1 hour.
3. Nominal Joint Width: As indicated.
4. Movement Capabilities: Class III - 30 percent compression or extension.
5. L-Rating at 400 deg F (204 deg C): Less than 1 cfm/lin. ft.

E. Head-of-Wall Fire-Resistive Joint Systems FRJS-<#>:

1. Available UL-Classified Systems: HW-D-0028, HW-D-0038, HW-D-0039.
2. Assembly Rating: 1 hour and 2 hours.
3. Nominal Joint Width: As indicated 3/4" ~ 1".
4. Movement Capabilities: Class III - 33 and 18 percent compression or extension.

F. Wall-to-Wall Fire-Resistive Joint Systems FRJS-<#>:

1. Available UL-Classified Systems: WW-D-1015.
2. Assembly Rating: 1 hour and 2 hours.
3. Nominal Joint Width: As indicated.
4. Movement Capabilities: Class III - 12.5 percent compression or extension.

G. Perimeter Fire-Resistive Joint Systems PFRJS-<#>:

1. Available UL-Classified Perimeter Fire-Containment Systems: CW-S-1001, CW-S-2001.
   a) Integrity Rating: 1 hour.
   b) Insulation Rating: 1 hour.
   c) Linear Opening Width: As indicated.
   d) Movement Capabilities: Class III compression or extension.

END OF SECTION 07842

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:

1. Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
2. Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1.2 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Preconstruction field test reports.

D. Compatibility and adhesion test reports.

E. Product test reports.

1.4 QUALITY ASSURANCE

A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint-sealant manufacturers for testing according to manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates according to the method in ASTM C 1193 that is appropriate for the types of Project joints.

C. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:

1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.
2. All test samples shall be approved and accepted by the Owner, Architect, Construction Manager and Manufacturer's field inspection personnel. Coordinate work and testing schedule with Manufacturer's field inspection personnel.

1.5 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Installers five (5) year workmanship warranty from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Twenty (20) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles or approved equal.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. Colors of Exposed Joint Sealants: As selected by Owner from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.

D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

E. Single-Component Neutral-Curing Silicone Sealant for all exterior and interior joints application except as listed for other applications:

1. Products:
   a. Dow Corning Corporation; 790.
   b. Tremco; Spectrem 1 (Basic).
   c. Or approved equal.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 100/50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
7. Paintable surface.

F. Single-Component Neutral-Curing Silicone Sealant for structural glazing and aluminum framing:

1. Products:
   a. Dow Corning Corporation; 795.
   b. Tremco; Spectrem 2
   c. Or approved equal.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 50.

4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
6. Paintable surface.

G. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant for all interior wet areas including all ceramic tiles:

1. Products:
   a. Pecora Corporation; 898.
   b. Tremco; Tremsil 200 White.
   c. Or approved equal.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

H. Concrete plank floor joists. Provide Sikaflex – 1A Elastomeric Joint Sealant or approved equal.

2.4 ACOUSTICAL JOINT SEALANTS – For all interior paintable gypsum / wood joints.

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products:
   a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
   b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
   c. or approved equal.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission for concealed gypsum / wood joints.

1. Products:
   a. Pecora Corporation; BA-98.
   b. Tremco; Tremco Acoustical Sealant.
   c. or approved equal.

2.5 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are

approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.
   a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.

2. Remove laitance and form-release agents from concrete.
   a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
4. Complete sealant all the way of the full joint length, everywhere.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth,

uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

G. Installation of Preformed Silicone-Sealant System: Comply with manufacturer's written instructions.

H. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

I. Conditions that should be avoided when working with Silicone Building Sealant:

1. **DO NOT** "wet tool" with solvents or soaps as this can inhibit the surface of this sealant, the rest of the sealant bulk may cure normally but the surface will remain tacky and gummy indefinitely.
2. **DO NOT** apply this sealant to a backer rod that is contaminated with solvent or primer.
3. **DO NOT** apply this sealant to a surface that has been cleaned with a solvent or primer.
4. **DO NOT** apply this sealant to EPOXY containing surfaces (unless they have been tested by The Americas Construction Test Lab) since they can inhibit the cure.

J. Do not use silicone sealant for:

1. Below-grade applications.
2. Surfaces to be immersed in water for prolonged time.
3. Brass and copper surfaces.
4. Materials bleeding oils, plasticizers, and solvents.
5. Structural glazing and adhesive.
6. Surfaces to be painted.
7. Surfaces in direct contact with food.
8. Medical and pharmaceutical applications.

K. Do not apply in totally confined spaces without ventilation for curing.

END OF SECTION 07920

SECTION 08100 – FRP FIBERGLASS DOORS (WIDE STILE)

PART 1 - GENERAL

1.1 GENERAL DESCRIPTION

A. WORK INCLUDED: The fiberglass doors and aluminum sub-frames required for this work are indicated on the drawings and include, but is not necessarily limited to:

1. The installation of new opening systems that include aluminum sub-frames, fiberglass doors, fiberglass panels, door hardware and glass.
2. Only wide stile fiberglass doors are to be used.

1.2 QUALITY ASSURANCE

A. MANUFACTURER'S CERTIFICATION: Manufacturer is to have a minimum of five (5) years of experience in the production of pre-installed hardware and pre-assembled door systems, using the type of materials specified for this project.

B. DISSIMILAR METALS: Wherever aluminum is in contact with steel, concrete or other materials potentially creative of electrolytic action, provide all required permanent isolation of the aluminum by back painting with first-quality bituminous paint.

C. INSTALLER'S QUALIFICATIONS: For the installation of the entrance systems, use only mechanics who are thoroughly trained and experienced in the skills required and who are completely familiar with the manufacturer's recommended methods of installation plus the requirements of this work.

D. WARRANTY:

1. System manufacturer will guarantee THE ENTIRE SYSTEM FOR A PERIOD OF 10 YEARS.
2. The Fiberglass doors are guaranteed for 10 YEARS AGAINST CORE RELATED PRODUCT FAILURE.
3. Warranties are to be in writing and MUST be submitted before final invoices for payment will be reviewed.

1.3 TESTING AND PERFORMANCE REQUIREMENTS

A. Entrance systems to be supplied and installed that will comply with requirements for system performance characteristics as determined by the testing methods listed.

B. Copies of recent test reports must accompany the Product Data Submittal package, the reports required for this project are as follows:

1. Thermal Performance Test
2. Structural Performance Test
3. FRP Face Sheet Test

C. Thermal Performance for complete Door and Frame Entry System:

1. Thermal Transmission: U-value of not more than 0.28,BTU/HR-FT-F per AAMA 1503.1-1988.
2. Air Infiltration: Not more than 0.26 CFM/FT, per ASTM E283-91.

D. FRP FACE SHEETS AND CORE PERFORMANCE:

1. Materials to be tested in accordance with (per ASTM E84) Ratings will be as follows: (per ASTM E84-79a)

	FLAME SPREAD	SMOKE DEVELOPED
FRP EXTERIOR (Class C)	145	345
FRP INTERIOR (Class A)	10	320
POLYSTYRENE CORE	15	125

2. IMPACT STRENGTH OF FRP Face Sheets-per ASTM D256-Izod Impact Strength, Maintains 95% of physical Flexural Strength after 30 months of outdoor exposure. 13.5
3. Barcol Meter Hardness test on FRP Face Sheets-not more than 50, per ASTM D2583.
4. COLOR RETENTION of FRP Face Sheets-Color will not change more than 5.0 DE units after exposure to 500,000 Langleys.

1.4 SUBMITTALS

A. PRODUCT DATA:

1. Submit manufacturer’s technical data for each type stile classification of door. Include all frame sections, elevations and details.
2. Include details of: Main frame corner joint construction on doors, stile and rail size, core material, vision lite moldings, louvers and factory finishing specifications.
3. Submit two samples of each door stile classification that shows rails, stiles, core, joint construction, edge trim and closer reinforcing for color section if requested by the Construction Manager or Owner.
4. Submit small samples of the FRP face sheets for color section.

B. TEST REPORTS: Provide the current test reports with the shop drawing submittal.

C. SHOP DRAWINGS: Submit signed and sealed shop drawings and calculations by a NJ registered professional engineer for the fabrication and installation of the Doors and Frames, and associated components of the work. Include wall elevations and detail sections of every typical composite member. Show frame anchoring, frame repairs to existing frames, glazing details, interior and exterior wall repairs and any other component or accessory required to complete each door opening.

SECTION 08100 – FRP FIBERGLASS DOORS (WIDE STILE)

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. IDENTIFICATION: Each door and frame will be tagged with a mark or number which correlates with the designation system used for shop drawings.

B. PROTECTION: All materials will be protected during transit and storage from soiling and deterioration.

PART 2 – PRODUCTS

2.1 MANUFACTURERS:

A. ACCEPTABLE MANUFACTURERS: The products outlined in this specification are not the exclusive property of any one manufacturer. However, it should be noted that the manufacturers listed in this specification will have to make some modifications to their standard products, and, that new dies and designs may be required to adhere to the demands of this specification.

B. Products are to be from FRP Architectural Doors, Inc Series Heavy Wall FD55 or Glass Enterprises GEF50 or approved equal. FRP doors must incorporate Kemlite RFP face sheet with extended U/V protection or approved equal.

2.2 MATERIALS

A. ALUMINUM MEMBERS:

1. Doors, sub-frames, miscellaneous components and entrance systems accessories are to be **by the same manufacturer**.

2. Provide alloy and temper as recommended for resistance to corrosion and color control. Aluminum member references are ASTM B 221 for extrusions and ASTM B 209 for sheets.

2.3 ALUMINUM FRAMES & CLADDING:

A. Structural Main Frame – doors have an aluminum main frame constructed from extruded aluminum 6063-T6 alloy. Doors are 1-3/4” thick. Main frame tube is to be a single extruded unit measuring 1-1/2” x 5-1/2” on both stiles, with a 6” top rail, and a 2-1/2” bottom rail.

B. Main Frame wall thickness:

1. Side Stiles – Minimum 3/16” thick hinge edge wall.
2. Top and Bottom Rails – Minimum 1/8” thick outside edge wall.
3. All Rails and Stiles – Minimum 1/8” thick face walls.
4. All Rails and Stiles – Minimum 1/8” thick inside edge wall.

C. Main Frame Joinery – Assembly for the meeting joints of the rails and stiles on the main frame are to be Mortise and Tenon on all four joints.

D. Face Sheets – face sheets will be fiberglass reinforced with extended U.V. protection, polymer, .120" thick, and have a pebble like embossed finish manufactured by Kemlite or approved equal.

E. Core Material – Insulated 5 lb. Urethane Injection Core with the option of 25 psi Polystyrene Core.

F. Interloc Edge Trim – all aluminum trim is completely removable. All parts of the door are replaceable and repairable in the field. No fastening devices are exposed on the stile edge trims.

G. Hardware Reinforcing – Closer reinforcing is built in to the 6" Header. Other surface applied hardware is reinforced with the standard 5-1/2" main frame tube with a wall thickness of 1/8". Reinforcing for mortise and concealed hardware is to be done per template requirements.

H. Weatherstripping – Center stiles of pairs will have pile weatherstripping .5" backing width and .5" pile height.

I. Vision Lites – Trim moldings will be aluminum extrusion – 6063-T5 alloy and removable from the inside only. Door vision lites will be factory glazed for ¼" or 1" thick glass as per the construction documents. Lite kits are by Glass Enterprises Inc. or approved equal.

J. Recessed Flush Pulls – Pull handle is 6" x 7-1/2" x 1-9/16" manufactured from all extruded aluminum 6063-T6 alloy. Unit is welded together. Pull will be finished to match door edge trim or as specified. Pull is to be secured to main frame of door without any of the fastening devices exposed to the fingers when hand is inserted into pull to open door. Pull is to be supplied and installed at the factory by Glass Enterprises Inc. or approved equal. All necessary reinforcements and modifications to door for receiving the recessed flush pull is to be done in the factory.

2.4 FIBERGLASS (FRP) FACE SHEETS

A. THICKNESS AND COLOR:

1. FRP face sheets will be .120 minimum thickness with a pebble-like surface with aluminum or galvanized steel backing sheet to meet current IBC code requirements. Face sheets shall be manufactured by Kemlite with extended UV protection or approved equal.
2. COLOR shall be selected from the full range of available manufacturer's options.

2.5 FIBERGLASS (FRP) PANELS

A. ALUMINUM EDGED FIBERGLASS (FRP) PANELS:

1. CONSTRUCTION: Panels will be constructed of two sheets of .120 fiberglass sheets bonded to ¾” core material. Panel thickness will be 1-3/4". A 1-3/4" x 2" x 1/8" wall thickness aluminum frame surrounds the perimeter of the panel. WOOD EDGED PANELS WILL NOT BE ACCEPTED.
2. CORE MATERIAL: Core Insulation will be high density expanded polystyrene. Core to have compressive strength ASTM D1621 - 25psi density with a nominal R-Value of 6.5. Core material must have a proven record for use in door fabrication without delaminating. Fill all openings, including frames. POLYSTYRENE CORES ARE REQUIRED.
3. COLOR shall be selected from the full range of available manufacturer’s options.
4. FIXED FRP PANEL: Panel will be two sheets of .120 fiberglass sheets bonded to 3/4" core material. Panel thickness shall be 1".

PART 3 – EXECUTION

3.0 EXECUTION AND INSTALLATION

A. SIZES AND PROFILES: the sizes for door and frame units and profile requirements as listed or shown in these Specifications are approximate. All bidders are responsible for visiting job site and measuring each tag for bidding purposes.

B. EXACT ORDER SIZES: ALL PROPER MEASURING AND ORDERING OF MATERIALS IS THE SOLE RESPONSIBILITY OF THE SUPPLIER/INSTALLER.

C. TOLERANCES between doors and frames are 1/8” around all sizes of single doors and 1/8” on hinge jambs and header with 3/16” in center of pairs, ¼” at threshold.

D. NOTIFY OWNER at least 48 hours before schedule date of installation for each opening and for each day of work.

E. PROVIDE barrier protection and warning signs around each opening before starting to work. This protection is for the people who may be using the building while the work is in progress.

F. COMPLY with all life safety code procedures that effect the use of the opening while work is being done. These procedures will be provided by an official of the building being worked on.

G. SET NEW THRESHOLDS in a bed of cement and press to a level line. However, never let threshold be raised more than an extra ½” on any one side.

H. PERIMETER CAULK new door frame on both sides of frame and with a matching color caulk to the finish of the frame.

I. INSTALLERS ARE TO CLEAN up every day leaving area in a safe and usable condition.

END OF SECTION 08100

SECTION 08110- STEEL DOORS AND FRAMES

1.1 GENERAL

A. Submit Product Data for each type of door and frame specified.

B. Quality Assurance: Comply with ANSI/SDI 100.

C. Fire-Rated Door Assemblies: NFPA 80, identical to assemblies tested per ASTM E 152, and labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

1. Amweld Building Products, Inc.
2. Benchmark Commercial Doors.
3. Ceco Door Products.
4. Copco Door Co.
5. Curries Co.
6. Deansteel Manufacturing Co.
7. Fenestra Corp.
8. Kewanee Corp.
9. Mesker Door, Inc.
10. Pioneer Industries.
11. Republic Builders Products.
12. Steelcraft.
13. Or approved equal.

B. Cold-Rolled Steel Sheets: ASTM A 366 (ASTM A 366M), commercial quality, or ASTM A 620 (ASTM A 620M), drawing quality.

C. Galvanized Steel Sheets: ASTM A 526 (ASTM A 526M), commercial quality, or ASTM A 642 (ASTM A 642M), drawing quality, with A 60 or G 60 (Z 180 or ZF 180) coating designation, mill phosphatized.

D. Steel Doors: Provide 1-3/4-inch- (44-mm-) thick doors of materials and ANSI/SDI 100 grades and models specified below, or as indicated on Drawings or schedules:

1. Interior Doors: Grade II, heavy-duty, Model 2, seamless design, minimum 16 gage thick cold-rolled steel sheet faces.
2. Exterior Doors: Grade III, extra heavy-duty, Model 2, seamless design, minimum 16 gage thick galvanized steel sheet faces with insulation core to have a minimum R Value of 11.25.
3. INTERIOR WOOD GRAINED EMBOSSED DOORS: Grade I, heavy-duty, Model 2, seamless design, minimum 16 gage thick, wood grain pattern, engraved with factory painting/staining with UV protective topcoat to be selected from manufacturer's full range of finish selections, including custom finish to match Owner's established building standard.

a. Light kits shall be Steelcraft "Dezigner" or approved equal trim flush lite kits, stained to match the door. VERY IMPORTANT: Contractor shall coordinate and order correct lite kit for specified glazing thickness.

E. Frames: Provide frames for doors, sidelights, borrowed lights, and other openings that comply with ANSI/SDI 100; fabricate to be rigid, neat in appearance, and free from defects, warp, or buckle.

1. For interior frames provide units with mitered or coped and continuously welded corners, formed from 16 gage thick cold-rolled steel.
2. For exterior frames provide units with mitered or coped and continuously welded corners, formed from 16 gage thick galvanized steel sheet.
3. Door Silencers: 3 on strike jambs of single-door frames and 2 on heads of double-door frames.
4. Plaster Guards: Provide where mortar might obstruct hardware operation and to close off interior of openings.
5. For new frame install in existing opening. Knock down frame is allowed to secure to existing opening.
6. Grout: As specified in Division 4 Section "Unit Masonry."

F. Tolerances: Comply with SDI 117.

G. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.

H. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to SDI 107 and the hardware specification.

I. Glazing Stops: Minimum 0.0359-inch- (0.9-mm-) thick steel or 0.040-inch- (1-mm-) thick aluminum.

1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
2. Provide screw-applied, removable, glazing beads on inside of glass, louvers, and other panels in doors.

J. Finishes, General: Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

1. Apply primers to doors and frames after fabrication.

K. Galvanized Steel Sheet Finishes: Comply with SDI 112 and the following:

1. Surface Preparation: Clean surfaces with nonpetroleum solvent so that surfaces are free of oil or other contaminants. After cleaning, apply a conversion coating of the type suited to the organic coating applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified to comply with ASTM A 780.
2. Galvanizing Repair Paint: SSPC-Paint 20, high-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight.

3. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply air-dried primer specified below immediately after cleaning and pretreatment.
   a. Shop Primer: Zinc-dust, zinc-oxide primer paint complying with performance requirements of FS TT-P-641, Type II.

4. Field Painted Finish: Immediately after cleaning and pretreating, apply 2-coat finish consisting of prime coat and finish coat. See Section 09900, "Painting."
   a. Color and Gloss: Match Architect's sample.

L. Steel Sheet Finishes: Comply with SSPC-PA 1, "Paint Application Specification No. 1."

1. Surface Preparation: Solvent-clean surfaces according to SSPC-SP 1. Remove mill scale and rust to comply with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).
2. Pretreatment: Immediately after surface preparation, apply a conversion coating suited to organic coating applied over it.
3. Factory Priming for Field-Painted Finish: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.

   a. Color and Gloss: Match Architect's sample.

1.3 EXECUTION

A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set.

1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.
2. Install at least 3 anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb.
3. In-place gypsum board partitions, install knock-down, slip-on, drywall frames.
4. Install fire-rated frames according to NFPA 80.
5. Coordinate installation of all required wiring/conduit prior to frame installation.

C. Door Installation: Fit exiting hollow-metal doors accurately in new hollow-metal frames, within clearances specified in ANSI/SDI 100, including new door in existing frame.

1. Fire-Rated Doors: Install with clearances specified in NFPA 80.
2. Smoke-Control Doors: Comply with NFPA 105.

D. Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

E. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

F. Labeling of the Existing Doors and Frames: The doors and frames indicated on the drawings are to remain and be repaired so that they may meet the label standard for the indicated fire rating per NFPA80. The work is to include the repair of existing hollow metal frames, fill holes in frames by installing steel plugs of the same gauge and thickness as the metal frame, provide new filler plates, secure frame to sub-frame, repair door surface, fill holes, replace hardware, replace glazing and glazing frame, fit existing door in frame, provide intumescent seal and all notes as shown on the drawings. The Contractor shall prime and repaint the entire frame to match the existing frames or the Owner's color selection. It is the Contractor s responsibility to repair / modify the doors and frames to obtain the fire rating. When the work is completed, the Contractor shall contact one of the following testing labs or approved equal, for field inspections, required documentation and required door/frame labels. All associated costs to certify and label modified doors/frames shall be paid for by the Contractor.

1. Guardian Fire Testing Laboratories, Inc.
2. Intertek Testing Services, NA, Inc.
3. Or approved equal.

END OF SECTION 08110

SECTION 08211 - FLUSH WOOD DOORS

1.1 GENERAL

A. Submittals: In addition to product data, submit the following:

1. Shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for veneer matching and factory finishing and other pertinent data. For factory-machined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light and louver openings.
2. Samples of actual materials in small sections for each face material and finish.

B. Quality Standard: Comply with the following standard:

1. NWWDA Quality Standard: I.S.1-A, "Architectural Wood Flush Doors," of the National Wood Window and Door Association.
2. AWI Quality Standard: "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute.

C. Fire-Rated Wood Doors: Provide wood doors labeled and listed by UL, Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction. Provide certification for fire rating required acceptable to authorized agencies having jurisdiction for oversize fire rated doors over 4'-0" wide

D. Warranty

1. Provide manufacturer's warranty to the following term:

a. Interior Solid Core Doors: "Full Life of Original Installation" including rehang and refinish if door(s) do not comply with Warranty tolerance standards.
2. Contractor's warranty: Provide a two (2) year warranty from the date of Substantial Completion to replace defective doors.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide doors by one of the following or approved equal:

1. Marshfield Door Systems, Inc., quality as defined in this section.
2. Algoma Wood Doors Inc., quality as defined in this section.
3. Eggers Wood Doors Inc., quality as defined in this section.
4. Mohawk Wood Doors Inc., quality as defined in this section.
5. V-T Industries Inc., quality as defined in this section.
6. Buell Door Company, quality as defined in this section.
7. Or approved equal.

B. Interior Solid Core Doors for Transparent Finish: As follows:
NOTE: ALL WOOD VENEER MUST APPEAR UNIFORM AND LIGHT IN APPEARANCE

1. Faces: Select White Birch, plain sliced.
2. Grade: "A" Select White ONLY
3. Construction: 5 plies.
4. Core: Structural composite lumber (engineered composite core)
5. Bonding: Stiles and rails bonded to core, then entire unit abrasive planed before veneering.

C. Interior Fire-Rated Solid Core Doors: As follows:

1. Faces and Grade: Provide faces and grade to match non-fire-rated doors in same area of building, unless otherwise indicated.
2. Edge Construction: Provide manufacturer's standard laminated-edge construction for improved screw-holding capability and split resistance.
3. Pairs: Furnish formed-steel edges and astragals for pairs of fire-rated doors, unless otherwise indicated.
4. Pairs: Provide fire-rated pairs with fire-retardant stiles that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.

D. Pairs and Sets: Provide pair matching and set matching.

E. Fabricate flush wood doors to comply with following requirements:

1. In sizes indicated for job-site fitting.
2. Factory fit doors to comply with clearance requirements of referenced quality standard. Comply with requirements of NFPA 80 for fire-resistance-rated doors.
3. Factory machine doors for hardware that is not surface applied.

    a. Metal Removable Mullions: Pre-machine locks and formed-steel edges for hardware for pairs of doors requiring removable mullions. See the Hardware Schedule.

4. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

    a. Light Openings: Trim openings with moldings of material and profile indicated. * To be selected from manufacturer's standard profiles and colors unless noted otherwise. At existing buildings, metal trim shall be required to match adjacent existing to remain.
    b. Louvers: Factory install louvers in prepared openings.

5. Provide metal flashing at top of out swinging units.

F. Finish wood doors at factory as factory finished.

1. Transparent Finish: Comply with requirements indicated for grade, finish system, staining effect, and sheen.

    a. Grade: Custom.

b. Finish: Manufacturer's standard finish with performance requirements comparable to either AWI System TR-2 catalyzed lacquer or AWI System TR-4 conversion varnish.
c. Staining: Match Architect's sample or existing buildings' wood doors.
d. Effect: Filled finish.
e. Sheen: Semigloss.

G. Provide soundproof seal as noted in the Hardware Schedule. Adjust Hardware and frame to align properly to have the best acoustical effect.

1.3 EXECUTION

A. Examination
1. Verify substrate-openings conditions.
2. Verify that opening sizes and tolerances are acceptable and ready to receive this work.
3. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

B. Installation
1. Install fire-rated and non-rated doors in accordance with NFPA 80, manufacturers' instructions and fire rated labeling requirements.
2. Trim non-rated door width by cutting equally on both jamb edges.
3. Trim door height by cutting bottom edges to a maximum 3/4 inch (19mm).
4. Trim fire door height at bottom edge only, in accordance with fire rating requirements.
5. Pilot drill screw and bolt holes using templates provided by hardware manufacturer. (Use threaded through bolts for half surface hinges.)
6. Coordinate installation of doors with installation of frames and hardware.
7. Coordinate installation of glass and glazing.
8. Install door louvers and light kits plumb and level.
9. Reseal or refinish any doors that required site alteration.

C. Warranty Tolerances

1. Conform to WDMA standards and testing methods for warp, cup, bow and telegraphing.

D. Adjusting

1. Adjust work under provisions Division 1.
2. Adjust doors for smooth and balanced door movement.

E. Door and Frame Components Schedules

1. Refer to door and frame schedule.

END OF SECTION 08211

SECTION 08411 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

I. GENERAL

1.1 DESCRIPTION OF WORK

A. This Section Includes:
   1. Exterior and interior manual-swing entrance doors and door-frame units.
   2. Exterior & interior storefronts.

1.2 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

   1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
   2. Dimensional tolerances of building frame and other adjacent construction.
   3. Failure includes the following:

      a. Deflection exceeding specified limits.
      b. Thermal stresses transferring to building structure.
      c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
      d. Noise or vibration created by wind and by thermal and structural movements.
      e. Loosening or weakening of fasteners, attachments, and other components.
      f. Sealant failure.
      g. Failure of operating units.

B. Structural Loads:

   1. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7 "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.
   2. Seismic Loads: IBC 2021, NJ Edition.
   3. Design wind load velocity at the project site is 100 mph
   4. The wind load design pressures for this project are 26. psf @ non-corner zones and 32 psf @ corner zones using ASD (Allowable Stress Design) methodology.

C. Deflection of Framing Members:

   1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/240 + ¼" at openings greater than 13'6" and shall not exceed L/175 at openings lesser than 13'6" of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.

2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

D. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits. The maximum wind load design pressure for this project is 32 psf.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft..

F. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.. The storefront systems shall have a maximum no leakage water performance of 12 psf.

G. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
2. Interior Ambient-Air Temperature: 75 deg F.

H. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 57 for the framing when tested according to AAMA 1503-98.

I. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.38 Btu/sq. ft. x h x deg F (3.92 W/sq. m x K) when tested according to NFRC 102-14.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.

2. Submit to architect approved shop drawings for Structural Stamp & Calculations provided by Professional Engineer registered in the state of New Jersey for all local jurisdiction codes and wind velocities indicated. Calculations shall indicate the adequacy of the storefront and curtain wall systems perimeter anchors & attachments and the structural integrity of the fenestration system framing members. The final shop drawings must be readable for field personnel to use as an installation guideline regarding fastener type and locations.

C. Color samples: Provide color samples for Owner selection.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

E. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

F. Warranties: Submit a copy of the Manufacturer's Special Ten (10) year Warranty.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative is to verify installation contractor's approval for ability to complete installation of units required for this Project.

B. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sight lines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including pre-construction testing, field testing, and in-service performance.

1. Do not revise intended aesthetic effects as judged solely by the architect, except with architect's approval. If revisions or substitutions are proposed, submit comprehensive explanatory data to architect within thirty (30) days of Notice to Proceed per Specification Section 01300, "Submittals". After thirty (30) days, no substitution products will be considered.

2. Stock length materials will be allowed for this project provided the manufacturer or the manufacturer's local representative approves of the installer's capabilities. All materials are to be job specific production and factory finished by the manufacturer at their facility in order to be utilized for this project

C. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

D. Single-Source Responsibility: Provide storefront and entrance doors and related fenestration system sections, as well as all necessary accessories from one source and produced by a single manufacturer.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Failure to meet performance requirements.
   b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
   c. Faulty operation of movable sash and hardware.
   d. Deterioration of metals, other materials, & metal finishes beyond normal weathering.
   e. Failure of insulating glass.
   f. Noise or vibration caused by thermal movement
   g. Water Leakage through fixed glazing and framing areas

2. Warranty Period: Ten (10) years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: Ten (10) years from date of Substantial Completion.

C. Contractors Warranty: Provide a (2) year installer warranty from the date of Substantial Completion.

II. PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or approved equal:

1. Efco Corporation, a Pella Company.

2. Wausau Window & Wall Systems.
3. Tubelite Systems Inc.

B. Basis of Design Products: Subject to compliance with requirements, provide Efco products; series 401, 402, & 403 storefronts and entrance packages, and series D500 wide stile, entrance doors. Approved equal substitutions will be considered in accordance with specification section 01300 – Submittals.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: storefront systems are screw spline construction.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: As indicated on architectural drawings.

B. Framing Members, General:

1. All storefront members shall have a minimum wall thickness of .080". The face dimension for the storefront system will be not less than 2" and the frame depth will not be less than 4 ½". All exposed work shall be carefully matched to produce continuity of line and design with all joints. System design will be such that raw edges will not be visible at joints.
2. Efco Series 401, 402 & 403 Storefront, or approved equal. Stocklength materials will be allowed for this project. All materials are to be factory finished by the manufacturer at their facility in order to be utilized for this project.
3. Any manufacturer bidding this project with their storefront systems must provide their own internal steel reinforcement members as required to meet the project wind load design criteria and a minimum 32 psf wind load design pressure.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Fasteners and Accessories: Provide nonmagnetic stainless steel or ceramic coated fasteners warranted by the fenestration system installer to be non-corrosive and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.

E. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

F. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

G. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation. Basis of design is Efco series D500 Wide Stile doors. Approved equal substitutions will be considered in accordance with specification section 01300 – submittals.

1. Major portion of the door sections shall have a .125" wall thickness. Glazing stop sections shall have a .050" wall thickness.
2. Door stiles shall be no less than 5" wide (not including glass stops). Door bottom rail shall have 12" height section.
3. Door stiles and rails shall have hairline joints at corners. Heavy concealed reinforcement brackets shall be secured with screws and shall be installed in one of pairs of doors and in jamb stiles of center pivoted doors.
4. Door stops shall include a bulb weather-strip that compiles with ASTM E 2203 specification.
5. Glazing Sops and Gaskets: Manufacturer's standard compression types, replaceable, that maintain uniform pressure and water tight seal, snap on, extruded aluminum stops and preformed gaskets.

B. Entrance Door Hardware: As specified in Division 08 Section "Door Hardware."

2.6 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil (0.762-mm) thickness per coat.

2.7 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal to metal contact. Install three silencers on strike jamb of single door frames and two silencers on head of frames for pairs of doors.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designing finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. High Performance Organic Finish: AA-C12C42R1X (Chemical Finish: Cleaned & inhibitive chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer' written instructions.

1. Fluoropolymer two coat system: Manufacturer's standard two-coat, thermocured system consisting of specifically formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70% polyvinylidene fluoride resin by weight; complying with AAMA 2605. Architect is to select a Featured color (non-metallic / non-exotic / non-MICA), which the fenestration system manufacturer can match "in house". Architect will select the featured color during the shop drawing review process.

III. EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure non-movement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.

6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weather tight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 08 Section "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weather tight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weather tight installation.

3.3 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment:

a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch .
b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.4 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

3.5 CLEANING

A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weather tight closure.

B. Remove excess sealant and glazing compounds, and dirt from surfaces.

3.6 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08411

SECTION 08510 – 1 HOUR SLIDER STEEL WINDOWS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire Rated Steel Windows (Horizontal Slider) – 60-Minute UL Labeled

1.2 PERFORMANCE REQUIREMENTS (Based on a single window in a testing lab environment)

A. Horizontal sliding steel windows shall conform to the HS-C30 voluntary specifications in AAMA/NWWDA 101/I.S.2-97 and be designed to meet the following performance requirements. Fire-rated windows shall bear the Underwriters Laboratories, Inc. label including the manufacturer's file number for the indicated rating.

1. Structural Performance: Structural test pressures on window units shall be for positive load (inward) and negative load (outward) in accordance with ASTM E 330 at a static pressure of 45 PSF. After testing, there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms or any other damage which could cause window to be inoperable. There shall be no permanent deformation of any main frame, sash or ventilator member in excess of the requirements established by AAMA/NWWDA 101/I.S.2-97 for the window types specified in this section.

2. Air Infiltration: Air infiltration shall not exceed .3 SCFM per square foot of window area at a static air pressure difference of 1.57 PSF as established by AAMA/NWWDA 101/I.S.2-97 when tested in accordance with ASTM E 283.

3. Water Resistance: When tested in accordance with ASTM E 547, there shall be no water leakage at a static air pressure difference of 4.5 PSF.

B. Fire Protective: Fire protective rating shall meet requirements as tested and classified by Underwriters Laboratories Inc, in accordance with UL-9. Products shall meet the requirements of Underwriters Laboratories Inc. The Listing Mark of UL on the product will be accepted as evidence of compliance.

1.3 SUBMITALS

A. Manufacturer's descriptive data and catalog cut sheets.

B. Drawings indicating elevations of windows, rough-opening dimensions for each type and size of windows, section details, fastenings, generic method of installation and anchorage, glazing details, method of glazing, weather-stripping details, types and locations of operating hardware, window type and indicating compliance with fire safety code.

C. Manufacturer's preprinted installation instructions and cleaning instructions.

D. Manufacturer's standard color samples of painted finishes.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

B. Manufacturer's Qualifications: A firm with not less than 10-years' experience in manufacture of similar type of 1-hour fire rated steel horizontal sliding windows.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Manufacturer's original, unopened, undamaged containers, identification labels intact. Inspect for damage upon delivery.

2. Handle and store products according to manufacturer's recommendations.

B. Storage and Protection:

1. Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended be manufacturer

2. Store windows to prevent damage or marring of finish. Store in shipping containers under cover on building site.

1.6 PROJECT CONDITIONS

A. Verify actual openings by field measurements before fabrication, show recorded measurements on shop drawings.

B. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.7 WARRANTY

A. Manufacturer's standard warranty to be 3 years from the date of shipping.

B. Contractor's warranty to be two (2) years from the date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Series 900 Horizontal Sliding Windows as manufactured by D.V. Fyre-Tec, Inc. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

B. Or approved equal.

2.2 STEEL WINDOW TYPES

A. Provide a 1-hour fire-rated windows conforming to UL-9 and labeled with a 1- hour fire-test rating. Units shall be designed and fabricated to meet glass sizes, window sizes, and opening dimensions established by NFPA 80. Hardware shall conform to NFPA 80 requirements. All operable fire-rated windows are to be self-closing and latching by means of a heat activated fusible link operator.

B. Automatic closure device to be activated by heat rise.

C. Provide a manual locking device for daily security needs.

2.3 MATERIALS

A. Steel Frames and Inserts

1. Steel frames and inserts shall be fabricated from roll-formed galvanized lock-forming quality steel per ASTM A 653.

2. Frame and insert corners shall be mitered and welded. Integral muntins where required shall be galvanized roll-formed material fitted and welded.

3. Operable insert/sash shall be supported on two field adjustable roller trucks consisting of corrosion resisting steel with integral ball bearing rollers. Rollers are to be supported and operate on a stainless-steel track.

B. Installation Kits

1. Provide attachable fin installation kits for all windows.

2. Provide subframe installation kits for all windows.

C. Weather Stripping

1. Weather-stripping for the inserts shall be designed to meet water penetration and air infiltration requirements specified under paragraph WINDOW PERFORMANCE, and shall be manufactured of material compatible with steel and resistant to weather. Weather-strips shall be factory applied and easily replaced in the field.

D. Formed Component Parts

1. Formed component parts shall be hot-rolled sheet steel conforming to ASTM A 569, commercial quality with a minimum of 0.15 percent carbon.

2. Sheet steel shall be zinc coated (galvanized) by the hot-dip process in accordance with ASTM A 653 or ASTM A 924.

E. Screws and Bolts

1. Screws and bolts shall conform to ASTM B 766, ASME B18.6.3 and ASME B18.6.4.

F. Fasteners

1. Fastening devices shall be window manufacturer's design made from cadmium-plated steel, zinc-plated steel, nickel/chrome-plated steel or magnetic stainless steel.

G. Window Anchors

1. Anchors for installing windows shall be stainless steel or hot-dip zinc coated steel conforming to ASTM A 123.

H. Glass and Glazing

1. Premium clear ceramic glass (1 hour rated)

2.4 FABRICATION

A. Fabricate windows in accordance with approved shop drawings.

B. Frame sections shall be one-piece sections with corners mitered, welded and dressed smooth.

C. Required muntins shall be securely welded to the frame members and at all intersections.

D. All windows shall be factory glazed with UL labeled glass meeting or exceeding the hourly rating required for the frame label. Individual lites shall display a UL label permanently affixed and in accordance with the requirements of the International Building Code and NFPA 80.

2.5 FINISHES – All products will be provided with a paint coating.

A. Finish Coat – Manufacturer's Standard Color

1. Steel windows, fins, mullions, cover plates and associated parts shall be cleaned, pre-treated with iron phosphate and factory powder coated and cured with a manufacturer's standard color in a dry film thickness of not less than 0.050 mm (2.0 mil).

PART 3 EXECUTION

3.1 EXAMINATION

A. Window openings shall conform to details and dimensions shown on the approved shop drawings.

3.2 INSTALLATION

A. Steel windows shall be installed in accordance with approved shop drawings and manufacturer's approved recommendations.

B. Fire-rated windows shall be installed in compliance with NFPA 80 and NFPA 101.

C. Steel surfaces in close proximity with masonry, concrete, wood, and dissimilar metals other than stainless steel, zinc, cadmium, or small areas of white bronze shall be protected from direct contact.

D. Verify that weep features at the bottom of the sills are opened at least 1/8" x 1". Failure to do so may lead to premature finish failures and void warranty.

3.3 ADJUSTING AND CLEANING

A. Steel window finish and glass shall be cleaned on interior and exterior sides in accordance with window manufacturer's recommendation. Alkaline, abrasive or brick wash agents shall not be used.

B. Operable sash shall be adjusted per manufacturer's instruction to provide minimal operating force.

3.4 PROTECTION

A. Protect installed products and finished surfaces from damage during construction.

B. Touch-up any abraded surface of the window finish with air dry paint furnished by the window manufacturer.

-- END OF SECTION –

SECTION 08520 – ALUMINUM CASEMENT, PROJECTION, & FIXED WINDOWS

1. GENERAL

1.1. Section Includes

A. Work of this Section includes all labor, materials, equipment and services necessary to complete the aluminum fixed, projection, and casement windows as shown on the Drawings and/or specified herein, including but not limited to, the following:
   1. Aluminum project in and fixed combination window systems.
   2. Anchors, hardware and accessories including panning, interior trim pieces and subframe / receptors.

1.2. Performance Requirements

A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of test size indicated below:
   1. Minimum size required by AAMA/WDMA/CSA 101/1.S.2/A440-17.

B. AAMA/WDMA/CSA 101/1.S.2/A440-17 Performance Requirements: Provide aluminum windows of the performance class and grade indicated that comply with AAMA/WDMA/CSA 101/1.S.2/A440-17.
   1. Performance Class: AW
   2. Performance Grade: Minimum for performance class indicated. (135)
   3. Testing performed according to AAMA/WDMA/CSA 101/1.S.2/A440-17 Uniform Load Deflection Test ASTM E 330.

C. Structural Performance: Provide aluminum windows capable of withstanding the following, including wind loads based on IBC 2021 NJ Edition, ASCE 7-16 (minimum design loads for buildings and other structures), and passing ASTM E330, Uniform Load Structural Test, at basic wind speed indicated:
   1. Design Criteria:
      a. Exposure: 'C'
      b. Importance factor: 1.15
      c. Wind load: 124 mph
      d. SHEG II A/v=0.10
      e. SPC C A/a=0.10
   2. The wind load design pressures for this project are 26 psf "ASD" / 42 psf "LFRD" @ non-corner zones and 32 PSF "ASD" / 52 psf "LFRD" @ corner zones.

D. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283, Air Infiltration Test.
   1. Maximum Rate: 0.1 cfm/sq.ft. (2 cu. m/h x sq.m) of area at an inward test pressure of 6.24 lbf/sq.ft. (300 Pa).

E. Water Resistance: No water leakage as defined in AAMA/NWWDA referenced test methods at a water test pressure equaling that indicated, when tested according to ASTM E 331/ASTM E 547, Water Resistance Test.
   1. Test Pressure: 15 static air pressure difference of 15.0 psf.

F. Condensation-Resistance Factor: Provide aluminum windows tested for thermal performance according to AAMA 1503 or per NFRC 100 simulation data, showing a minimum CRF of 74 for the frame.

G. Thermal Transmittance: Window manufacturer to provide aluminum windows with a whole-window U-value maximum indicated at 15-mph (24-km/h) exterior wind velocity and winter condition temperatures when tested according to AAMA 1503 or per NFRC 100 simulation data.
   1. U-Value: 0.**45** Btu/sq.ft. X h x deg F (W/sq.m x K) for operable sash.
   2. U-Value: 0.**38** Btu/sq.ft. X h x deg F (W/sq.m x K) for fixed frame.

H. Thermal Movements: Provide aluminum windows, including anchorage, that accommodate thermal movements of units resulting from the following maximum change (range) in ambient and surface temperatures without buckling, distortion, opening of joints, failure of joint sealants, damaging loads and stresses on glazing and connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to solar heat gain and nighttime sky heat loss.
   1. Temperature Change (Range): 120 deg F (67 deg C), ambient.

I. Projected Windows: Comply with AAMA/WDMA/CSA 101/1.S.2/A440-17 for the following tests:
   1. Torsion Test.
   2. Horizontal Concentrated Load Test on Latch Rail.
   3. Vertical Concentrated Load Test on Latch Rail.
   4. Torsion Load Test on Intermediate Frame Rails.
   5. Vertical Concentrated Load Test on Intermediate Frame Rails.
   6. Balance Arm Load Test.

1.3. Submittals

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and the following:
   1. Mullion details, including reinforcement and stiffeners.
   2. Joinery details.
   3. Expansion provisions.
   4. Flashing and drainage details.
   5. Weather-stripping details.
   6. Thermal-break details.
   7. Glazing details.
   8. Internal Blinds and removable takeout panel.
   9. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation and used to determine the following:
      a. Structural test pressures and design pressures from basic wind speeds indicated.
      b. Deflection limitations of glass framing systems.

C. Color Samples: Provide material color samples from manufacturers full standard product line. Manage color selection with Owner.

D. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency, for each operation and configuration of aluminum window. Test results based on use of down-sized AAMA standard test size units will not be accepted.

E. Shop drawings shall be sealed by a state licensed structural engineer to assure all requirements in this specification and drawings are met. The final shop drawings must be readable for field personnel to use as an installation guideline regarding fastener type and fastener locations.

F. Submit a copy of the Manufacturer's Special 10 year warranty.

1.4. Quality Assurance

A. Manufacturers Qualifications: Must have minimum 10 years of continuous fabrication of aluminum windows similar in design and scope to that which is required for this project. The window products supplied for this project must be produced and glazed by the same factory assembly line that the certified test window unit was produced. Any products fabricated by independent subcontractor organizations using "S.L." stock length parts fabricated at their own factory or shop facilities must be pre-approved by project architect with the manufacturer or manufacturer's representative organization consultation prior to fabrication of materials. Field glazing is not permitted.

B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

D. Single Source Responsibility: Provide aluminum window units, related fenestration system sections, and all necessary accessories from one source and produced by a single manufacturer.

E. For maximum performance, windows for this project must meet both the testing requirements stated herein and the minimum material requirements specified. Windows which carry the applicable AAMA rating but which do not meet the material thickness and depths are not acceptable for use on this project.

F. Pre-installation Conference: Conduct conference at Project site. Review methods and procedures related to aluminum windows including, but not limited to, the following:
   1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
   2. Review and finalize construction schedule and verify availability of materials.

Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

3. Review required testing and inspecting procedures.

1.5. Project Conditions

A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6. Warranty

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
   1. Failure to meet performance requirements.
   2. Structural failures including excessive deflection.
   3. Water leakage, air infiltration, or condensation.
   4. Faulty operation of movable sash and hardware.
   5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   6. Insulating glass failure.

B. Warranty Period: ten (10) years for windows and insulated glass from date of Substantial Completion.

C. Warranty Period for Metal Finishes: ten (10) years from date of Substantial Completion.

2. PRODUCTS

2.1. Manufacturers

A. Manufacturers: Approved equal manufacturers will be considered in accordance with Specification Section 01300 – Submittals. Subject to compliance with requirements, provide architectural grade thermal project-in, project out, and fixed combination windows, with minimum 4-1/2" frame depth, by one of the following or approved equal:

   1. Fixed Windows (all aluminum not less than 0.125 inches thick):
      a. EFCO Corporation: Series 450X.
      b. Wausau Window and Wall Systems: Model 4250I XLT.
      c. Oldcastle Building Envelope: (Moduline Model) 16PL series.
   2. Casement & Projected Windows (all aluminum not less than 0.125 inches thick):
      a. EFCO Corporation: Series 450X.
      b. Wausau Window and Wall Systems: Model 4250I XLT.
      c. Oldcastle Building Envelope: (Moduline Model) 16PL series

B. The following specifications are based on EFCO Corporation, Series 450X (Enhanced Thermal Performance Window). Approved equal manufacturers will be considered in accordance with Specification Section 01300 – Submittals.

2.2. Materials: General

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength, not less than 16,000-psi (110-MPa) minimum yield strength, and not less than 0.125-inch (1.6-mm) thickness at any location for the main frame and sash members.

B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.
   1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch (3.2-mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, non-corrosive, pressed-in, splined grommet nuts.
   2. Exposed Fasteners: Unless avoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member of hardware being fastened, as appropriate.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

D. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when aluminum window is closed.
   1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/NWWDA 101/I.S.2.

E. Replaceable Weather Seals: Comply with AAMA 701/702.

F. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.3. Glazing

A. Glass: Exterior glass lite comprised of ¼" standard grey tint tempered and interior glass lite comprised of ¼" clear tempered with Vitro "SB60" soft coat Low E @ #3 surface complying with Division 8 Section "Glazing". The air spacer cavity shall be Argon gas filled.

2.4. Hardware

A. General: Provide manufacturer's standard hardware fabricated from, stainless steel, complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows and sized to accommodate sash or ventilator weight and dimensions. Cadmium-plated hardware is not permitted. Do not use aluminum in frictional contact with other metals. Where exposed, provide white bronze alloy and nonmagnetic stainless steel.

B. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.

C. Projected Windows: Provide the following operating hardware:
   1. Hinge: 5 Knuckle Butt Hinge (or approved equal).
   2. Lock: Combination lever handle and cam-action lock with stainless steel operation arm. Operable sash at more than 6'0" off of finish floor should be provided with pole operated cam action locks. Each classroom with a pole operated sash should receive (1) one pole @ 6'0" length with wall mount clip.
   3. Limit Device: Use manufacturer's standard limit device hardware; located within each ventilator sash. Manufacturer to provide Architect with final allowable clear opening dimensions, once opening sizes have been confirmed by project architect.

D. Casement Windows: Provide the following operating hardware:
   1. Hinge: 4 bar Anderberg Arm Hinge (or approved equal).
   2. Lock: Combination single point of contact single casement handle sash lock and Truth Contour Roto Operators with Friction Adjust arm and Lift Blocks.
   3. Limit Device: Use manufacturer's standard limit device hardware; located within each ventilator sash. Manufacturer to provide Architect with final allowable clear opening dimensions, once opening sizes have been confirmed by project architect.

2.5. Insect Screens

A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Locate screens on inside of window and provide for each operable exterior sash or ventilator.
   1. Aluminum Tubular (extruded) Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows", Architectural C-24, or Monumental M-32 class.
   2. Comply with SMA 1004, "Specifications for Aluminum (extruded) Tubular Frame Screens for Windows", for minimum standards of appearance, fabrication, attachment of screen fabric, hardware, and accessories unless more stringent requirements are indicated.

B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints, concealed fasteners, adjustable rollers, and removable PVC spline/anchor concealing edge of frame.
   1. Extruded-Aluminum or Aluminum Tubular Framing Sections and Cross Braces: Not less than 0.040-inch (1-mm) wall thickness.
   2. Finish: Match aluminum window frame finish.

C. Aluminum Mesh Fabric: 18-by-16 (0.11 diameter) mesh of PVC-coated, alum mesh threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration in the following color. Comply with ASTM D 3656.
   1. Mesh Color: "Brite Kote" (lighter) or "Gun Metal" (Darker).

D. Wickets: Provide both full hinge sash wickets (Projection Windows) or fixed mount screens (Casement Windows), if required framed and trimmed for a tight fit and durability during handling.

2.6. Fabrication

A. General: Fabricate aluminum windows, in sizes indicated, that comply with AAMA/WDMA/CSA 101/1.S.2/A440-17 for performance class and performance grade indicated. Include a complete system for assembling components and anchoring windows.

B. General: Fabricate aluminum windows, in sizes indicated, that comply with requirements and that meet or exceed AAMA/WDMA/CSA 101/1.S.2/A440-17 performance requirements for the following window type and performance class. Include a complete system for assembling components and anchoring windows.
1. Projected Windows: AW120 or approved equal.
2. Casement Windows: AW120 or approved equal.
3. Fixed Windows: AW150 or approved equal.

C. Fabricate aluminum windows that are re-glazable without dismantling sash or ventilator framing.

D. Thermally Improved Construction: All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
1. The thermal barrier shall be thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions. Poured and de-bridged urethane thermal barriers shall not be permitted.

E. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.

F. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

G. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.

H. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units to meet project wind loads. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Vertical side stacking between window units is permitted provided window system provides necessary structural values to meet project specific wind loads.

I. Subframes: Provide subframes with anchors for window units as indicated on architectural drawings as shown, of profile and dimensions indicated but not less

than 0.062-inch (1.6-mm) thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units. Provide subframes capable of withstanding design loads of window units.

J. Exterior Panning: Provide exterior extruded panning system as indicated on architectural drawings as shown, of profile and dimensions indicated but not less than 0.062-inch thick extruded aluminum. Finish to match window units. Corners of the panning shall be factory mitered. Panning assembly shall not require the use of exposed fasteners. Panning shall be shipped KD and field assembled. A stainless steel corner alignment clip shall be provided for each joint. Clip shall be of such a design that after panning is installed, weather sealing or caulking will completely cover the clip. Back seal all panning frame joints to prevent water migration into frame cavity prior to installation.

K. Interior Trim: Provide interior trim as indicated on architectural drawings as shown, of profile and dimensions indicated but not less than 0.050-inch thick extruded aluminum. Finish to match window units.

L. Factory-Glazed Fabrication: Glaze aluminum windows in the factory.

2.7. Finishes

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Finish: Fluorocarbon 2 coat thermocured system, composed of specifically formulated inhibitive primer and fluorocarbon color topcoat containing not less than 70% PVFD resin by weight; comply with AAMA 2605. The color selected by Owner/Architect to be a Featured color (non-metallic / non-exotic / non-MICA), which the window manufacturer can match. The architect will select the featured color during the shop drawing review process.

3. EXECUTION

3.1. Examination

A. Examine openings, substrates, structural support, anchorage, and conditions with Installer present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate; coordination with wall flashings, vapor retarders, and other built-in components; operational clearances; and other conditions affecting performance of work.
   1. Masonry Surfaces: Visibly dry and free of excess mortar, sand and other construction debris.
   2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76-mm) of opening.

3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offset at joints.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. Installation

A. General: Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components; Drawings; and Shop Drawings.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

E. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101-I.S.2.

3.3. Adjusting

A. Adjust operating sashes and ventilators, screens, hardware, operators, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.4. Protection and Cleaning

A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains or other contaminants immediately according to manufacturer's written recommendations.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt and other substances.

C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove non-permanent labels and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.5. Demonstration

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system. Refer to Division 1 Section "Closeout Procedures".

END OF SECTION 08520

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
   a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
   b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
   a. Wiring Diagrams: For power, signal, and control wiring and including:
      1) Details of interface of electrified door hardware and building safety and security systems.
      2) Schematic diagram of systems that interface with electrified door hardware.
      3) Point-to-point wiring.
      4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
   a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:
   a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
   b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
   c. Indicate complete designations of each item required for each opening, include:
      1) Door Index: door number, heading number, and Architect's hardware set number.
      2) Quantity, type, style, function, size, and finish of each hardware item.
      3) Name and manufacturer of each item.
      4) Fastenings and other pertinent information.
      5) Location of each hardware set cross-referenced to indications on Drawings.
      6) Explanation of all abbreviations, symbols, and codes contained in schedule.

7) Mounting locations for hardware.
8) Door and frame sizes and materials.
9) Degree of door swing and handing.
10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:
   a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
   b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
   c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
   d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
   e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
   f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
   a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
   b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
   a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
   b. Catalog pages for each product.
   c. Final approved hardware schedule edited to reflect conditions as installed.
   d. Final keying schedule
   e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
   f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:

a. Fire door assemblies, in compliance with NFPA 80.
b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
   a. For door hardware: DHI certified AHC or DHC.
   b. Can provide installation and technical data to Architect and other related subcontractors.
   c. Can inspect and verify components are in working order upon completion of installation.
   d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
   a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
   b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
2. Smoke and Draft Control Door Assemblies:
   a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
   b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware
   a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:
   a. Comply with governing accessibility regulations cited in "REFERENCES" article 08710, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
   a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      2) Preliminary key system schematic diagram.
      3) Requirements for key control system.
      4) Requirements for access control.
      5) Address for delivery of keys.

2. Pre-installation Conference
   a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   b. Inspect and discuss preparatory work performed by other trades.
   c. Inspect and discuss electrical roughing-in for electrified door hardware.
   d. Review sequence of operation for each type of electrified door hardware.
   e. Review required testing, inspecting, and certifying procedures.
   f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:
   a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.

C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.

1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
    a. Mechanical Warranty
        1) Locks
            a) Schlage ND Series: 10 years
        2) Exit Devices
            a) Von Duprin: 10 years
        3) Closers
            a) LCN 4000 Series: 30 years
        4) Automatic Operators
            a) LCN: 2 years

b. Electrical Warranty
   1) Locks
      a) Schlage: 3 years
   2) Exit Devices
      a) Von Duprin: 3 years

1.08 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards.

B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

C. Cable and Connectors:

1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Ives 5BB series

2. Acceptable Manufacturers and Products:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
   a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
   b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high

4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
   a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. 2 inches or thicker doors:
   a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high

6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   a. Steel Hinges: Steel pins
   b. Non-Ferrous Hinges: Stainless steel pins
   c. Out-Swinging Exterior Doors: Non-removable pins
   d. Out-Swinging Interior Lockable Doors: Non-removable pins
   e. Interior Non-lockable Doors: Non-rising pins

9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Von Duprin EPT-10

2. Acceptable Manufacturers and Products:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.

2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage ND series

2. Acceptable Manufacturers and Products:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide escutcheon with lock status indicator window on top of lockset rose:
   a. Escutcheon height (including rose) 6.05 inches high by 3.68 inches wide.
   b. Indicator window measuring a minimum 3.52-inch by .60 inch with 1.92 square-inches of front facing viewing area and 180-degree visibility with a total of .236 square-inches of total viewable area.
   c. Provide snap-in serviceable window to prevent tampering. Lock must function if indicator is compromised.
   d. Provide messages color-coded with full text and symbol, as scheduled, for easy visibility.
   e. Unlocked and Unoccupied message will display on white background, and Locked and Occupied message will display on red background.
3. Cylinders: Refer to "KEYING" article, herein.
4. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
5. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
6. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
8. Provide electrified options as scheduled in the hardware sets.
9. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
   a. Vandlgard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
   b. Lever Design: Sparta (17).

2.07 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage L9000 series

2. Acceptable Manufacturers and Products:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches. Provide motor based electrified and motor based latch retraction locksets that comply with the following requirements:
   a. Low holding current (Lever control or latch retraction) – maximum 0.01 amps to produce minimal heat, eliminate "hot levers" in electrically locked applications and motorized latch retraction applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
   b. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
   c. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case
   d. Low maximum current draw – maximum 0.4 amps (Lever control) and maximum 2.0 amps (Latch retraction) to allow for multiple locks on a single power supply.
   e. Connections – provide quick-connect Molex system standard.
8. (OPTION Key Override) Provide locks with a key override feature built into the chassis that allows the outside key to retract the deadbolt and/or latchbolt, overriding the inside thumbturn when it is being held in the locked position - where the XL13-439 option is specified in the hardware sets.
9. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
   a. (OPTION Vandlgard) Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
   b. Lever Design: Sparta (17)

2.08 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

a. Von Duprin 98/35A series

2. Acceptable Manufacturers and Products:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide smooth touchpad type exit devices, fabricated from brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match the balance of door hardware.
4. Touchpad must extend a minimum of one-half of the door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with a deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices at pool gates with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
9. Provide exit devices with manufacturers' approved strikes.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
17. Accessibility: Require not more than 5 lb. to retract the latchbolt, per CBC 2019 11B-404.2.7 and 11B-309.4.
    a. Mechanical method: Von Duprin AX feature, where touchpad directly retracts the latchbolt with 5 lb. or less of force. Provide testing lab certification confirming that the mechanical device is independent third-party tested to meet this 5 lb. requirement.
    b. Electrical method: Von Duprin's RX-QEL feature, where lightly pressing the touchpad with 5 lb. or less of force closes an electric switch, activating quiet electric latch retraction.

2.09 ACCESS CONTROL READER

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage MT Series

2. Acceptable Manufacturers and Products:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide access control card readers manufactured by a global company who is a recognized leader in the production of access control devices. Card reader manufactured for non-access control applications are not acceptable
2. Provide multi-technology contactless readers complying with ISO 14443.
3. Provide access control card readers capable of reading the following technologies:
   a. CSN - DESFire® CSN, HID iCLASS® CSN, Inside Contactless PicoTag® CSN, ST Microelectronics® CSN, Texas Instruments Tag-It®, CSN, Phillips I-Code® CSN
   b. 125 KHz proximity - Schlage® Proximity, HID® Proximity, GE/CASI® Proximity, AWID® Proximity, LenelProx®
   c. 13.56 MHz Smart card - Schlage smart cards using MIFARE Classic® EV1, Schlage smart cards using MIFARE Plus®, Schlage smart cards using MIFARE® DESFire® EV1, Schlage smart cards using MIFARE® DESFire® EV2/EV3

2.10 ACCESS CONTROL PLATFORM

A. Manufacturers and Products:

1. Scheduled Manufacturer:
   a. Schlage Engage Commercial

2. Acceptable Manufacturers and Products:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide a cloud-based platform capable of managing users, credentials, access rights, schedules, and audits.
2. All locks must be supplied in construction mode.
3. Provide a platform that supports a mobile application (app). Mobile application must allow for:
   a. Commissioning and configuring devices
   b. Immediately updating door files
   c. Retrieving audit information
   d. Performing firmware updates

4. Provide software set up on the owner's workstation and Mobile Device which includes:
   a. Creation of the Owner's Account
   b. Creation of the Project Site
   c. Creation of the Team as directed by the Owner
   d. Addition of five users
   e. Set up of MT20W and update firmware
   f. Create unique credentials and verify proper commissioning of ten locks

5. Provide, at the owner's request, the following on-site training prior to the expiration of the service agreement:
   a. Completing the following with ENGAGE software:
      1) Modifying the Team
      2) Move in/move out procedure including
         a) Adding and Deleting Users
         b) Adding and Deleting Doors
      3) Adding, assigning and programming credentials for access
      4) Replacing or deleting lost credentials.
      5) Retrieving and viewing of audit information
      6) Assigning temporary access
   b. Commissioning and verifying proper functioning between locks and credentials.
   c. Updating firmware on the locks.

6. Must include a service agreement ending a year after Substantial Completion. This service agreement includes being on-site up to 16 hours for set-up and training, as listed above.

2.11 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage/Von Duprin PS900 Series

2. Acceptable Manufacturers and Products:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
   a. 12/24 VDC Output, field selectable.
   b. Class 2 Rated power limited output.
   c. Universal 120-240 VAC input.

d. Low voltage DC, regulated and filtered.
e. Polarized connector for distribution boards.
f. Fused primary input.
g. AC input and DC output monitoring circuit w/LED indicators.
h. Cover mounted AC Input indication.
i. Tested and certified to meet UL294.
j. NEMA 1 enclosure.
k. Hinged cover w/lock down screws.
l. High voltage protective cover.

2.12 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage Everest 29 T

2. Acceptable Manufacturers and Products:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
   a. Patented Restricted: cylinder with interchangeable core with patented, restricted keyway.

3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
4. Nickel silver bottom pins.

2.13 KEYING

A. Scheduled System:

1. New factory registered system:
   a. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:
   a. Replaceable Construction Cores.
      1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
         a) 3 construction control keys

b) 12 construction change (day) keys.

2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2. Permanent Keying:
   a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
      1) Master Keying system as directed by the Owner.
   b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
   c. Provide keys with the following features:
      1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
      2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
      3) Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
   d. Identification:
      1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
      2) Identification stamping provisions must be approved by the Architect and Owner.
      3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
      4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
      5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
   e. Quantity: Furnish in the following quantities.
      1) Permanent Control Keys: 3.
      2) Master Keys: 6.
      3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
      4) Key Blanks: Quantity as determined in the keying meeting.

2.14 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Telkee

2. Acceptable Manufacturers:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
   a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
   b. Provide hinged-panel type cabinet for wall mounting.

2.15 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. LCN 4040XP series

2. Acceptable Manufacturers and Products:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

11. Closers shall be capable of being upgraded by adding modular mechanical or electronic components in the field.

2.16 ELECTRO-HYDRAULIC AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. LCN 4600 series

2. Acceptable Manufacturers and Products:
   Architect approved equal by official substitution request

B. Requirements:

1. Provide low energy automatic operator units with hydraulic closer complying with ANSI/BHMA A156.19.
2. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
3. Provide units with conventional door closer opening and closing forces unless power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
5. Provide drop plates, brackets, and adapters for arms as required for details.
6. Provide actuator switches and receivers for operation as specified.
7. Provide weather-resistant actuators at exterior applications.
8. Provide key switches with LED's, recommended and approved by manufacturer of automatic operator as required for function described in operation description of hardware group below. Cylinders: Refer to "KEYING" article, herein.
9. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
10. Provide units with vestibule inputs that allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.17 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.18 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, bevelled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.19 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
   a. Glynn-Johnson

2. Acceptable Manufacturers:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.20 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Architect approved equal by official substitution request

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.21 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.22 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Zero International

2. Acceptable Manufacturers:
   a. Architect approved equal by official substitution request

B. Seals and Gasketing: Provide continuous gasketing on exterior openings, to the head and jambs, forming a continuous seal between the door and the frame. Provide smoke, light, or sound gasketing on interior doors where indicated.

1. Provide self-tapping fasteners for aluminum extruded gasketing being applied to hollow metal frames.
   a. Provide non-corrosive fasteners for all exterior applications.
   b. Provide security fasteners where indicated.

2. Provide neoprene, EPDM, silicone, or nylon brush inserts as specified in hardware sets. Provide non brush inserts of solid or sponge cell, as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

C. Smoke Labeled Gasketing: At all smoke labeled openings, provide smoke listed perimeter gasketing assemblies complying with NFPA 105 listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for smoke control ratings indicated based on testing according to UL 1784.

D. Fire Listed Gasketing: Assemblies complying with NFPA 80 that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction for fire ratings indicated based on testing according to UL-10C.

1. Where frame-applied intumescent seals are required by the manufacturer, provide gaskets that comply with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies and UBC 7-2, Fire Tests of Door Assemblies.

E. Sound-Rated Gasketing: Provide acoustic gasketing to meet Sound Transmission Class (STC) rating required.

F. Meeting-Stile Gasketing: Provide meeting-stile gasketing that fastens to the meeting stiles forming a continuous seal when doors are closed.

G. Door Sweeps or Shoes: Apply to the bottom of the door to close the gap between the door bottom and finished floor or saddle threshold.

1. Provide solid neoprene, EPDM, silicone, or nylon brush type of seal as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

H. Automatic Door Bottoms:

1. Provide closed cell sponge, bulb neoprene. or EPDM type of seal as specified in hardware sets.
2. Door bottom to be mortised, semi mortised, or surface mount as with a minimum thickness as specified in hardware sets.

I. Rain Drips:

1. Provide overhead rain drips for out-swinging hollow metal doors that are not covered against 45 degree blowing rain. Aluminum extrusion to be a minimum of .088 inches thick and extend 2.50 inches from the face of the frame, in anodized finish to match door.
2. Door sweeps or shoes with integral rain drip must meet ADA requirements

J. Thresholds: Provide threshold units not less than 4 inches wide, formed to accommodate change in floor elevation where indicated, and fabricated to accommodate door hardware and fit door frames.

1. Threshold extrusion to be a minimum thickness as specified in hardware sets.

2.23 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Schlage

2. Acceptable Manufacturers:
   a. Architect approved equal by official substitution request

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.24 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.
3. Furnish permanent cores to Owner for installation.

J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect's opening number.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

L. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.

M. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

N. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

P. Thresholds:

1. Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
2. Aluminum thresholds to be cut-in, and scribed around mullions, frame members, and stops. Do not butt to thresholds. Provide a continuous surface across full width of opening from jamb to jamb.
3. Where aluminum panic-type (rabbeted) thresholds with neoprene inserts are specified, undercut doors as required to properly mate with seal in threshold.

Q. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

R. Perimeter Gasketing:

1. Apply to head and jamb, forming seal between door and frame.
2. Install gasketing in a manner eliminating need to cut any seal to install surface mounted hardware. Install compatible mounting bracket for surface mounted hardware unless minimum 1/4 inch thick solid aluminum seals are provided for mounting of surface applied hardware.

S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets: Please note that the Hardware Schedule has basis of design manufacturers listed. Approved equal manufacturers will be considered in accordance with Specification Section 01300 - Submittals

Abbreviation	Name
B/O	By Others
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	LCN Commercial Division
SCE	Schlage Electronic Security
SCH	Schlage Lock Company
TBD	Manufacturer To Be Determined
VON	Von Duprin
ZER	Zero International Inc

Legend:
↯ Electrified Opening

Hardware Group No. 01

For use on Door #(s):
110 111

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 (NRP AS REQUIRED)	652	IVE
1	EA	CLASSROOM LOCK	ND70TD SPA	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR 64/65 AS REQUIRED	GRY	IVE

Hardware Group No. 01A

For use on Door #(s):
113 114

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 (NRP AS REQUIRED)	652	IVE
1	EA	CLASSROOM DEAD LOCK W/ OUTSIDE INDICATOR	L463T OS-SYM	626	SCH
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM	626	
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

Hardware Group No. 04 - Not Used

Hardware Group No. 05

For use on Door #(s):
102.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQUIRED)	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50TD SPA	626	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM	626	
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR 64/65 AS REQUIRED	GRY	IVE

Hardware Group No. 05A

For use on Door #(s):
107B

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQUIRED)	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50TD SPA	626	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM	626	
1	EA	OH STOP	100S	630	GLY
3	EA	SILENCER	SR 64/65 AS REQUIRED	GRY	IVE

Hardware Group No. 05B

For use on Door #(s):
100 101 105

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQUIRED)	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50TD SPA	626	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM	626	
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

Hardware Group No. 05C

For use on Door #(s):
102

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQUIRED)	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50TD SPA	626	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM	626	
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	GASKETING	SR64/65 OR 488 SEALS AS REQUIRED	BK	ZER

Hardware Group No. 08

For use on Door #(s):
104A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQUIRED)	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM	626	
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR 64/65 AS REQUIRED	GRY	IVE

Hardware Group No. 08A

For use on Door #(s):
115

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQUIRED)	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM	626	
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

Hardware Group No. 08B

For use on Door #(s):
116.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQUIRED)	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM	626	
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

Hardware Group No. 09

For use on Door #(s):
005 103 118

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQUIRED)		652	IVE
1	EA	POWER TRANSFER	EPT10	✓	689	VON
1	EA	EU STOREROOM LOCK	ND80TDEU SPA RX 12V/24V DC	✓	626	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM		626	
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR 64/65 AS REQUIRED		GRY	IVE
1	EA	MULTITECH READER	MT11/MT15 BY DIVISON 28	✓	BLK	SCE
1	EA	DOOR CONTACT	679-05WD/HM AS REQUIRED	✓	BLK	SCE
1	EA	POWER SUPPLY	PS902 KL900 120/240 VAC	✓	LGR	SCE
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS			
1			PROVIDE RISER DIAGRAMS			

DOOR OPERATION:
DOOR NORMALLY CLOSED AND LOCKED.
ENTRY BY KEY OR VALID CREDENTIAL.
FREE EGRESS AT ALL TIMES.
UPON LOSS OF POWER, DOOR REMAINS LOCKED. [FAIL SECURE]
RX MONITORS INSIDE LEVER POSITION.
DC MONITORS DOOR POSITION.

Hardware Group No. 09A - Not Used

Hardware Group No. 09B

For use on Door #(s):
106 119

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQUIRED)		652	IVE
1	EA	POWER TRANSFER	EPT10	✓	689	VON
1	EA	EU STOREROOM LOCK	ND80TDEU SPA RX 12V/24V DC	✓	626	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM		626	
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488FSBK PSA		BK	ZER
1	EA	MULTITECH READER	MT11/MT15 BY DIVISON 28	✓	BLK	SCE
1	EA	DOOR CONTACT	679-05WD/HM AS REQUIRED	✓	BLK	SCE
1	EA	POWER SUPPLY	PS902 KL900 120/240 VAC	✓	LGR	SCE
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS			
1			PROVIDE RISER DIAGRAMS			

DOOR OPERATION:
DOOR NORMALLY CLOSED AND LOCKED.
ENTRY BY KEY OR VALID CREDENTIAL.
FREE EGRESS AT ALL TIMES.
UPON LOSS OF POWER, DOOR REMAINS LOCKED. [FAIL SECURE]
RX MONITORS INSIDE LEVER POSITION.
DC MONITORS DOOR POSITION.

Hardware Group No. 09C

For use on Door #(s):
107 108 109 117

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQUIRED)		652	IVE
1	EA	POWER TRANSFER	EPT10	✓	689	VON
1	EA	EU STOREROOM LOCK	ND80TDEU SPA RX 12V/24V DC	✓	626	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM		626	
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488FSBK PSA		BK	ZER
1	EA	MULTITECH READER	MT11/MT15 BY DIVISON 28	✓	BLK	SCE
1	EA	DOOR CONTACT	679-05WD/HM AS REQUIRED	✓	BLK	SCE
1	EA	POWER SUPPLY	PS902 KL900 120/240 VAC	✓	LGR	SCE
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS			
1			PROVIDE RISER DIAGRAMS			

DOOR OPERATION:
DOOR NORMALLY CLOSED AND LOCKED.
ENTRY BY KEY OR VALID CREDENTIAL.
FREE EGRESS AT ALL TIMES.
UPON LOSS OF POWER, DOOR REMAINS LOCKED. [FAIL SECURE]
RX MONITORS INSIDE LEVER POSITION.
DC MONITORS DOOR POSITION.

Hardware Group No. 09D

For use on Door #(s):
112

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQUIRED)		652	IVE
1	EA	POWER TRANSFER	EPT10	✓	689	VON
1	EA	EU MORTISE LOCK W/ INDICATOR XL13-346	L9492TEU 17A L583-363 XL13-346 RX DM CON 12/24 VDC	✓	626	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM		626	
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488FSBK PSA		BK	ZER
1	EA	MULTITECH READER	MT11/MT15 BY DIVISON 28	✓	BLK	SCE
1	EA	DOOR CONTACT	679-05WD/HM AS REQUIRED	✓	BLK	SCE
1	EA	POWER SUPPLY	PS902 KL900 120/240 VAC	✓	LGR	SCE
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS			
1			PROVIDE RISER DIAGRAMS			

DOOR OPERATION:
DOOR NORMALLY CLOSED AND LOCKED.
ENTRY BY KEY OR VALID CREDENTIAL.
CREDENTIAL READER SHUNTED BY DEADBOLT WHEN OCCUPIED.
FREE EGRESS AT ALL TIMES.
UPON LOSS OF POWER, DOOR REMAINS LOCKED. [FAIL SECURE]
RX MONITORS INSIDE LEVER POSITION.
DC MONITORS DOOR POSITION.

Hardware Group No. 10

For use on Door #(s):
103.1 116 119.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224HD EPT		628	IVE
1	EA	POWER TRANSFER	EPT10	✓	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-NL-OP-110MD 24 VDC	✓	626	VON
1	EA	RIM HOUSING	20-079		626	SCH
1	EA	FSIC CORE	23-030 ICX		ORG	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM		626	
1	EA	RECESSED DOOR PULL	PROVIDED BY FRP DOOR MFG.			TBD
1	EA	SURFACE CLOSER	4040XP SCUSH SRI		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA DW + 4" (OMIT @ COVERED OPENINGS)		AA	ZER
1	EA	GASKETING	488FSBK PSA		BK	ZER
1	EA	DOOR SWEEP	8198AA		AA	ZER
1	EA	THRESHOLD	65A-223		A	ZER
1	EA	MULTITECH READER	MT11/MT15 BY DIVISON 28	✓	BLK	SCE
1	EA	DOOR CONTACT	679-05WD/HM AS REQUIRED	✓	BLK	SCE
1	EA	POWER SUPPLY	PS902 KL900 120/240 VAC	✓	LGR	SCE
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS			
1			PROVIDE RISER DIAGRAMS			

Hardware Group No. 10A

For use on Door #(s):
001 002 003

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD EPT		628	IVE
1	EA	POWER TRANSFER	EPT10	✓	689	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-98-NL-OP-110MD 24 VDC	✓	626	VON
1	EA	RIM HOUSING	20-079		626	SCH
1	EA	FSIC CORE	23-030 ICX		ORG	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM		626	
1	EA	90 DEG OFFSET PULL	8190EZHD 12" STD		630-316	IVE
1	EA	SURF. AUTO OPERATOR	4642 TBWMS 120 VAC	✓	689	LCN
1	EA	ACTUATOR PKG	8310-3857TW		630	LCN
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	GASKETING PROVIDED BY ALUMINUM FRAME MFGR.			B/O
1	EA	THRESHOLD	655A-223		A	ZER
1	EA	MULTITECH READER	MT11/MT15 BY DIVISON 28	✓	BLK	SCE
1	EA	DESK MOUNT BUTTON	660-PB	✓	628	SCE
1	EA	DOOR CONTACT	7764	✓	628	SCE
1	EA	POWER SUPPLY	PS902 BBK 900-4RL 120/240 VAC	✓	LGR	SCE
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS			
1			PROVIDE RISER DIAGRAMS			

DOOR OPERATION:
DOOR NORMALLY CLOSED AND LOCKED.
ENTRY BY MECHANICAL KEY OR VALID CREDENTIAL.
FREE EGRESS AT ALL TIMES.
OUTSIDE ACTUATOR ENABLED BY VALID CREDENTIAL.
INSIDE ACTUATOR ALWAYS ACTIVE.
UPON LOSS OF POWER, DOOR REMAINS LOCKED [FAIL SECURE].
RX MONITORS EXIT DEVICE PUSH PAD.
DOOR CONTACT MONITORS DOOR POSITION.

Hardware Group No. 10B

For use on Door #(s):
001.1 002.1 003.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD EPT		628	IVE
1	EA	POWER TRANSFER	EPT10	✓	689	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-98-NL-OP-110MD 24 VDC	✓	626	VON
1	EA	RIM HOUSING	20-079		626	SCH
1	EA	FSIC CORE	23-030 ICX		ORG	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM		626	
1	EA	90 DEG OFFSET PULL	8190EZHD 12" STD		630-316	IVE
1	EA	OH STOP	100S		630	GLY
1	EA	SURF. AUTO OPERATOR	4642 TBWMS 120 VAC	✓	689	LCN
1	EA	ACTUATOR PKG	8310-3857TW		630	LCN
1	EA	GASKETING	GASKETING PROVIDED BY ALUMINUM FRAME MFGR.			B/O
1	EA	DOOR SWEEP	8198AA		AA	ZER
1	EA	THRESHOLD	65A-223		A	ZER
1	EA	MULTITECH READER	MT11/MT15 BY DIVISON 28	✓	BLK	SCE
1	EA	DOOR CONTACT	7764	✓	628	SCE
1	EA	POWER SUPPLY	PS902 BBK 900-4RL 120/240 VAC	✓	LGR	SCE
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS			
1			PROVIDE RISER DIAGRAMS			

DOOR OPERATION:
DOOR NORMALLY CLOSED AND LOCKED.
ENTRY BY MECHANICAL KEY OR VALID CREDENTIAL.
FREE EGRESS AT ALL TIMES.
OUTSIDE ACTUATOR ENABLED BY VALID CREDENTIAL.
INSIDE ACTUATOR ALWAYS ACTIVE.
UPON LOSS OF POWER, DOOR REMAINS LOCKED [FAIL SECURE].
RX MONITORS EXIT DEVICE PUSH PAD.
DOOR CONTACT MONITORS DOOR POSITION.

Hardware Group No. 13

For use on Door #(s):
104.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	PANIC HARDWARE	LD-98-EO	626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH SRI	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA DW + 4" (OMIT @ COVERED OPENINGS)	AA	ZER
1	EA	GASKETING	488FSBK PSA	BK	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	65A-223	A	ZER
1	EA	DOOR CONTACT	679-05WD/HM AS REQUIRED	BLK	SCE

Hardware Group No. 15

For use on Door #(s):
104

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	FIRE EXIT HARDWARE	98-L-NL-F-17	626	VON
1	EA	RIM HOUSING	20-079	626	SCH
1	EA	FSIC CORE	23-030 ICX	ORG	SCH
1	EA	CYLINDER CORE	KEYED TO MATCH OWNER'S SYSTEM	626	
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

END OF SECTION

SECTION 08800 – GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows
2. Doors.
3. Store Front.

1.2 DEFINITIONS

A. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

B. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

C. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

D. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
   a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in 130 miles per hour at 33 feet (10 m) above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
      1) Seismic Loads: IBC 2021, NJ Edition.
      2) Design wind load velocity at the project site is 125 mph
      3) Importance factor is 1.15
      4) Exposure category is "C"

   b. Specified Design Snow Loads: 30 PSF, but not less than snow loads applicable to Project as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7.0, "Snow Loads." Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
      1) Load Duration: 60 seconds or less.

   c. Minimum Glass Thickness for Exterior Lites: Not less than 1/4".
   d. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick of thickness indicated.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite 1/4", 6.0 mm thick and a nominal 1/2-inch-12.7-mm-) wide interspace.
4. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
   a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).
   b. Solar Heat Gain Coefficient: NFRC 200.
   c. Solar Optical Properties: NFRC 300.

1.4 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: 12-inch- (300-mm-) square, for each type of glass product indicated, other than monolithic clear float glass.

C. Glazing Schedule: Use same designations indicated on Drawings.

D. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer.

1.5 QUALITY ASSURANCE

A. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing according to ASTM C 1087, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:

B. Glazing for Fire-Rated Door Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257 and 16 CFR 1201.

C. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and IBC 2021 NJ Edition.

D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA/GANA Publications: “Glazing Manual” and "Laminated Glazing Reference Manual."
2. FGIA/IGMA Publication for Insulating Glass: IGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

E. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the Insulating Glass Certification Council.

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups as shown on Drawings for one bay or curtain wall or one unit window.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass, Laminated Glass and Insulating Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS

A. Tinted Float Glass: ASTM C1036, Type I, Class 2 (tinted), Quality-Q3.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Guardian Glass, LLC. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals. See Schedule or select comparable product by one of the following:
   a. Vitro.
   b. Interpane.
   c. Or approved equal.

B. Fully Tempered Float Glass; ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion horizontally oriented upon completion of installation, unless otherwise indicated.

C. Low-E Coated Vision Glass: ASTM C 1376, coated by vacuum deposition (sputter-coating) process, and complying with other requirements specified.

D. Laminated Glass: comply with ASTM C 1172. Provide products classified by the Glass Industry for use in "Safety Glazing Applications". Laminated Glass shall comply with the Consumer Product Safety Commission 16 CFR 1201 and the Safety Glass requirements of ANSI Z97.1 (current editions). Complying with other requirements specified and with the following:

1. Interlayer: Polyvinyl butyral of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

E. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.

1. Provide FT (fully tempered) float glass.

2. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
3. Sealing System: Dual seal.
4. Spacer Specifications: Manufacturer's standard spacer material and construction.
5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:

    a. Spacer Material: Stainless Steel warm edge spacer OR Aluminum with mill or clear anodic finish.
    b. Corner Construction: Manufacturer's standard corner construction.

2.2 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

1. Neoprene, ASTM C 864.
2. EPDM, ASTM C 864.
3. Silicone, ASTM C 1115.
4. Thermoplastic polyolefin rubber, ASTM C 1115.
5. Any material indicated above.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:

1. Neoprene.
2. EPDM.
3. Silicone.
4. Thermoplastic polyolefin rubber.
5. Any material indicated above.

2.3 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those

referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Single-Component Neutral-Curing Silicone Glazing Sealants:

   a. Products:
      1) See Section 07920 - Joint Sealants.
      2) Type and Grade: S (single component) and NS (nonsag).
      3) Class: 100/50.
      4) Use Related to Exposure: NT (nontraffic).
      5) Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.

2.4 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; non-staining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

   1. AAMA 804.3 tape, where indicated.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

   1. Type 1, for glazing applications in which tape acts as the primary sealant.
   2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.5 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.6 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.7 LAMINATED GLASS UNITS (Interior Glazing Only)

A. Laminated Glass – (Laminated 3/8" Units):

1. Products:

   a. PPG Industries
   b. Interpane Glass Company
   c. Guardian Industries Corp.
   d. Or approved equal

2. Class 1 (clear) 3/8" laminated glass with laminate film sandwiched between two panes of glass.

   a. 3/16" clear tempered glass - .060 PVB – 3/16" clear tempered glass (laminated sandwich panel).

2.8 INSULATING GLASS UNITS

A. Low-E Coated, Tinted Insulating **Vision** Glass Unit IG-1 Gray/Light Gray (Standard 1" Unit):

1. Overall Unit Thickness: 1 inch.
2. Outdoor Lite: 1/4 inch (6 mm), Class 2 (tinted), float glass.

   a. Tint Color: Owner to select from manufacturer's standard light gray, gray and/or blue tint colors.
   b. Low-E Coating on #2 Surface: Guardian SunGuard SN 68 or approved equal.
   c. Heat Treatment: Kind FT (fully tempered).

3. Interspace: Argon filled, 1/2 inch wide, hermetically sealed.
4. Indoor Lite: 1/4 inch (6 mm), Class 1 (clear), float glass.

   a. Heat Treatment: Kind FT (fully tempered).

5. Glass Unit Performance Values for **Light Gray (CrystalGray) Glass**:

   a. Visible Light Transmittance: 48 percent minimum.

b. Winter Nighttime U-Factor: 0.25 maximum.
c. Summer Daytime U-Factor: 0.22 maximum.
d. Solar Heat Gain Coefficient: 0.29.

6. Glass Unit Performance Values for **Gray Glass**:

a. Visible Light Transmittance: 34 percent minimum.
b. Winter Nighttime U-Factor: 0.25 maximum.
c. Summer Daytime U-Factor: 0.22 maximum.
d. Solar Heat Gain Coefficient: 0.24.

B. Low-E Coated, Clear Insulating **Vision** Glass Unit IG-1 Blue Glass (Standard 1" Unit):

1. Overall Unit Thickness: 1 inch.
2. Outdoor Lite: 1/4 inch (6 mm), Class 1 (clear) float glass.

a. Low-E Coating on #2 surface: Guardian SunGuard SNE 50/25 or approved equal.
b. Heat Treatment: Kind FT (fully tempered).

3. Interspace: Argon filled, 1/2 inch wide, hermetically sealed.
4. Indoor Lite: 1/4 inch (6 mm), Class 1 (clear), float glass.

a. Heat Treatment: Kind FT (fully tempered).

5. Glass Unit Performance Values for **Blue Glass**:

a. Visible Light Transmittance: 48 percent minimum.
b. Winter Nighttime U-Factor: 0.24 maximum.
c. Summer Daytime U-Factor: 0.21 maximum.
d. Solar Heat Gain Coefficient: 0.25.

C. Ceramic or Silicone Coated, Low-E Coated, Tinted Insulating **Spandrel** Glass Unit IG-1S Gray/Light Gray (Standard 1" Unit):

1. Overall Unit Thickness: 1 inch.
2. Outdoor Lite: 1/4 inch (6 mm), Class 2 (tinted), float glass.

a. Tint Color: Owner to select from manufacturer's standard light gray, gray and/or blue tint colors.
b. Low-E Coating on #2 Surface: Guardian SunGuard SN 68 or approved equal.
c. Heat Treatment: Kind FT (fully tempered).

3. Interspace: Argon filled, 1/2 inch wide, hermetically sealed.
4. Indoor Lite: 1/4 inch (6 mm), Class 1 (clear), float glass.

a. Coating on #4 Surface: Gray Silicone or Ceramic Spandrel.
b. Heat Treatment: Kind FT (fully tempered).

5. Glass Unit Performance Values for **Light Gray (CrystalGray) Glass**:

a. Visible Light Transmittance: 0 percent minimum.
b. Winter Nighttime U-Factor: 0.25 maximum.
c. Summer Daytime U-Factor: 0.22 maximum.
d. Solar Heat Gain Coefficient: 0.23.

6. Glass Unit Performance Values for **Gray Glass**:

a. Visible Light Transmittance: 0 percent minimum.
b. Winter Nighttime U-Factor: 0.25 maximum.
c. Summer Daytime U-Factor: 0.22 maximum.
d. Solar Heat Gain Coefficient: 0.19.

D. Ceramic or Silicone Coated, Low-E Coated, Clear Insulating **Spandrel** Glass Unit IG-1S Blue Glass (Standard 1" Unit):

1. Overall Unit Thickness: 1 inch.
2. Outdoor Lite: 1/4 inch (6 mm), Class 1 (clear) float glass.

a. Low-E Coating on #2 surface: Guardian SunGuard SNE 50/25 or approved equal.
b. Heat Treatment: Kind FT (fully tempered).

3. Interspace: Argon filled, 1/2 inch wide, hermetically sealed.
4. Indoor Lite: 1/4 inch (6 mm), Class 1 (clear), float glass.

a. Coating on #4 Surface: Gray Silicone or Ceramic Spandrel.
b. Heat Treatment: Kind FT (fully tempered).

5. Glass Unit Performance Values for **Blue Glass**:

a. Visible Light Transmittance: 0 percent minimum.
b. Winter Nighttime U-Factor: 0.24 maximum.
c. Summer Daytime U-Factor: 0.21 maximum.
d. Solar Heat Gain Coefficient: 0.19.

E. Low-E Coated, Tinted Insulating **Translucent (Acid Etched)** Glass Unit IG-1T Gray/Light Gray (Standard 1" Unit):

1. Overall Unit Thickness: 1 inch.
2. Outdoor Lite: 1/4 inch (6 mm), Class 2 (tinted), float glass.

a. Tint Color: Owner to select from manufacturer's standard light gray, gray and/or blue tint colors.
b. Low-E Coating on #2 Surface: Guardian SunGuard SN 68 or approved equal.
c. Heat Treatment: Kind FT (fully tempered).

3. Interspace: Argon filled, 1/2 inch wide, hermetically sealed.
4. Indoor Lite: 1/4 inch (6 mm), Class 1 (clear), float glass.

a. Coating on #3 Surface: Opaque Opacity Acid Etched Glass.

b. Heat Treatment: Kind FT (fully tempered).

5. Glass Unit Performance Values for **Light Gray (CrystalGray) Glass**:

a. Visible Light Transmittance: 48 percent minimum.
b. Winter Nighttime U-Factor: 0.25 maximum.
c. Summer Daytime U-Factor: 0.22 maximum.
d. Solar Heat Gain Coefficient: 0.29.

6. Glass Unit Performance Values for **Gray Glass**:

a. Visible Light Transmittance: 34 percent minimum.
b. Winter Nighttime U-Factor: 0.25 maximum.
c. Summer Daytime U-Factor: 0.22 maximum.
d. Solar Heat Gain Coefficient: 0.24.

F. Low-E Coated, Clear Insulating **Translucent (Acid Etched)** Glass Unit IG-1T Blue Glass (Standard 1" Unit):

1. Overall Unit Thickness: 1 inch.
2. Outdoor Lite: 1/4 inch (6 mm), Class 1 (clear) float glass.

a. Low-E Coating on #2 surface: Guardian SunGuard SNE 50/25 or approved equal.
b. Heat Treatment: Kind FT (fully tempered).

3. Interspace: Argon filled, 1/2 inch wide, hermetically sealed.
4. Indoor Lite: 1/4 inch (6 mm), Class 1 (clear), float glass.

a. Coating on #3 Surface: Opaque Opacity Acid Etched Glass.
b. Heat Treatment: Kind FT (fully tempered).

5. Glass Unit Performance Values for **Blue Glass**:

a. Visible Light Transmittance: 48 percent minimum.
b. Winter Nighttime U-Factor: 0.24 maximum.
c. Summer Daytime U-Factor: 0.21 maximum.
d. Solar Heat Gain Coefficient: 0.25.

2.9 INSULATING LAMINATED GLASS UNITS

A. Low-E Coated, Tinted, Laminated Insulating-Glass Unit IG-2 Gray/Light Gray (Security/Laminated Units):

1. Overall Unit Thickness: 1 and 1/16 inch.
2. Outdoor Lite: 1/4 inch (6 mm), Class 2 (tinted) float glass.

a. Tint Color: Owner to select from manufacturer's standard light gray, gray and/or blue tint colors.
b. Low-E Coating on #2 Surface: Guardian SunGuard SN 68 or approved equal.

c. Heat Treatment: Kind FT (fully tempered).

3. Interspace: Argon filled, 3/8 inch wide, hermetically sealed.
4. Indoor Laminated Glass Unit: Class 1 (clear) float glass, 7/16" laminated glass.

a. Laminated Sandwich: 3/16 inch (5 mm) clear glass - 0.060" PVB interlayer - 3/16 inch (5 mm) clear glass.
b. Heat treatment: Kind FT (fully tempered).

B. Low-E Coated, Clear, Laminated Insulating-Glass Unit IG-2 Blue Glass (Security/Laminated Units):

1. Overall Unit Thickness: 1 and 1/16 inch.
2. Outdoor Lite: 1/4 inch (6 mm), Class 1 (clear) float glass.

a. Low-E Coating on #2 Surface: Guardian SunGuard SNE 50/25 or approved equal.
b. Heat Treatment: Kind FT (fully tempered).

3. Interspace: Argon filled, 3/8 inch wide, hermetically sealed.
4. Indoor Laminated Glass Unit: Class 1 (clear) float glass, 7/16" laminated glass.

a. Laminated Sandwich: 3/16 inch (5 mm) clear glass - 0.060" PVB interlayer - 3/16 inch (5 mm) clear glass.
b. Heat treatment: Kind FT (fully tempered).

PART 3 - EXECUTION

3.1 GLAZING

A. General: Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

1. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
2. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
3. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
4. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
5. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
6. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

7. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

B. Tape Glazing: Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

1. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
2. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
3. Apply heel bead of elastomeric sealant.
4. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
5. Apply cap bead of elastomeric sealant over exposed edge of tape.

C. Gasket Glazing (Dry): Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

1. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
2. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
3. Install gaskets so they protrude past face of glazing stops.

D. Sealant Glazing (Wet): Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

1. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
2. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.2 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces. Protect glass from contact with

contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 08800

SECTION 08817 - FIRE RATED GLASS-CERAMIC GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-rated glazing materials for Fire Resistance Rated Assemblies and for vision lights in fire-rated doors.

1.2 REFERENCES

A. American Standard for Testing of Materials (ASTM)

1. ASTM E2074-00: Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
2. ASTM E2010-01: Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.

B. American National Standards Institute (ANSI):

1. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings

C. Consumer Product Safety Commission (CPSC):

1. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials

D. Glass Association of North America (GANA):

1. GANA – Glazing Manual.
2. FGMA – Sealant Manual.

E. National Fire Protection Association (NFPA):

1. NFPA 80: Fire Doors and Windows.
2. NFPA 252 – Fire Tests of Door Assemblies.
3. NFPA 257 – Fire Tests of Window Assemblies.

F. Underwriters Laboratories, Inc. (UL):

1. UL 9 – Fire Tests of Window Assemblies.
2. UL 10B – Fire Tests of Door Assemblies.
3. UL 10C – Positive Pressure Fire Tests of Door Assemblies.

G. Standard Council of Canada:

1. ULC Standard CAN4-S104: Fire Tests of Door Assemblies.
2. ULC Standard CAN4-S106: Fire Tests of Window Assemblies.
3. CAN/ULC-S101M: Standard Methods of Fire Endurance Tests.

H. IBC 2021 NJ Edition.

1.3 PERFORMANCE REQUIREMENTS

A. Fire-rated glass ceramic laminated clear and wireless glazing material for use in impact safety-rated locations such as doors, transoms and borrowed lites with fire rating requirements ranging from 20 minutes to 3 hours with required hose stream test.

B. Passes positive pressure test standards UL10C.

1.4 SUBMITTALS

A. Comply with requirements of Section 01300.

B. Product Data: Submit manufacturer's technical data for each glazing material required, including installation and maintenance instructions.

C. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

D. Product Test Listings: From UL indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.

E. Samples: Submit, for verification purposes, approx. 8-invh by 10-inch sample for each type of glass indicated.

1.5 QUALITY ASSURANCE

A. Glazing Standards: FGMA Glazing Manual and Sealant Manual.

B. Fire Protective Rated Glass: Each lite shall bear permanent, nonremovable label of UL certifying it for use in tested and rated fire protective assemblies.

C. Fire Protective Glazing Products for Door Assemblies: Products identical to those tested per ASTM E2074-00 and UL 10B, labeled and listed by UL.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials under provisions of Section 01600 – Materials and Equipment.

B. Deliver materials to specified destination in manufacturer or distributor's packaging, undamaged, complete with installation instructions.

C. Store off ground, under cover, protected from weather and construction activities.

1.7 WARRANTY

A. Provide manufacturer's limited warranty under provision of Section 01740 – Warranties and Bond.

B. Warranty Period: Five years from date of Substantial Completion.

PART 1 - PRODUCTS

1.1 FIRE-RATED GLAZING MATERIALS

A. Subject to compliance with specified requirements, provide products by one of the following manufacturers or approved equal:

1. Vetrotech Saint-Gobain; Keralite Select Laminated (L)
2. McGrory Glass; Pyran Platinum L
3. Technical Glass Products (TGP); Firelite Plus
4. Or approved equal.

B. Properties:

1. Thickness: 5/16 inch [8 mm] overall.
2. Weight: 4.1 lbs./sq. ft.
3. Approximate Visible Transmission: 82 percent.
4. Fire-rating: 20 minutes to 3 hours for doors; 20 minutes to 90 minutes for other applications.
5. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
6. STC Rating: Approximately 35 dB.
7. Surface Finish: Select (polished).
8. Positive Pressure Test: UL 10C

C. Maximum sheet sizes based on surface finish:

1. Select: 44 inches by 96 inches.

D. Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg F (250 deg C) temperature-rise limitation; and the fire-resistance rating in minutes.

E. Fire Rating: Fire-Protection-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing according to NFPA 252/NFPA 257 or UL 9/10B/10C, CAN/ULC-S104 and S106, including the hose-stream test, and shall comply with NFPA 80.

1. Fire-protection-rated glazing required to have a fire-protection rating of 20 minutes shall be exempt from the hose-stream test.

1.2 FIRE AND SAFETY RATED GLAZING MATERIALS (20-minute rated glazing only)

A. Pyroswiss 20 or approved equal, Fire Rated Tempered Glass: Fire rated, wireless, optically clear tempered glazing material for use in impact safety rated 20-min. doorlite applications. Provides smoke and flame barrier. Does not provide a barrier to radiant or conductive heat. For use in interior or exterior applications.

B. FireDefend20 by McGrory Glass (or approved equal).

C. Fireglass 20 by TGP (or approved equal).

D. Provide units with the following properties:

1. Thickness: 1/4 inch (6mm).
2. Weight: 3.2 lbs/sf (16 kg per sq. meter).
3. Approximate Visible Light Transmission: 90 percent.
4. Impact Safety Performance: ANSI Z97.1 and CPSC 16CFR1201 (CAT I & II).
5. Labeling: Each lite shall be labeled with a permanent logo including the name of product, manufacturer, testing laboratory (Underwriters Laboratories), fire rating period and safety glazing standards.
6. Fire Rating: 20-minutes (without hose stream test).
7. Fire Rating Testing: Fire rating tested and listed by Underwriters Laboratories; tested in accordance with NFPA 252, UL 9, UL 10C and ASTM E 2074 (without hose stream test).
8. Framing System: Standard fire rated doors and frames as applicable.

1.3 GLAZING ACCESSORIES

A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.

B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
   a. Dow Corning Corporation.
   b. GE Construction Sealants; Momentive Performance Materials Inc.
   c. Tremco Incorporated.
   d. Or approved equal.

C. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

D. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

1.4 FABRICATION

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Examine glass framing, with glazier present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
2. Minimum required face or edge clearances.
3. Observable edge damage or face imperfections.

B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

C. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

2.2 INSTALLATION (GLAZING)

A. Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

B. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

C. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.

D. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.

E. Place setting blocks located at quarter points of glass with edge block no more than 6 inches from corners.

F. Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.

G. Place glazing tape on free perimeter of glazing in same manner described above.

H. Install removable stop and secure without displacement of tape.

I. Use specified glazing compound, without adulteration; bed glazing material in glazing compound; entirely fill all recess and spaces. Provide visible glazing compound with smooth and straight edges.

J. Install in vision panels in fire-rated doors to requirements of NFPA 80.

K. Install so that appropriate [UL] markings remain permanently visible.

2.3 PROTECTION AND CLEANING

A. Protect glass from contact with contaminating substances resulting from construction operations. Remove any such substances by method approved by glass manufacturer.

B. Wash glass on both faces not more than four days prior to date scheduled for inspections intended to establish date of substantial completion. Wash glass by method recommended by glass manufacturer.

GLAZING SCHEDULE

Rating	Assembly	Max. Exposed Area (Sq. In.)	Max. Width Of Exposed Glazing (In.)	**O R**	Max. Height Of Exposed Glazing (In.)	Stop Height
20 min.	Doors					
	HMS or Wood*	3,204	36		89	5/8"
	Other than doors					
	HMS or Wood	3,325	95		95	5/8"
45 min.	Doors					
	HMS or Wood	3,204	36		89	5/8"
	Other than doors					
	HMS or Wood	3,325	95		95	5/8"
60 min.	Doors (non-temp rise)	3,204	36		89	5/8"
	HMS or Wood	3,204	36		89	3/4"
	Doors (temp rise)					
	Other than doors	3,325	95		95	5/8"
	HMS or Wood	3,325	95		95	3/4"
90 min.	Doors (non-temp rise)	2,034 100	36 12		56 ½" 33	3/4" 1/2"
	Doors (temp rise)					
	Other than doors	2,627	56 ½"		56 ½"	5/8"
	HMS	2,627	56 ½"		56 ½"	3/4"
3 hours	Doors	100	12		33	1/2"

* HMS indicates hollow metal steel framing. For wood frames, check with manufacturer for maximum tested glass sizes.

END OF SECTION

SECTION 09255 – GYPSUM BOARD ASSEMBLIES

1.1 GENERAL

A. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

B. Fire Resistance: Where fire resistance rated gypsum board assemblies are indicated, provide gypsum board assemblies that are identical to assemblies tested for fire resistant according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

C. Design framing systems in accordance with 2021 IBC New Jersey Edition and AISI S220.

1.2 SUBMITTALS

A. Evaluation Reports: Submit evaluation reports certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 accreditation criteria for inspection agencies.

B. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified in accordance with the product-certification program of the Steel Framing Industry Association (SFIA) or similar organization providing a verifiable code-compliance program.

C. Provide an index (table of contents) of job specific products, assemblies and reference the contract drawing details. Indicate on the manufacturer's cut sheets the specific products, gauge, etc. to be used (be specific).

1.3 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

1. Steel Framing and Furring:

a. ClarkDietrich
b. Marino/Ware (formerly Marino Industries Corp.).
c. Or approved equal.

2. Grid Suspension Assemblies:

a. Armstrong World Industries, Inc.
b. USG Interiors, Inc.
c. Or approved equal.

3. Gypsum Board and Related Products:

a. GP Gypsum, LLC
b. National Gypsum Co.; Gold Bond Building Products Division (NG).
c. United States Gypsum Co. (USG).
d. Or approval equal.

B. Steel Framing Components for Suspended and Furred Ceilings: Provide components complying with ASTM C 754 for conditions indicated.

1. Powder-Actuated Fasteners in Concrete: Corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190.
2. Wire Ties: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper, 0.062 inch (1.6 mm) thick.
3. Wire Hangers: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper, 0.162-inch (4.1-mm) diameter.
4. Hanger Rods: Mild steel and zinc coated or protected with rust-inhibitive coating.
5. Flat Hangers: Mild steel and zinc coated or protected with rust-inhibitive coating.
6. Channels: Cold-rolled steel, 16 ga minimum thickness of base steel and 1/2- inch-(13-mm-) wide flanges, and as follows:

    a. Carrying Channels: 2 inches (50.8 mm) deep, 590 lb/1000 feet (88 kg/100 m), unless otherwise indicated.
    b. Finish: ASTM A 653, G 60 (ASTM A 653M, Z 180) hot-dip galvanized coating for framing for exterior soffits and where indicated.

C. Steel Studs for Furring Channels: AISI S220, in depth indicated and with 0.0179 inch (0.45 mm) minimum base steel thickness, unless otherwise indicated.

1. Protective Coating: Comply with AISI S220; ASTM A 653, G 40 (Z120); or coating with equivalent corrosion resistance of ASTM A653/A653M, G40 (Z120) hot-dip galvanized coating for framing for exterior soffits and ceiling suspension members in areas within 10 feet (3 m) of exterior walls. Galvannealed products are unacceptable.

    a. Coating to demonstrate equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.

D. Steel Resilient Furring Channels: Standard product fabricated from steel sheet complying with ASTM A 653 (ASTM A 653M) to form ½-inch- (12.7-mm-) deep channel of the following configuration unless otherwise indicated:

1. Double-Leg Configuration: Hat-shaped channel with 1-1/2-inch- (38.1-mm-) wide face connected to flanges by double-slotted or expanded-metal legs (webs).
2. Single-Leg Configuration: Asymmetrical.

    a. Product: ClarkDietrich; RC Deluxe (RCSD) Resilient Channel or approved equal.

E. Grid Suspension System for Interior Ceilings: ASTM C 645, manufacturer's standard direct-hung system.

F. Steel Framing for Walls and Partitions: Provide a minimum of 20 gauge interior non-bearing steel framing members complying with the following requirements: (for all bearing walls refer to structural drawings)

1. Protective Coating: Comply with AISI S220; ASTM A 653, G 40 (Z120) or coating with equivalent corrosion resistance of ASTM A653/A653M, G40 (Z120), hot-dip galvanized coating for framing members attached to and within 10 feet (3 m) of exterior walls. Galvannealed products are unacceptable.

   a. Coating to demonstrate equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.

2. Steel Studs and Runners: AISI S220 in depth indicated 20 gauge minimum base steel thickness, unless otherwise indicated.

   a. Product: ClarkDietrich; ProSTUD Drywall Framing System ProSTUD 30 (0.0296 inch – 0.7518 mm) for typical walls and ProSTUD 33 (0.0329 inch – 0.8382 mm) for tile walls with Smart Edge technology and with DiamondPlus® Coating or approved equal.

INTERIOR NON-BEARING GYPSUM STUD
PARTITION HEIGHT LIMITATION & GAUGE TABLE

INTERIOR NON-BEARING GYPSUM STUD PARTITION			
1 5/8" STUD 16" o.c.	2 1/2" STUD 16" o.c.	3 5/8" STUD 16" o.c.	6" STUD 16" o.c.
	18 GA. UP TO 12'- 6"	18 GA. UP TO 16'- 6"	16 GA. UP TO 22'- 0"
20 GA, UP TO 8'- 10"	20 GA. UP TO 11'- 6"	20 GA. UP TO 15'- 0"	
SEE STRUCTURAL DRAWINGS FOR OTHER FRAMING GAUGE & SIZE			

G. Steel Rigid Furring Channels: AISI S220, hat shaped, in depth indicated and with 0.0296 inch (20 gauge), minimum base steel thickness unless otherwise indicated.

   1. Product: ClarkDietrich; Furring Channel or approved equal.

H. Fasteners for Metal Framing: Type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

I. Gypsum Board Products: Provide 5/8" Type X fire-resistant GWB. Provide one of the four products listed per the application location. Provide maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.

1. **Abuse Resistant Gypsum Board**: Provide this product at most locations up to ten (10) feet above the finished floor. Above ten (10) fee above finished floor the Contractor may use mold-resistant GWB to the roof deck or ceiling. Note that all walls shall run to the structure above (full height). Provide Hi-Abuse Brand Wallboard, fire resistant gypsum core encased in a heavy, smooth, white abrasion resistant paper on the face side and heavy liner paper on the back side, 5/8" thick. Conforming to the physical properties of ASTM C36 and ASTM C1177 on Glass mat back. Rating of 10 "No Mold Growth" as tested for 4 weeks according to ASTM D3273 "Armor Plus" manufactured by Georgia-Pacific Corporation, "Extreme Abuse" by Certainteed or approved equal.

2. **Moisture Rated Gypsum Board**: Provide within eight feet of sinks, drinking fountains or wet locations without tile. Interior Moisture, Mold and Mildew Resistant Gypsum Wallboard: Coated inorganic glass mat-faced, water resistant treated gypsum core wallboard, 5/8" thick. Conforming to the physical properties of ASTM 630 and ASTM C1177, Rating of 10 "No Mold Growth" as tested for 4 weeks according to ASTM D3273. DensArmor Plus Interior Guard manufactured by Georgia-Pacific Corporation or approved equal.

3. **Tile Backer**: Provide at all tile locations: Water Resistant Board:

   a. DensSheild Tile Backer (or approved equal) sheathing conforming to ASTM C 1178/C, mold resistant; 5/8" thick, non-combustible; perm rating <1.5.
   b. Cementitious Backer Units: ANSI A 118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges. Product subject to compliance with requirements of USG Corporation; DUROCK cement board, 5/8" thick; mold resistance ASTM D 3273, score of 10, or approved equal.

4. **Exterior Sheathing**: DensGlass Gold Exterior (or approved equal) sheathing conforming to ASTM C1177, water-resistant, treated core with a fiberglass mat face and back, 5/8" thick, non-combustible; resistant to growth of mold per ASTM D3273.

J. Gypsum Board Base Layer(s) for Multilayer Applications: ASTM C 1396 in thickness indicated:

1. Type: 5/8 inches Type X for fire-resistance-rated assemblies.
2. Type: Sag-resistant type for ceiling surfaces, unless otherwise indicated.

K. Accessories for Interior Installations: Cornerbead, edge trim, and control joints complying with ASTM C 1047, formed metal or plastic, with metal complying with the following requirement:

1. Steel sheet zinc added space coated by hot dip proceed or rolled zinc.

L. Joint Treatment Materials: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

1. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.

a. Use pressure-sensitive or staple-attached, open-weave, glass-fiber reinforcing tape with compatible joint compound where recommended by manufacturer of gypsum board and joint treatment materials for application indicated.

1) Product: ClarkDietrich; Strait-Flex Butt-Tape, or approved equal.

2. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job- mixed, chemical-hardening powder products formulated for uses indicated.

a. For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer.
b. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by gypsum board manufacturer.
c. For topping compound, use sandable formulation.

3. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.

a. Ready-Mixed Formulation: Factory-mixed product.

1) Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
2) All-purpose compound formulated for both taping and topping compounds.

M. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that is effective in reducing the airborne transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.

N. Miscellaneous Materials: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

1. Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum panels.
2. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.
3. Fastening Adhesive for Metal: Special adhesive recommended for laminating gypsum panels to steel framing.

4. Steel drill screws complying with ASTM C 1002 for the following applications:

    a. Fastening gypsum board to steel members less than 0.033 inch (0.84 mm) thick.
    b. Fastening gypsum board to gypsum board.

5. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
6. Foam Gaskets: Closed-cell vinyl foam adhesive-backed strips, that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit metal stud size indicated.
7. Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation to comply with ASTM C 665 for Type I.

1.4 EXECUTION

A. Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.

1. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
2. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.

    a. Where building structure abuts ceiling perimeter or penetrates ceiling.
    b. Where partition framing and wall furring abut structure, except at floor.

3. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

B. Installing Steel Framing for Suspended and Furred Ceilings: as follows:

1. Sway-brace suspended steel framing with hangers used for support.
2. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.
3. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vel iical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

C. Installing Steel Framing for Walls and Partitions: Install steel studs and furring at spacings indicated.

1. Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.
2. Extend partition framing full height to structural supports or substrates above suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
3. Cut studs 1 inch short of full height to provide perimeter relief.

4. All interior walls are STC-rated and some are fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.
5. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated.
6. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

D. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

1. Install sound-attenuation blankets prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
2. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
3. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches (813 mm) wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.
4. Form control and expansion joints, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels. Provide per manufacturer's recommendations / industry standards.
5. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to ½-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
6. All walls are STC-rated gypsum board assemblies. Seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.
7. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.

    a. Space screws a maximum of 12 inches (304.8 mm) o.c. for vertical applications or as required by fire resistive design.

8. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.
9. Install water resistant gypsum board within 6 feet of wet locations. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or penetrations.
10. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:

    a. Fasten with screws.

11. Multilayer Fastening Methods: Apply base layers of gypsum panels and face layer to base layers as follows:

    a. Fasten both base layers and face layers separately to supports with screws.

E. Installing Trim Accessories: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.

1. Install cornerbead at external corners.
2. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.

    a. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
    b. Install L-bead where edge trim can only be installed after gypsum panels are installed.
    c. Install U-bead where indicated.
    d. Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by Architect for visual effect.

F. Finishing Gypsum Board Assemblies: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

1. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.
2. Apply joint tape over gypsum board joints, except those with trim accessories having flanges not requiring tape.
3. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214-15.

    a. For all areas provide Level 4 finish for gypsum board surfaces.

4. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.
5. Finish water-resistant gypsum backing board to comply with ASTM C 840 and gypsum board manufacturer's directions.

END OF SECTION 09255

SECTION 09300 – CERAMIC TILE

PART 1 GENERAL

A. ANSI Tile Standards: Comply with ANSI A137.1 Standard Specification for Ceramic Tile and ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile."

B. TCNA Installation Guidelines: The current edition of the TCNA "Handbook for Ceramic, Glass, and Stone Tile Installation"; comply with TCNA installation method F112 for recessed wet set floor construction, W223and W202I for interior wall construction.

C. Submittals: With manufacturer's product data and installation instructions for tile work, submit samples of each type, color, and texture of tile mounted on 12-inch-square backing with joints grouted.

D. Attic Stock: Provide 5 percent of amount installed, packaged with protective covering for storage, and identified with labels clearly describing contents, before installation begins. Furnish attic stock: Furnish not less than 1 box for each 50 boxes or a fraction thereof, of each type, color, pattern, and size as installed.

PART 2 PRODUCTS

A. Colors, Textures, and Patterns: For tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, comply with the following requirements:

1. Provide selections made by Architect from manufacturer's full range of standard colors, textures, and patterns for products of type indicated.
2. The Architect may use multiple color patterns.

B. Sizes and Thicknesses: As indicated on the drawings.

C. Tile Grade: Provide category one and two standard grade color selection samples for field use and up to category four color selection samples for accent tiles. When the Contract Documents call to match existing tile, the Contractor shall include "color match" by QTCO distributed by Daltile or approved equal.

D. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

E. Unglazed Ceramic Mosaic Floor Tile: Factory-mounted flat tile and as follows:

1. Composition: Porcelain with abrasive admixture.
2. Face: Standard design with cushion edges.

F. Glazed Wall Tile: Factory-mounted flat tile and as follows:

1. Face: Plain with cushion edge.
2. Mounting: Back-mounted.

G. Backer Board: Provide ¼" thick cement backer board at all existing CMU wall surfaces to receive new ceramic tile finish. Backer boards shall be fabricated with 90% Portland cement and sand mixture to resist damage from moisture. Formulation and structure must provide strength, uniform composition and excellent tile adhesion. Provide HardieBacker by James Hardie or approved equal.

H. Trim Shapes: Same material, size, color, and texture as field tile. Provide cove base, inside and outside vertical coves and beads.

I. Marble Thresholds: Group "A"; ASTM C 503, for exterior use with minimum hardness of 10.0 per ASTM C 241; white with honed finish unless otherwise indicated.

J. Surface Preparation Materials: Provide surface preparation materials as follows:

1. Trowelable Floor/Wall Patch and Render Mortar: Quick-Setting, Polymer-Modified, Fiber-Reinforced, Cementitious Rendering, Patching, and Leveling Mortar, can be applied at 1/8 inch to 1-1/4 inch (3 mm to 32 mm).

    a. Product: MAPEI, Planitop 330 Fast.
    b. Or approved equal

2. Trowelable Concrete Floor Patch: High-Performance, Fast-Setting Cementitious Patching Compound. Can be applied at 1/16 inch to 1-1/2 inches (1.5 mm to 38 mm) neat and from 1-1/2 inches to 3 inches (38 mm to 76 mm) neat in areas no larger than 24 sq ft (2.23 sq m).

    a. Product: MAPEI, Mapecem Quickpatch.
    b. Or approved equal

K. Self-Leveling Underlayments: Provide self-leveling underlayments as follows:

1. Quick-Setting, Hydraulic Cement Underlayment: Polymer-modified, self-leveling, hydraulic cement. Applied Minimum Uniform Thickness: 1/8 to 1 inch (3 to 25 mm).

    a. Product: MAPEI, Novoplan 2 Plus. Or approved equal
        1) Primer required: MAPEI, Primer T.
        2) or approved equal

L. Waterproof and Crack Isolation Membranes: Provide Waterproof and Crack Isolation membranes as follows:

1. Fluid-Applied Membrane: Advanced liquid-rubber; extremely quick-drying, premium waterproofing and crack- isolation membrane, IAPMO-listed, ANSI A118.10 and A118.12.

    a. Product: MAPEI, Mapelastic AquaDefense. (or approved equal)
        1) With MAPEI, Reinforcing Fabric (or approved equal)

M. Setting Materials: Provide setting materials as follows:

1. Portland Cement Mortar: Materials complying with ANSI A 108.1 and as follows:

   a. Latex additive (water emulsion) as follows, replacing part or all of gauging water, specifically recommended by latex additive manufacturer for use with job-mixed portland cement and aggregate mortar bed.

      1) Latex Additive: Manufacturer's standard.
         a) Product: MAPEI, Planicrete AC.
         b) Or approved equal

2. Dry-Set Portland Cement Mortar: ANSI A118.1.

3. Latex-Portland Cement Mortar: ANSI A118.4.

   a. Prepackaged dry mortar mix composed of portland cement, graded aggregate, and the following dry polymer additive in the form of a reemulsifiable powder to which only water is added at job site.

      1) Dry Polymer Additive: Manufacturer's standard.
         a) Product: MAPEI, Ultraflex 2 or Keraflex Plus.
         b) Or approved equal

4. Improved Modified Dry-Set Cement Mortar: Non-Sag, for Large and Heavy Tile; ANSI A118.4HTE, ANSI A118.11, ANSI A118.15HTE, and ISO 13007 C2TES1P1.

   a. Product: MAPEI Ultraflex LFT or Keraflex Super.
   b. Or approved equal

5. Improved Modified Dry-Set Cement Mortar: ANSI A118.4E, ANSI A118.11, ANSI A118.15E, and ISO 13007 C2ES2P2.

   a. Product: MAPEI, Kerabond/Keralastic System or Ultralite S2.
   b. or approved equal

6. Latex additive as described below, replacing part or all of gauging water, combined at job site with prepackaged dry mortar mix specified by latex additive manufacturer.

   a. Latex Type: Manufacturer's standard.
      1) Product: MAPEI, Kerabond/Keralastic System.
      2) Or approved equal

7. Organic Tile Adhesive: ANSI A136.1, Type I.

N. Grouting Materials: Provide grouting materials as follows:

1. Latex-Portland Cement Grout: ANSI A118.6 of the following composition.

   a. Latex additive (water emulsion) replacing part or all of gauging water, added at job site with dry grout mixture, with type of latex and dry grout mix as follows:
      1) Latex Type: Manufacturer's standard.

2) Dry Grout Mixture: Commercial portland cement specified or supplied by latex additive manufacturer.

2. High Performance Cement Tile Grout: For grout joints from 1/16 to 3/4 inch (1.5 to 19 mm) and meeting ANSI A118.7 and ISO 13007 CGWAF.

a. Product: MAPEI; Ultracolor Plus FA.
b. Or approved equal

O. Elastomeric Sealants: Manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with requirements of Division 7 Section "Joint Sealers" including ASTM C 920 as referenced by Type, Grade, Class, and Uses.

1. One-Part Mildew-Resistant Silicone Sealants: ASTM C 920, Type S, Grade NS, Class 25, Uses NT, G, A, and O (for use in joints in nontraffic areas).

a. Product: MAPEI; Mapesil T Plus.
b. Or approved equal

P. Miscellaneous Materials: Provide the following materials:

1. Metal Edge Strips: Stainless steel or zinc alloy, 1/8-inch wide at top edge.

2. Temporary Protective Coating: As follows, formulated to protect exposed surfaces of tile against adherence of mortar and grout, compatible with tile and mortar/grout products, and easily removable without damaging grout or tile.

a. Petroleum paraffin wax, fully refined, tasteless, odorless, containing at least 0.5 percent oil, with a melting point of 120 deg F (49 deg C) to 140 deg F (60 deg C) per ASTM D 87.

3. Sulfamic Acid Crystals: Cleaner and problem-solver for nonporous, acid-resistant tile and natural stone. Removes cured cement grout haze, mortar residue, rust stains and mineral deposits such as efflorescence.

a. Product: MAPEI, UltraCare Sulfamic Acid Crystals.
b. Or approved equal

4. Grout release: high-performance sacrificial coating that protects the tile surface from grout stains, improves cleanability and reduces the risk of grout haze or film residue, interior and exterior applications on all-natural stone; marble, limestone, sandstone, slate, granite and travertine, porcelain/ceramic tiles, masonry and quarry tiles.

a. Product: MAPEI, UltraCare Grout Release.
b. Or approved equal

5. Solvent-Based Penetrating Sealer: Natural-look providing maximum protection against most common stains. For use on interior and exterior natural stone; marble, limestone, sandstone, slate, granite, travertine, unglazed porcelain and ceramic tiles, masonry, quarry tiles and cement grout. Can also be used as a pre-grouting sealer.

a. Product: MAPEI, UltraCare Penetrating SB Stone, Tile and Grout Sealer.
b. Or approved equal

6. Neutral pH Cleaner: Highly concentrated, zero-VOC, for ceramic, porcelain and natural stone surfaces and prevent soap scum buildup and hard water deposits.

a. Product: MAPEI, UltraCare Concentrated Tile and Grout Cleaner.
b. Or approved equal

7. High-Alkaline Cleaner: Highly concentrated and degreaser that quickly removes waxes, grease, oil, light soap scum, mildew and algae stains. For areas that have been neglected or subject to heavy use.

a. Product: MAPEI, UltraCare Heavy-Duty Stone, Tile and Grout Cleaner.
b. Or approved equal

PART 3 EXECUTION

A. Field-Applied Temporary Protective Coating: Where indicated under or needed to prevent adhesion or staining of exposed tile surfaces by grout, precoat tile with a continuous film of temporary protective coating indicated below:

1. Petroleum paraffin wax.

B. Installation: Follow TCNA Installation Guidelines. TCNA "Handbook for Ceramic Tile Installation"; comply with TCNA installation method F112-2007, F113-2007 for recessed wet set floor construction, W202-2007, W223-2007 for wall construction.

C. Existing Floor Preparation: Assume that major floor preparation and leveling will be required on concrete subfloor. Provide positive slope to the floor drain. Assume that up to 1 ½" of leveling may be required on existing concrete subfloor.

D. Joint Pattern: Use grid pattern with 1/16-inch-wide joints unless otherwise indicated.

E. Expansion, Control, Contraction, and Isolation Joints: As indicated per TCNA Method EJ171.

1. Seal tile joints with elastomeric sealants to comply with Division 7 Section "Joint Sealants."

F. Edge Strips: Provide at exposed edge of tile meeting carpet, wood, or resilient flooring, unless otherwise indicated.

G. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions but no sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning.

Flush surface with clean water before and after cleaning.

3. Remove temporary protective coating, by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
4. Floor drain: Slope setting mortar bed to floor drain for positive water flow. Remove and clean the drain cover after grouting and final cleaning.

END OF SECTION 09300

SECTION 09510 - ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 Summary:

A. This Section includes acoustical ceilings consisting of suspended exposed-grid systems with lay-in acoustical panels.

1.2 Submittals:

A. Product Data: Manufacturer's complete technical descriptive literature for each item required, including specifications and installation recommendations.

B. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Within 60 days after award of Contract, submit coordination drawings for all new or altered areas, draw n accurately to a scale no less than 1/8" = 1 ' - O ", coordinating penetrations and ceiling-mounted items. Coordinate with other prim e contractors to obtain necessary information and agreement on location of penetrations and ceiling-mounted items. Upon review and acceptance by Architect, incorporate revisions (if any) into an AutoCAD -based file. Furnish one hard copy of accepted shop drawings and one updated CAD-file copy to all other applicable prim e contractors for their further information and use. Show the following:

1. Ceiling suspension system members.
2. Method of attaching hangers to building structure.
3. Bulkheads, soffits, areas with drywall ceilings (if any), and areas of exposed structure (if any).
4. Room names and numbers, ceiling types, and ceiling elevations above the finished floor.
5. Special moldings at walls, column penetrations, and other junctures with adjoining construction, including all curved walls and bulkheads.
6. Ceiling-mounted items, including light fixtures; HVAC air distribution devices; speakers; fire alarms; sprinkler heads; and other similar devices or fixtures.

C. Shop Drawings: Show details and information pertinent to construction, installation, and placement of all components required for continuous, smooth wall angles at curved walls, bulkheads and circular columns. Include sections of typical curved wall angle.

1.3 Quality Assurance:

A. Installer Qualifications: Engage an experienced installer who has completed acoustical tile ceilings and finishes similar in material, design, and extent to that indicated for this Project and with a minimum five-year record of successful in-service performance.

B. Source Limitations for Ceiling Units: Obtain all acoustical panel and grid systems from one single source.

1.4 Delivery, Storage and Handling:

A. Deliver acoustical materials and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be

protected against damage from moisture, direct sunlight, surface contamination, and other detrimental conditions.

B. Before installing acoustical materials, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical tiles and panels carefully to avoid chipping edges or damaging units in any way.

1.5 Project Conditions:

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. The work area shall be broom clean and the structure in proper condition to receive acoustical materials. Acoustical work shall follow the installation of ductwork, piping and conduit located in ceiling space above ceilings.

1.6 Coordination:

A. Coordinate layout and installation of acoustical materials and suspension systems with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.7 Extra Stock:

A. Furnish two (2) extra cartons of full-size ceiling tiles of each type with protective covering for storage and are identified with labels describing contents.

PART 2 PRODUCTS

2.1 Acoustical Ceilings. General:

A. Humidity Resistance: Unless indicated otherwise, ceiling panels shall be rated for 90% humidity conditions and shall have a 10-year sag- and warp-resistance warranty, comparable to Armstrong's "HumiGuard Plus" or approved equal.

B. Acoustical Ceiling Colors: Manufacturer's standard white, unless indicated otherwise.

C. Fire-Test-Response Characteristics: Provide ceilings (ceiling panels/tiles, grids and accessories) that comply with the following requirements:

1. Fire-response tests were performed by UU, ITS/Wamock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
2. Surface-burning characteristics of acoustical panels shall comply with ASTME 1264 for Class A materials as determined by testing identical products per ASTME 84.

D. Dimensions: Length by width dimensions for lay-in ceiling panels are nominal dimensions. Actual dimensions are to be factory-cut sizes that fit within suspended ceiling grids having standard modular dimensions matching the specified panel nominal length and width.

2.2 Acoustical Ceiling Systems:

A. ACT-A: 24 in. x 48 in. x 7/8 in. lay-in panels with square edge profile; wet-formed panel composed of mineral fiber with a factory-applied, vinyl latex paint finish; minimum light reflectance (LR) rating of 0.84; minimum ceiling attenuation class (CAC) of 40; and minimum noise reduction coefficient (NRC) of 0.70. Suspension system - Type A.

1. Subject to compliance with requirements, provide one of the following panel products:

a. Armstrong World Industries; School Zone Fine Fissured #1714
b. Certainteed; Sereno Fine Fissured #SFF-497 HNRC/HCAC
c. USG Interiors; Radar Clima Plus, High-NRC #22441
d. or approved equal

B. ACT-B: 24 in. x 24 in. x 5/8 in. lay-in panels with square edge profile; wet-formed panel composed of mineral fiber with a factory-applied, vinyl latex paint finish; minimum light reflectance (LR) rating of 0.84; minimum ceiling attenuation class (CAC) of 40; and minimum noise reduction coefficient (NRC) of 0.70. Suspension system - Type A.

2. Subject to compliance with requirements, provide one of the following panel products:

a. Armstrong World Industries; School Zone Fine Fissured #1713
b. Certainteed; Sereno Fine Fissured #SFF-457 HNRC/HCAC
c. USG Interiors; Radar Clima Plus, High-NRC #22521
d. or approved equal

2.3 Suspension Systems:

A. General: Unless indicated otherwise, suspension grids shall comply with ASTMC 635 "Intermediate Duty" Classification.

B. Suspension System Types:

1. Type A, B: Exposed grid system with 15/16 in. wide face, shall be HDG steel, Class A Fire Rated, White.

C. Suspension System Accessories: Provide all accessories necessary to complete installation, including, but not limited to, the following:

1. Preformed, factory-finished, bull-nosed comers to match grid material and finish. Provide radiused corners where grid meets bull-nosed block.
2. Provide impact clips at toilet room and gymnasium ceilings.

3. Provide retention clips for ceilings located in wind locks and vestibules.
4. Provide white, dual durometer polyvinylchloride (PVC) bellow s-style filler for 1-inch expansion joints in suspended lay-in acoustical ceilings, selected from the following options:

    a. Allway HC/HC W Series; Construction Specialties, Inc.
    b. DX Series; M M Systems Corp.
    c. Wabo Fast Wrap CES Series; Watson Bowman Acme Corp.
    d. or approved equal

PART 3 EXECUTION

3.1 Ceiling Installation:

A. Suspend main beams spaced at 24 in. or 48 in. o.c., as indicated on Drawings, from structure above by minimum #12 gauge galvanized wire hangers spaced not more than 48 in. o.c.

B. Install interlocking cross-tees at 24 in. o.c. to form a 24 in. x 48 in., or 24 in. x 24 in. grid pattern.

C. System shall be accurately leveled to within 1/8 in. in 12 ft. 0 in. Deflection shall not exceed 1/360 of the span of any component.

D. Provide matching perimeter molding around separate room areas, abutting walls, and around columns and similar protrusions, unless indicated otherwise.

    1. At radiused bulkheads and walls, provide curved wall angle, factory-formed to match diameter of bulkheads and walls; aluminum, finished to match ceiling grid. Field cut and formed edges made up of straight sections will not be permitted.

E. Where perimeter molding meets expansion joint trim, provide a clear break in the molding equal to no less than the expansion joint width.

F. Scribe and cut panels at borders and penetrations to provide a neat, precise fit. Coordinate with work of HVAC, plumbing and electrical trades.

3.2 Cleaning:

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09521 - ACOUSTICAL WALL PANELS

PART 1 GENERAL

A. Submittals: In addition to product data, submit the following:

1. Shop Drawings: Show fabrication and installation of panels including plans, elevations, sections, details of components, and attachments to other construction.
2. Samples: 12-inch- (300 mm-) square samples of each type of panel and in each color, texture and pattern indicated.

B. Surface-Burning Characteristics: Flame spread, 25 or less; smoke developed, 200 or less; per ASTM E 84.

PART 2 PRODUCTS

A. Colors, Textures, and Patterns: As indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard. See drawings for size and locations of all panels. All edges to be finished and covered by finish surface material.

B. Back-Mounted, Edge-Reinforced Acoustical Wall Panels: Manufacturers standard construction: facing material laminated to front, edges, and back border of molded glass fiberboard core; with edges chemically hardened:

1. Core Density: 6-7 lb/cu. ft.
2. Thickness and NRC: Nominal overall panel thickness of 2 inches and NRC of not less than 0.95 for Type A (ABPMA No. 4) mounting.
3. Facing Material: Guilford or approved equal polyester fabric unless otherwise specified. Style and color as selected with scrim underlayment as necessary by the manufacturer.
4. Panel Size: As indicated on the drawings.
5. Edge Detail: Square.
6. Corner Detail: Square.
7. Products: Subject to compliance with requirements, provide one of the following:

a. Conwed Respond, Conwed LLC.
b. Soundsoak AWP-1, Armstrong World Industries, Inc.
c. Whisper Wall Panels, Whisper Walls Co.
d. or approved equal

C. Back-Mounting Accessories: Mechanical fasteners, including clips, hangers, and other attachment components, as required by manufacturer for concealed fastening of back-mounted panels to walls, ceilings, or other architectural elements as per drawings.

D. Fabrication: Fabricate panels with finish facing material extended over edges. Attach or bond facing material to core material so there are no wrinkles, sags or blisters.

PART 3 EXECUTION

A. Install acoustical wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, scribed to fit adjoining work accurately at borders and at penetrations. Comply with panel manufacturer's printed instructions for installation of panels.

B. Scribe acoustical wall panels to fit adjacent work. Apply accessories and fastenings as recommended by manufacturer.

C. Remove and replace acoustical wall panels that are damaged and are unacceptable to Architect.

D. Maintenance Stock: Provide 3% of each type and color of the panels (minimum of one full sized panel if less than 3%).

END OF SECTION 09521

SECTION 09619 – LVT RESILIENT TILE FLOORING

Part 1 - General

1.1 Summary

A. Section Includes:

1. Flooring and accessories as shown on the drawings and schedules and as indicated by the requirements of this section.

B. Related Documents

1. Drawings and General Provisions of the Contract (including General and Supplementary Conditions and Division 1 sections) apply to the work of this section.

1.2 References

A. Manufacturer's Technical Manuals

1. Armstrong Guaranteed Installation Systems manual, F-5061
2. Or Approved Equal

B. ASTM International:

1. ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
2. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
3. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
4. ASTM F 1482, Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring
5. ASTM F 1700 Standard Specification for Solid Vinyl Tile
6. ASTM F 1861 Standard Specification for Resilient Wall Base
7. ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
8. ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

C. National Fire Protection Association (NFPA):

1. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
2. NFPA 258 Standard Test Method for Measuring the Smoke Generated by Solid Materials

D. Sustainability Standards

1. ASTM E1347 - 06(2011) Standard Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry

2. ASTM D5116 - 10 Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products and California Department of Public Health (CDPH) Standard Method V1.1-2010
3. ISO 14001 Environmental management systems -- Requirements with guidance for use
4. ISO 14021 Environmental labels and declarations-Self-declared environmental claims (Type II environmental labeling)
5. ISO 14024 Environmental labels and declarations -- Type I environmental labeling -- Principles and procedures
6. ISO 14025 Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures
7. NSF/ANSI 332: Sustainability Assessment for Resilient Floor Coverings

1.3 System Description

A. Performance Requirements:

1. Provide flooring which has been manufactured, fabricated and installed to performance criteria certified by manufacturer without defects, damage, or failure.

B. Administrative Requirements

1. Pre-installation Meeting: Conduct an on-site pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.
2. Pre-installation Testing: Conduct pre-installation testing as follows: [Specify testing (i.e. moisture tests, bond test, pH test, etc)

C. Sequencing and Scheduling

1. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring.
2. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond, moisture tests and pH test.

1.4 Submittals

A. Tech Data

1. Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation and maintenance instructions (latest edition of manufacturer's Guaranteed Installation Systems manual) for flooring and accessories.

B. Samples

1. Submit the manufacturer's standard samples showing the required colors for flooring and applicable accessories.

C. MSDS

1. Submit Material Safety Data Sheets (MSDS) available for flooring product, adhesives, patching/leveling compounds, floor finishes and cleaning agents.

D. Certifications-1

1. If required, submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required fire tests.

E. Closeout: Closeout Submittals: Submit the following:

1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
2. Warranty: Warranty documents specified herein

1.5 Quality Assurance

A. Responsibility

1. Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

B. Select Installer: Select an installer who is competent in the installation of the specified or Other Approved Equal flooring.

1. Engage installers certified as the manufacturer's Certified Installers for the required materials and application.
2. Confirm installer's certification by requesting their credentials

C. Fire Performance: Fire Performance Characteristics: Provide resilient tile flooring with the following fire performance characteristics as determined by testing material in accordance with ASTM test methods indicated below by a certified testing laboratory or other testing agency acceptable to authorities having jurisdiction:

1. ASTM E 648 Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I
2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less

1.6 Delivery, Storage, and Handling

A. Comply-D1: Comply with Division 1 Materials and Equipment Sections

B. Comply-Manufacturer: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Deliverability: Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.

D. Storage: Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

1.7 Project Conditions

A. Temperature: Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65°F and a maximum temperature of 100°F for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55°F (13°C) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances. Refer to and comply completely with the manufacturer's Guaranteed Installations Systems manual for all applicable materials and project conditions.

1.8 Warranty

A. Resilient: Resilient Flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.

B. Warranty Period: 20 years

1.9 EXTENDED SYSTEM LIMITED WARRANTY

A. Resilient Flooring System: Submit a written warranty executed by the manufacturer, agreeing to repair or replace system (subfloor preparation products, adhesive, and floor covering) that fails within the warranty period.

B. Limited Warranty Period: 10 years on top of the Resilient Flooring Limited Warranty

C. The installation of an Armstrong Flooring or approved equal product along with the recommended Armstrong Flooring or approved equal adhesive, as well as any one of the Strong System or approved equal subfloor preparation products listed above, provides 10 additional years of limited warranty coverage. The Strong System or approved equal limited warranty covers the installation integrity for the length of the flooring product warranty plus 10 years. In order to qualify for the Strong System Warranty, any subfloor preparation product needed for an installation must be an Armstrong Flooring or approved equal product. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

1.10 Maintenance

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials from same production run as products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Quantity: Furnish quantity of flooring units equal to 2% of amount installed.
2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra material.

PART 2- Products

2.1 Manufacturer

A. Company: Resilient tile flooring, wall base, adhesives and accessories:

1. Armstrong Flooring, Inc.
2. Or approved equal.

2.2 Resilient Tile Flooring Materials

A. Products: Provide Natural Creations with Diamond 10 Technology Luxury Solid Vinyl Tile Flooring manufactured by Armstrong Flooring Inc. (or approved equal).

1. Description: A layered construction consisting of a tough, clear, rigid vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Protected by a diamond-infused UV-cured polyurethane finish, the wear surface is embossed with different textures to enhance each of the printed visuals. Colors are insoluble in water and resistant to cleaning agents and light.
2. Reference specification - ASTM F 1700, "Standard Specification for Solid Vinyl Tile", Class III, Type B – Embossed Surface. Meets requirements for size, squareness, thickness, thickness of wear layer, residual indentation, resistance to chemicals, resistance to light and resistance to heat.
3. Pattern and Color: To be selected by Owner from the full range currently available from Armstrong Flooring Inc.
4. Size: To be selected by Owner from 36 in. x 4 in., 36 in. x 6 in., 48 in. x 6 in., 48 in. x 9 in., 12 in. x 24 in., or 18 in. x 18 in., 18 in. x 36 in.
5. Wear layer thickness: 0.020
6. Thickness: 1/8"/0.125 in.

2.3 Product Substitution

A. Substitutions will be approved in accordance with Specification Section 01300.

2.4 Wall Base Materials

A. Refer to Specification Section 09653.

2.5 Adhesives

A. Standard Moisture: Provide adhesive under the flooring and wall base as recommended by the flooring manufacturer.

B. High Moisture: If required, provide high moisture adhesive under the flooring as recommended and required by the flooring manufacturer.

2.6 Accessories

A. Patching: Provide patching, smoothing, and leveling monolithic subfloors (concrete, terrazzo, quarry tile, ceramic tile, and certain metals) with the manufacturers products to comply with the warrantied system. All products shall be provided by one manufacturer.

B. Sealing: For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.

C. Transition: Provide transition/reducing strips tapered to meet abutting materials.

D. Threshold: Provide threshold of thickness and width as shown on the drawings.

E. Resilient Edge Strips: Provide resilient edge strips of width required and of equal gauge to the flooring, homogeneous vinyl or rubber composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available. Contractor shall field verify existing and proposed materials/conditions and verify exact materials and methods via shop drawing submittals.

F. Metal Edge Strips: Provide metal edge strips of width required and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage, or overlap-type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish. Contractor shall field verify existing and proposed materials/conditions and verify exact materials and methods via shop drawing submittals.

PART 3 - Execution

3.1 Manufacturer's Instructions

A. Compliance: Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog, installation instructions, and product carton instructions for installation and maintenance procedures as needed.

3.2 Examination

A. Site Verification: Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions (i.e. moisture tests, bond test, pH test, etc.).

B. Visual Inspection: Visually inspect flooring materials, adhesives and accessories prior to installation. Flooring material with visual defects shall not be installed.

C. Examine Subfloors: Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.

D. Inspect Subfloors: Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.

E. Reporting: Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

3.3 Preparation

A. Smooth Surfaces

1. Subfloor Preparation: Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects.

B. Subfloor Cleaning

1. Subfloor Cleaning: Remove paint, varnish, oils, release agents, sealers, and waxes. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents. Refer to the Armstrong or approved equal Guaranteed Installation Systems manual, F-5061 and ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring for additional information on subfloor preparation.

C. Standard Moisture Test

1. Perform subfloor moisture testing in accordance with ASTM F 2170, 'Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes' and Bond Tests as described in publication F-5061, "Armstrong or approved equal Guaranteed Installation System," to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Relative humidity shall not exceed 80%. MVER shall not exceed 5 lbs./1000 sq. ft./24 hrs. On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.

D. High Moisture Test

1. For Tile High-Moisture Installation Warranty, when using S-543 Adhesive, perform subfloor moisture testing in accordance with ASTM F 2170, 'Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes' and Bond Tests as described in publication F-5061, "Armstrong or approved equal Guaranteed Installation System," to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Relative humidity shall not exceed 90%. MVER shall not exceed 7 lbs./1000 sq. ft./24 hrs. On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not

proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.

E. pH Test

1. Concrete pH Testing: Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained.

F. Surface Cleaning: Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.

3.4 Installation of Flooring

A. F5061: Install flooring in strict accordance with the latest edition of Armstrong or approved equal Guaranteed Installation Systems manual, F-5061.

B. Wall to Wall: Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.

C. Pan-type: If required, install flooring on pan-type floor access covers. Maintain continuity of color and pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and to covers.

D. Scribe: Scribe, cut, and fit to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.

E. Roll: Roll with a 100-pound (45.36 kilogram) roller in the field areas Refer to specific rolling instructions of the flooring manufacturer.

F. Tools: Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.

3.5 Installation of Accessories

A. Top Set: Apply top set wall base to walls, columns, casework, and other permanent fixtures in areas where top-set base is required. Install base in lengths as long as practical, with inside corners fabricated from base materials that are mitered or coped. Tightly bond base to vertical substrate with continuous contact at horizontal and vertical surfaces.

B. Voids: Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.

C. Resilient Edge Strips – Butted: Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.

D. Metal Edge Strips: Apply overlap] metal edge strips as needed to protect edges, before flooring installation. Secure units to the substrate, complying with the edge strip manufacturer's recommendations.

3.6 Cleaning

A. Perform initial cleaning and maintenance in strict accordance with the manufacturer's requirements/recommendations before turning over to Owner.

3.7 Protection

A. Protection: Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.

END OF SECTION 09619

SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 GENERAL

A. Submittals: As follows:
   1. Product Data: For each type of product specified.
   2. Samples: In manufacturer's standard sizes of each product color and pattern specified.

B. Extra Materials: Furnish not less than 10 linear feet (3 linear m) for each 500 linear feet (150 linear m) or fraction thereof, of each different type, color, pattern, and size of resilient product installed. Deliver extra materials to Owner.

C. Stair treads shall comply with ADA Code for visual impaired strip in contrasting color with a factory manufactured integral color product. Field applied strips are not acceptable.

PART 2 PRODUCTS

A. Manufacturers

   1. Basis-of-Design: Johnsonite (Tarkett) Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.
   2. Roppe
   3. or approved equal

B. Rubber Cove Wall Base: Basis of design is Johnsonite Wall Base Duracove Thermoplastic Rubber or approved equal, Standard Toe, 4" high x 1/8" thick. Coiled lengths. Color shall be selected from the manufacturer's standard choices. Use the manufacturer's standard adhesives.

C. Vented Cove Base: Basis of design is Tarkett Vent Cove Wall Base. Products complying with ASTM F-1861, Type II, Style B-Coved, 4" high with a 3" toe by 1/8" thick. Color shall be selected from manufacturer's standard choices. Use the manufacturer's standard adhesives.

D. Rubber Stair Treads: Basis of design is Johnsonite Angle Fit Rubber Stair Tread with visual impaired strip in contrasting color. Hammered texture. Color shall be selected from the manufacturer's standard choices. Use the manufacturer's standard adhesives. Comply with IBC 2021 NJ Edition and ADA = ICC A117.1.

E. Rubber Landing Tile: Basis of design is Johnsonite solid color Rubber Tile. Thickness to be 1/8", tile size to be 24"x24" with hammered texture. Color shall be selected from the manufacturer's standard choices and should match the color of Stair Treads. Use the manufacturer's standard adhesives.

F. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by resilient product manufacturer for applications indicated.

G. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PAT 3 EXECUTION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements, including those for maximum moisture content. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Preparation: Comply with manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

C. Installation: Install resilient products according to manufacturer's written installation instructions.

1. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

    a. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
    b. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
    c. Do not stretch base during installation.
    d. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
    e. Form corners on job, from straight pieces of maximum lengths possible, without whitening at bends.

2. Place resilient products so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.
3. Apply resilient products to stairs as indicated.

D. Clean and protect resilient products according to manufacturer's written recommendations. Clean resilient products after installation and not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project.

END OF SECTION 09653

SECTION 09680 – CARPET TILE

PART 1 - GENERAL

A. Submittals: Submit Product Data for each type of carpet, carpet cushion, and the following:

1. Shop Drawings showing carpet type, color, and dye lot, seam locations, types, and methods; type of subfloor; type of installation.
2. Samples of each type of carpet material required.
3. Schedule of carpet using same room designations indicated on Drawings.
4. Maintenance data for carpet and cushion to include in the operation and maintenance manual.

B. Carpet Surface Flammability: Passes CPSC 16 CFR, Part 1630.

1. Flame Spread: 25 or less per ASTM E 84.
2. Smoke Developed: 450 or less per ASTM E 84.

C. Project Conditions: Comply with CRI 104, Section 6: "Site Conditions."

D. Subfloor Moisture Conditions: Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours (14.6 kg/1000 sq. m/24 hours) when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 deg F (12.7 deg C).

E. Subfloor Alkalinity Conditions: A pH range of 5 to 9 when subfloor is wetted with potable water and Hydrion paper or approved equal is applied.

F. Attic Stock: Furnish two (2) cases of each carpet tile selected by the Owner, packaged with protective covering for storage, and identified with labels clearly describing contents, before installation begins. The carpet attic stock must be from the same run and dye lot as the carpet installed on the project.

PART 2 - PRODUCTS

A. Available Products: Subject to compliance with performance requirements, products by Mohawk Group, Shaw Contract, or approved equal. Owner shall have **all carpet line options** for their color, texture and pattern selections. specified in each carpet Product Data sheet at end of this Section.

B. Concrete-Slab Primer: Non-staining type as recommended by the carpet manufacturer.

C. Trowelable Underlayments and Patching Compounds: As recommended by the carpet manufacturer.

D. Adhesives: Water-resistant, mildew-resistant, non-staining type to suit products and subfloor conditions indicated and to comply with flammability requirements for installed carpet as recommended by the carpet manufacturer.

E. Seaming Cement: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subfloors and conditions are satisfactory for carpet installation and comply with requirements specified in this Section and those of the carpet manufacturer.

B. Level subfloor within 1/4 inch in 10 feet (6 mm in 3 m), noncumulative, in all directions. Use leveling and patching compounds to fill cracks, holes, and depressions in subfloor as recommended by the carpet manufacturer.

C. Remove subfloor coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone.

D. Broom or vacuum clean subfloors to be covered with carpet. Following cleaning, examine subfloors for moisture, alkaline salts, carbonation, or dust.

E. Concrete-Subfloor Preparation: Apply concrete-slab primer, according to manufacturer's directions, where recommended by the carpet manufacturer.

F. Comply with carpet manufacturer's recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Bind or seal cut edges as recommended by the carpet manufacturer.

G. Install pattern parallel to walls and borders. The color, texture and pattern shall be directed by the Owner.

H. Vacuum carpet using commercial machine with face-beater element and protect during construction.

I. Provide aluminum thresholds or PVC vinyl extrusion edge at changes of materials or as required.

CT-1: CARPET TILE

Manufacturer	Mohawk Group or Approved Equal
Brand	Mohawk
Style Name/Number	Adopt a Plan GT466
Construction	Tufted
Surface Appearance	Textured Patterned Loop
Tufted Weight	18 oz/yd^2 (510 g/m^2)
Gauge	1/12" (47.00 rows per 10 cm)
Dye Method	Solution Dyed
Fiber type	Duracolor, Premium Nylon
Stain Release Technology	Permanent, Built into the Fiber
Soil Release Technology	Sentry Soil Protection
GSA Stain Release Rating	Passes
Backing Material	EcoFlex ONE
Indoor Air Quality	Green Label Plus Certified # 1098
NSF 140	Platinum
Size	24" x 24" (.6096 m x .6096 m)
Installation Method	Vertical Ashlar/Multi-Directional
Foot Traffic Recommendation (TARR)	Heavy Traffic
Flammability	ASTM E 648 Class 1 (Glue Down)
Smoke Density	ASTM E 662 Less than 450
Static Propensity	AATCC – 134 Under 3.5 KV
Warranties:	Lifetime Limited Modular Warranty, Lifetime Limited Duracolor Stain Warranty, Lifetime Static

CT-2: WALK-OFF TILE

Manufacturer	Mohawk Group or Approved Equal
Brand/Collection	Mohawk Group / Tuff Stuff II
Style Name/Number	Step In Style II / GT312
Construction	Tufted
Surface Appearance	Textured Performance Cut and Loop
Gauge	5/32" (25.2 rows per 10 cm)
Tufted Weight	30 oz/yd (1017 g/m)
Dye Method	Solution Dyed
Fiber type	Duracolor Premium Nylon
Stain Release Technology	Permanent, Built into the Fiber
Soil Release Technology	Sentry Soil Protection
Backing Material	EcoFlex NXT
Indoor Air Quality	Green Label Plus Certified # 1098
NSF 140	Gold
Size	24" x 24" (.6096 m x .6096 m)
Installation Method	Quarter Turn
Foot Traffic Recommendation (TARR)	Severe Traffic
Flammability	ASTM E 648 Class 1 (Glue Down)
Smoke Density	ASTM E 662 Less than 450
Static Propensity	AATCC – 134 Under 3.5 KV
Warranties:	Lifetime Limited Modular Warranty, Lifetime Duracolor Stain Warranty, Lifetime Static

CT-1: CARPET TILE

Manufacturer	Shaw Contract or Approved Equal
Brand	Shaw Industries
Style Name / Number	Daydreamer Tile / 5T593
Style Name / Number	Ponder Tile / 5T596
Style Name / Number	Imagine Tile / 5T594
Style Name / Number	Mindscape Tile / 5T595
Construction	Multi-Level pattern Loop
Surface Appearance	Multi-Level Pattern Loop
Tufted weight	18 oz/yd
Gauge	1/12in 47.2 per 10cm
Dye method	100% Solution Dyed
Fiber type	EcoSolution Q 100
Stain Release Technology	Inherent Stain Resistance
Soil Release Technology	Shaw SSP (Shaw Soil Protect)
GSA Stain Release	Passes
Backing Material	EcoWorx Tile
Indoor Air Quality	Green Label Plus Certified #GLP9968
NSF 140	Gold
Installation Method	Ashlar / Brick / Monolithic/ Quarter Turn
Foot Traffic Recommendation (TARR)	Heavy Traffic
Flammabiity	ASTM E 648 Class 1 (Glue Down)
Smoke Density	ASTM E 662 Less than 450
Status Propensity	AATC -134 Under 3.5kv
Warranties	Lifetime Commercial Warranty (non prorated)

CT-1: WALK-OFF TILE

Manufacturer	Shaw Contract or Approved Equal
Brand	Shaw Industries
Style Name / Number	Welcome II Tile
Construction	Needlebond Hobnail
Surface Appearance	Needlebond Hobnail
Tufted weight	49 oz/yd
Dye method	100% Solution Dyed
Fiber type	PET Polyester
Stain Release Technology	Inherent Stain Resistance
GSA Stain Release	Passes
Backing Material	EcoWorx Tile
Indoor Air Quality	Green Label Plus Certified #GLP0520
NSF 140	Gold
Installation Method	Ashlar / Brick / Monolithic/ Quarter Turn
Foot Traffic Recommendation (TARR)	Heavy Traffic
Flammabiity	ASTM E 648 Class 1 (Glue Down)
Smoke Density	ASTM E 662 Less than 450
Status Propensity	AATC -134 Under 3.5kv
Warranties	Lifetime Commercial Warranty (non prorated)

END SECTION 09680

SECTION 09900 – PAINTING

1.1 GENERAL

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint all exposed surfaces. Block fill prime paint all CMU walls full height to the roof deck above ceiling and behind all built in casework, lockers, etc. Paint ALL CMU walls with block filler including but not limited to behind metal stud furred out finished wall. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces. If the schedules do not indicate color or finish, the Owner will select from standard colors and finishes available.

C. Do not paint prefinished items, finished metal surfaces, operating parts, and labels.

1. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Submittals: For each paint system specified, provide the following:

1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.

E. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated. After color selection, the Architect will furnish color chips for surfaces to be coated.

F. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
2. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.
3. Submit Samples on the following substrates for the Architect's review of color and texture only:
    a. Concrete: Provide two 4-inch- (100-mm-) square samples for each color and finish.
    b. Concrete Masonry: Provide two 4-by-8-inch (100-by-200-mm) samples of masonry for each finish and color.
    c. Stained or Natural Wood: Provide two 4-by-8-inch (100-by-200-mm) samples of natural- or stained-wood finish on actual wood surfaces.
    d. Ferrous Metal: Provide two 4-inch- (100-mm-) square samples of flat

metal and two 8-inch- (200-mm-) long samples of solid metal for each color and finish.

G. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

H. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.

1. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface as specified.

a. After finishes are accepted, the Architect will use the room or surface to evaluate coating systems of a similar nature.

I. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label.

J. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers in clean condition, free of foreign materials and residue. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

K. Project Conditions: Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

L. Additional Material: Provide one gallon for each 200 gallons paint used in each color and type (minimum one gallon) to Owner.

1.2 PRODUCTS

A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers.

C. Colors: Match colors indicated by reference to manufacturer's color designations.

1.3 EXECUTION

A. Examine substrates, areas, and conditions under which painting will be performed for compliance with paint application requirements. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates.

C. Preparation: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

D. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

E. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

1. Cementitious Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation. Use abrasive blast-cleaning methods if recommended by paint manufacturer.

    a. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

2. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

    a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
    b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
    c. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

    a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

F. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
2. Use only thinners approved by paint manufacturer and only within recommended limits.

G. Application: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors and finishes shall be selected during construction. Contractor shall allow for use of up to (4) four different wall colors and (2) two different trim colors throughout the building interior, including use of accent walls and use of different colors within the same room/space. Contractor shall allow for use of (2) two different exterior paint colors. Additionally, the contractor may have to color match and paint items to match immediately adjacent pre-finished items and existing items as necessary throughout construction.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in items are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
7. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
8. Sand lightly between each succeeding enamel or varnish coat.

H. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has

cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

I. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

J. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

K. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

L. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

N. Field Quality Control: The Owner reserves the right to engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.

1. The testing agency will perform appropriate tests as required by the Owner.
2. If tests show material being used does not comply with specified requirements, the Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

O. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

P. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

Q. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

R. Paint Schedules: Provide the following paint systems for the various substrates indicated by Sherwin Williams (SW), The Pittsburgh Paints Company (PITT) or approved equal products:

S. **Exterior Paint Systems:**

1. Ferrous Metal:

a. Full gloss enamel finish - rust inhibitive primer with acrylic finish

Primer:	SW:	Pro Industrial Pro-Cryl Universal Primer
	PITT:	Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer 90-1912 Series.
1st Coat:	SW:	Pro Industrial DTM Acrylic Finish, semi-gloss
	PITT:	Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
2nd Coat:	SW:	Pro Industrial DTM Acrylic Finish, semi-gloss
	PITT:	Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.

2. Non-Ferrous Metal and AESS Steel Finish:

a. Full gloss enamel finish - galvanized metal primer with acrylic finish (Lintels, Railings, Bollards, columns, canopy frames, etc.)

Primer:	SW:	Pro Industrial Pro-Cryl Universal Primer
	PITT:	Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer 90-1912 Series.
1st Coat:	SW:	Pro Industrial DTM Acrylic Finish, semi-gloss
	PITT:	Pitt-Tech Plus EP Interior/Exterior DTM Industrial Enamel Semi-Gloss. 90-1610 Series
2nd Coat:	SW:	Pro Industrial DTM Acrylic Finish, semi-gloss
	PITT:	Pitt-Tech Plus EP Interior/Exterior DTM Industrial Enamel Semi-Gloss. 90-1610 Series

b. AESS Steel finish shall be level 4 and finish painted in a controlled environment shop offsite.

T. **Interior Paint Systems:**

1. Concrete, Masonry (not including CMU):

   a. Acrylic epoxy

Primer:	SW:	Loxon Concrete & Masonry Primer
	PITT:	4-603XI Perma-Crete Interior Exterior Alkali Resistant Primer.
2nd Coat:	SW:	Pro Industrial Pre-Catalyzed Epoxy
	PITT:	Paints Pitt Glaze W B1 Pre-Catalyzed Epoxy 16-xxx
3rd Coat:	SW:	Pro Industrial Pre-Catalyzed Epoxy
	PITT:	Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx

2. Concrete Masonry Units (CMU): Typical Walls (Block fill prime paint all CMU walls full height and behind all built in casework, lockers, etc.)

   a. Acrylic epoxy – eggshell finish

Filler:	SW:	Loxon Acrylic Block Surfacer
	PITT:	Paints Speedhide Latex Block Filler 6-15XI
2nd coat:	SW:	ProIndustrial Pre-Catalyzed Epoxy, eggshell
	PITT:	Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-1310
3rd Coat:	SW:	ProIndustrial Pre-Catalyzed Epoxy, eggshell
	PITT:	Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-1310

   b. Acrylic epoxy – semi-gloss finish (Kitchen areas)

Filler:	SW:	Loxon Acrylic Block Surfacer
	PITT:	Paints Speedhide Latex Block Filler 6-15XI
2nd coat:	SW:	Pro Industrial Pre-Catalyzed Epoxy, semi-gloss
	PITT:	Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-1510
3rd Coat:	SW:	Pro Industrial Pre-Catalyzed Epoxy, semi-gloss
	PITT:	Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-1510

3. Drywall and Plaster:

   a. Acrylic latex

Primer:	SW:	ProMar 200 Zero VOC Interior Latex Primer
	PITT:	Paints Speedhide zero Interior Latex Primer 6-4900XI
2nd Coat:	SW:	Pro Industrial Pre-Catalyzed Waterbased Epoxy
	PITT:	Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx
3rd Coat:	SW:	Pro Industrial Pre-Catalyzed Waterbased Epoxy
	PITT:	Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx

4. Wood:

   a. Acrylic epoxy

Primer:	SW:	Multi-Purpose Interior/Exterior Latex Primer Sealer
	PITT:	Paints Seal Grip Interior/Exterior Primer/Sealer 17-921XI
2nd Coat:	SW:	ProIndustrial Pre-Catalyzed Epoxy
	PITT:	Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx
3rd Coat:	SW:	ProIndustrial Pre-Catalyzed Epoxy

PITT: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx

b. Transparent Stain with urethane finish

1st coat: SW: Minwax Wood Finish 250 Stain
PITT: Varithane Classic Water Based Wood Stain VAR-89 Series

2nd Coat: SW: Minwax Polycrylic
PITT: ProLuxe Specialty Interior/Exterior Gloss Waterbased Poly Clear.

3rd Coat: SW: Minwax Polycrylic
PITT: ProLuxe Specialty Interior/Exterior Gloss Waterbased Poly Clear.

5. Ferrous Metal:

a. Gloss Finish - rust inhibitive primer with acrylic finish

Primer: SW: Pro Industrial Pro-Cryl Universal Primer
PITT: Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer 90-1912 Series.

1st Coat: SW: Pro Industrial DTM Acrylic Finish, semi-gloss
PITT: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.

2nd Coat: SW: Pro Industrial DTM Acrylic Finish, semi-gloss
PITT: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.

6. Non-Ferrous Metal (New Galvanized and Aluminum):

Primer: SW: ProIndustrial Pro-Cryl Primer
PITT: Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer 90-1912 Series.

1st Coat: SW: Pro Industrial DTM Acrylic Finish, semi-gloss
PITT: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.

2nd Coat: SW: Pro Industrial DTM Acrylic Finish, semi-gloss
PITT: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.

7. Concrete Floors – light traffic (janitor closets and utility spaces)

Primer: SW: ArmorSeal Tread-Plex Water Based Acrylic Primer
PITT: Breakthrough Satin Acrylic V51 Series

2nd coat: SW: ArmorSeal Tread Plex Water Based Acrylic Finish
PITT: Breakthrough Satin Acrylic V51 Series

8. Concrete Floors – High Traffic Epoxy

Primer: SW: ArmorSeal 8100 Urethane Epoxy @ 3.0-5.0 mils dft
PITT: Aquapon WB EP Waterborne Epoxy Series 98E @ 2.0 mils dft

2nd coat: SW: ArmorSeal 8100 Urethane Epoxy @ 3.0-5.0 mils dft
PITT: Aquapon WB EP Waterborne Epoxy Series 98E @ 2.0 mils dft

9. Concrete Floors – Heavy Duty Vehicular Traffic Epoxy (Garages/Apparatus Bays)
   - Primer: SW: ArmorSeal 33 Epoxy Primer @ 8.0 mils dft
     PITT: PITT Flooring 912 LV (ICO Primer LV) @ 8 mils dft
   - 2nd coat: SW: ArmorSeal 1000 HS 2-Part Polyamide Epoxy @ 3.0-5.0 mils dft
     PITT: PITT Flooring 610 (ICO Guard Coating) – 100% solids epoxy floor coating. Install at one coat – 12-15 mils dft
   - 3rd coat: SW: ArmorSeal 1000 HS 2-Part Polyamide Epoxy @ 3.0-5.0 mils dft
     PITT: 3rd coat Not Required
   - Additive: Include manufacturer recommended anti-slip additive. Provide samples for selection by Owner, (3) minimum, fine, medium-fine and medium.

10. Exposed Ceiling Deck – Dryfall coating
    - Primer – Ferrous Metal:
      - SW: Pro Industrial Pro-Cryl Universal Primer
      - PITT: Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer 90-1912 Series.
    - Primer – Non-Ferrous Metal:
      - SW: Pro Industrial Pro-Cryl Universal Primer
      - PITT: Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer 90-1912 Series.

      Finish 1-2 coats:
      - SW: Pro Industrial Waterborne Acrylic Dryfall
      - PITT: Speedhide Super Tech Flat Dryfall 6-725XI

END OF SECTION 09900

SECTION 10156 - TOILET COMPARTMENTS (Plastic)

PART 1 - SCOPE

A. Requirements of the general conditions and special conditions apply to the work in this section.

B. References

1. ASTM International:
   a. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   b. ASTM D 1735 - Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus
   c. ASTM D 2247 - Standard Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity.

2. United States Green Building Council (USGBC): LEED Green Building Rating System

C. Work not included in this section:

1. Toilet room accessories

PART 2 - SUBMITTALS

A. Submit electronic shop drawings, including details and a sample of each item of hardware for Architect's approval.

B. Provide drawings showing location for adequate steel reinforcements of wood blocking in walls to be provided by others for proper securement of the finished work.

C. Provide the manufacturer's standard thirteen (13) color options and textures for Owner Selection that meet the NFPA 286 test.

D. Furnish documentation on hardware, headrail, and continuous wall bracket to meet specification as outlined.

E. Provide certified test results showing the High Density Polyethylene (HDPE) passes NFPA 286 test.

PART 3 - MATERIALS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ASI Global Partitions
2. or approved equal

B. Toilet compartment shall be floor mounted, overhead braced, with non-corrosive doors, panels, and pilasters.

C. Panels, doors and pilasters shall be fabricated from High Density Polyethylene (HDPE) that is certified and passes the NFPA 286 test, containing a minimum of 10% postindustrial recycled

material manufactured under high pressure forming a single component section which is waterproof, nonabsorbent, and has a self-lubricating surface that resists marking with pens, pencils, or other writing utensils.

D. Provide the manufacturer's standard thirteen (13) color options and textures for Owner Selection that meet the NFPA 286 test.

E. Characteristics:

1. Dual component compression molded high density polyethylene (HDPE), virgin resin materials in colors that extend throughout the surface; the panels, doors and pilasters shall have combined recycled and/or virgin material (HDPE) as the core material.
2. Doors, panels and pilasters shall be a minimum of 1" thick and all edges machined to a radius of .250" and all exposed surfaces to be free of saw marks.

F. Fabrication:

1. Dividing panels shall be 55" high and mounted at 14" above finished floor.
2. Doors shall be 55" and mounted 14" above finished floor.
3. Pilasters shall be 82" high, mounted within a stainless steel shoe with one way theft proof, stainless steel sex bolts.
4. Aluminum edging strips to be fastened to the bottom edge of all doors and panels using vandal proof stainless steel fasteners.
5. Minimum clear height from finish floor to bottom of top rail shall be 80"

G. Technical Data:

1. Solid Plastics Products to be independently certified in writing by the manufacturer indicating compliance to appropriate building codes governing the project as it applies to the use of plastic in a commercial building.
2. The Product must comply with National Fire Protection Association (NFPA) 286 test.

H. Manufacturer to supply a written warranty covering all components and hardware against breakage, corrosion, and delamination for a period of 15 years.

PART 4 - HARDWARE

A. Door hardware shall be as follows:

1. Hinges 8 inches long, fabricated from heavy-duty extruded aluminum with bright dip anodized finish, wrap-around flanges, adjustable on 30-degree increments, through bolted to doors and pilasters with stainless steel, sex bolts. Hinges operate on field-adjustable nylon cams, field adjustable in 30 degree increments.
2. Each handicapped door to include (1) door pull and (1) wall stop.
3. Door strike and keeper shall be fabricated from heavy aluminum extrusion (6364-T5 Alloy) with clear anodized finish with wraparound flange surface mounted and thru-bolted to door with one-way de-burred bolts. Size of strike shall be 6" in length.
4. Door latch housing shall be fabricated from heavy aluminum extrusion (6364-T5 alloy) with clear anodized finish, surface mounted, and thru-bolted to door with one-way de-burred bolts. Slide to bolt and button shall be heavy aluminum with Tuff-Coat Black or approved equal anodized finish.

B. Pilaster Sleeves shall be 3 inches high, stainless steel shoe secured to pilaster with stainless steel tamper resistant sex bolt.

C. Provide full length double ear continuous extruded aluminum wall brackets. Brackets shall be used for all panels to pilaster, pilasters to wall, and panel to wall connections. Wall brackets shall be thru-bolted to panels and pilasters with one-way de-burred bolts. Attachment of brackets to adjacent wall construction shall be accomplished by 12" #14 stainless steel tamper proof head screws anchored directly behind the vertical edge of panels and pilasters at 13" intervals along with full length of bracket and each 13" interval alternately spaced between anchor connections.

D. Headrail shall be heavy aluminum extrusion (6364-T5 Alloy) clear anodized finish in anti-grip configuration weighing not less than 1.188 lbs per linear foot. Headrail shall be fastened to tops of pilasters and headrail brackets by thru-bolting with one-way stainless steel de-burred bolts (no cadium plated bolts allowed).

E. Hinge hold-open setting shall be 30 degrees for all non-handicapped stall doors. Handicapped doors shall be self-closing.

F. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.

G. Urinal screens shall be of a design with integrated leg to floor.

PART 5 - INSTALLATION

Erection of partitions, etc. shall be in accordance with the manufacturer's standard recommendations and the following:

A. All parts shall be erected in a substantial manner, straight, level and plumb.

B. No evidence of drilling, cutting or patching shall be visible in the finished work.

C. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 1/4".

D. Finish surfaces shall be cleaned after installation and left free of imperfections.

E. Authorized factory installers to be utilized.

F. Adjust doors and latches to operate correctly.

END OF SECTION 10156

SECTION 10425 – SIGNS: CAST METAL PLAQUES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Cast Metal Plaque(s)

1.2 SHOP DRAWINGS

A. Submittals

1. Shop Drawings: Provide a shop drawing for the Cast Metal Plaque**.** Provide plans, elevations, and sections showing typical members, anchors, layout, reinforcement, accessories, and installation details. Provide the following:

a. The Architect will provide a graphic layout of the text with the Owner's seal or logo.
b. Provide a drawing to scale for Owner approval.
c. Upon Owners approval of the text provide a full-size rubbing for metal plaques.

2. Samples: Provide a color selection material, pattern, and surface texture. **All samples go to the Owner**.

B. Unless indicated otherwise provide one (1) Cast Metal Plaque. Location of plaque to be determined by owner.

1.3 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 PRODUCTS

A. Fasteners: Concealed noncorrosive metal.

B. Anchors and Inserts: Nonferrous metal or hot-dipped galvanized. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts for concrete or masonry work.

C. Plaques: Castings shall be free from pits, scale, sand holes, or other defects. Comply with requirements shown for thickness, size, shape, and copy. Hand-tool and buff borders and raised copy to produce satin polished finish. Contents of plaques will be supplied by Owner / Architect and may include logos, County Seals, Building Seals, Mascots and Owner requested Graphics. Plaque size = 24" x 30"

1. Metal: Bronze
2. Border Style: Raised flat band.

3. Background Color and Texture: Provide Manufacturer's standard finishes for Owner's Selection.

D. Metal Finishes: Comply with NAAMM "Metal Finishes Manual" for finish designations and applications recommendations.

PART 3 EXECUTION

A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.

1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.

a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place plaque in position and push until flush to surface, embedding studs in holes. Temporarily support plaque in position until adhesive fully sets.
b. Thin or Hollow Surfaces: Place plaque in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

C. Remove and replace damaged or deformed plaques and plaques that do not comply with specified requirements. Replace plaques with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

D. Remove temporary protective coverings and strippable films.

E. On completion of installation, clean exposed surfaces of plaques according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain plaques in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10425

SECTION 10426 – INTERIOR ROOM SIGNS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior Room signage

1.2 SHOP DRAWINGS

A. Submittals

1. Shop Drawings: Provide a shop drawing for the Interior Room Signs. Provide plans, elevations, and sections showing typical members, anchors, layout, reinforcement, accessories, and installation details. Provide the following:

a) A signage spread sheet with each door location, room name, room number and detailed layout.
b) Setting drawings, templates, and directions for installing anchors.
c) Full-size spacing templates for dimensional letters.

2. Samples: Provide a separate physical sample of the color selection material, pattern, and surface texture for each of the signage types listed above in 1.1.A. **All samples go to the Construction Manager or the Owner**.

3. Provide an additional ten (10) Interior Room Signs. The text and format will be provided by the Construction Manager or Owner.

1.3 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 PRODUCTS

A. Basis of Design: VISTA Sign Systems or approved equal

1. Standard Room Sign: Curved Vista Wall Sign 7.87" x 4.1575" x 0.84" with 1mm Glossy/Non-Glare lens with standard ADA tactile and Braille and digitally printed 10 mil double-sided matte rigid PVC film insert

a) V200 (200mm/7.87") aluminum sign holder extrusion, Clear Anodized, 4.1575 inch.
b) CC200 - Clear cover (Glossy/Non-Glare) for V200 extrusion (1mm thick), Glossy/Non-glare, 4 inch.
c) 2 PEC200 - Plastic (ABS) end caps for V200 extrusion, Black.
d) CCADA200 - ADA Lens for V200 extrusion (7.8" / 198mm)

2. Standard Room Sign (Bathrooms, Elevators, Area of Refuge and Room Occupancy) 7.87" x 8" x 0.84" with 1mm Glossy/Non-Glare lens with standard ADA tactile and Braille and digitally printed 10 mil double-sided matte rigid PVC film insert

    a) V200 (200mm/7.87") aluminum sign holder extrusion, Clear Anodized, 8 inch.
    b) CC200 - Clear cover (Glossy/Non-Glare) for V200 extrusion (1mm thick), Glossy/Non-glare, 8 inch.
    c) 2 PEC200 - Plastic (ABS) end caps for V200 extrusion, Black.
    d) CCADA200 - ADA Lens for V200 extrusion (7.8" / 198mm)

B. Fasteners: Concealed noncorrosive metal.

C. Anchors and Inserts: Nonferrous metal or hot-dipped galvanized. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts for concrete or masonry work.

D. Graphic Content and Style: Provide sign copy that complies with size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices. Also include braille lettering to meet the handicapped ADA requirements and 2021 IBC New Jersey Edition Code.

PART 3 EXECUTION

A. General: Install using mounting methods indicated and according to manufacturer's written instructions.

1. Install level, plumb, true to line, and at locations and heights indicated, with surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Signage Used for Room Identification: Install in locations on walls as indicated and according to ADA accessibility standards.

C. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

    a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.

b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

2. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
3. Brackets: Remove loose debris from substrate surface and install bracket supports in position so that sign is correctly located and aligned.
4. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
5. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
6. Shim-Plate Mounting: Provide 1/8-inch- (3-mm-) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate.

D. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

E. Remove temporary protective coverings and strippable films as signs are installed.

F. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner

END OF SECTION 10426

SECTION 10427 – SIGNS: INTERIOR MARKINGS AND IDENTIFICATION SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior Marking and Identification Signage

1.2 SHOP DRAWINGS

A. Submittals

1. Shop Drawings: Provide a shop drawing for the Interior Marking and Identification Signage. Provide a plan showing the layouts and locations of the signage required by the 2021 IBC New Jersey Edition and/or local authority having jurisdiction.

a) Provide shop drawings of concealed space identification

1. Floor plan with all firewalls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations located.
2. Message list for each sign with wording and letter layout.

1.3 MARKINGS AND IDENTIFICATION

A. At all new or existing firewalls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations within the work area where there is accessible concealed floor, floor-ceiling or attic space provide permanent signage in the concealed space as follows.

1. Signage to be either signs or stenciled.
2. Be located within 15 feet of the end of each wall and in intervals not exceeding 30 feet measured horizontally along the wall or partition.
3. include lettering not less than 3 inches in height with a minimum 3/8-inch stroke in contracting color.
4. Wording: "FIRE AND/OR SMOKE BARRIER – PROTECT ALL OPENINGS" or other wording.

1.4 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 EXECUTION

A. Install level, plumb, true to line, and at locations and heights indicated, with surfaces free of distortion and other defects in appearance.

1. Before installation, verify that surfaces are clean and free of materials or debris that would impair installation.

END OF SECTION 10427

SECTION 10522 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

1.1 GENERAL

A. Submittals: Submit the following:

1. Product Data: Include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, panel style, and materials.
2. Samples for Initial Selection: Manufacturer's color charts showing full range of colors, textures, and patterns available for each finish indicated or exposed to view.

B. Coordination: Verify that cabinets are sized to accommodate type and capacity of extinguishers indicated.

C. UL-Listed Products: Fire extinguishers shall be UL listed with UL listing mark for type, rating, and classification of extinguisher.

D. FM-Listed Products: Fire extinguishers approved by Factory Mutual Research Corporation for type, rating, and classification of extinguisher with FM marking.

1.2 PRODUCTS

A. Fire Extinguishers: Provide fire extinguishers for each cabinet and for other locations indicated.

1. Multipurpose Dry Chemical Type: Type MP-10, UL-rated 4-A:60-B:C, 10 lb nominal capacity, in enameled steel container.
2. Class "K" high hazard area (kitchen and food classroom) dry chemical 4-A, 60:B:C, 10 lb. capacity in enameled steel container.
3. Multipurpose Dry Chemical Type: UL-rated 2-A:10:B:C, 5 pound nominal capacity in steel container to hang on bracket in classroom or office.
4. Provide certified inspection tags per local code requirements for all fire extinguishers provided.

B. Cabinet Construction: Box with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.

1. Fire-Rated Cabinets: UL listed with UL listing mark with fire-resistance rating of wall where it is installed.
2. Cabinet Type: Suitable for containing the following:
   a. Fire extinguisher.
3. Cabinet Mounting: Suitable for the mounting indicated:
   a. Semirecessed: Partially recessed in walls of shallow depth.
4. Trim Style: One piece with corners mitered, welded, and ground smooth.
   a. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge.
      i. Rolled-edge with 2-1/2-inch backbend depth.
      ii. Metal: Same metal and finish as door.

C. Door Material and Construction: Manufacturer's standard of material indicated, coordinated with cabinet types and trim styles selected.

1. Enameled Steel: Hollow construction with tubular stiles and rails.
2. Door Glazing: Fully tempered float glass complying with ASTM C 1048, Condition A, Type I, Quality q3, Kind FT, and Class as follows:
   a. Class 1 (clear).
3. Identify fire extinguisher in cabinet with FIRE EXTINGUISHER lettering applied to door. Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location.
   a. Application Process: Silk screen.

D. Door Style: Manufacturer's standard design.

1. Full-Glass Panel: Fully tempered, Float glass, 1/8 inch thick.

E. Door Hardware: Provide door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

F. Cabinet Finishes: Comply with NAAMM "Metal Finishes Manual." Protect exposed finishes from damage by application of temporary strippable covering prior to shipment.

G. Steel Cabinet Finishes: Solvent-clean surfaces to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust from uncoated steel.

1. Baked-Enamel Finish: Immediately after cleaning and pretreatment, apply a two-coat baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's instructions for application and baking to achieve a minimum dry film thickness of 2.0 mils.
   a. Color and Gloss: In addition to manufacturer's standard "white", provide a minimum of 8 other painted finish options for review and selection by Owner. Paint the following:
      i. Exterior of cabinet except for surfaces indicated to receive another finish.
      ii. Interior of cabinet.

1.3 EXECUTION

A. Installation: Follow manufacturer's printed instructions.

B. Install at heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities and meet State and handicapped codes and ADA requirements.

1. Prepare wall recesses for cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.
2. Fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb.

END OF SECTION 10522

SECTION 10562 - MOBILE STORAGE SHELVING

PART 1 - GENERAL

1.1. SUMMARY

A. This section includes the following:

1. High-density mobile storage units mounted on mechanically assisted carriage, support rails, fabrication and installation including leveling of support rails.

2. 4-Post shelving units, fabrication and installation on mobile carriage.

1.2. PERFORMANCE REQUIREMENTS

A. Seismic Performance: Provide mobile carriages and shelving capable of withstanding the effects of earthquake motions as determined according to IBC 2021 New Jersey Edition and local building codes.

B. Design Requirements: All mobile carriage and shelving elevations as per drawings.

C. Color Samples: Provide sample for each exposed product and for each color required.

D. Selection Samples: For selection of colors and textures, submit manufacturer's color charts consisting of actual product samples, showing full range of colors and textures available. Vendors must provide a minimum of 12 color selections in powder coat paint finish.

E. Installer Qualifications: Hire an experienced installer who is the manufacturer's authorized and certified representative.

1. Minimum Qualifications: 5-years experience installing systems of similar size and complexity to specified project requirements.

2. Manufacturer Certification: Required by manufacturer on manufacturer's letterhead required in the shop drawing. Certifications by sales representatives, dealers, or distributors are unacceptable. Qualification must include resume of certified installation supervisor.

3. Provide support within 24 hours for service call.

F. Warranty: Submit a written warranty, executed by the Contractor, Installer and Manufacturer, agreeing to repair or replace units that fail in materials or workmanship within the specified warranty period. This warranty shall be in addition to, not limitation of, other rights the Owner may have against the Contractor under Contract Documents.

LIFETIME LIMITED WARRANTY: for the lifetime of the shelving and mobile carriages ("structural frames"). For the purposes of this warranty, structural frames shall be deemed to exclude all moving parts, controls and guides that have immediate contact with any moving parts.

5-YEAR LIMITED WARRANTY: for five (5) years from the date Substantial Completion for all equipment, other than structural frames, carriage drive motors, new electronic components installed for an electrical upgrade of systems, light fittings and these electronic components: emergency power system (UPS), routers and WIFI remote controls. During the 5-year warranty period, all parts are included at no cost for 5 years. Labor installation is included at no cost during the first year of the 5-year warranty period.

G. Reference List: Provide a list of three (3) minimum installed mobile storage installations to be contacted or visited by owner, architect and contractor. Installation must be of similar size, scope of specified system. Visit is intended to inspect operation, quality of installation and verify the suitability of manufacturer's products and comparison with materials and products specified. Manufacturer is required to address all issues raised by owner, architect and contractor. List must include contact names, phone numbers or e-mails, size and quantity of shelving units.

H. Manufacturer Qualifications:

1. ISO 9001:2015: Engage an experienced manufacturer who is ISO 9001:2015 certified for the design, production, installation and service of powered mobile systems. Submit manufacturer's ISO 9001:2015 quality system registration certificate.

2. ISO 14001:2015: Engage an experienced manufacturer who is ISO 14001:2015 certified. This international standard defines a process for monitoring and improving an organization's environmental performance. This process minimizes adverse impacts on the environment caused by the activities of the enterprise and helps to continually improve the environmental performance of the organization. Submit manufacturer's ISO 14001:2015 registration certificate, certifying the environmental performance of manufacturer.

1.3. SUBMITTALS

A. Product Data: Submit manufacturer's product literature, schematics, testing data, and other items as described in this specification. Include data substantiating that products to be furnished comply completely with requirements of the contract documents and specifications. Include installed weight, load criteria, furnished specialties, and accessories.

B. Shop Drawings: Prepared and detailing fabrication, assembly, and installation of mobile carriages and storage shelving, as well as procedures and diagrams. Include details of layout and installation, as well as clearances, spacing, relation to adjacent construction in plan, elevation, and section, components, assemblies, connections, attachments, reinforcements, and anchorage. Furnish floor layouts, technical, and installation manuals for every unit shipment.

1.4. PROJECT CONDITIONS

A. Field Measurements: Verify mobile carriages and shelving unit location by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating mobile carriage and shelving units without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

B. Delivery, Storage, & Handling: Comply with instructions and recommendations of manufacturer for special delivery, storage and handling requirements.

C. Sequence & Scheduling: Sequence mobile carriage and storage shelving system installation with other work to minimize possibility of damage and soiling during remainder of construction period.

D. Pre-Installation Conference: Conduct conference at project site. Review methods and procedures related to installation of mobile carriage and storage units including, but not limited to, the following:

1. Inspect and discuss condition and levelness of flooring and other preparatory work performed under other contracts.

2. In addition to the Contractor and the installer, arrange for the attendance of the following:

   a. Other Installers affected by the work of this section.

   b. The Owner's Representative.

   c. Manufacturer's representative.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

A. General: Products are based on mobile shelving system products manufactured by Montel Inc. and distributed by Storage Systems USA. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

2.2. BASIC MATERIALS

A. Grout:

1. General: The compound shall be cementitious grout which, when mixed with water, will harden to produce a permanent bolt setting anchor. The compound shall conform to the following specifications, all of which are based on the performance of the test specimens at room temperature and in laboratory environment.

2. Linear Movement: It shall not shrink on setting but shall exhibit a slight expansion of not more than .002 inch per linear inch.

3. Compression Strength: Two (2) inch cubes made in accordance with ASTM standards tested on a Baldwin-Southwark machine of 60,000 pounds capacity shall have the following minimum average compression strengths:
   Age: 1 day - 4,500 PSI
   7 days - 8,000 PSI

4. All tracks shall be grouted the entire length of each run, including all track joints. As the grout slightly expands during the cure process, it shall be in permanent contact with the grouted structural members. This provides a continuous support to the system, and optimal weight distribution on the existing floor slab.

2.3. MANUFACTURED COMPONENTS – MOBILE

A. Tracks:

1. Rails shall be designed and manufactured to carry loads of 1,000 pounds per linear foot (1,488kg/m) of carriage. Made of minimum cold rolled steel (CRS) rail assembly of ¾" (19mm) high x 1" (25mm) wide inserted in a surface treated aluminum sub-rail. Rail contact surface shall be minimum 1" (25mm) wide. The inserted steel rail shall be replaceable. One-piece rails with no sub-rails are not permitted.

2. Sub-rails shall be leveled with self-leveling screws above or below the walking surface. Shims shall not be accepted.

3. Sub-rails shall be designed to be anchored on top of structural concrete floor and to allow for adjustment so sub-rails can be leveled over an uneven floor.

4. In the sub-rail, the opening adjacent to rail which accommodate manufacturer's carriages guidance system and/or anti-tip system shall not exceed 7/16" wide x ¾" deep.

5. All rail connections shall have interlock steel rail connectors. All sub-rail connections shall have interlock steel sub-rail connectors. All track connections shall be designed to provide horizontal and vertical continuity between rail/sub-rail sections, to gradually transfer the concentrated wheel point load to and from adjoining sections. To insure vertical and horizontal stability, tongue-and-groove connections are not permitted.

6. Tracks shall be layered and staggered to ensure a smooth weight transfer from one track to the other. Top-to-bottom track shall be without joints to support continuously the top steel rail at the junction point and provide greater structural rigidity. One-piece rails with tongue-and-groove joints and connections are not permitted.

7. Rail shall be located and positioned properly, leveled and grouted, allowing at least 3/8" (9.5mm) for grout under high point. Anti-slip grooves under sub-rail shall prevent track to slip when grout is poured. Grout shall infiltrate inside the grooves to anchor the sub-rail to the cement. Grout to be worked under rail, any voids completely filled and trimmed upsides and flush with rails. This allows proper weight distribution from rail to existing slab.

8. Levelness of rails: 3/32" maximum variation from true level within any system; 1/16" maximum variation between adjacent rails, perpendicular to rail direction; 1/32" maximum variation in 10' 0" of rail length, along any rail.

9. Rails are to be verified for integrity of position and levelness, as well as anchored into structural concrete slab, using anchors in sizes and quantities as determined by manufacturer.

10. Sub-rail section shall be a minimum of 12' foot each and rail section shall be provided in shorter section of 10' foot. Shorter sections are used to complete each individual rail assembly

11. Built-in anti-tip device sub-rail shall be provided to meet local building code and high height-to-width ratio.

B. Floor/Ramp:

1. Surface Mounted Floor / Ramp:

   a. Finished elevation of the raised floor shall be flush with the top of the rails.

   b. The ramp shall not extend beyond the end of the carriages and shall have a maximum slope of nine (9) degrees. The vertical transition from the ramp edge to the floor shall be a maximum of 1/8". Ramps shall extend under all movable and stationary ranges except as noted differently. Ramps shall be made of 12-gauge steel.

   c. Floor panels shall be constructed of a minimum ¾" thick, Fire retardant underlayment grade plywood. Floor panels must be provided between all rails the full width of systems, except under stationary platforms.

   d. Floor panels shall be provided with built-in floor anchor to provide a continuous leveled floor surface.

   e. The floor and ramp shall be constructed in a manner preventing any warping or deformation of the floor panels in a normal operating environment.

C. Carriages:

1. All carriages shall be riveted-bonding construction for flexibility and potential reconfiguration. Welded carriages or carriages with formed lips are unacceptable. Carriages and stationary platforms shall be constructed of a full "C" shape profiles 1 ½" deep x 5" high, minimum 12-gauge steel, with 1,000 pounds per linear foot maximum capacity. Wheel support sections shall be minimum 12-gauge steel and shall be riveted between the main support face sections, one per aisle assembly. Support sections shall be embossed to eliminate the need of filler plates between the shelving/cabinet and the C shape supports.

2. Stationary carriages, as shown on the drawings, shall be of same construction and height as the mobile carriages and anchored to rails. Setting of shelving on floor at ends of mobile runs is unacceptable.

3. Necessary carriage splices shall be bolted type designed to maintain proper unit alignment and weight load distribution.

4. Carriage face sections shall provide a smooth, clean appearance without any assembly holes or protruding hardware.

5. Carriage straightness shall have no more than ¼" maximum deviation from a true straight line. There shall be no permanent set or slippage in any spliced or welded joint when exposed to forces encountered in normal operating circumstances.

6. Carriage construction shall be designed to allow the shelving uprights to be secured to the carriage frame with two assembly kits per upright of vibration-proof graded 5" bolt, nut, and clamp anchor assemblies and so that there is no visible hardware on carriage face. Recess design carriages are not permitted. Self-drilling screw attachment is not acceptable method of attachment shelving units to the carriage. No shelving or cabinet attachment hardware shall be visible on exterior face of carriages

7. Each carriage shall have at least two wheels per rail.

8. Carriages shall have powder coat (1.5 mil) finish on all surfaces. Color selection by the Owner to match shelving. Powder coat paint finish is required for finish durability and elimination of any off gassing. Finish shall be inert, with no volatiles present in finished product. Visible galvanized steel structural carriage components are unacceptable.

D. Drive/Guide System:

1. Direct-Drive System: Provide with full-length drive shaft which prevents carriage whipping, binding and excessive wheel and rail wear under normal operation. All wheels shall be direct driven at every rail location on one side of carriage. Synchronized drive with multiple chains, trolleys, and drive shafts are not acceptable.

2. Torque-Resistant Tubular Drive Shaft: Minimum of 1 5/16" (33mm) outside diameter by maximum 1 1/8" (29mm) inside diameter. Solid steel rod is not acceptable.

3. Dual-Flange Wheels: Provide positive guidance and tracking. Guidance requiring cam followers and ball bearings running on either side of the rail is unacceptable.

4. Narrow Guidance Channels: Provide a maximum 3/8" (9.5mm) between sub-rail and rail sections to reduce tripping hazards, allow carts to easily roll over, prevent debris accumulation, and facilitate cleaning.

E. Wheels:

1. Wheels shall be constructed of solid minimum 1045 cold rolled steel (CRS) for smooth operation. Minimum load capacity per wheel 3,200 pounds Wheels shall be precision ground, balanced. All bearings shall be permanently shielded and lubricated.

2. All wheels shall be minimum 5" diameter (outside dimension). They shall be dual-flanged and sloped to insure efficient guidance. Single center flanged wheels are not acceptable.

3. Due to carriage length and shelving/racking heights, guide wheels shall be at all wheel locations.

F. Face Panels:

1. Materials: All exposed face panels shall be steel. Face panels shall be located on all operating ends of ranges as shown on drawings.

2. Finishes: Selected from manufacturer's standard available colors and patterns.

3. Face panels must cover the full height and width of shelving.

G. Movement Controls:

1. The system shall be of the mechanical assist type having a chain sprocket drive system. A driving system is required to provide uniform movement along the total length of the carriage even with unbalanced loads on the carriage. The system shall be a positive drive to ensure that there is no play in the drive handle, and the carriage will stop without drifting. All components of the system shall be compatible for smooth non-jerking, even movement along the total length of the carriage. All bearings used in the drive mechanism shall be permanently shielded and lubricated.

2. Operating handles shall be three-spoke type (single spoke handle are unacceptable) of 18 3/4" diameter transmitting power through a chain drive to the drive wheels. Provide operating handles on drive end of carriages as noted on drawings. Each mechanical device shall come with a chain-tensioner. Handle must be mounted at 39 1/2" from the bottom of the carriage.

H. Safety Features:

1. Aisle Safety Push-Button Lock (for single access): Shall be located at the center of the handle. The user shall press the aisle safety push-button, which will lock the respective carriage. After being pressed, the aisle safety push-button shall protrude from the handle face to display a red band visible to users. After being re-pressed, the aisle safety push-button shall return to its unlocked state. Pull-out pins are unacceptable. Both carriages on either side of the aisle must be secured.

2.4. MANUFACTURED COMPONENTS – 4-POST SHELVING

A. Upright Frames: Upright frames are made of two or more cross members welded to the top and bottom (and center if necessary) of the post and forming a rectangular upright frame. Each post shall be made of 16-gauge 1 ¼" x 1 ½" rectangular shaped cold rolled steel. The lateral sides of the posts are slotted at every one-inch increment. The slots are 3/16" wide x 5/8" long and are designed to accommodate a variety of shelf and roll-out drawer configurations. The back of the post is also slotted at every 1 ½" increment with two rows of slots side by side from top to bottom. They are

3/16" wide x 5/8" long with 3/8" between the two rows. The uprights must allow for component integration on either 1" or 1 ½" increment depending only on the selected shelf component. Due to aesthetic concerns, user's performance requirements, safety of users and stored materials, and to provide maximum flexibility, "L & T 4-Post" utility shelving system styles are unacceptable.

B. Cross Members: Cross members are 4" high x ½" wide. They are made of 16-gauge steel folded to create a "U" shape channel. At both ends, hook type design allows to snap the cross members in both rows of slots at the same time. The cross members shall be welded to the post. Non-welded frames must be available to minimize shipping volume, thus reducing truck pollution.

C. Levelers: Each post shall have an integrated leveler, inserted into formed upright tube, which allows for ¾" adjustment to accommodate for uneven floor surface. No temporary shims or other third-party leveling device will be accepted.

D. Supported type:

1. Full-depth shelves: Full-depth shelves are made of box rolled formed 20-gauge steel, with "Four Bend" ¾" edge construction which adds additional strength and capacity as well as it creates a hidden safety edge to protect people and items. The full-depth shelves are supported by two longitudinal shelf supports and the appropriate number reinforcement channels. Shelves are also available in 18-gauge steel as an option.

2. Longitudinal supports: ¾" high supports are made of one "U" shaped 12-gauge steel channel. A standard formed steel claw is welded at each end to form a complete support. These supports are inserted into the slots located at the back of the post.

3. Front-to-back reinforcement channels: ¾" high reinforcement channels are made of 12-gauge steel formed in a "U" shaped channel and are sitting on the longitudinal shelf supports.

4. Base support: A 12-gauge steel special "U" shaped channel is provided for the bottom shelf. The support is inserted at the bottom of each post and anchored to the floor or to the carriage, in compliance with seismic standards.

E. End Panels: Shall be constructed of 20 gauge steel, 2" thick, they are bolted to bottom and top upright cross members.

F. Slotted Backstops (single entry): Shall be 5 17/32" high formed of 20-gauge steel with a 3/8" bend on top and bottom and a 1 3/16" bend on each side. Slots are located on 1" increments for dividers adjustment.

G. File Dividers: Shall be formed of 20-gauge steel with one lug at the top rear and two lugs on the bottom to engage slots in the shelf for easy adjustment on 1" horizontal centers. The front top corner of the divider is rounded with an approximate 2" radius. Provide 3 file dividers per level.

2.5. FINISH SPECIFICATIONS

A. Shall be the finest of their respective kinds and those best adapted to the construction for which they are employed to meet ISO 9001:2015 quality standards. All steel shall be superior quality milled, cold rolled, pickled, and double annealed, free from scale and buckle. All gauges are U.S. standard. The design of all parts shall be such that the completed installation shall present a neat and finished appearance and shall be free from exposed sharp edges or projections. All other special materials shall be as hereinafter specified.

B. All components shall be painted with an electrostatically applied powder coat finish. All steel parts shall be machined smoothed and thoroughly cleaned by a process of completely washing in a phosphatizing solution to ensure removal of oil, grease or other foreign material which could

interfere with the adhesion of the priming coat in any way. Following the cleaning process, all parts shall be coated and confirming every part is thoroughly and completely covered with fine powder coat and baked to the paint manufacturer's recommendation. The finish for powder coat shall be medium gloss, giving a reading of 35 to 65 degrees on a standard gloss meter and must be capable of withstanding severe hammer and bending tests without flaking. The finish for epoxy-polyester hybrid powder coat shall be a minimum 1.2 mil thickness capable of resisting methyl ethyl ketone, salt spray, abrasion and printing, and all normal usage resistant requirements of a good finish. In addition, powder coat shall not be off gassing to prevent deterioration of collection and other stored materials. Colors to be selected by owner.

PART 3 - EXECUTION

3.1. EXAMINATION

A. Examine subfloor surfaces, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of mobile storage units.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of mobile storage units.

2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. INSTALLATION

A. Install components and accessories after finishing operations, including painting, have been completed. Install shelving units to comply with final layout drawings, in strict compliance with manufacturer's printed instructions and structural calculations. Position unit's level and plumb at proper location relative to adjoining units and related work

B. Field Quality Control: Remove and replace components that are chipped, scratched, or otherwise damaged and which do not match adjoining work. Provide new matching units, installed as specified and in manner to eliminate evidence of replacement.

C. Adjust: Adjust components and accessories to provide smoothly operating, visually acceptable installation.

D. Cleaning: Immediately upon completion of installation, clear components and surfaces. Remove surplus materials, rubbish and debris resulting from installation upon completion of work and leave areas of installation in neat, clean condition.

E. Protection: Protect system against damage during remainder of construction period. Advise Owner of additional protection required to ensure shelving units will be without damage or deterioration at time of substantial completion.

3.3. DEMONSTRATION/CUSTOMER TRAINING

A. Provide complete training to end-user's staff. Training shall include general safety and operation instructions, and basic preventative maintenance procedures.

END OF SECTION

SECTION 10800 - TOILET AND BATH ACCESSORIES

1.1 GENERAL

A. Submittals: Manufacturer's product data for each toilet accessory item specified, including details of construction relative to materials, dimensions, gages, profiles, mounting methods, specified options, and finishes.

B. Samples: Full-size samples of the following toilet accessory items to verify design, operation, and finish requirements. Acceptable samples will be returned and may be used in the Work:

1. Hand dryer.
2. Stainless steel framed mirror unit.
3. Grab Bar.
4. Waste Receptacle.
5. Sanitary Napkin Disposal.
6. Napkin/Tampon Vendor.
7. Trash Container.
8. Toilet seat cover dispenser

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, all items shown in this section are Bobrick Products. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or approved equal:

1. A & J Washroom Accessories
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation
5. General Accessory Manufacturing Co.
6. McKinney/Parker
7. Kimberly/Clark
8. Georgia Pacific

B. Materials, General: Fabricate toilet accessory items from the following materials and according to requirements specified for individual accessory items:

1. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 0.034-inch (22-gage) minimum thickness, unless otherwise indicated.
2. Brass: Leaded and unleaded, flat products, ASTM B 19; rods, shapes, forgings, and flat products with finished edges, ASTM B 16; Castings, ASTM B 30.
3. Sheet Steel: Cold-rolled, commercial quality ASTM A 366, 0.04-inch (20-gage) minimum thickness, unless otherwise indicated. Surface preparation and metal pretreatment as required for applied finish.
4. Galvanized Steel Sheet: ASTM A 527, G60.
5. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.
6. Baked Enamel Finish: Factory-applied, gloss white, baked acrylic enamel coating.

7. Mirror Glass: Tempered Glass Nominal 6.0-mm (0.23-inch) thick, conforming to ASTM C 1036, Type I, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.
8. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
9. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.
10. Keys: Provide universal keys for access to toilet accessory units requiring internal access for servicing, resupply, etc. Provide a minimum of six keys to Owner's representative.

C. Surface Mounted Hand Dryer: Automatic sensor operated, 110-120V by Excel Dryer, Inc. Model XL (color selected by Owner/Architect) or approved equal.

D. Waste Receptacle: 22 gallons with funnel top. Rubbermaid #3546 and #3548 top or approved equal.

E. Trash Container: 28 ½ quarts, Rubbermaid #2956 and #3066 or approved equal.

F. Surface-Mounted Napkin/Tampon Vendor: Stainless steel all weld construction. 22 GA cabinet, 18 GA door, coin operation American Specialties, Inc. 0864 or approved equal.

G. Surface-Mounted Sanitary Napkin Disposal: Stainless steel construction, Bobrick B-254 or approved equal.

H. Stainless Steel Grab Bars: Provide grab bars with wall thickness not less than .050 inch (18 gage), Bobrick Model B-6806 or approved equal and as follows:

1. Mounting: Concealed, manufacturer's standard flanges and anchorages.
2. Clearance: 1-1/2-inch clearance between wall surface and inside face of bar.
3. Gripping Surfaces: Smooth, satin finish.
4. Heavy-Duty Size: Outside diameter of 1-1/2 inches.

I. Stainless Steel Channel-Framed Mirror Units: Fabricate frame with channel shapes not less than 0.04 inch (20 gage), with square corners carefully mitered to hairline joints and mechanically interlocked. Provide in Type 430, bright polished finish. Bobrick Model B-165 Series or approved equal.

J. Fabrication: Only a maximum 1-1/2-inch diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by means of either a waterproof, printed label or a stamped nameplate, indicating manufacturer's name and product model number.

K. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless-steel piano hinge. Provide concealed anchorage wherever possible.

L. Framed Mirror Units, General: Fabricate frames for tempered glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation, as follows:

1. Provide galvanized steel backing sheet, not less than 0.034 inch (22 gage) and full mirror size, with non-absorptive filler material. Corrugated cardboard is not an acceptable filler material.

M. Mirror Unit Hangers: Provide system of mounting mirror units that will permit rigid, tamperproof, and theft-proof installation, as follows:

1. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

N. Toilet Seat Cover Dispenser: Georgia Pacific Model # 57710 (White) or approved equal.

1.3 EXECUTION

A. Installation: Install toilet accessory units according to manufacturers' printed installation instructions, using fasteners appropriate to substrate as recommended by unit manufacturer. Install units plumb and level, firmly anchored in locations and at heights indicated.

1. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set the units plumb, level, and square at locations indicated, in accordance with manufacturer's instructions for type of substrate involved.
2. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
3. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION 10800

SECTION 12242 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roller Shades: Solar type shades that roll into a coil and unroll flat.
2. Provide one (1) shade for every individual window sash at all new replacement windows.

1.3 SUBMITTALS

A. Product Data: For each type of product.

1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Provide an overall floor plan showing all window shade locations. Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations. Provide a roller-shade schedule on the shop drawing.

C. Provide Material Samples for Initial Selection: For each type and color of shadeband material.

1. Include samples of accessories involving color selection.

D. Provide a Typical Window Opening Full Size Mock-up Sample for each type of roller shade.

1. Shadeband Material: Not less than 10 inches (250 mm) square. Mark inside face of material if applicable.
2. Roller Shade: Full-size operating unit, not less than 12 inches wide by 12 inches long for each type of roller shade indicated.
3. Installation Accessories: Full-size unit, not less than 10 inches (250 mm) long.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing. In the Shop Drawing, the contractor shall specifically note each deviation or change.
5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Submit a sample Warranty: Provide the manufacturer's warranty documentation.

F. Provide an Installer Qualifications and a letter from the manufacturer certifying the installer.

G. Provide Product Certificates that the product meets the "children's product" US Consumer Product Safety Commission accepted third-party conformity assessment body. The operating cords must be inaccessible or non-hazardous.

H. Provide Product Test Reports:

1. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
2. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roller shades to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer trained and certified by the manufacturer having at least ten (10) years' experience installing products comparable to those specified in this section.

B. Installer: must be an approved installer meeting all qualifications required by the manufacturer.

1.6 WARRANTY

A. Roller Shade Hardware and Shadecloth: Manufacturer's 25-year warranty that all components are free from manufacturing defects from the date of substantial completion.

B. Roller Shade Installation (Labor and Material): Two (2) years from date of substantial completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from

Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Legrand Clutch Shade System or approved equal.

1. Supplier: Contexture or approved equal

B. Source Limitations: All shade systems specified in this section shall be provided by one manufacturer.

C. Basis of Design: TELESHADE system shall be a smooth operating chain and sprocket roller shade system manufactured by Legrand or approved equal. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals. Shade shall come pre-assembled to jobsite but allow for reversable chain operation for easy reconfiguration without disassembling the shade system

1. Easy-Lift (Chain operated) Action with infinite positioning. Left hand, right hand or both sides operation available as standard. Provide the chain restraining device.
2. Manual Teleshade shall include a "manual override" requirement that allows the shade to be pulled down by the hembar without using the chain. This operation must be demonstrated onsite with the required sample shade.
3. Provide fully factory assembled shade unit consisting of 2 end brackets, shade tube, extruded aluminum fascia, hembar and fabric.
4. Removal shall not require the disassembly of the shade unit.
5. End Bracket: 3 inches by 3-3/4 inches (77 X 96 mm) end bracket shall be a two piece molded ABS construction with 2-1/2 inches (64 mm) diameter nylon drive sprocket. Brackets color shall co-ordinate with the fascia color.
6. Shade Tube: Extruded aluminum shade tube shall be 1/16 inch (1.52 mm) thick with three internal continuous fins 3/16 inch (4.82 mm) high, for strength and drive capabilities when attached to the nylon sprocket. The fins shall be spaced 120 degrees apart.
7. Fascia: the extruded aluminum fascia shall be 1/16 inch (1.7 mm) thick, complete with two continuous screw flutes, anodized or powder coated as required
8. Drive Assembly: - Factory set for size and travel of shades.
   a. Capable of being field adjusted from the exterior of the shade unit without having to disassemble the hardware.
   b. Provided with a built-in shock absorber system to prevent chain breakage, under normal usage conditions.
9. Drive Chain: shall be No. 10 stainless steel bead chain formed in a continuous loop. Chain with 90 pound tensile strength.
10. Exterior Hem-bar: extruded aluminum with plastic end finials.
11. Fabric –Room Darkening Fabric – 0% - Color to be selected from manufacturers standard. Fabric must be NFPA 701 compliant.
12. Front Fascia: Provided by shade contractor.

a. SnapLoc (or approved equal) Front Fascia: Aluminum extrusion that conceals front and underside of roller and operation mechanism and attaches to roller endcaps without exposed fasteners. Provide for all exposed shades.
b. Shape: L-shaped.

13. End Caps: To cover exposed end caps.

2.2 SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):

1. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

C. Shadeband Fabrication: Fabricate shadebands without battens or seams to greatest extent possible except as follows:

1. Railroaded Materials: Railroaded materials due to material roll width not meeting window opening requirements will not be permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER-SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

1. Opaque Shadebands: Located so shadeband is not closer than 2 inches (51 mm) to interior face of glass. Allow clearances for window operation hardware.

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades.

END OF SECTION 12242

SECTION 12400 – PLASTIC LAMINATE CASEWORK

PART 1 GENERAL

1.1 GENERAL PROVISIONS

A. Applicable provisions of General Conditions, Special Conditions, and General Requirements shall apply to this section as if repeated in full herein. Reference other Sections and Divisions for work in connection with this section.

1.2 SCOPE OF WORK

A. Cabinets: Furnish prefabricated cabinetry and related components as specified herein. Refer to plans and equipment lists for details and requirements. Cabinetry shall include all fillers, scribes, finish ends, finish backs, laminate and solid polymer countertops. Locks to be provided where shown on casework drawings or described in equipment lists.

B. Sinks and Fixtures: Provide sinks, fixtures, electrical outlets, and fittings specified as part of complete model numbered units. Provide materials to appropriate trades for final hook ups and installation.

1.3 RELATED WORK NOT INCLUDED

A. Sinks and Fittings: Sinks and fittings, connection, piping, traps, supplies, shut offs, and special plumbing applicable to codes. Electrical fittings, devices, conduit, wiring, fans, blowers, motors, ductwork, and special grills not specified as part of furnishings. (Specified in electrical, plumbing, and heating/ventilation/air conditioning sections)

B. Blocking, Framing and Reinforcements: In walls, ceilings, and floors for cabinetry anchorage and mountings, SHALL BE COORDINATED DURING SHOP DRAWING SUBMITTALS & CONSTRUCTION AND PROVIDED BY GENERAL CONTRACTOR AS NEEDED.

C. Locks: Master keyed to room doors or specialty locking systems. (Specified in lock section)

D. Vinyl Base Molding: (Specified in resilient flooring section)

1.4 QUALIFICATION

A. Casework Standards: Casework is based on Stevens Industries model numbers. Cabinet Construction options are as specified in this section and on Contract drawings.

B. The manufacturers listed below will vary somewhat in exact construction methods included in their base or standard designs but are acceptable as equal manufacturers. Accordingly, any acceptable manufacturer must include the options and/or customized materials and construction methods to meet or exceed the specified design criteria.

1. Case Systems
2. Clearwood
3. Or Approved Equal

C. Substitutions:

1. Substitutions will be approved in accordance with Specification Section 01300.

2. Contractor shall state in writing any deviations from requirements and specifications. The casework shall conform to the configuration, arrangement, design, material quality, joinery, panel thickness, and surfacing of that specified and shown on drawings.

3. Manufacturers requesting approval shall submit samples with cut-aways showing cabinet construction, joinery, drawer and door construction, hardware, and materials, along with catalogs and specification, in order that accurate evaluations can be made. Manufacturers shall show full sized working samples. Catalogs and specifications shall be submitted with written request, along with detailed list of compliance and deviations from these documents for approval. Samples may be impounded by owner and retained until completion of job for verification and compliance of specifications.

4. Manufacturer must be Architectural Woodwork Institute (AWI) Premium Certified.

1.5 SUBMITTALS

A. Shop Drawings: Shall be submitted for approval after formal notification of award of contract. Drawings shall consist of floor plans indicating arrangement and relation to adjacent work and equipment and complete elevations of casework. Centerline of service requirements shall be noted for use by other trades. A schedule of all sinks, fittings, and accessories that are part of this contract shall be provided.

B. Color Samples: Shall be submitted for selection and coordination at time of shop drawing submittals. Samples of actual materials and color shall be available as required.

C. Catalog Cuts: Additional catalog cuts, details, and samples as requested by architect for evaluation and coordination.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protection: Protect casework and related materials during transit, delivery, storage, and handling to prevent damage, soiling, and deterioration.

B. Storage: Store casework and related materials at project site in installation and storage areas with similar ambient conditions as final installation. Storage areas must be kept dry, heated with low relative humidity, and away from construction work such as painting, wet work, grinding, and similar operations.

C. Site Conditions: In accordance with AWI's *Quality Standards Illustrated* (current edition).

1.7 WARRANTY

A. Casework manufacturer shall warrant for a period of three (3) years that its manufactured product is free from defects in materials and workmanship when properly installed and under normal use and conditions.

B. Accessory equipment (sinks, fittings, etc.) shall be warranted by appropriate manufacturer's guarantee to the limit of that manufacturer's standard warranties.

PART 2 PRODUCTS

2.1 SURFACE MATERIAL

A. Cabinet:

1. Exposed finish ends, fronts, modesty panels, and finish backs shall be faced with vertical grade (.028") High Pressure Laminate (HPL), tested under National Electrical Manufacturers Association (NEMA) LD3-2005.

2. Panels with exterior .028 HPL surfaces shall have Cabinet Liner Surface (CLS) (.020") white interior cabinet liner.

B. Semi-Exposed Interior: Surfaces exposed when doors and drawers are open, but not exposed when door and drawers are closed shall be Cabinet Liner Surface (CLS) (.020") white interior.

C. Exposed Interior: Surfaces not concealed by doors and drawers (open shelving, lockers, etc.) and surfaces visible thru transparent (glass) doors exposed when doors shall be faced with vertical grade (.028") High Pressure Laminate (HPL), tested under National Electrical Manufacturers Association (NEMA) LD3-2005.

D. Drawers: Sides, back and sub front shall be constructed of ½" thick particleboard laminated with white melamine. Drawer bottom shall be ½" thick particleboard laminated in white melamine and screwed directly to the bottom of the drawer box. Cabinet with less than ½" thick bottom or painted drawer bottoms will not be acceptable.

E. Concealed Backs: Shall be ¼" thick white hardboard to match interior of cabinet

2.2 CORE MATERIALS

A. Particleboard: Shall be high performance industrial grade core. Particleboard shall be 45# - 48# density 3-ply type formation conforming to American National Standards Institute (ANSI) A208.1 and American Society for Testing and Materials (ASTM) D1037-91A standards.

B. Medium Density Fiberboard: Core shall be minimum 48# density conforming to ANSI A208.1 MD-130 standards.

C. Moisture Resistant Core: Interior-Grade moisture resistant particleboard to meet or exceed M-3 Grade, according to ANSI-A208.1-2009 shall be used at all cabinets and counters within 8 feet of any plumbing fixture.

2.3 EDGINGS

A. Door and Drawer Fronts: Edges shall have 3mm radius extrusion banding. 3mm pattern selection Fronts shall have radius edges and corners utilizing automated hot melt adhesive application and trimming.

B. Cabinet Edges: Cabinet sides, top, bottom, adjustable shelves, and other interior components shall be edged with (.020") flat edge extrusion. Automated hot melt adhesive application and trimming.

C. Drawer Components: 3/4" sides shall be edged with (.020") flat edge extrusion. Automated hot melt adhesive application and trimming.

D. Selections: Edgebanding to match laminate selections based on commercially available patterns, including premium selections to match and coordinate with laminate selected by Owner during construction.

2.4 SELECTIONS AND APPLICATIONS

A. Exposed: Cabinet finish ends, fronts, modesty panels, and finish back HPL .028 thickness shall be selected from Wilsonart full range of available options including all "premium" laminates (excluding HD laminates) or approved equal.

B. Interior of Exposed Cabinets (any surface exposed to view when doors and drawers are in closed position) shall be High Pressure Laminate to match the exterior

C. Semi-exposed Surfaces (surfaces not exposed, completely concealed from view when doors and drawers are in closed position): are to be white .020 cabinet liner

D. Drawer Interiors: Are to be white

E. Backs: Shall be matching to Interior of cabinet (White .020 cabinet liner)

F. Laminate Countertops: Selected from Wilsonart full range of available options including all "premium" laminates (excluding HD laminates) or approved equal.

2.5 HARDWARE

A. Hinges: Type and finish shall be confirmed during shop drawing submittal process. Contactor shall include use of both types listed below and submit samples of each type with finish choices for selection by Owner. Provide a minimum of five (5) standard finishes. Doors less than 47" shall have two (2) hinges per door. Doors exceeding 47" shall have three (3) hinges per door.

5-Knuckle Hinges (High Use/Abuse Locations): Shall be heavy duty 5-knuckle 270-degree pivot reveal overlay style. Hinges shall have interlaying leaves 270-degree swing constructed of (.090") thickness steel. Hinges shall be (Grade 1) with hospital ground tips and non-removable pin.

Concealed Hinges (Improved Aesthetic Locations): Shall be fully concealed 170-degree European style hinges.

B. Door Catches: Shall be 7lb pull magnetic with screws slotted for adjustment

C. Pulls: Shall be offered in easy grip 4" metal wire type pulls. Provide a minimum of five (5) standard finishes to match and coordinate with exposed hinges.

D. Full Extension Slides: Full extension ball bearing slides to be an option feature available for all cabinet drawers if selected in specification options. Slides shall be side mounted with profile to not reduce interior drawer space normally provided. Ball bearing slides to be tested under The Business and Institutional Furniture Manufacturer's Association (BIFMA) X5.5 Section 7. Slides shall pass both 50,000 and 100,000 cycle test with a 120# load rating.

E. Shelf Supports: Adjustable shelf supports shall be injection molded clear polycarbonate. Supports shall incorporate integral molded lock tabs to retain shelf from tipping or inadvertent lift out. Supports shall have 5mm diameter double pin engagement into precision bored cabinet vertical hole patterns. Adjustment shall be (32mm) 1 1/4" spacings. Supports shall have a compression ridge effecting force against shelf edge to maintain positive pin engagement. Supports shall have molded-in screw attachment feature. Static test load shall exceed 200# per clip. Shelf spans above 27" shall have 5-point support with backs drilled to receive a mid-span shelf support, further reducing deflection. Shelf spans below 27" shall have end 4-point support.

F. Locks: shall be 5 pin by National lock or approved equal. Provide locks on all casework doors and drawers. Key match locks per room.

2.6 COMPONENT DETAILS AND CONSTRUCTION

A. Fronts: Door and drawer fronts shall be 3/4" thick. Fronts shall be edged with 3mm radius edge extrusion with face laminate as described 2.01.A. Automated hot melt adhesive application and trimming.

B. Wall Cabinets: Components shall be 3/4" thick members throughout. Wall cabinet tops and bottoms shall include back groove and minimum four (4) dowel pins per joint for insertion into cabinet ends. Wall cabinet ends shall be 3/4" thick with back groove and precision Computer Numerical Control (CNC) drill pattern for accurate location of fixed members, hardware, and shelf supports. Wall cabinet tops and bottoms to be 1" thick

C. Mounting Frames: Incorporated in wall units, tall units, and base units, shall be 3/4" thick with minimum two (2) dowel pins per mounting frame end joint for wall and tall units. Base units shall have a minimum of three (3) dowel pins per mounting frame end joint.

D. Tall Cabinets: Components shall be 3/4" thick members throughout. Tall cabinet tops and bottoms shall include back groove and up to eight (8) total dowels per end joint (based on cabinet depth). Tall cabinet ends shall be 3/4" thick with back groove and precision CNC drill pattern for accurate location of fixed members, hardware, and shelf supports. Tall cabinets to have two (2) integral (dowel into end) mounting frames. (Designs with simple spacer rails or rails without dowel pin engagement into ends are not acceptable.)

E. Base Cabinets: Components shall be 3/4" members throughout. Base unit bottoms shall incorporate back groove and up to dowel pins per end joint (based on cabinet depth). Base units shall have a full ¾" sub top. Cabinets with top frame will not be acceptable

F. Toe Kicks: Bases shall be separate ladder base design using water resistant exterior grade plywood & concealed fastening. No cabinet sides or body to touch floor. Individual bases constructed of the water-resistant exterior grade plywood will be acceptable.

G. Cabinet Backs: Shall be in an integrated system of a " prefinished Medium Density Fiberboard (MDF) back captured inside and horizontal grooves. Unit back to be further integrated with attachment to 3/4" doweled-in mounting frames. Fixed backs are mechanically fastened into grooves and sealed with hot melt adhesive. Removable backs shall be set in groove and attached with screws. On cabinets with exposed back a ¾" High Pressure overlay panel will be used in colors to match exposed casework

H. Adjustable Shelves: All Shelves shall be 1" thick to match the color of interior of cabinet. If cabinet interior is exposed, then shelves are to be laminated with .028 HPL to match.

I. Drawers: Four (4) sided full box design with separate attached front shall be provided. Drawer members shall be ½" thick for back, sub-front, sides and bottom.

2.7 LAMINATE TOPS

A. Decorative laminate shall meet NEMA LD3-2005 PF-42 (.042") specification standards. Patterns shall be selected from Wilsonart full range of available options including all "premium" laminates (excluding HD laminates) or approved equal.

B. Laminate tops shall be 1 1/16" thick with solid moisture resistant particleboard core and laminated with backer sheet edges are to be provided 3mm PVC countertops are to be provided with 4" back and side splash, edged backsplash to match front edge.

2.8 ACRYLIC SOLID SURFACE TOPS

A. Refer to Specification Section 06651.

PART 3 EXECUTION

3.1 INSTALLATION

A. The installer must examine the job site and the conditions under which the work in this section is to be performed and notify the contractor in writing of any unsatisfactory conditions. Do not proceed with work under this section until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

B. Casework, countertops, and related materials to be conditioned to average prevailing humidity condition in installation areas prior to start of work.

C. Install casework and countertops with factory-trained supervision, authorized by manufacturer. Casework shall be installed plumb, level, true, and straight with no distortions (shim as required). Casework shall be securely attached to building structure with anchorage devices of appropriate type, size, and quantity to meet applicable codes, specifications, and safety conditions. Where casework and countertops abut other finished work, scribe and trim to accurate fit, and caulk as required.

D. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware.

E. Repair, or remove and replace, defective work as directed upon completion of installation.

F. Advise project site superintendent of problems and precautions for protection of casework and countertops from damage by other trades until acceptance of the work by the owner.

G. Cover casework with 4-mil polyethylene film for protection against soiling and deterioration during remainder of construction period.

END OF SECTION

SECTION 15010 - GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

1. The General, Supplementary, and Special Conditions, applicable portions of all divisions and the addenda thereto, are made a part of this Contract.

2. It is the intent of these specifications to include all material, service and labor necessary to form a complete and properly operating whole.

3. Where equipment is shown on plans and specified as a single unit in specifications, the equipment quantities shall be per plans. Provide a complete operating system for all equipment.

4. Where reports and/or requirements are specified herein as a single report, it is the intent that each requirement and/or report be separate for each building, i.e., commissioning report, operation instructions, etc.

5. Specifications for certain equipment or performance may not be applicable for all areas. Refer to the plans for where equipment and/or performance are required.

1.02 CONTRACT DRAWINGS

1. Examine all drawings and specifications. Visit the site to become acquainted with the construction and the extent of the work.

2. In referring to drawings, figured dimensions take precedence over scale measurements. Discrepancies must be referred to the Architect for decision. Each Contractor shall certify and verify all dimensions before ordering material or commencing work.

3. Any work called for in the specifications, but not mentioned or shown on the drawings, or called for on the drawings, but not mentioned in the specifications, shall be furnished as though called for in both.

4. When any device or part of equipment is herein referred to in singular number, such as "the pump", such reference shall be deemed to apply to as many such devices as required to complete the installation.

5. The term "provide" shall mean "furnish and install". Neither term will be used generally in these specifications but will be assumed. The term "furnish" shall mean to obtain and deliver on the job for installation by other trades and/or Contractor.

1.03 CODES AND STANDARDS

1. All work shall comply with all regulations and latest edition of applicable codes and be subject to inspection and approval of all authorities having jurisdiction.

2. All electrical work shall comply with latest edition of the NEC National Electrical Code.

3. Where items indicated on contract documents differ from code requirements, Contractor shall inform Architect prior to installation. Any construction installed by contractor that is not in

compliance with applicable codes, shall be removed, modified, and/or replaced at no additional cost to Owner or others.

4. Contractor shall give all notices, obtain and pay for all permits, deposits, and fees necessary.

1.04 SCOPE OF WORK

1. It is the intent of these specifications to include all material, service and labor necessary to form a complete and properly operating whole system.

1.05 PROGRESS

1. See Specification Sections 01040-Coordination, 01310-Construction Progress and 01315-CPM Schedule.

1.06 SHOP DRAWINGS AND SUBMITTALS

1. See Specification Section 01300 – Submittals.

2. Ductwork and piping shop drawings shall be prepared u at 1/4" scale (minimum).

3. The Contractor shall provide a written report stating whether or not any equipment furnished is eligible to receive a Program Incentive payment through the NJ Clean Energy Commercial and Industrial Program (New Jersey SmartStart Buildings®). The report is to be submitted with original shop drawing submittal. Report shall include all supporting equipment specification sheets, applicable AHRI Certificate and any other documentation required.

   Listed below are the types of qualifying equipment & approved technologies listed by New Jersey SmartStart Buildings® that may qualify incentives which require a report be submitted from each equipment manufacturer for each equipment item submitted. (Note: a negative report MUST be submitted where applicable)

   Electric Unitary HVAC
   - Unitary HVAC & Split Systems
   - Packaged Terminal Systems
   - Central DX AC Systems
   - Dual Enthalpy Economizer
   - Controls
   - Occupancy Controlled
   - Thermostats
   - A/C Economizing Controls

   Variable Frequency Drives
   - Variable Air Volume Units
   - Pumps
   - Boilers

   Gas Heating

   - Gas-Fired Boilers
   - Controls

1.07 EQUIPMENT DEVIATIONS

1. The material and products mentioned in these specifications are given to establish a standard of quality, design and performance. The phrases "equivalent", "acceptable", "or approved equal" and "equivalent to" shall be used to indicate that other similar products may be used and provided in accordance with "General Conditions", where applicable, such substitutes are accepted by the Architect as meeting all standards necessary to perform the function intended.

2. Where Contractor proposes to use equipment other than that specified or detailed on drawings, which will require any changes of the structure, partitions, foundations, piping, wiring or any other part of the design documents; all design, engineering and any new coordination drawings and detailing required by other contractors and/or professionals shall be paid by Contractor at no additional cost to Owner.

3. Where such deviations from equipment specified and/or indicated on plans, require a different quantity and/or arrangement of any duct work, piping, electrical work, wiring conduit and/or equipment that would have been required for equipment. Contractor shall with the approval of the Architect provide all material, equipment and labor required by the change at no additional cost to the Owner.

4. Where such approved deviation requires a change to the structure, electrical, plumbing or any other Contractor's or Sub-Contractor's work, or any change to the construction as indicated on the design documents. Contractor shall pay for all costs incurred due to such deviations at no additional cost to the Owner.

1.08 REJECTED MATERIALS

1. See Specification Section 01300-Submittals and the AIA Document A201-2017 General Conditions of the Contract for Construction.

1.09 WORKMANSHIP

1. See Specification Section AIA Document A201-2017 General Conditions of the Contract for Construction.

1.10 WARRANTY

1. See Specification Section 01740 – Warranties and Bonds.

2. Filter Change - See Specification Section 15010 “Filter Changes”.

1.11 MAINTENANCE SERVICE

1. Contractor shall furnish complete parts and labor service and maintenance of all HVAC systems, equipment, devices, controls, etc., for two (2) years from Date of Substantial Completion as determined by Architect.

2. Provide a schedule of all HVAC related maintenance and service items and tasks included in the contract scope of work to be submitted as a shop drawing. Include name of the item and anticipated service/maintenance dates as well as frequency of required maintenance of each item or task in the schedule.

3. Provide scheduled maintenance service with three (3) month interval as maximum time period between scheduled service or as indicated elsewhere (applicable only if less than 3-month intervals).

4. Provide 24-hour emergency service on breakdowns and malfunctions.

5. Include maintenance items as outlined in manufacturer's operating and maintenance data. These items shall only include those listed as required by the equipment or system manufacturer for safe or proper operation of the equipment or system. Any other routine cleaning or maintenance service recommended but not required by the equipment or system manufacturer shall be performed at the service intervals listed above when needed.

6. Submit copy of service call work order or report and include description of work performed. Handwritten report acceptable at time of service. Type written report to be provided to Owners' maintenance staff within two (2) weeks of service call.

7. See Section 15930 for additional requirements for control system.

1.12 AS-BUILT DRAWINGS

1. See Specification Section 01700 – Project Closeout

1.13 FIRE RATING

1. All materials used anywhere in the work must have NFPA rating, and be in accordance with ASTM-E-84 as follows:

   A. Flame Spread - Not Over 25
   B. Smoke Developed - Not Over 50
   C. Fuel Contributed - Not Over 25

2. All materials shall be "Self-Extinguishing".

1.14 EQUIPMENT SELECTION AND SERVICEABILITY

1. All equipment shall be located and installed so that it may be serviced. Demonstrate to Owner as part of instructions that there is room to remove all coils, tube bundles, filters, motor and similar equipment. Equipment which is too large or poorly located to permit servicing shall be replaced or repositioned or modifications made to allow for proper servicing at no additional cost to the Owner.

2. Where piping, control diagrams and/or sequencing differ from the recommended piping arrangements of the equipment manufacturer, and will directly affect the equipment performance, the manufacturer's recommendations shall be submitted in writing to the Architect for approval, prior to purchasing the equipment involved and piping arrangement, control, etc., as recommended by manufacturer shall be used. Contractor shall be responsible for obtaining such recommendations from the manufacturers in order to effect correct and proper operation of the equipment at the capacities and temperatures indicated.

1.15 EQUIPMENT FURNISHED BY OTHER TRADES

1. All equipment furnished and/or installed by other trades requiring connections and services by Contractor shall have such services provided by Contractor.

2. Contractor shall verify exact requirements with approved shop drawings supplied by the equipment contractor and/or supplier prior to construction.

3. Contractor shall verify locations, sizes and requirements of all services to equipment, in field with the equipment contractor prior to construction.

1.16 FACTORY TESTING

1. All factory assembled packaged equipment shall be factory tested including helium leak testing of the coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. A certified factory Run test report shall be provided for each unit. **The "Run Test Report" shall be submitted to Owner for approval, prior to acceptance of unit for payment.**

2. All factory assembled packaged equipment shall be fully quality tested by factor run testing under normal operating conditions. Quality control system shall automatically perform via computer; triple leak check, pressure tests, evacuation and accurately charge system, perform detailed heating and cooling mode tests, and quality cross check all operational and test conditions to pass/fail criteria.

3. Detailed report card will ship with each unit displaying status for critical tests and components.

4. If unit fails on any cross check, it shall not be allowed to ship. Serial numbers will be recorded by factory and furnished to contractor on report card for east of unit warranty status.

PART 2 PRODUCTS

2.01 ELECTRICAL EQUIPMENT

1. Contractor shall furnish all his equipment complete with motor, controllers, capacitors and starting equipment.

2. Electric motors shall be premium high efficiency (refer to table below for minimum efficiency), open, drip proof induction motors premium high efficiency rated for continuous duty at 15% overload with 40° C. rise; single phase motor shall be capacitor start-induction run. Motors one-half and larger shall be polyphase, motors smaller than one-half horsepower shall be single phase, unless otherwise noted (see Division 16). Starting equipment shall consist of magnetic across-the line starters by Furnas Bulletin 14 or approved equal, unless otherwise specified. Thermal overload type, motor rated manual switches shall be furnished for motors ¾ HP and less which do not require magnetic starters for control purposes.

   Premium high efficiency motors shall have efficiencies equivalent to or greater than listed below.

SIZE/HP	1800 RPM ODP NEMA NOMINAL EFFICIENCY	1800 RPM TEFC NEMA NOMINAL EFFICIENCY
1	85.5%	85.5%
1.5	86.5%	86.5%
2	86.5%	86.5%
3	89.5%	89.5%
5	89.5%	89.5%
7.5	91.0%	91.7%
10	91.7%	91.7%
15	93.0%	92.4%
20	93.0%	93.0%
25	93.6%	93.6%
30 & above	94.1%	93.6%

3. Provide Power Factor correction capacitors size to increase full load power factor to 95%. Capacitors shall be fused, in NEMA enclosure, connected between safety switch and motor starter.

4. Where apparatus is specified as "Packaged", all electrical equipment shall be furnished, set and wired to a single point of connection for apparatus as a unit.

5. Contractor shall set all electrical equipment furnished by Contractor unless same is to be mounted on an electrical panelboard, junction box or similar piece of electrical equipment and is to be wired by others.

6. Where electrical characteristics are not shown, all electrical characteristics shall be as indicated on electrical plans. Where there is a conflict between model numbers which indicate electrical characteristics and electrical drawings, the electrical drawings shall take precedent.

7. Contractor shall verify all electrical characteristics of all equipment with the electrical contractor. Contractor shall submit to Electrical Contractor location of all motors, starters, all other electrical equipment, voltage and phase required prior to submission of Contractor's and/or electrical contractor's shop drawings or start of construction. Contractor shall submit to the electrical contractor all equipment requiring electrical services and obtain the review of the shop drawings for correct electrical characteristics for the electrical contractor prior to submission for review.

8. Should Contractor change type of equipment which results in change to electrical characteristics, then Contractor will be responsible to coordinate these changes with all other trades and pay for all costs required as a result of changes.

9. Should Contractor change electrical characteristics of equipment from that shown on electrical drawings or does not submit shop drawings to the electrical contractor for his review, he is responsible for all cost required, resulting from such change or failure to submit shop drawings.

2.02 ELECTRICAL WIRING

1. Contractor shall furnish and install all electric power wiring required for his contract, with the exception of certain wiring shown under electrical contract. Contractor shall furnish and install

all control wiring required for his contract including power wiring to all ATC devices, panels, etc. (unless indicated otherwise on electrical plans).

2.03 RELIEF VALVES

1. Provide ASME or approved equal labeled relief valve on each closed fluid system, set to relieve full code capacity at design pressure. Pipe discharge to suitable receptor with air gap in accordance with all codes. Do not locate pipe at floor to create a tripping hazard.

2.04 GAUGE GLASSES

1. Jerguson #56 or approved equal cocks with bleed fitting and vertical rising ball check for tubular glass with four guard rods.

2.05 PRESSURE GAUGES

1. All pressure gauges shall be Ashcroft 1020 or approved equal, 4½ size with white dial, black figures and markings. Gauges shall be provided with level handle gauge cock and steam siphon where required.

2.06 THERMOMETERS

1. Thermometers shall be 5" diameter dial type with stainless steel cases and separate wells. Ashcroft T-7173T or approved equal, adjustable to any angle.

2.07 TAGS

1. Contractor shall provide a 2" dia. brass tag with stamped service designation and valve numbers, fastened to each valve with brass chain and "S" hook.

2. Each control, starter, disconnect switch, etc., shall be provided with 3/4" x 2-1/2" metal name tag securely fastened to device. Name tags on controls exposed in finished spaces shall be located on inside of access door or access panel. Provide valve chart and schematic diagram along with floor plan. Both chart and diagram shall be permanently mounted with metal frame and glass front in mechanical room or other area designated by Owner. Contractor may submit an alternative mounting method for Owners' review and approval.

2.08 EQUIPMENT ISOLATION

1. Provide shutoff valves on supply and balancing and shutoff valve on return lines for each piece of equipment including all radiation loops, unit heaters, coils, unit ventilators, air handling units, fan coil units and all pieces of hydronic equipment.

2. At all branch lines serving two or more pieces of equipment, provide a shutoff valve on supply and balancing and shutoff valve on return at the points where the branch line connects to main. Provide drainage and slope pipe to drain points.

3. At all branch lines from mains, whether directly feeding equipment or not, provide shutoff valves on supply and return with ability to drain branch lines.

4. All valves shall be tagged (see tags) and when installed above accessible construction, provide

color coded markers (per architect's direction). Where installed above non-accessible construction, contractor shall provide access panels. Panels shall be marked for equipment.

2.09 NEW EQUIPMENT IDENTIFICATION

1. All new HVAC equipment, control panels and starters shall have engraved plastic equipment tags. Tags shall be 1/16" plastic with mounting holes or adhesive backing to allow tags to be permanently mounted to equipment. Indication shall be for the equipment number, usage and location and where applicable circuit numbers and panel for electrical feed served. Equipment number shall be per the contract documents, or where different numbering system is used by the contractor, the number system shall be per as-builts, O & M manuals and/or control drawings. Areas served shall be per room name and number (if applicable) based on architectural plans; contractor to verify prior to submittal. If different room designations and number system is used by Owner/contractor, these shall be used.

2. Size of equipment tags shall be minimum 1"x3". Larger sizes shall be used, 1-1/2" x 4", for equipment requiring additional information.

3. Colors shall be to the extent practical and possible, match duct and pipe marker color.

4. For equipment not ducted or piped, provide same color as adjacent equipment. Engraved plastic equipment tags shall be manufactured by MSI or approved equal.

5. Equipment location tags shall be used for equipment located above acoustic ceiling. Provide white permanent adhesive one inch long by half inch-wide labels on the ceiling grid with color coded laser printed text to identify all above ceiling devise, equipment and valves.

PART 3 EXECUTION

3.01 METHOD OF PROCEDURE

1. The drawings accompanying these specifications are diagrammatic and intended to cover the approximate and relative locations of the systems. Where FMCS plenum-rated cable wiring is allowed it shall be run parallel to or at right angles to the structure, properly supported and installed in a neat and workmanlike manner.

2. Installation, connection and interconnection of all components of these systems shall be complete and made in accordance with the manufacturers' instructions and best trade practices. Contractor shall erect all parts of equipment to be furnished by him under his contract in such time and in such a manner as not to delay or interfere with other contractors' work.

3. Contractor shall lay out his work and be responsible for the establishment of heights, grades, etc., for all interior and exterior piping, equipment, conduit, duct work, etc., included in Contract Documents, in strict accordance with the intent expressed thereby. The establishment of the location of all work shall be performed in consideration of the finished work. In case of conflict, equipment and/or materials shall be relocated without additional cost to the Owner, as directed by the Architect, regardless of which equipment was installed first.

4. Each contractor shall cooperate with other contractors for the proper securing and anchoring of all work included within these specifications. Extraordinary care shall be used in the erection and installation of all equipment and materials to avoid marring surfaces of the work of other

contractors, as each contractor will be held financially responsible for all such damage caused by the lack of precaution and due to negligence on the part of his workmen.

5. Do not run pipe or conduit for mechanical systems in any concrete slab 3" or less in thickness. Do not place any pipe or conduit in any slab where the outside diameter of the pipe or conduit is more than one-quarter the thickness of the slab.

6. All piping, duct work, conduit and other mechanical materials and equipment shown to be mounted below ceilings are to be kept as close to ceiling areas as possible unless otherwise noted.

7. All items such as valves, dampers, equipment, controllers, starters, ATC panels, etc., that will be concealed in construction shall be installed and so arranged as to be fully accessible for adjustment, service and maintenance by use of access doors.

8. Where these devices are above suspended ceiling, colored indications mounted on ceiling, markings on suspended ceiling grid, shall be submitted for review and be used to indicate such devices. Color scheme and material used for this shall be coordinated and approved by Owner and reviewed by Architect.

3.02 CLEANING

1. Upon completion of the work, Contractor shall remove all excess material, debris, tools and equipment from the site, and leave the premises in a broom clean condition.

2. Flush out all piping systems with proper solvents to insure removal of all foreign materials. Clean equipment, piping and other surfaces soiled by the work. Remove debris and rubbish on a daily basis.

3. Disposal of all materials shall be Contractors' responsibility. All solvents and other chemicals, and materials used, shall be disposed of in strict accordance with all applicable environmental codes.

3.03 STARTUP AND ADJUSTMENTS

This work is the contractors' responsibility is not part of commissioning and is to be done prior to commissioning.

1. Equipment Startup

   A. Contractor shall provide all startup. Startup shall be provided by the equipment supplier for all equipment.

   B. As part of startup, the equipment manufacturer shall provide a complete checklist of all start-up requirements for each piece of equipment. This checklist, when completed, shall be provided to the architect/owner indicating that the equipment has been started up, adjusted, balanced, tested and installed in strict accordance with the equipment manufacturer's requirements and is functioning per specification.

   C. This written confirmation shall be the equipment manufacturers' standard checklist for start-up. All start-up, adjustments, replacement of equipment, rebalancing, installation, and any

other modification to the equipment or system required to provide the correct and/or specified performance shall be made at no additional cost to Owner. Any of the above items needed shall be indicated as part of this start-up.

D. All startup provided by the equipment manufacturer shall have written confirmation as specified above and shall be submitted to Owner/architect prior to contractor submission of payment for substantial completion. Failure to provide start-up reports will result in non-payment of billing for substantial completion.

E. Where any modifications and/or reinstallation is required as specified above and results in additional work to any other contractors or subcontractors work, this work shall be the responsibility of the HVAC contractor and shall be done at no additional cost to Owner/Architect.

F. Where start-up is not completed in a timely manner and results in additional cost to other contractors, regardless of cause, these additional costs will be the responsibility of the HVAC contractor. These costs shall result in no additional cost to Owner.

G. The equipment manufacturer personnel who will do the start-up and provide report shall be a certified factory trained representative whose primary function is starting up of equipment. Qualifications of the start-up representative shall be provided as part of the report or inspection.

H. As part of startup, the Owner shall be provided operation and maintenance manuals.

I. As part of startup and/or inspection services after startup has been performed, the same factory trained representative shall be available for a period of classroom instruction to instruct the Owners' personnel the proper maintenance equipment.

J. Contractor shall supply the Owner with the following literature as furnished by the manufacturer, four weeks prior to startup, and have equipment manufacturers' representative available for any questions.

1) Three (3) complete sets of installation drawings.
2) Field wiring diagrams.
3) Installation instructions.
4) Start-up operation and maintenance instructions.

K. It is the intent of these specifications that the factory start-up personnel have their expertise in the equipment that they are providing start-up service. Where one manufacturer provides more than one type of equipment (i.e., chiller rooftops, etc.), then a factory trained representative for each different type of equipment, if necessary, shall provide startup, inspection report and/or training.

L. Where startup results in performance which is not in accordance with contract documents or manufacturers' specifications, Contractor shall submit to the architect the discrepancies prior to commissioning of work. Any discrepancies shall be the responsibility of the contractor and be corrected by the Contractor at no additional cost to Owner.

M. **All of the work in this section must be completed and accepted by the Owner/Architect as a condition for issuing a substantial completion letter.**

2. Upon completion of initial testing and prior to final balance, Contractor, ATC subcontractor and sheet metal sub-contractor shall perform a survey and testing of the entire system. The testing shall be done with the commissioning agent and/or Owner. Contractor shall include the services of a minimum of three (3) personnel; not to include control personnel and equipment start-up personnel. This report is in addition to and to be completed prior to commissioning. Balance for substantial completion will be withheld until report is completed, reviewed and accepted.

3. Contractor shall perform, but not limited to the following;

   A. Each individual thermostat and/or sensor shall be tested with Owners' representative for proper operation and setpoint. Adjustments shall be made to setpoints, calibration, repairs, and/or replacement of defective equipment.

   B. Each shutoff valve shall be tested and shall be set for its proper position and tagged per specifications.

   C. Each balancing valve shall be tested and tagged per specifications (suitable for balancing by commissioning agent.

   D. Each terminal device not having an electric motor, i.e. baseboard, hot water coil, chilled water coil, etc., shall be tested to determine proper setting operation in accordance with balance specifications and results recorded in balance report.

   E. Each and every new control device, valve, damper, and controller shall be tested, adjusted, repaired, and/or replaced if found defective. All wiring associated with the control system shall be tested. This shall include control transformers, wiring, electronic devices, and all equipment associated with the control system. (Also see Specification Section 15010, Factory Testing.)

   F. Each piece of packaged equipment shall be tested with the factory representative present as part of their start-up and shall be tested and operated up to its full capacity. All tests of packaged equipment shall be done before and after equipment has been integrated with the remainder of the system.

   G. Each fan shall be tested, adjusted, repaired, and/or replaced and made ready for final air balance performed. Fan shall be tested before and after it has been installed and integrated into the remainder of the system.

   H. The entire automatic control system shall be tested. First, each component shall be tested to determine proper operation, calibration, performance and sequence prior to installation and/or integration into the remainder of the system. After the initial test, the equipment shall be installed and integrated into the system. After this is done, the entire system shall be tested and adjusted for proper sequence of operation, performance, function and capacity of the entire system. This equipment shall be tested from DC computer station and verified for operation in field using 2-way communication.

   I. When delivered to the job site, all new equipment in need of repair and/or replacement shall not be installed until the necessary repairs have been made. In the event equipment is required to be repaired for whatever reason, it shall be repaired and/or replaced at no additional cost to Owner, and with no interruption of service or extension of contract time and no extension of completion date.

J. All piping shall be tested per specification. Include all valves and joints. Any leaks found shall be repaired and damaged construction replaced at no additional cost to Owner.

K. All tests, adjustments, repair, and/or replacement of all the mechanical system shall be completed at least three (3) weeks prior to the scheduled date of substantial completion and/or commissioning agent. No extension of time will be given for contractors' failure to perform the above. No extra compensation will be given due to the "overtime" hours implicated on the requirements of this section.

L. Upon completion of all tests, Contractor shall prepare a written report for submission to the Architect for his review. This report shall indicate the activity, time performed, results, initial balance points, final balance points, initial and final control settings, repair, and/or remedial work required and performed.

M. Contractor shall schedule (submit schedule as part of shop drawing for review) all his work and testing, so that in the event there is replacement, repair, and/or adjustment to system and equipment, it shall be completed, so as not to delay substantial completion.

4. As a result of test, adjustments, and work necessary to perform the above, Contractor shall, at his own expense, remove and replace any construction, either his or of other contractors. It is incumbent upon Contractor to schedule the required work so as to not affect other trades or progress of other contractors work.

3.04 OPERATING AND MAINTENANCE INSTRUCTIONS

1. Contractor shall prepare complete sets of bound operating and maintenance instructions for the Owner; including valve chart framed under glass or laminated with clear plastic mounted on masonite board, indicating number, location and purpose of each valve. Two (2) charts and one (1) mylar copy shall be provided for each mechanical room or as designated. The instructions prepared shall be black on white and shall be complete enough so that men generally familiar with the type of system will need no further data to properly perform the indicated procedures.

2. Contractor shall arrange for and perform a video and audio recording of all instruction periods. All tests associated with recording shall be the responsibility of the contractor. The contractor shall obtain Owners' preferences for recording prior to the instructions.

2. Contractor shall furnish qualified personnel to instruct the Owner's people in the operation of the system and must request from the Owner, in writing, a date for such instruction to begin. Contractor's personnel shall remain until such instruction is complete to Owner's satisfaction. Contractor shall receive from Owner written verification that the Owner's personnel have been thoroughly instructed in the operation, maintenance, and all facets of the system operation.

   Where instructions and operation for a particular system cannot be properly done due to system not being able to be operated, i.e., cooling system in winter; Contractor shall obtain from Owner time and date when this instruction will be performed and provide instructions at that time and date when system can be properly operated. This shall be done at no additional cost to Owner and final payment to contractor shall reflect this requirement.

3. Contractor shall provide to Architect for approval report indicating the itinerary of this instruction complete with duration of instructions location, time, and all other pertinent data.

4. Contractor shall have manufacturers' representatives, as part of their start-up, provide instruction on each piece of equipment. Where offsite instruction, due to complexity of systems, as determined by Architect of record, this shall be provided at no additional cost.

5. Manuals shall include all equipment, equipment parts lists, complete oiling, recommend spare parts, complete coiling, cleaning and servicing data compiled in a clearly indexed and easily understood form. The data shall indicate the serial numbers of each piece of equipment and provide complete lists of replacement parts, motor parts, ratings and actual loads.

6. Provide list of any special emergency operating instructions and a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to the various parts of the system.

7. Provide a certified log of air quantities at all air supply, return and exhaust openings, ASME and State pressure vessel inspection forms, all motor data, including standard and actual operating in service data and copies of all manufacturer's equipment guarantees and warranties.

8. Provide all ASME and State pressure vessel inspection forms.

9. Provide list of all motor data, including standard and actual operating in service data.

10. Provide all manufacturer's equipment guarantees and warranties.

11. Provide a list of units, filter sizes, quantities and recommended changes. For each piece of equipment, locate filter and demonstrate filter change.

3.05 TRAINING AND INSTRUCTION

1. Provide operating instructions shall include wiring and control diagrams showing the complete lay out of each system. These instruction periods shall be a minimum of hours listed:

   General System 16 Hours

   Provide additional training for equipment (see specification sections for hours) as specified in equipment specification sections and control system (see Specification Section 15930). The requirements for these instructions are in addition to the startup requirements for each type of equipment per Specification Section 15010, Part 3.03.

3.06 PAINTING AND FINISHING

1. All painting is to be done in accordance to Rust-Oleum Corporations or approved equal printed instructions. All surfaces to receive two (2) coats of primer, exposed surfaces one (1) finished coat, color selected. Aluminum or galvanized metal surfaces are considered finished where concealed.

2. All surfaces to be carefully cleaned and/or pickled and filled as required to provide a proper uniform surface. Factory finished equipment shall be touched up or refinished where required.

3. Where equipment is provided as factory painted and is visible on roofs from grade (as determined by construction manager), exposed in space or otherwise not concealed behind finished surfaces, equipment shall be factory painted in accordance with manufacturers standard

painting procedures. The color shall be selected by the architect and a color chart shall be submitted for review.

4. All duct exposed and all other exposed equipment, pipe and appurtenances in all other areas unless specifically indicated to be painted by general contractor, to be painted by Contractor color as selected. Submit for approval. All surfaces shall be prepared for painting and/or constructed of materials suitable to be painted.

5. All tags, labels and other removable instructions not required by the manufacturer to remain on equipment shall be removed.

6. Remove all labels and tags on sheet metal for exposed duct and duct above ceiling.

3.07 CONSTRUCTION SAFETY

1. All work shall be done in accordance with the following Federal regulations:

   A. Williams-Steiger Occupational Safety and Health Standards, Chapter XVII of Title 29, Codes of Federal Regulations.

2. Comply with local Health and Safety Regulations.

3.08 ENERGY CONSERVATION CODES

1. It is the intent of this specification that all equipment and materials furnished meet the latest enforced edition of the International Energy Conservation Code, latest applicable edition, or such code as locally applicable, if more restrictive.

3.09 FLASHINGS

1. All piping passing through roofs shall be provided with Stoneman "Stormtite" or approved equal seamless lead flashing.

2. All ducts penetrating roof shall be provided with curbs, flashing, counter flashing and flashing collar welded to duct. Coordinate exact requirements with roofing contractor or roof bonding agent.

3.10 EQUIPMENT INSTALLATION

1. Rooftop equipment installed within 10' of edge of roof shall have a painted guard, provided by Contractor, at edge of roof, top of guard to be minimum 42" above roof surface, constructed to prevent passage of 2" dia. sphere.

2. Mounting, details, color, and arrangement of guard shall be submitted for review. Coordinate all details with all other contractors.

3.11 EQUIPMENT LIST

Refer to general conditions. Exclusion of items on list does not relieve Contractor of the responsibility of providing equipment as specified, required to complete work or shown on drawings to be provided by Contractor.

		MANUFACTURERS		
EQUIPMENT	NUMBER 1	NUMBER 2	NUMBER 3	NUMBER 4
Heating Coils	Carrier	Daikin	Johnson	Or approved equal
Cabinet Unit Heater	Berko/Q-Mark	Sterling	Modine	Or approved equal
Unit Heaters	Berko/Q-Mark	Sterling	Modine	Or approved equal
Exhaust Fans	Cook	Greenheck	Pennvent	Or approved equal
Air Devices	Titus	Tuttle Bailey	Metal Aire	Or approved equal
Vibration Isolation	Mason Industries	Vibration Mountings		Or approved equal
Insulation	Owens Corning	John Manville	Knauf	Or approved equal
Louvers	Ruskin	Air Balance	Penn Vent	Or approved equal
Ductless Split System	Carrier	Samsung	Daikin	Or approved equal
Split Systems	Carrier	Samsung	Daikin	Or approved equal

3.12 SCHEDULE OF WORK AND COMPLETION DATES

1. The exact times and dates and schedules that the projects will be available for Contractor to do work, shall be as indicated in General Conditions. Refer to general conditions for completion dates.

3.13 DELIVERY AND STORAGE OF EQUIPMENT

1. Contractor shall store, take deliveries and install all equipment in accordance with manufacturers' requirements (see "General Conditions").

3.14 CONSTRUCTION SEQUENCING

1. Refer to General Conditions for the overall contract staging. However, specific items for HVAC contractor should be noted. The following are suggested methods of staging construction. Alternate methods to achieve the intent of these specifications will be allowed; however, they must be coordinated with other trades and submitted for review and approval.

2. The sequence of construction shall be as indicated in the General Conditions of the specifications.

3. Where work is shown on mechanical plans where it is outside the phase areas indicated or specified in the General Conditions, this work shall be done at any time. All work shall be done so not to interfere with normal business operations. Where work is done outside normal business occupied areas (boiler room, roof area), this work may proceed at Owner's option. All work, regardless of the location of work, type of work, or extent of work, shall be done with the approval of the Owner.

4. Where work is to be done outside the construction boundaries, Contractor shall locate all new duct, pipe, and equipment to allow for new construction and/or to integrate with existing building construction.

5. Where ductwork is to be installed in an unconditioned space (due to space not being constructed when duct, pipe, etc., is required to be installed), the pipe and/or duct shall be insulated as specified for outdoors. Where new pipe is required to be installed in an unconditioned space or space which shall be exposed to freezing, the pipe shall be insulated as specified for outdoors and heat traced to prevent freezing (power wiring by Contractor).

6. All new ductwork and piping shall be installed and coordinated with proposed new work.

7. All work required to be modified due to non-compliance with this section, General Conditions or Construction Sequencing, shall be removed, replaced and/or modified at no additional cost to Owner.

8. The permanent ATC system shall be operational for any new construction, regardless of phase. Existing and/or new DDC systems and all wiring shall be installed and protected during construction to facilitate phasing. The use of modular control panels (LSIS, SAC's, etc.) will be allowed as long as the system functions can be monitored and controlled from that location for that phase and be connected to main system upon completion of work. Owner to be instructed on operation (not part of instruction period).

9. Provide valves for isolation and draining lines.

10. All work associated with compliance of this section shall be the responsibility of Contractor.

11. Contractor shall provide, prior to doing any work, schedule and provide procedure for accomplishing the work.

3.15 ALLOWANCE

1. Contractor shall provide as part of his bid a total allowance for items specified in General Conditions and specification.

3.16 FILTER CHANGES

1. Contractor to be responsible for three (3) sets of filters for all new and/or replaced equipment with filters. One set installed on equipment from factory. Install a second set of filters prior to balancing. Install a third set of filters following substantial completion at the start of the 2-year warranty period.

2. These filters are in addition to the filter required for service and filter changes per Section 15010, Part 1.11 – Maintenance Service.

3. Where existing equipment is to remain and be retrofitted, the existing equipment shall have filter changes as specified for new/replacement units.

3.17 RELOCATION OF EXISTING EQUIPMENT

1. Contractor shall be responsible for removal, storage, relocation and installation of all existing equipment shown or scheduled to be relocated or as may be required to remove existing equipment and/or install new equipment. Contractor will be responsible for capping and reconnection of all existing services presently feeding existing equipment which must be relocated and/or modified and shall patch all adjacent surfaces to match existing.

3.18 PROTECTION OF SERVICES DURING CONSTRUCTION AND DEMOLITION

1. Contractor shall repair, replace, and maintain in service any utilities, facilities or services (in existing areas where new work and/or demolition is to occur) which are damaged, broken, or otherwise rendered inoperative during the course of demolition and/or construction.

2. Contractor shall effectively protect, at his own expense, his work, materials and/or equipment which may cause injury to building personnel during the construction period. All openings must be securely covered, or otherwise protected.

3. Contractor shall be held responsible for all damage so done until his work is fully completed and finally accepted.

4. It shall be the responsibility of Contractor to protect all existing construction and new motors, HVAC equipment, pumps, electrical equipment, plumbing fixtures and all construction during all phases of construction.

5. Where new openings for equipment, duct, etc., are to be provided in one phase and openings provided in another later phase, these openings shall be temporarily secured and make weathertight.

3.19 CUTTING AND PATCHING

1. Where ducts are removed from louvers in exterior wall, the louver shall remain and have insulation between sheet metal. Sheet metal painted (R=8) (caulked) and patched to match existing.

2. Unless otherwise specified and/or Contractor, Contractor shall cut and patch walls, floors, ceilings, roof surfaces and all existing construction for the removal of existing equipment, fixture, piping, controls and other construction for the completion of work under this Contract. All equipment, piping, ductwork, furniture and all construction or materials that are disturbed during construction shall be stored and protected from damage until replaced.

3. Cutting shall be done only after shop drawings have been prepared and with the Architect's approval. Contractor shall exercise proper care and shall not endanger the structure by indiscriminate cutting and shall be responsible for and shall protect all existing construction to remain from damage. Provide and maintain all necessary temporary protective materials, coverings and barricades.

4. Wherever previously unfinished areas are exposed by the removal of existing equipment, these areas shall receive new finishes to blend into the adjoining work.

5. Wherever existing chases must be enlarged to encase new work, they shall be enlarged to match the existing construction.

6. Wherever fire rated material must be patched, it shall be patched in a manner not to affect its fire rating.

7. All patching work must be done by skilled mechanics in a manner to minimize the patch effect. Wherever new painting is required, it shall be done with at least two coats over new materials.

8. The painting must not only cover the area of the actual patch, but also to the nearest natural break of the newly painted surface. Wherever the surrounding surface to be painted is in poor condition, all loose paint shall be removed before new paint is applied.

9. Patching of existing floor must be done in a manner to assure smooth undersurface and all joints must line up with existing.

10. Wherever new vinyl or rubber bases are to be supplied, they shall match adjoining bases in height and color.
11. Whenever existing ceilings are disturbed, they shall be replaced with new ceiling tiles or patched to match existing and all services, lights, fixtures, etc. supported temporarily and permanently reinstalled.

12. Contractor shall remove and replace all ceilings required for his work with the exception of ceilings shown on architectural plans.

3.20 NEW ROOF OPENINGS IN EXISTING ROOFS

1. Unless otherwise shown on plans, Contractor shall cut all new openings in roof. Structural work by Contractor. Contractor to provide flashing and counterflashing for openings. Contractor shall provide all curbs and equipment. Structural steel must be installed prior to cutting holes.

2. Contractor shall verify opening locations by use of coordination drawing developed by Contractor. Prior to any cutting or construction, Contractor shall physically mark locations for all other prime contractors.

3. Once hole is cut by the general contractor, prior to duct or equipment being set, Contractor shall temporarily protect the opening. After duct and/or curb or equipment is permanently installed and flashed and counter flashed by Contractor, and opening is weatherproofed, it shall be the responsibility of Contractor for any water damage.

4. As part of the coordination, contractors shall provide a schedule agreed to by all parties so that the new openings are permanently closed as soon possible. No opening shall be left temporarily sealed for an extended period of time, as determined by the construction manager.

5. Where new openings for equipment, duct, etc., are to be provided in one phase and openings provided in another later phase, these openings shall be temporarily secured and make weathertight.

3.21 REMOVAL OF EXISTING EQUIPMENT ON EXISTING ROOF

1. Contractor shall remove existing equipment including all duct, duct supports, pitch pockets, control wiring, electrical wiring (to closet point of termination), all piping and appurtenances. Where removal requires new roofing, this work shall be done by the general contractor.

2. Contractor shall remove existing equipment and provide shop drawings to all contractors for their review. The shop drawings are to include proposed schedule, locations, sizes and other pertinent details. Contractor shall provide a temporary waterproof enclosure. Existing curb shall remain. General contractor to provide permanent cap where curbs are to remain. See architectural and structural plans for details.

3. Where existing curbs are to be removed, these shall be removed by general contractor and Contractor to provide permanent roofing.

4. As part of the coordination, Contractor shall provide a schedule agreed to by both parties so that the existing openings are permanently closed as soon as possible. No opening shall be left temporarily sealed for an extended period of time, as determined by the construction manager.

3.22 REMOVAL

1. Contractor shall remove existing systems as indicated on drawings.

2. Contractor to remove existing systems, pipe, duct, wire, etc., and provide either new equipment and/or patch openings.

3. All equipment, cabinets, ductwork, pipe controls, all pipe insulation (except any asbestos insulation), hangers, electric wiring and all construction and appurtenances shall be removed, to complete all work under this Contract. All work by Contractor.

4. Equipment identified by the Owner, prior to removal, that is to be retained by the Owner, which is not to be re-installed, and is to remain the property of the Owner shall be removed undamaged and stored in the building. Location shall be determined by the construction manager at no additional cost to Owner. The Contractor shall then load, transport and unload equipment from building to a site designated by the Owner within 20-mile radius of site.

5. Removed ductwork, registers, equipment, automatic controls, pneumatic tubing, piping, pipe insulation and electric wiring and all debris shall be removed from the building and site in accordance with general conditions and shall be disposed of in accordance with all applicable environmental rules and regulations. Failure to properly dispose of materials in a proper manner that result in fines, penalties or additional costs are the responsibilities of the Contractor.

6. All debris in areas occupied by the building personnel during periods of building operation shall be removed daily.

7. Contractor shall patch all wall, floors and ceilings and roof surfaces to match existing adjacent surfaces where obsolete equipment, piping, ductwork, controls and wiring are removed.

8. Work shown on drawings may not indicate all equipment, pipe, etc., nor exact routes, sizes, locations, etc. The drawings are not to be used for estimating detailed take-off for amount of work required, drawings are for reference only. The Contractor shall visit site to determine extent of work and all conditions.

9. Where existing louvers are shown to be removed, the Contractor shall remove and provide temporary closure and the Contractor to provide permanent construction unless otherwise specifically indicated.

3.23 BUILDING ALTERATION WORK

1. Contractor shall furnish all labor, equipment and materials required to complete alteration work in the building. Unless otherwise indicated on architectural drawings, Contractor shall remove existing construction and replace, to remove existing equipment and/or install new equipment in conjunction with the work.

2. Cut, patch and paint walls, floors, ceilings, roof surfaces and all construction for the installation of equipment, piping and controls.

2. Cut and patch exterior walls for the installation of air intake and exhaust. Finish to match existing adjacent surfaces.

4. Where existing electrical HVAC or plumbing work, due to removal of existing and/or installation of new equipment, is required to be removed. Contractor shall disconnect existing equipment, cap services in a safe manner, remove equipment, store in a location to prevent damage, replace equipment, patch construction to match existing conditions and reconnect equipment to existing services.

5. Contractor shall either retain qualified independent contractors or utilize the other on-site contractors. Contractor shall assume all requirements for any conflicts with union policy and be responsible for same. Contractor shall furnish necessary shop drawings and supervision, in such a manner as not to impede the progress of other trades and be responsible for the adequacy and accuracy of same.

END OF SECTION
15010.6470

SECTION 15110 - BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 MATERIALS AND EQUIPMENT

1. All material and equipment used for this contract shall be unused and of the latest model or design available. Equipment shall be installed in strict accordance with the manufacturer's recommendations and details.

2. Materials not specifically described but indicated or incidentally required shall be acceptable to the Architect and/or Engineer. Submit shop drawings. Materials shall be delivered, stored and handled so as to preclude injury by weather, dirt or abrasion.

3. Contractor shall use only specifically assigned areas for storage of materials and construction operation, unless other areas are authorized by the Owner. Such areas will be identified after the award of Contract by Owner. Comply with local municipal regulations regarding use of and parking on public streets.

4. Contractor shall repair streets, drives, curbs, sidewalks and any existing surface where disturbed by construction operations and leave them in as good condition after completion of the work as before operations started.

1.02 PROTECTION

1. No pipe shall be left open any longer than is required to affix the next piece. If pipe ends are to be left for an extended period, they shall be closed with approved plugs or caps.

2. All equipment shall be covered to protect it from damage; all damage is the responsibility of Contractor.

3. Any pipe, equipment or construction in existing building shall be done in such a manner to prevent injury to building personnel. Particular care must be taken for any work which will be done during buildings' normal operation.

1.03 IDENTIFICATION OF PIPING

1. Use color scheme for painting listed in "Scheme for identification of Piping System", ANSI A-13 and Rust-Oleum Corporation Form # 117 or approved equal. Paint identifying band of color near each valve and fitting, on both sides of pipes passing through wall, and on long pipe runs approximately every 30' (closer when directed), throughout building.

2. All new exposed pipe in any occupied area and all existing exposed pipe insulated and uninsulated, including insulation, hangers, supports and all appurtenances, shall be painted color to match existing. All equipment without factory finished paint shall be painted. All painting shall receive two coats as specified for painting (see Section 15010).

3. Stencil on pipe, near each valve, name of pipe contents in abbreviated form, size of pipe, and arrow indicating direction of flow. Place legend in such location that it can be read from floor. Size of stencil letters shall vary with the size of pipe.

4. Seaton "SETMARK" pipe markers or approved equal are acceptable.

1.04 TESTING

1. At the completion of all work, and before any covering is applied, all piping except drainage shall be tested hydrostatically at a pressure equivalent to 150% of the working pressure or to material test pressure, if lower. All piping concealed in any manner shall be tested before being concealed. Maximum drop in pressure permissible shall be 2 psi in 24 hours.

2. Testing shall be in accordance with ANSI B31.1 in all test gauges, traps and all other apparatus which may be damaged by the test pressure shall be removed or valved off from the system before tests are made.

3. Where new pipe is shown or required to be connected to existing pipe or equipment, existing and new pipe shall be tested. Tests for new pipe and equipment in existing areas shall be done only after building normal occupied period. All tests shall be done in such a manner as to avoid injury to building personnel and protection of existing construction from damage which may occur due to test or failure of test and/or tested material.

4. In the existing building, all required tests on new and/or existing systems shall only be done after normal school hours. All tests done in the building shall be done in such a manner as to avoid injury to building personnel and damage to existing and/or new construction. Protect all new and existing construction from damage which may occur as a result of the test or failure of test material.

1.05 PRESSURE RATINGS

1. All equipment and materials shall have a working pressure as determined by A.S.M.E. (or similar body), of not less than 125 P.S.I.

1.06 SLEEVES

1. All pipes passing through construction shall be fitted with flush sleeves of sufficient diameter to pass the insulation. Sleeves shall be 20 USG galvanized iron, except in masonry, where steel pipe sleeves shall be used. Sleeves in waterproof construction shall be steel pipe, waterproofed with modular mechanical synthetic rubber seals equivalent to "Link Seals" (Thunderline or approved equal). In floors, they shall extend an inch above the floor.

2. In fire divisions, sleeves shall be constructed of fire-retardant material and shall be installed to maintain the fire integrity of the fire division.

3. All materials and construction methods shall be installed in accordance with the manufacturer recommendations and the requirements of the IBC Code or any other applicable code.

PART 2 PRODUCTS

2.01 PIPE

1. Steel pipe shall be Schedule 40; electric welded, ASTM-A53, Grade A, plain or galvanized as specified under applicable system. . Schedule 80 shall be used for condenser water.

2. Copper tubing shall be hard temper "Type L" except that all piping underground shall be "Type K", conforming to ASTM-B-88.

3. Refrigerant piping, fitting, and joining methods for VRV/F systems shall conform to equipment manufacturer's requirements and all applicable codes and standards.

2.02 PIPE FITTINGS

1. All welded fittings shall be of the same thickness and material as the pipe meeting ASTM-A234. Branch connections shall be made with Weldolets (or approved equal) or welding fittings.

2. All flanges shall conform to A.S.A. B-16 using gaskets suitable for the service.

3. Cast iron screwed fittings shall be 125 psi cast iron, ASTM-A-126.

4. Malleable iron fittings shall be 150 psi wsp conforming to ASTM-A-338.

5. Fittings for copper tubing shall be wrought copper of the Solder Type conforming to A.S.A. B16.22.

2.03 BUTTERFLY, BALL, GLOBE AND CHECK VALVES

1. All valves 2" or smaller shall be ball valves and shall be bronze solder end valves in copper tubing and screwed end in other lines. Globe and swing check valves shall be 125 psi WSP, 200 psi WOG with renewable composition disc.

2. All valves 2½" or larger shall be butterfly valves; 125 psi WSP.

3. All valves used for throttling shall be globe type with 500 brinnel full plug and removable seat.

4. Non-slam checks shall be used on all pump discharges, elsewhere at Contractor's option.

2.04 PLUG AND BALL VALVES

1. Plug and ball valves shall be 150 psi WOG with full port. Valves used for balancing shall have infinite throttling handle and adjustable stops. All valves bubble tight shut-off.

2.05 UNIONS

1. Unions shall be installed for the removal of equipment.

2. Unions 2" and smaller in copper tubing shall be all brass, ground joint, solder end. In other lines, screw end, malleable iron, 125 psi WSP, 300 psi WOG of the ground type.

3. Unions 2½" and larger in copper tubing shall flanged pattern, all brass, solder end. In other lines, 125 psi WPS-175 psi WOG, cast iron flanged pattern, black or galvanized to match piping.

2.06 STRAINERS

1. Strainers to be self-cleaning ("Y" type), cast iron body installed ahead of all control valves and pumps; screens to be Monel or stainless steel with proper perforations for the service, ends to be screwed to 2" size, flanged for sizes 2½" and larger.

2.07 ESCUTCHEON PLATES

1. Where any pipe passes into a finished space, there shall be provided a solid brass, chrome plated, escutcheon plate held to the pipe mechanically or fastened to the building construction.

2.08 ANCHORS

1. Anchors of approved design shall be provided where shown or required for the property control of the stress due to expansion. Anchors shall be heavy metal sections securely fastened to the building construction.

2.09 ANCHOR BOLTS

1. Contractor shall furnish and install anchor bolts as required for the equipment. Anchor bolts shall be DECO's (or approved equal) standard anchor with floating nut, adjustable ½" in any direction. Grout all bases.

2.10 DRIP PANS

1. Provide drip pans of adequate size for all pipes and equipment carrying liquid or, liquid vapors where pipes pass over areas or equipment requiring protection. Drip pans shall be constructed of stainless steel, minimum 20-gauge, provide 3" deep pan. Provide drain line to closest sanitary line (minimum 2" diameter).

2.11 ACCESS PANELS

1. Furnish and install access panels not smaller than 18"x18", for access to all concealed valves, automatic dampers, equipment, accessories, etc.

2. Access panels shall be all steel construction with a 16-gauge wall or ceiling frame and a No. 16 gauge wall or ceiling frame and a 14-gauge panel door with not less than 1/8" insulation secured to inside of door.

3. Doors shall have concealed hinges and cylinder lock except doors for wall panels may be secured with suitable clips and countersunk screws.

4. Access panels shall be flush with finished wall or ceiling and shall be painted to match adjacent surfaces. Access panels behind finished surfaces shall have color coded marking on finished surface to indicate location of doors and type of equipment.

5. Access panels in fire rated construction shall be fire rated.

2.12 HANGERS

1. All piping shall be supported by hangers, concrete inserts, and insulation saddles conforming to MSS-SP-58.

2. Hangers for steel pipe and copper tube shall be spaced not over 8' or as required by applicable code.

3. Vertical runs of pipe shall be supported by riser clamps except that pipe 1¼" and smaller may be braced by galvanized malleable iron fasteners. A hanger shall be placed no further than 24" from each change in direction of piping.

4. Hangers for copper tubing shall be copper plated, and completely encircle the tubing. Hangers for insulated pipe shall be outside insulation with sheet metal between insulation and hanger.

5. Hangers shall not be connected to or supported from other pipe, conduits or any other equipment, and shall only be supported directly from building structure.

6. All hangers shall be installed in strict accordance with manufacturers' requirements and good industry standards.

7 Where existing construction is disturbed, removed and/or modified to install new hangers, the existing construction disturbed shall be repaired and/or replaced and finished to match adjacent surfaces.

8. Provide saddles under all pipe, see Section 15180 for specifications. All saddles on exposed pipe shall be painted.

9. Where hangers, support pipe or equipment is exposed in finished spaces, any penetrations of finished surfaces by hanger or supports shall have escutcheons or device to cover opening. All hangers in finished areas shall be painted and done in a neat workmanlike manner. Where hangers or supports may cause injury or are below 8'-0", provide color coded foamed glass finished padding minimum 1½" thick. Padding to be installed so that there are no rough exposed edges. All padding to be installed with fastening devices; no tape allowed.

10. Provide Unistrut or approved equal for mounting of pipe where building structural elements are not adequate.

2.13 CONDENSATE REMOVAL

1. All condensate pipe shall be copper and installed at a minimum of ¾" dia. and a constant slope and uniform alignment. All condensate pipe shall be insulated.

2. All connections to units shall have traps and trap depth equivalent to operating static pressure of unit (i.e., unit with 2" static pressure, minimum depth of water in trap 2").

3. All condensate connections to units less than 15 tons shall be EZ Trap Series 100 cleanable condensate trap kits, or approved equal, consisting of ¾" dia. trap inlet cross and outlet tee with closure cap. Provide for each five (5) traps installed, one (1) brush (minimum 2 brushes).

4. Condensate pipe shall discharge to leaching wells or as indicated on plans per local codes and/or site conditions.

5. All condensate pipe from rooftop units shall not dump on roof but shall extend to closest roof drain and/or gutter. Where roof drain and/or gutter is greater than 50' from unit discharge, condensate shall discharge to roof with splash block. Splash block to be located where roof pooling, due to drain location, will not occur. Condensate discharging to roof shall be piped to a location where it will drain away from unit or low points on roof.

6. Provide condensate pump where gravity flow is not practical or possible.

2.14 LINTELS

1. The Contractor shall furnish and install all lintels required for the installation and completion of all work of Contractor, provided that the general contractor is advised in advance of such requirements.

2. Failure to give proper notice and/or to comply with the above, requires Contractor involved to be financially liable for all work and material necessary for the completion of work to install lintels. Submit shop drawings of all openings requiring lintels to general contractor.

2.15 AUXILIARY DRAIN PANS

1. Provide auxiliary drain pans under units containing cooling coils where units are located above suspended ceiling or furred space and where there is a blockage of condensate system resulting in overflow which will cause damage.

2. Drain pans shall be constructed of stainless steel, minimum .0276" and minimum 1½" deep, extending 3" beyond unit.

3. For all equipment above finished spaces; provide a water level detector in auxiliary drain pan which shall automatically de-energize unit upon detection of water. Overflow cut-off switch shall be EZ Trap Model EZT-225 or approved equal suitable for vertical and horizontal installation. Contractor shall be responsible for all wiring.

4. On secondary drain lines, provide a water level detector in overflow line which shall automatically de-energize unit upon detection of water. Overflow cut-off switch shall be EZ Trap Model EZT-225 or approved equal suitable for vertical and/or horizontal installation. Contractor shall provide all wiring.

5. Existing equipment being replaced shall have new auxiliary drain pans. The existing systems' duct, pipe and appurtenances shall be modified to allow for new auxiliary drain pans.

PART 3 EXECUTION

3.01 EXCAVATION AND BACKFILL

1. Contractor shall do all excavating and backfilling necessary and repair finished surfaces that are disturbed. Contractor shall remove or distribute all earth remaining as directed, and/or provide required backfill. Excavate all substances encountered to the depths and sections shown on drawings.

2. Excavation for pipes, manholes, catch basins, drain inlets, and other accessories shall have 12" clearance on all sides. Areas adjacent to any excavation shall be graded to prevent water running in.

3. Excavation shall not be carried below the required level, and if so carried shall be backfilled with gravel or sand, and tamp to proper compaction.

4. After proper inspection and tests all excavation shall be backfilled with approved material, free from large stones, clumps or frozen earth, wood and other objectionable material. Contractor shall haul away excess material or provide additional fill as required.

5. Backfill for pipes shall be placed evenly and carefully around and over the pipe in six inches minimum layers. Each layer shall be thoroughly and carefully rammed by hand until one-foot cover exists over the pipe. The remainder of the backfill shall then be placed, moistened and compacted to a density equivalent to that of adjacent original materials using mechanical tamping machines.

6. Backfill for shall be placed symmetrically on all sides in one-foot maximum layers and shall be compacted with mechanical or hand tampers to density equivalent to 90% of laboratory density in accordance with ASTM-D698 test.

3.02 INSTALLATION OF PIPING

1. All fittings, offsets, etc., may not be shown. Contractor shall determine their necessity by investigating conditions at the site. Contractor shall use shop drawings for exact locations.

2. All piping above ground shall be run parallel with the lines of the building in the most direct manner, concealed in furred spaces where possible.

3. Pipes shall be cut accurately and placed without springing or forcing all burrs removed.

4. All water piping inside the building shall be properly graded to drain equipped with a ½" hose outlet and angle drain valves.

5. All changes in size of piping shall be made by reducing fittings; no bushing will be permitted unless approved.

6. Contractor shall determine, with approval, where expansion joints, loops or anchors will be required due to space restrictions prohibiting proper runout flexibility.

7. Valves, air vents, balancing cocks, etc., shall be placed in accessible positions, and flush metal access doors, (18"x18" minimum size), with necessary lintels, etc., provided where they are concealed.

8. All piping shall be located to prevent freezing. Where pipe is located in areas subject to freezing, provide freeze protection and insulation.

9. Contractor shall coordinate all pipe runs with other contractors. Where coordination of Contractors' work requires a modification of his equipment, layout, pipe runs, offsets in pipe, or additional pipe from what is diagrammatically shown on contractor documents, this shall be done at no additional cost to Owner.

10. For all insulated exposed pipe below 8' +/- AFF and in all other locations where pipe damage can occur provide a painted sheet metal jacket 22-gauge with concealed fasteners. (See Section 15180).

3.03 JOINING PIPE

1. Steel piping shall be of welded or flanged construction in sizes 2½" and larger; screwed or welded construction in sizes 2" and smaller. All screwed fittings to be cast iron unless otherwise specified. All threads shall be conformity with A.S.A. B-21.

2. All screwed pipe joints shall be made with Teflon Dry Thread Sealer (3M-#48) or approved equal; applied to male threads only.

3.04 JOINING DISSIMILAR METALS

1. Where copper is jointed to steel, joints shall be made by means of brass or bronze adapter in a cast iron fitting or by means of an electrochemically insulated union. Hangers supporting copper tubing shall be copper or copperized. Copper tubing lines shall not be, even temporarily, supported or secured to ferrous metals.

3.05 FOUNDATIONS

1. Foundations shall be provided by Contractor for all equipment mounted on concrete floors and shall be of concrete construction not less than 6" high unless otherwise shown. Details of all foundations shall be submitted for approval.

2. Foundations or footings for structural steel supports shall be carried to a point not less than 12" below the underside of the floor slab, except where rock is encountered at less depth, then foundation may set on the rock. All foundations shall be built to templates and reinforced as required by the load to be imposed upon them.

3.06 STRUCTURAL STEEL

1. Contractor shall furnish and install all structural steel, supports, braces, hangers, etc., required for his contract unless shown as being furnished and/or supplied by others.

2. Structural steel shall conform to "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings", of the American Institute of Steel Construction, and where applicable, "Code for Welding Building Construction", of the American Welding Society.

3. All structural steel design for support of HVAC system shall be the responsibility of Contractor. The design shall be prepared by a Registered Professional Engineer licensed in New Jersey, whose seal should be affixed to plans.

3.07 PLENUM AREAS

1. Any duct plenum area, ceiling or room plenum shall not contain any combustible material, and all wiring and/or piping shall be suitable and approved by local authorities for plenum installation.

END OF SECTION
15110.6470

SECTION 15180 - INSULATION

PART 1 GENERAL

1.01 SCOPE

1. All surfaces throughout the work shall be insulated with fiberglass insulation as indicated in applicable section.

2. Removal and replacement of existing insulation for new work.

3. All insulation thickness and R Value shall be installed in accordance with ASRAE 90.1, latest edition.

1.02 UNIT PRICES & ALLOWANCES

1. See General Conditions and Specification Section 15010.

PART 2 PRODUCTS

2.01 PIPE INSULATION

1. All piping throughout the work shall be insulated with fiberglass pipe insulation in thickness, indicated in Part 3.04, of high density and with jacket indicated in the applicable section with the exception that outside, or areas exposed to freezing; thickness shall be doubled.

2. All pipe shall be insulated in such a manner as to prevent condensation on all pipe surfaces and appurtenances. All pipe insulation to be tightly butted and sealed to prevent condensation.

3. Vapor barrier jackets shall have self-sealing lap joint, and joints between sections shall be covered with a 4" wide strip to self-sealing vapor barrier materials. Aluminum bands shall be applied, two to a section on all indoor insulation.

4. All pipe exposed in finished areas shall be painted color selected. All other pipe exposed in any finished area, where pipe is located below 8'- 6" AFF, insulation shall have stainless steel jacket same as indicated for outdoor pipe, except with no exposed joints or seams.

5. All Refrigerant piping (except hot gas) throughout the work shall be insulated with a 3/4" (nominal wall thicknesses) mold resistant flexible elastomeric, thermal insulation, Insulation must be acceptable for use in air plenums and conform to NFPA 90A and NFPA 90B requirements and meet or exceed ASTM C 534, Type I - Tubular Grade I Standard.

6. All pipe insulation located inside of building shall be plenum rated.

7. Refrigerant pipe insulation shall be insulated in accordance with insulation and equipment manufacturer requirements. Where insulation needs to be cut for installation, all joints shall be tested for condensation.

2.02 DUCT INSULATION

1. All supply ducts in unconditioned spaces and all fresh air ductwork shall be insulated with high density fiberglass blanket insulation, UL labeled faced with aluminum foil covered, glass reinforced, flameproof, kraft paper.

   A. Duct insulation R Values shall be in accordance with 2021 International Energy Conservation Code, Section C403.2.9.

      Unconditioned Space – R=6.0 per requirements indicated for the climate zone of the building.

      Outside Building – R=8.0 per requirements indicated for the climate zone of the building.

2. All supply and return ductwork in attic space and outside of building insulation envelope shall be insulated as above in 3" thickness (R-8.0).

3. Duct insulation and linings shall not glow, flame or smolder when tested at their rated temperatures in accordance with ASTM-C-411, test temperature 250° F. or greater.

4. Duct coverings shall not penetrate fire resistance rated enclosures or partitions required to be fire rated. Duct insulation at rated enclosure shall have insulating material in accordance with applicable code.

5. For exposed duct in finished locations where external insulation is required, insulation shall be rigid insulation, not blanket. Note – Rigid insulation shall meet all requirements for insulation. All external insulation in finished spaces shall be painted.

PART 3 EXECUTION

3.01 INSTALLATION OF PIPE INSULATION

1. All pipe insulation shall be applied over dry, clean surface with joints tightly butted and jacket firmly and securely attached and smoothed. Insulation shall be continuous through wall, floor or ceiling openings and sleeves.

2. All valve bodies and fittings shall be insulated with preformed fittings of thickness equivalent to adjacent insulation and jacketed with same material. At Contractor's option, except in plenums, outdoors and where not permitted by code; provide precut fiberglass insulation blanket of same insulation thickness as adjacent insulation with a preformed snap on type molded PVC jacket, cover edges with vapor barrier adhesive or vapor barrier tape.

3. Provide metal shields under all hangers or pipe supports on outside of insulation; on roller supports provide pipe shoe cavity with insulation. Insulation inserts shall be heavy duty insulation material length 12" up to 6" dia. pipe 16" long on 8" & 10" pipe & 22" long on 12" pipe and larger. Where insulation cannot support pipe, provide a rigid insulation. Provide vapor barrier. **HANGERS SHALL NOT PENETRATE PIPE INSULATION**. Paint shields

on exposed pipe same color as pipe. If pipe is not painted and insulated, paint same color as insulation (white).

4. On outdoor insulation, double insulation thickness, provide stainless steel jacket, and removable stainless-steel jacket at fittings and valves.

5. All pipe connections to equipment shall include all insulation to cover openings to unit unless manufacturer provides method of closure.

6. All pipe insulation to be installed in accordance with insulation manufacturers' requirement to provide moisture tight and thermal performance per specifications and manufacturer's requirements.

7. Hot water pipe in radiation enclosure no insulation.

3.02 INSTALLATION OF DUCT INSULATION

1. Insulation shall be pasted to the duct using "3M" EC-321 or approved equal with joints butted and taped with Scotch No. 47A, or approved equal, flame-resistant vinyl baked tape and dry dust free surface using nylon sealing tool. Tape to be used to seal joints only, NOT TO HOLD INSULATION TO DUCT.

2. In lieu of pasting insulation to duct it may be impaled on 12-gauge mechanical fasteners welded or glued on 12" to 18" centers with minimum of two (2) rows, per side-seal protruding pin with mastic and secure with metal cap.

3. Duct coverings shall not penetrate fire resistance rated enclosures nor partitions required to be fire rated.

4. Insulation shall fit between seams and stiffeners. All joints tightly butted.

5. All duct insulation shall be installed per manufacturers' requirements.

3.03 EQUIPMENT INSULATION

1. All equipment containing fluids whose piping is specified to be insulated or whose surface temperatures will be low enough to cause condensation (60° F.), or high enough to burn persons touching same (110°F.), shall be insulated with a minimum of 1½" thick fiberglass block firmly butted and wired in place, and covered with ½" thick coat of insulating cement troweled over one-inch galvanized hexagonal wire mesh and cement troweled smooth. Metal corners beads shall be applied to protect corners.

3.04 INSULATION THICKNESS

1. Minimum pipe insulation thickness shall be in accordance with the International Energy Efficiency Code (Latest applicable edition), Table C403.2.1 or local requirements and the following table:

Fluid Design Operating Temp. Range (°F.)	Insulation Conductivity		Nominal Pipe or Tube Size (in.)				
	Conductivity Btu·in./(h·ft²·°F)	Mean Rating Temp. °F	<1	1¼ to <½	1½ to 4	4 to <8	≥8
201-250	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141-200	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140	0.21-0.28	100	1.0	1.0	1.5	1.5	1.5
40-60	0.21-0.27	75	1.0	1.0	2.0	2	2
<40	0.20-0.26	50	0.5	1.0	1.0	1.0	1.5

A. For piping small than 1½" and located in partitions within conditioned spaces, reduction of these thickness by 1" shall be permitted, but not to a thickness less than 1".

2. Where piping runs outdoors or attic, increase insulation thickness to 2-1/2".

3. Insulate all condensate drainage piping, drain pans, and related accessories. Thicknesses shall comply with appropriate sections of this specification.

4. Provide heat tape (electric) to prevent freezing of outdoor piping and new/existing outdoor condenser water pipe, domestic water pipe chemical treatment pipe and spray pump assembly and pipe, and all other piping subject to freezing. Electric heat tape to be Chromalox Type M1 cable or approved equal, furnished with all controls, power wiring and appurtenances. Size and capacity per manufacturers' requirements. Provide interface to DDC system for alarm conditions.

END OF SECTION
15180.6470

SECTION 15190 - TESTING AND BALANCING

PART I GENERAL

1.01 SCOPE

1. Provide all labor, materials and miscellaneous items as required to perform all the testing and balancing of ALL air and water system devices and/or systems indicated on plans and/or in the specifications as the mechanical contractor's scope of work.

2. Provide all labor, materials and miscellaneous items as required to perform the testing and balancing of ANY air and water system devices and/or system indicated on plans and/or in the specifications to be provided by TAB contractor.

3. The TAB contractor is to furnish and install all sheaves and pulleys for new and existing HVAC equipment where indicated on plans and/or in the specifications.

4. The TAB contractor shall rebalance 10% of the air and water devices and/or systems after the final balancing report is completed and reviewed by the mechanical engineer. The rebalancing scope shall be as directed by the mechanical engineer's review comments of the final balancing report.

1.02 APPROVALS

1. All work to be done in accordance with the following:

   A. American National Standards Institute (ANSI): Specification for Sound Level Meters

   B. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE): ASHRAE Handbook of Fundamentals latest edition.

   C. Associated Air Balance Council (AABC): 2002 AABC National Standard for Total System Balance

   D. National Environmental Balancing Bureau (NEBB): 1998 Procedural Standards for Testing-Balancing Adjusting of Environmental System; 2nd Edition.

1.03 TESTING AND BALANCING

1. Upon completion of the installation and field testing, performance test and adjust all air, water, and/or steam system to provide the air volume and water flow quantities indicated and sound levels required. Accomplish all work in accordance with the agenda and procedures specified by AABC and standards of the NEBB. Correct air and water system performance deficiencies disclosed by the test before balancing the systems.

1.04 AGENCY QUALIFICATIONS

1. This Contractor shall obtain the services of a qualified testing organization to perform the testing and balancing work. Prior to commencing work the testing organization shall have been approved by the Architect/Engineer.

2. The criteria for determining qualifications shall be membership in the AABC, or certification by the NEBB, or the testing organization shall have submitted proof to satisfy the Architect/Engineer that the organization meets the technical standards for membership of the AABC.

1.05 AGENDA

1. Review plans and specifications prior to installation of any of the affected system. Submit a written report to the architect indicating any deficiencies in the system.

2. An agenda shall be submitted and approved by the architect prior to start of testing and balancing work. Include the following:

   A. General description of each system with its associated equipment, and operation cycles.

   B. A complete listing of all flow and air terminal measurements to be performed.

   C. Proposed selection points for sound measurements.

   D. Specific test procedures and parameters for determining specified quantities; e.g. flow drafts, sound levels, etc.

   E. Samples of forms showing applications of procedures and calculations.

1.06 PROCEDURES, GENERAL

1. Adjust systems and components thereof that perform as required by drawings and specifications.

2. Operating tests of heating and cooling coils, fans and other equipment shall be of not less than 4 hours duration after stabilized operating conditions have been established.

3. Method of application of instrumentation shall be in accordance with the approved agenda.

4. Instruments used for measurements shall be accurate. Calibrate each test instrument by an approved laboratory or by the manufacturer. The engineer has the right to request instrument recalibration, where accuracy of readings is questionable.

5. Comply with manufacturer's certified instructions.

6. Do not install permanently installed equipment for the tests, e.g. gauges, thermometers, etc., until just prior to the tests to avoid damage and changes in calibration.

1.07 BALANCE & BALANCE REPORT SCHEDULE

1. The HVAC contractor shall provide the balance report and submit to the architect/Owner as a shop drawing, which shall be distributed and reviewed in accordance with the general conditions.

2. Any and all work required for balancing of the system shall be done prior to the HVAC contractors' submission of exhaust fan shop drawings.

3. The requirement of this specification is applicable to all phased projects. For phasing, refer to General Conditions.

PART 2 EXECUTION

2.01 AIR SYSTEMS GENERAL REQUIREMENTS

1. All systems shall be balanced to provide air flow rates measured and adjusted to within 7.5% of the design rates. Provide a typed or computer-generated balance report using standard AABC forms, and industry accepted practices for presentation. Where conditions do not allow for system to achieve the specified values, is to be clearly indicated prior to submission of balance report as a separate professionally prepared industry standard form.

2. Review of Documents - It shall be the responsibility of this Contractor and balancing contractor to thoroughly review the design drawings prior to submission of shop drawings and indicate where there may be possible problems with accessibility to equipment to allow for proper balancing or where system design will not allow for proper balancing and provide written description of possible problems. The balancing contractor shall review pipe and sheet metal shop drawings and shall provide written confirmation that this has been done. Coordinate with this Contractor for locations of all volume control devices. Where volume control devices are required for proper balancing of the system, they shall be provided by this Contractor at no additional cost to Owner.

3. Air systems shall be balanced in a manner which shall first minimize throttling loses, then fan speed shall be adjusted to meet design flow conditions.

4. After completion to tests, adjustments and balancing under minimum fresh air conditions, set the system for 100% fresh air. Repeat the total CFM tests as specified above to check field versus design conditions. The results under 100% fresh air cycle shall agree with conditions found under "minimum fresh air operation" before the system is considered to be in balance. Adjustments of the proper dampers shall be made to achieve balance.

5. This Contractor shall include as part of his bid, cost to rebalance system after initial and final adjustments based on field conditions, Owners' request or problem areas. For purposes of the bid, the Contractor shall assume a maximum of 10% of all air devices to be rebalanced, to include rebalancing of the fans associated with the air devices.

6. This Contractor shall be certified by N.E.B.B. or A.A.B.C.

7. This Contractor shall notify Owner or his representative in a timely manner prior to balancing system so that if they elect, they may accompany balancing contractor.

8. The system shall be commissioned as specified and all balancing shall be done in accordance with time schedule as specified above and in General Conditions.

9. Variable Air Volume Distribution Systems - Where the distribution system utilizes a variable speed or variable air design, all main duct between the fan and controlling devices does not have to be balanced, except where automatic dampers with an air quantity are shown, these shall be set for proper air flow at maximum design conditions. All outlets downstream of the control device (VAV box) shall be balanced.

2.02 AIR SYSTEM PROCEDURES

1. Adjust all air handling systems to provide the required design air quantity to, or through, each component.

2. Adjust equalizing devices to provide uniform velocity across the inlets.

3. Use flow adjusting (volume control) devices to balance air quantities only.

4. Balancing between runs (submains, branch mains, and branches): Use flow regulating devices at, or in, the divided - flow fitting.

5. Final Measurement of Air Quantity: Make final measurements of air quantity, after the air terminal has been adjusted to provide the optimum air patterns of diffusion.

6. Fan Adjustment: Total air system quantities, generally, shall be varied by adjustment of fan speeds.

7. Except as specifically indicated herein, make pitot tube traverses of each duct to measure air flow therein.

8. Pitot tube traverse may be omitted if the duct serves only a single room or space and its design volume is less than 2,000 cfm.

9. Where ducts' design velocity and air quantity are both less than 1000 (fpm/cfm), air quantity may be determined by measurements at terminals served.

10. Test holes shall be in a straight duct, as far as possible downstream from elbows, bends, take-offs, and other turbulence generating devices.

11. Air Terminal balancing: Measurement of flow rates by means of velocity meters applied to individual terminals shall be used only for balancing. Measurement of air quantities at each type of air terminal (inlet and outlet) shall be determined by the method approved for balancing agenda.

12. The volume dampers, splitters and deflectors shall be adjusted so that the air velocities and volume will be as specified.

13. A further balance shall be made on temperature basis to maintain uniformity throughout, if so directed.

14. With the fan supply set to handle normal minimum outdoor air, the balancing firm shall perform the following tests and compile the following information.

A. Air Handling Equipment

1. Design Conditions

a. CFM Supply Air
b. Static Pressure
c. Motor HP
d. Code Required Outside air CFM
e. Outside air CFM
f. Fan RPM

2. Installed Equipment

a. Manufacturer
b. Size/Model Number
c. Motor HP, Voltage, Phase, Full Load Amperes

3. Field Test

a. Fan Speed
b. No Load Operating Amperes
c. Fan Motor Operating Amperes
d. Calculated BHP

4. Test for Total Air

a. Size of discharge, return air, and outside air ducts.
b. Number and locations of velocity readings taken and Static Pressure readings taken.
c. Duct Average Velocity
d. Total CFM
e. Outside air CFM
f. Return air CFM

B. Individual Outlets (diffusers, registers and/or grilles)

1. Identify each outlet or inlet as to location area and fan system, outlet, manufacturer, and type, outlet size, free area, core area, or neck area, required FPM and test velocity and CFM and test results.

2.03 AIR DELIVERY AND NOISE

1. This Contractor shall guarantee that all equipment shall operate without objectionable noise or vibration; that all ductwork shall be free from pulsation or objectionable noises; that the volume of air specified will be delivered to all points of supply and exhaust.

2. After this system is in operation, should the ductwork be found to vibrate or chatter, this Contractor will be required to eliminate same.

2.04 AIR TIGHTNESS

1. All ductwork shall be airtight per SMACNA leakage standards. All transverse, joints longitudinal seams and duct wall penetrations shall be sealed in accordance with ASHRAE 90.1 and have adhesive (3M EL-750 or approved equal). Pressure sensitive tape shall only be allowed for supply air duct with design pressures less than 2" W.C. in return air plenums.

END OF SECTION
15190.6470

SECTION 15605 - TERMINAL UNITS, ELECTRIC

PART 1 GENERAL

1.01 SCOPE

1. Furnish and install all equipment and leave all equipment completely installed so that only the connection of auxiliary services is required for start up.

1.02 CERTIFICATION

1. Units shall be listed by Underwriters Laboratories for 0 clearance.

2. Guarantee - Motors and elements shall be guaranteed for five (5) years.

PART 2 PRODUCTS

2.01 BASEBOARD RADIATION

1. Casing shall be fabricated from 16-gauge zinc coated steel. All exterior parts shall be painted and baked with acrylic enamel color as directed by the Owner. Enclosures shall be ribbed longitudinally for strength and have center reinforcement to resist impact.

2. Provide tubular prewired wireways matching terminal boxes with separate covers in which thermostats and relays can be mounted to each end of the heater. Elements shall consist of nickel chromium alloy resistance wire embedded in magnesium oxide, enclosed in corrosion resistance finned sheaths.

3. Thermal Overload - Full length hydraulic tubular type, automatic reset.

2.02 UNIT HEATERS

1. Enclosures shall be fabricated from heavy gauge zinc coated steel, finished in high gloss beige enamel. Air shall be discharged through independently adjustable horizontal louvers.

2. Elements shall consist of nickel chromium alloy resistance wire embedded in magnesium oxide, enclosed in corrosion - resistant finned sheaths. Element assemblies shall be arranged to insure uniform air flow.

3. Motor shall be totally enclosed permanently lubricated and equipped with automatic reset thermal overload protection. Fan blade shall be of the axial flow type designed for quiet operation. Fan speed shall not exceed 1,600 RPM.

4. Thermal Overload Protection - Manual reset thermal cutout type.

5. Units shall be factory assembled and wired so that only electrical supply and thermostat connections are required in the field. Thermostats shall be wall mounted and tamper-proof. Contractor shall furnish and install all wiring between thermostat and units.

2.03 INSERT HEATERS

1. Heaters shall be of the forced air type with non-glowing elements, arranged so that air is drawn in at the center and discharged at each side. Heaters shall be semi-recessed to extend not more than 1½" from the wall unless otherwise approved.

2. Enclosures shall be of impact resistant construction, incorporating a chrome-plated welded steel wire guard and an underguard of perforated metal with openings no greater than ¼" x ¾". Enclosure shall be finished in a high gloss baked enamel with semi-gloss black perforated underguard.

3. Motor shall be permanently lubricated, totally enclosed, with automatic reset thermal overload protection, 1,100 RPM maximum. Elements shall consist of nickel chromium alloy resistance wire embedded in magnesium oxide, enclosed in corrosion - resistant finned sheaths. Provide automatic reset thermal overload protection.

4. Built-In Controls - Built-in thermostat on-off switch. Controls shall be operated from vandal proof knobs.

2.04 DUCT HEATERS

1. Heaters shall be slip-in type with terminal boxes suitable for the installation.

2. Heaters shall have nickel-chromium resistance coils, insulated by floating bushings supported in aluminized steel frames.

3. All heaters shall be furnished with thermal cutouts for primary and secondary protection. Primary automatic reset, secondary manual. All internal wiring shall be suitable for 105° F.

4. Control Circuit - Heaters shall be supplied "packaged" with thermal cut-outs, magnetic contactors, fuse blocks, airflow switches and disconnect switches.

PART 3 EXECUTION

3.01 INSTALLATION

1. Provide all materials and hanging materials necessary for installation, verify supports prior to installation.

3.02 WIRING

1. Heaters shall be installed and wired according to the manufacturers' recommendations and applicable national and local codes.

END OF SECTION
15605.6470

SECTION 15655 - PACKAGED SPLIT SYSTEMS

PART 1 GENERAL

1.01 SCOPE

1. Furnish and install all split system air-conditioning units. Leave equipment completely installed so that only the connection of auxiliary services is required to make ready for start up. Provide all materials, miscellaneous equipment and inter-connecting piping required for the proper functioning of the work.

2. Remove, modify and/or add to existing systems and all appurtenances for new equipment.

1.02 APPROVALS

1. Equipment shall bear the UL label, be constructed, rated and installed with all applicable ARI and AGA Standards

PART 2 PRODUCTS

2.01 OUTDOOR UNITS

1. The unit shall be properly assembled and tested at the factory.

2. Performance - Cooling capacity shall be rated with air entering condenser at 95° F. and a saturated suction temperature at compressor of 40° F. Saturated condensing temperature shall not exceed 117° F. The unit shall operate down to 0°F. ambient (low ambient control).

3. Outdoor coil shall be of nonferrous construction. Coil shall have aluminum plate fins, mechanically bonded to seamless copper tubes. Coil shall be circuited for sub-cooling.

4. Condenser Fans and Motors - Unit shall be furnished with direct-driven, propeller-type fans arranged for vertical discharge. Condenser fan motors shall have Class B motor insulation, inherent protection, and shall be of the permanently lubricated type, resiliently mounted. Each fan shall have a safety guard.

5. Compressors –Each shall be of serviceable hermetic design with external spring isolators and shall have an automatically reversible oil pump. Compressor shall be located in a section separated from condenser fans and coil. Multiple compressor units shall be step-start. Provide variable speed compressors for capacity control.

6. Controls shall be factory wired and located in a separate enclosure. Safety devices shall consist of high and low-pressure switches and compressor overload devices. Unit wiring shall incorporate a positive acting timer to prevent short-cycling of compressor if power is interrupted. Timer shall prevent compressor from restarting for a five-minute period. Provide reduced current starters where required.

7. Casing shall make unit full weatherproof for outdoor installation. Casing shall be of galvanized steel, zinc phosphatized and finished with baked enamel. Openings shall be provided for power and refrigerant connections. Panel shall be removable to provide access for servicing. Units shall have an access door on the control panel.

8. Connections - Only refrigerant piping and one (1) power supply connection shall be required for each unit.

9. Arrangement - Unit shall be arranged for pad, mounting on grade.

10. Provide units with marine coating.

2.02 AIR HANDLING UNITS

1. See Specification Section 15810.

2.05 REFRIGERANT PIPE

1. Split system units are specifically designated as packaged equipment and as such, the manufacturer shall provide a complete design of the interconnecting piping and controls. As part of the submission of equipment, provide a compete refrigerant pipe design to include all pipe lengths, maximum pipe elevations and distances, as well as all other appurtenances. Equipment manufacturer shall be responsible to provide all refrigerant charge. Equipment manufacturer shall review the location and travel distances of refrigerant pipe and point out where there are problems prior to installation. All modifications of the system design shall be the responsibility of the Contractor. Piping materials and installation shall comply with manufacturer's recommendations and all applicable codes and standards.

2. All pipe materials and installation procedures shall be in accordance with the equipment manufacturer's recommendations and all applicable codes and standards. Refrigerant pipe shall be type "K" copper located within finished walls or furred-in or concealed in finished areas. All refrigerant pipe shall be properly supported, insulated and installed in accordance with manufacturers requirements.

3. Furnish complete refrigerant piping packaged pre-charged with fittings thermal expansion valve.

4. Furnish and install at each evaporator or liquid connection an externally equalized thermal expansion valve. Valve shall be capable of being serviced with the body flange in line.

5. Provide at each evaporator liquid solenoid valve with moisture resistant coil, manual operating stem and solder or flanged connectors with maximum one psi or less pressure drop at maximum design loading.

6. Insulate all refrigerant pipe per Section 15180.

7. Where units are unavailable with multi-stage or variable speed compressors, provide refrigeration APR Control usage for capacity control. APR Controls by Rawal Devices, Inc. or approved equal shall be installed to provide capacity modulation on the refrigeration circuits of the split system for improved humidity control during partial load conditions.

   The APR Control shall be installed in the condensing section in accordance with the manufacturer's installation instructions. ASHRAE refrigeration piping protocol must be adhered to when the condensing unit is located above the evaporator, or any suction riser exists. The APR control is a field installed device and shall be sized by the manufacturer to confirm proper application.

8. Provide acoustical blanket around compressor. Blanket shall be removable with inner and outer chemical resistant PTFE fiberglass cloth high density material and vinyl. Noise reduction in "A" weighting 100-5000H, 29.5 dba per ASTM test procedure E1222-87. Blanket shall be insulate LT450TAST-2" by Shannon Enterprises or approved equal.

PART 3 EXECUTION

3.01 EQUIPMENT INSTALLATION

1. Install equipment on vibration isolating base and necessary supporting steel.

2. Verify weight and mountings with Structural Engineer and/or Steel Fabricator for approval and/or coordination.

3. All refrigerant pipe shall be properly supported, insulated and installed in accordance with manufacturers requirements.

4. Provide condensate drain trapped with minimum slope to closest receptor.

5. Provide emergency drain pan per Specification Section 15010.

3.02 CONDENSATE REMOVAL

1. Provide trapped condensate pipe sloped to proper reception. Condensate is to be drained to storm or sanitary systems as required by local codes. All pipe to be PVC pipe (except in plenums where type L copper shall be used). All pipe to be insulated with 1" thickness fiberglass pipe insulation with ASJ (minimum R = 4.0).

3.03 DDC CONTROL

1. Provide DDC control for all new equipment. The intent of the design is to provide an open protocol for split system units. See specification 15930 for control requirements. Provide all components required for a complete operable system.

END OF SECTION
15655.6470

SECTION 15656 - DUCTLESS SPLIT SYSTEMS

PART 1 GENERAL

1.01 SCOPE

1. Furnish and install all ductless split system air-conditioning system.

2. Leave equipment completely installed so that only the connection of auxiliary services is required to make ready for start up.

3. Provide all materials, miscellaneous equipment and interconnecting piping required for the proper functioning of the work.

1.02 APPROVALS

1. Equipment shall be installed, constructed and rated in accordance with all applicable ARI Standards and bear U.L. label.

1.03 ENERGY EFFICIENCY

1. Units 65,000 BTU/hr or less total cooling capacity shall have SEER of 10.0 at standard ratings. Units 65,000 BTU/hr to 135,00 BTU/hr total cooling capacity shall have SEER of 10.3 at standard conditions.

PART 2 PRODUCTS

2.01 OUTDOOR UNITS

1. The unit shall be properly assembled and tested at the factory.

2. Performance - Cooling capacity shall be rated with air entering condenser at 95°F. and a saturated suction temperature at compressor of 40°F. Saturated condensing temperature shall not exceed 117°F.

3. Outdoor coil shall be of nonferrous construction. Coil shall have aluminum plate fins, mechanically bonded to seamless copper tubes. Coil shall be circuited for sub-cooling.

4. Condenser fans and motors - Unit shall be furnished with direct-driven, propeller-type fans arranged for vertical discharge. Condenser fan motors shall have Class B motor insulation, inherent protection, and shall be of the permanently lubricated type, resiliently mounted. Each fan shall have a safety guard. Thru-wall units shall have centrifugal fans, horizontal discharge.

5. Compressors - Each shall be of serviceable hermetic design with external spring isolators and shall have an automatically reversible oil pump. Compressor shall be located in a section separated from condenser fans and coil. Multiple compressor units shall be step-start.

6. Controls shall be factory wired and located in a separate enclosure. Safety devices shall consist of high- and low-pressure switches and compressor overload devices. Unit wiring shall incorporate a positive acting timer to prevent short cycling of compressor if power is interrupted. Timer shall prevent compressor from restarting for a five (5) minute period. Provide reduced current starters where required.

7. Casing shall make unit full weatherproof for outdoor installation. Casing shall be of galvanized steel, zinc phosphatized and finished with baked enamel. Openings shall be removable to provide access of servicing. Units shall have as access door on the control panel.

8. Connections - Only refrigerant piping and one (1) power supply connection shall be required for each unit.

9. Arrangement - Unit shall be arranged for pad, wall or roof mounting as noted on drawings.

2.02 REFRIGERANT PIPE

1. Split system units are specifically designated as packaged equipment and as such, the manufacturer shall provide a complete design of the interconnecting piping and controls. As part of the submission of equipment, provide a complete refrigerant pipe design to include all pipe lengths, maximum pipe elevations and distances, as well as all other appurtenances. Equipment manufacturer shall be responsible to provide all refrigerant charge. Equipment manufacturer shall review the location and travel distances of refrigerant pipe and point out where there are problems prior to installation. All modifications of the system design shall be the responsibility of the HVAC contractor.

2. Refrigerant pipe shall be type "K" copper located within finished walls or furred-in or concealed in finished areas. All refrigerant pipe shall be properly supported, insulated and installed in accordance with manufacturers requirements.

3. Furnish complete refrigerant piping packaged pre-charged with fillings thermal expansion valve.

4. Furnish and install at each evaporator or liquid connection an externally equalized thermal expansion valve. Valve shall be capable of being serviced with the body flange in line.

5. Provide at each evaporator liquid solenoid valve with moisture resistant coil, manual operating stem and solder or flanged connectors with maximum one psi or less pressure drop at maximum design loading.

6. Insulate all refrigerant pipe per Section 15180.

2.03 INDOOR UNITS (WALL-MOUNTED)

1. General

A. The wall-mounted indoor unit section with a slim silhouette and shall have a modulating linear expansion device. The wall mounted indoor unit shall be used with the outdoor unit. The wall mounted indoor unit shall support individual control.

B. Each system shall perform in accordance to the ratings shown on plans. Performance shall be based on nominal cooling conditions of 80°F DB, 67°F WB for the indoor unit and 95°F DB for the outdoor unit.

2. Indoor Unit

   A. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

3. Unit Cabinet

   A. The casing shall have a white finish.

   B. Multi directional drain and refrigerant piping offering four directions for refrigerant piping and two directions for draining shall be standard.

   C. There shall be a separate back plate which secures the unit firmly to the wall.

4. Fan

   A. The indoor fan shall be an assembly with one or two line-flow fan(s) direct driven by a single motor.

   B. The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.

   C. A manual adjustable guide vane shall be provided with the ability to change the airflow from side to side (left to right).

   D. A motorized air sweep louver shall provide an automatic change in airflow by directing the air up and down to provide uniform air distribution.

   E. The indoor fan shall provide various speeds.

5. Filter

   A. Return air shall be filtered by means of an easily removable, washable filter.

6. Coil

   A. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.

   B. The tubing shall have inner grooves for high efficiency heat exchange.

   C. All tube joints shall be brazed with phos-copper or silver alloy.

   D. The coils shall be pressure tested at the factory.

   E. A condensate pan and drain shall be provided under the coil.

F. Both refrigerant lines to the indoor units shall be insulated.

7. Controls

A. Unit shall use controls provided by manufacturer necessary to operate the system and communicate with BMS.

PART 3 EXECUTION

3.01 EQUIPMENT INSTALLATION

1. Provide necessary supporting steel and verify weight and mountings with Structural Engineer.

2. Refrigerant pipe shall be type "K" copper and shall be properly supported and insulated per manufacturers requirements. Maximum length, minimum size supports and insulated in accordance with manufacturers' requirements.

3.02 CONDENSATE REMOVAL

1. Provide trapped condensate pipe sloped to proper reception. Condensate is to be drained to storm or sanitary systems as required by local codes. All pipe to be PVC pipe (except in plenums where type L copper shall be used). All pipe to be insulated with 1" thickness fiberglass pipe insulation with ASJ (minimum R = 4.0).

3.03 CONDENSATE LINES AT GRADE

1. Condensate lines at grade shall be enclosed with Mitsubishi Hide-Line or approved equal. Provide all supports to wall. Condensate lines to condensing units greater than 3' from wall shall have enclosure.

END OF SECTION
15656.6470

SECTION 15810 - AIR HANDLING EQUIPMENT

PART 1 GENERAL

1.01 SCOPE

1. Furnish and install all fans and air handling units. Leave equipment completely installed so that only the connection of auxiliary services is required to make ready for startup. Provide all materials, miscellaneous equipment and interconnecting piping required for the proper function of the work.

2. Remove existing air handling units as indicated on plans.

3. Remove existing fans as indicated on drawings. Existing curb to remain. Provide adapt curb or approved equal.

1.02 CERTIFICATION

1. All fans shall have AMCA Certified ratings for sound and performance and bear UL label and manufacturer be 150 9001 certified facility.

1.03 ENERGY EFFICIENCY

1. All motors shall be premium high efficiency type.

1.04 BALANCING

1. Balance all equipment per manufacturers' requirements and Section 15190.

1.05 FACTORY TESTING

1. All factory assembled air handling units shall be factory tested including helium leak testing of the coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. A certified factory Run test report shall be provided for each unit. **The "Run Test Report" shall be submitted to Owner for approval, prior to acceptance of unit for payment.**

2. All factory assembled packaged equipment shall be fully quality tested by factor run testing under normal operating conditions. Quality control system shall automatically perform via computer; triple leak check, pressure tests, evacuation and accurately charge system, perform detailed heating and cooling mode tests, and quality cross check all operational and test conditions to pass/fail criteria.

3. Detailed report card will ship with each unit displaying status for critical tests and components.

4. If unit fails on any cross check, it shall not be allowed to ship. Serial numbers will be recorded by factory and furnished to contractor on report card for east of unit warranty status.

PART 2 PRODUCTS

2.01 FANS

1. All fans to be manufacturer type, size, quantity and capacity shown on drawings. All rooftop fans shall have self-flashing Unibeam (or approved equal) roof curbs and disconnect switch. All fan motors shall be premium high efficiency. All fans shall have backdraft damper.

2. Ceiling exhaust fans shall have acoustically insulated housings, maximum sound level rating of 4.6. AMCA Sones terminal box with cord, plug and receptacle inside the housing. Entire fan, motor and wheel assembly shall be removable from the housing. Motor speeds shall not exceed 1,500 RPM and all fan motors shall be suitably grounded and mounted on rubber-in-shear vibration isolators. Provide insulation on all discharge duct where required to prevent condensation. Units shall have metal face grille. Provide reinforced aluminum backdraft damper with continuous aluminum hinge rod and brass bushings. Pressure drops, fan speeds and horsepower to be adjusted for sound block. Units to have wall caps, brick vents, roof caps, where required and/or shown. Controls to be Solid State control, unless otherwise indicated. Where units are used for inline applications, provide inlet duct collar and delete face grille.

3. Inline centrifugal fans shall be constructed of welded steel, inlet and outlet diameters shall be the same size. The fan wheels shall be the backward curved centrifugal type with non-overloading characteristics, constructed with die-formed, aerodynamic blades, continuously welded to a flat radiant blackplate.

2.02 AIR HANDLING UNITS

1. Furnish and install packaged air handling units of size, type and capacity as indicated on plans.

2. Unit shall be constructed of heavy gauge galvanized steel with welded framework.

3. All exterior surfaces of unit shall be finished with vinyl chlorinated lacquer over phosphatized galvanized steel. Paint colors shall be selected by Owner.

4. Unit shall have an insulated stainless-steel sloped floor under the fan/motor assembly that drains into a double pitched insulated galvanized drain pan under the coils. An insulated "P" trap shall be field provided to provide proper condensate drainage.

5. Adult-sized gasketed and piano hinged double wall access doors with industrial style latches and insulation retainers shall be provided.

6. Low leak dampers shall be of the airfoil type constructed of 14-gauge galvanized steel. Dampers shall be parallel blade type with compressible metal jamb seals and vinyl blade edge seals. Blades shall rotate on stainless steel sleeve bearings. Leakage rate damper shall be no more than 9 cfm/square foot at 4" wg.

7. The complete casing, from the entering airside to leaving airside shall be factory insulated with 2", 1½ lb. density matt-faced insulation. Unit shall be double wall construction interior, minimum 22-gauge perforated galvanized steel.

8. Fans shall be forward curved or air foil type DWDI mounted on a large diameter tubular shaft with externally mounted bearings, ball type, grease packed. Fan drives shall be variable speed selected for final, balanced air resistance as determined on job.

9. Motors shall be premium high efficiency mounted integral to an isolated fan assembly mounted inside the unit casing and shall be adjustable to permit drive belt tensions. Drives shall be variable pitch, suitable for adjustment within 5 percent of specified rpm. Drives shall be selected at 1.2 service factor. Fan and motor assembly to be internally isolated from unit casing with spring isolators; furnished and installed by unit manufacturer.

10. Furnish heating and cooling coils as shown.

11. Filter sections with proper racks and access doors to permit easy removal of filters.

12. Provide a control system for air handling units in accordance with ATC Section, to provide all functions as specified. Manufacturer shall provide all components, equipment, relays, etc. to interface with control system. Provide connection for all auxiliary functions and equipment associated with air handling unit sequence of operations (i.e. relief, exhaust, radiation, interlocks, etc.).

2.03 FILTERS (AIR HANDLING UNITS)

1. Provide spare filters per Specification Section 15010.

2. Provide 2" thick fiberglass pleated filters with MERV rating of 13.

3. Units internal static pressure requirements shall include additional pressure loss of MERV 13 filter.

PART 3 EXECUTION

1. Provide all hanging materials and vibration isolation prior to hanging any unit, verify supports with Structural Engineer.

2. Provide wall caps or roof caps for ceiling fans flashed and secured as required.

3. All rooftop fans, gravity ventilators, wall/roof caps, and utility sets shall be factory painted color selected.

5. All fans with duct connections or connections to building construction shall have flexible connections as specified in Section 15860.

6. All exhaust fans shall have backdraft dampers.

END OF SECTION
15810.6470

SECTION 15860 - DUCT SYSTEMS

PART 1 GENERAL

1.01 SCOPE

1. The work under this heading shall include the furnishing and installation of:

   A. All sheet metal work required for the various systems, including installation of control devices and connections to equipment and all materials and specialties required for the proper functioning of the work.

   B. All acoustical treatment required for the work as hereinafter specified.

   C. Removal, modification, expansion and/or connection of existing ducts for new work.

   D. Removal of existing ducts, flues and all appurtenances as indicated on drawings as required for execution of design intent of new systems.

1.02 CONSTRUCTION

1. All ducts shall be constructed of prime quality, re-squared, galvanized steel sheets in accordance with "Duct Manual and Sheet Metal Construction for Ventilating and Air Conditioning Systems of the "Sheet Metal and Air Conditioning Contractors National Association, (SMACNA) Sections 1 and 2.

2. Gauges shall be as recommended for the use intended in the applicable SMACNA Manuals. All ductwork and other sheet metal shall be properly stiffened and supported as per the applicable recommendations of SMACNA Manuals. Only first quality, smooth, cold rolled sheets of the best grade steel shall be used and shall be guaranteed to double seam without showing fracture.

3. High Velocity Ductwork: Defined as ducts with velocities in excess of 2,500 FPM or two inches static pressure.

1.03 FLEXIBLE DUCTS

1. Use corrugated solid metal flexible duct for inlet connection to air control devices such as V.A.V. boxes, etc. Use corrugated aluminum or core polyester core (insulated) for connections on outlet-side of air control devices and low velocity runouts.

2. Ducts must be suitable for the service of acceptable fire rating and shall be insulated as specified for ductwork.

3. Flexible ducts shall be run in the most direct manner and shall be hung so that no bend has a centerline radius less than three times its diameter, maximum 12' +/-. Duct found not in compliance shall be removed and installed to comply with this section at no additional cost.

4. Substitution of flexible ducts for runouts shown as sheet metal or vice versa is acceptable but must be submitted for approval.

5. Flexible duct shall not pass through any wall, draft stopping wall, floor, ceiling or fire resistance rated assembly. Where flexible duct is shown thru these, provide sheet metal collar thru wall and minimum 6" either side.

6. All duct wraps, insulation and appurtenances shall be plenum rated.

7. Flexible duct on inlet to VAV boxes shall have minimum straight run of duct as required and recommended by the VAV box manufacturer.

8. Where flexible ducts are shown to be connected to return air or supply air plenum boxes, the duct connections shall be made to allow for installation of plenum boxes thru ceiling and/or down from roof.

1.04 BALANCING AND TESTING

1. See Section 15190.

1.05 DIMENSIONS

1. Duct dimensions are INSIDE CLEAR DIMENSIONS: Increase metal duct size to allow for thickness of inside insulation.

1.06 DUCTWORK CLEANLINESS AND STORAGE

1. Comply with SMACNA, "Duct Cleanliness for New Construction Guidelines," and follow the requirements for the "Advanced Level." After fabrication, seal ductwork and maintain the sealed conditions during transportation, storage and after installation until final cleaning is complete. All ductwork shall be sealed either by blanketing or capping the duct ends, bagging small fittings, surface wrapping or shrink wrapping. Store in a clean, dry environment. Do not install ductwork until the building is clean and dried and maintain the integrity of the sealed ends until final "white glove cleaning" is complete and dust free.

2. Duct installed and where the duct joints have had sealant, do not cover duct openings until sealant has cured. All work on preventing buildup of the sealant gases shall be done in accordance with sealant manufacturer's requirements and SMACNA.

1.07 PAINTING OF SHEET METAL DUCTS

1. The following is a guide for surface preparation for duct painting.

   A. Surface shall be clean, dry and free from spiral manufacturers' lubricants.

   B. Remove dirt and grease from galvanized spiral ductwork with water and a non-petroleum-based detergent (Simple Green, TSP, Krud Cutter, Dawn or approved equal) and wipe dry with a clean cloth.

   C. Surface shall be free of foreign materials that will adversely affect adhesion or appearance of applied painted coating.

   D. Contractor shall use DTM (direct to metal) Sherwin Williams (or approved equal) paint.

1. Primer/Topcoat – Sherwin Williams B42W Series or approved equal
2. Primer/Topcoat – Sherwin Williams B42T1 or approved equal

E. All oil-based paint shall be in accordance with manufacturers' recommendations for surface preparation and primer requirement.

F. The use of alkaline oil-based paint shall not be used.

PART 2 PRODUCTS

2.01 FITTINGS

1. Round elbows shall be formed or stamped type; use five-piece construction where stamped fittings are available, centerline radius equal to 1.5 times the duct diameter minimum.

2. All round take offs to be expanded to 90-degree conical type of 45-degree branches.

3. Obstructions: Where possible, avoid locating any pipe, wire or structural member in a duct. Where such obstructions cannot be avoided, duct shall be eased, split or transformed as the Engineer may direct.

4. Transformation: Where changes result in an increase of area slope shall not exceed one (1) in seven (7); where areas remain constant or decrease, slope shall not exceed one (1) in four (4), but one (1) in seven (7) is preferable.

5. Changes in direction: Changes in direction shall be made with elbows or tees as conditions necessitate in the following order or preference:

   A. Unvaned elbow, centerline radius equal to 1.5 times duct width.
   B. 6" throat radius with full radius vanes and heel radius.
   C. 3" throat radius with full radius vanes and heel radius.
   D. 3" throat radius with 3" heel radius, double thickness vanes.
   E. No square elbows without turning vanes allowed.

6. Branch Takeoffs: Made, in order of preference, with radius elbow, radius tap-in or suitable vanes in a square takeoff.

2.02 JOINTS

1. All connections of duct shall be installed in strict accordance with SMACNA standards, except that all exposed non-spiral duct with design pressure less than 2" W.C. or 2,500 fpm velocity in finished areas shall use streamline joints.

2. Mechanical joint fasteners, such as Ductmate or approved equal, shall be installed in strict accordance with manufacturers' requirements. Where mechanical fasteners are used, contractor shall coordinate joint locations with all other trades for clearances. Where use of mechanical fasteners result in an increased requirement for space and clearance and results in modification, removal, replacement, or new work for Contractor or other contractors work; the work shall be done at Contractors' expense and with no additional cost to Owner. These joints shall not be used for exposed duct in furnished areas.

3. Where any joint is installed in any duct below 7'0", installation shall have protection as specified under ductwork installation.

4. All joints shall be sealed as specified for air tightness.

2.03 DAMPERS

1. Furnish and install all dampers. Dampers for automatic operation shall be minimum leakage, multi-opposed type with neoprene balloon edge and snap steel side.

2. Outside air dampers for rooftop units shall be able to be closed within 30 seconds.

2.04 VOLUME DAMPERS, SPLITTERS AND ADJUSTABLE DEFLECTORS

1. Volume dampers shall be installed in all of the trunk and branch ducts, no exceptions. The balancing trade shall not depend upon register shutters or dampers for balancing. The sheet metal contractor shall submit shop drawings to the balancing contractor for his review of location, type, size, and quantity of balancing dampers. Where additional control devices or alternate methods of duct installation are suggested and/or required, these shall be provided, and all modifications made at no additional cost to Owner.

2. Volume dampers shall be Everlock locking type manual volume dampers as manufactured by Rossi HVAC Hardware (or approved equal).

3. Bracket – Cold rolled Steel (ASTM A-1008), 18-gauge nominal thickness of 0.0478 with tolerance range of 0.0438 to 0.0518. single cut and formed bracket for use with 1.5" or 2.0" insulation wrapping or any other such stand-off applications finished with a white Chromate plating.

4. Handle and Thumb Trigger – Polyamide 66 (PA66), flame retardant, glass reinforced, Zytel or approved equal.

5. Retaining Spring – Ext. self-lock TX-75ST-ZF carbon steel SAE 1074 with zinc bright plating. C-scale Rockwell hardness 47 to 51.

6. Blades

   A. 4" to 14" dia. single blade (or disc). ASTM-A527 LFO G90, 20-gauge reinforced to equal strength of 18-gauge material.

   B. 3/8" full length bar fits through formed channel in center of damper blade.

7. Bars – 3/8" square aluminum bar.

8. Bearings

   A. Snap-in bearings for medium and low-pressure systems. Polyamide 66 (PA66), flame retardant, glass reinforced, "Zytel" or approved equal.

   B. B-lined bearings for lined duct. Polyamide 66 (PA66), flame retardant, glass reinforced, "Zytel" or approved equal.

9. Splitter dampers shall be installed where shown on drawings. Splitters shall be made of 18-gauge galvanized steel or heavier and shall be cross broken and flanged or hemmed for rigidity. Splitters shall be made easily adjustable and readily accessible for adjustment.

10. Adjustable deflectors and adjustable turning-vane devices for diverting air flow from a duct main into a branch duct shall be multi-blade assembly hinged at one end and so constructed that, as it is closed, the air passage between the blades narrows until no air passage remains when the assembly is in the fully-closed position.

2.05 FIRE DAMPERS

1. Fire dampers shall be provided and installed at all places where duct passes through a floor, fire wall, fire rated ceiling or other fire division, or as required by applicable codes.

2. Steel curtain dampers may be used in any system but are required 100% free area.

3. Fire dampers shall comply with UL-555 and shall bear the label of an approved agency. Fire dampers shall be installed in accordance with manufacturers' installation instructions.

4. Provide access doors at all fire dampers.

5. Contractor shall, prior to shop drawing preparation, coordinate with general contractor, the location of all fire dampers based on architectural plans and/or existing construction. Where access doors are required behind any inaccessible area, Contractor shall furnish and install access panels in general construction which shall be suitable for servicing of dampers.

6. Where due to existing and/or new construction of any trades, access to fire dampers are not possible prior to duct installation. Contractor shall notify the architect and/or engineer.

2.06 ACCESS DOORS

1. Access doors of suitable sizes minimum 18"x18" shall be provided for access to all coils, dampers, controls, etc.; in insulated duct, door shall be double panel, insulated type.

2.07 FLEXIBLE CONNECTIONS

1. Flexible connections shall be provided to motorized equipment, made with at least 3" of neoprene coated fiberglass cloth with 1" slack material (except kitchen hood exhaust).

2.08 LOUVERS AND SCREENS

1. All louvers shall be 45 degree, 4" deep, drainable louvers. Blades shall be stationary with two (2) drainable gutters incorporated. Head/jamb frame shall be drainable and resist water penetration. Material shall be 0.081" extruded aluminum. Provide optional welded frame, integral flange and bird/inset screen. Provide insulated blank off panel with 0.032" aluminum skin to match louver finish. Coordinate and provide necessary trim and attachment details.

2. Louver panels shall be continuous within the specified masonry openings. Coordinate required sizes, total depth, offset to new equipment, etc. with field conditions and necessary modifications, attachment methods, gaskets, etc. Seal perimeter so not to restrict louver

drainage mechanism. Document and submit field verified and equipment coordinated louver specifics via shop drawing submittal. Finish shall be Owner/Architect selected custom color (non-metallic and non- exotic) Kynar or approved equal painted finish as required to match brick or Owners' color sample.

3. An aluminum painted screen (½ " mesh) in an aluminum frame shall be provided over the louver in such a way as to be easily removable for maintenance.

4. Where air intakes or relief discharges occur on roofs, prefabricated aluminum curbs (maximum height 12"; minimum height 4") shall be provided one inch higher than gravel stop or parapet scuppers and properly flashed. Aluminum rain hoods or goosenecks, unless otherwise shown, shall be provided thereon, so designed as to prevent rain entrance, provide low frictional resistance and have rigid construction, each provided with removable screen.

5. Where louvers have internal component and/or their associated dampers as indicated on drawings and/or specifications, all internal portions shall have a metal protective screen. Screen shall be constructed to allow for specified air flow.

6. Screen shall be of adequate size, dimension and configuration to allow for proper air flow and protection of internal components.

7. Provide hinged access for components requiring maintenance.

8. Screen shall be removable. Paint screen and all components color selected.

2.09 FAN DISCHARGE, BACK DRAFT AND RELIEF DAMPERS

1. Air/Dynamic as manufactured Air Balance or approved equal.

2.10 DUCT IDENTIFICATION

1. Provide for all concealed insulated and non-insulated duct and duct exposed in non-finished areas; self-adhesive color-coded labels for identification of air flow and equipment.

2. Markers shall be installed at every turn in direction and minimum every 25'.

3. Markers shall have color coding per the manufacturer. In addition to marking, the duct shall have flow directions located next to duct markers.

4. Flow directional tape shall be completely around all visible portions of duct and termination shall be 1' +/- past visible corner. Flow directional tape shall be ASME A13.1 color coding. Color to match duct markers. Arrows shall be white on green, red or blue and black on yellow, green or orange.

5. The duct shall have flow direction located next to flow direction. Indication shall be MS900 flow directional tape; 2" wide for duct up to 12' +/- AFF and 4" wide for duct above 12' +/- AFF.

6. Markers shall have color coding and lettering per the manufacturer and meet ASME A13.1 Standards.

7. Duct markers shall be; duct up to 12' +/- AFF – 2-1/4" x 13" and duct above 12' +/- AFF – 4" x 24".

8. Duct markers shall be MSI MS-900 or approved equal.

2.11 GAS FIRED EQUIPMENT COMBUSTION AIR INTAKES AND FLUES

1. Provide vertical concentric roof vent kits for all gas fired equipment. Intake and flue duct material in accordance with manufacturer's requirements and applicable codes. Size per manufacturer's requirements.

PART 3 EXECUTION

3.01 AIR DELIVERY AND NOISE

1. Contractor shall guarantee that all equipment shall operate without objectionable noise or vibration; that all ductwork shall be free from pulsation or objectionable noises; that the volume of air specified will be delivered to all points of supply and exhaust.

2. After this system is in operation, should the ductwork be found to vibrate or chatter, Contractor will be required to eliminate same.

3.02 TESTING OF AIR DISTRIBUTION SYSTEM

1. The volume and velocities of air at all terminals, outlets and inlets, shall be tested.

2. The volume dampers, splitters and deflectors shall be adjusted so that the air velocities and volume will be as specified.

3. See Specification Section 15010 "Start Up and Adjustments", 15190 for balancing and testing.

3.03 DUCTWORK INSTALLATION

1. All ductwork shall generally be installed in the location and manner shown and detailed on the drawings with all fittings and connections made in accordance with the applicable SMACNA Manuals. Duct shown on drawings are diagrammatic. Contractor to determine in field exact routing, size and configuration. All modifications or deviations required by job conditions must be approved prior to any fabrication.

2. Prepare all ductwork and set it in place before furring begins. Extend all damper operators and serviceable or adjustable devices to accessible locations.

3. All connections from sheet metal assemblies such as ductwork, plenums, etc., to operating machines and/or mechanisms such as fans, air conditioners, etc., shall have flexible connections.

4. Where any ductwork is mounted lower than 7'-0" above a finished floor line, all seams in ducts shall be flattened and filed so that no standing seams or angle bracing protrudes from the duct in any manner which could cause injury to personnel. Covering of standing seams with an

approved flexible bumper material, like split Armaflex pipe insulation or approved equal is acceptable.

5. Coordinate exact location of all duct in field with existing construction. Coordinate location of all duct with truss manufacturer.

6. All ductwork shall be delivered and sealed in accordance with SMACNA requirements and sealing shall only be removed prior to installing duct. After installation, duct shall still be protected from water damage.

7. All labels on exposed and concealed duct shall be removed.

3.04 ACOUSTICAL TREATMENT

1. Unless otherwise noted, all duct from all fans and units with fans to 20' from fans shall be acoustically insulated. Ducts to be acoustically insulated shall be insulation in the interior of the duct with 1" thick, 1-1/2# density fiberglass meeting ASTM C1071, coated with acrylic treated EPA registered anti-microbial agent proven to resist microbial growth as determined by ASTM G21 and G22, K value :25 at 75 deg. F., N.R.C. .65 or higher based on type A mounting and listed in accordance to ASTMC-423.

2. Rectangular duct shall be secured using full coverage water based adhesive meeting ASTM C916. Secure insulation with mechanical lines fasteners per SMACNA, NAIUI or manufacturers requirements. All exposed edges of the insulate shall be factory or field coated. Repair liner surfaces with adhesive. Insulate may be installed after duct fabricator at contractors' option. Increase duct size to allow for insulation thickness.

3. Insulation shall be pasted to the metal surface with "3M" EC-890 or approved equal, before duct is made up. On large ducts, stick pins stud-welded or pasted shall be used as additional support. Insulation may be installed after duct is fabricated at Contractor's option.

4. Duct insulation and linings shall not glow, flame or smolder when tested at their rated temperatures in accordance with ASTM-C-411, test temperature 250° F. or greater. Duct liners shall be interrupted at fire damper and fire doors.

5. Where acoustical insulation is installed, exterior duct wrap is not required unless acoustical insulation does not meet the specifications for duct insulation R Values as indicated in Section 15180.

6. All acoustical insulation shall be plenum rated.

3.05 OUTDOOR DUCT

1. All ductwork installed outdoors shall be internal duct acoustical insulation minimum (R=8). Duct joints shall be mechanical joints with gaskets. Duct and joints shall be enclosed in duct insulation specified by section 15180 "OUTDOOR DUCT INSULATION."

2. Rooftop mounted duct shall be supported with galvanized steel angle or pipe and be installed per SMACNA requirements with curb mounting and seismic supports. Fasteners shall not penetrate insulation.

3. Where vibration isolation is required, flexible connections shall be impervious to water. Slope all horizontal ducts to drainage outlets. Locate all duct above roof with clearance for roof maintenance per roof manufacturer, bonding agent, and/or general contractor requirements.
4. All duct shall be sloped away from intakes. Avoid ponding of water against units.

5. All duct shall have finish suitable for painting. All duct above roof not behind screening and visible (as determined by architect) shall be painted.

3.06 ROOF PENETRATIONS

1. All roof penetrations shall have roof curb minimum 12" high with cant strip, flashing collars, flashing and counterflashing.

2. Provide sloped roof curbs at sloped roofs. Verify all curbs with roof conditions prior to shop drawing submission.

3. All roof curbs shall be installed per SMACNA requirements.

4. Where re-roofing work requires higher curbs due to new insulation, these shall be used. Coordinate with general contractor for exact location.

5. Gooseneck terminations are not permitted.

3.07 AIR TIGHTNESS

1. All ductwork shall be airtight as defined by ASHRAE and SMACNA. All transverse, joints longitudinal seams and duct wall penetrations shall be sealed in accordance with ASHRAE 90.1 latest edition and have adhesive (3M EL-750 or approved equal). Pressure sensitive tape shall only be allowed for supply air duct with design pressures less than 2" W.C. in return air plenums.

3.08 FAN DUCT CONNECTION

1. All duct connections to fans and/or equipment with fans shall be installed in strict accordance with fan manufacturer's requirements. Ducts shall be installed to eliminate any system effects pressure losses. Where ducts are shown or are required to be installed that are not in compliance with manufacturers requirement, the additional pressure losses due to the system effect shall be added to the fans specified static pressure and fan size increased accordingly. All work shall be done at no additional cost.

2. Where elbows are required at discharge, they shall be full radius elbow R/W = 1.5 or greater.

3. All discharge dampers shall be arranged and installed in accordance with manufacturers' requirements and to avoid any system effects.

3.09 EXISTING DUCT

1. All existing duct regardless of use that is shown to remain and/or to be used for new work shall be cleaned.

END OF SECTION 15860.6470

SECTION 15870 - TEMPERED AIR TERMINAL UNITS

PART 1 GENERAL

1.01 SCOPE

1. Furnish and install all air terminal devices in sizes, types and capacities shown on the drawings.

2. Removal, addition and/or modification of existing systems as indicated on plans.

3. Removal of existing air devices and replacement with new air devices as indicated on plans.

1.02 RATINGS

1. Manufacturer shall rate all terminals in accordance with Air Diffusion Council (where applicable).

PART 2 PRODUCTS

2.01 REGISTERS AND GRILLES

1. All supply air registers shall be as scheduled on the drawings or approved equal consisting of two (2) banks of fins, front bank vertical, second bank horizontal, with one (1) bank of multi-opposed damper blades operated by a concealed screwdriver operator.

2. All return and exhaust air registers shall consist of one (1) bank of horizontal fins fixed at a 45-degree angle with one (1) bank of multi-opposed damper blades operated by a removable key.

3. Where grilles are shown, omit the damper.

4. All registers and grilles shall be of aluminum construction with baked white enamel finish.

5. All return and exhaust air registers shall be as scheduled on the drawings approved equal.

2.02 DIFFUSERS

1. All ceiling diffusers shall distribute air in a horizontal pattern parallel to the ceiling.

2. All diffusers shall be equipped with opposed blade dampers, operated from diffuser face by an unobtrusive screw operator.

3. All diffusers shall be as scheduled on the drawings or approved equal for lay-in ceilings. Face size shall be 24"x24". All diffusers shall be aluminum construction with aluminum face plates. The finish shall be white baked enamel with black back pan and interiors.

PART 3 EXECUTION

3.01 INSTALLATION

1. All devices shall be mounted true and square, pulled up tightly without distortion.

2. Provide equalizing deflectors and/or air extractors where required to achieve proper air distribution.

3.02 FIRE RATED CONSTRUCTION

1. All devices in fire rated construction shall be provided with approved fire dampers, "tents", or other devices as required to conform to applicable regulations.

303 VISIBILITY

1. Where registers and grilles are at floor level and inside of duct is visible, provide acoustic insulation (black) or where insulation is not specified or required, paint all visible inside surfaces of duct flat black.

END OF SECTION
15870.6470

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

PART ONE – GENERAL

1.01 SCOPE

1. Provide a fully integrated Web Browser Control System incorporating Direct Digital Control (DDC) Technology with energy management, equipment monitoring, and remote communications.

2. The system shall be an extension of the current building system being installed. The existing control contractor for the township facilities is CM3. Substitution by Architect approval.

3. The intent of this specification Section is to provide the following features, functionality, and interface services as follows:

   A. Open Source: The Facility Management Control System (FMCS) shall be Open Source, consisting of materials and components available through Open Source product procurement suppliers. Single source exclusivity or other conditions which inhibit the Owner from obtaining both materials and support services from less than three independent procurement avenues of shall not be acceptable.

   B. Open System platform: The FMCS shall furnish and install a complete JENEsys Niagara N4 Building Management System or approved equal and an Automatic Temperature Control System including all necessary hardware, all operating and applications software necessary to perform the control sequences as called for within the "Sequence of Operation for HVAC Equipment", BMS Diagrammatic Details, as shown on the project drawings. The new DDC controllers furnished in this section shall be an Open System platform, all programming of the shall utilize the Open Niagara N4 Platform or approved equal embedded software package and communicate peer-to-peer via the Open ASHRAE 135 BACnet communications protocol. Provide 2-year post-construction material warranty for all new FMCS controllers and IT hardware.

   C. Open Niagara Interface Conformance Statements (NICS) or approved equal:

      1. All Niagara 4 software licenses shall have the following NICS:

         - "accept.station.in=*"
         - "accept.station.out=*"
         - "accept.wb.in=*"
         - "accept.wb.out=*"

      2. All NICS shall follow the Open Niagara (or approved equal) Interface Conformance specifications.

      3. All JACE hardware licenses and certificates shall be stored on local MicroSD memory card (or approved equal) employing encrypted "safe boot" technology.

   D. Peer to Peer Communications

      1. FMCS architecture shall fully support a multi-vendor environment and be able to integrate third party systems via existing vendor protocols including, as a minimum:

- BACnet MS/TP
- BACnet IP
- LonTalk
- Rapid Spanning Tree Protocol
- MODBUS RTU.

E. Web-based Graphical Interface:

1. The Owner shall provide any Thin Client Web Stations (TCWS).

2. The Operator shall be able to manage the Building Management System through a connected Thin Client Web Station's web-browser.

3. The FMCS Contractor shall provide 3-dimensional web graphics. Including all floor plans, new mechanical systems, boilers, pumps, fans, unit ventilators, roof top units, coils, etc.

4. Copies of the web graphics shall be retained in the BMS Archival Data Server

F. Local and Remote Connectivity:

1. The FMCS shall provide the Owner with:

a. Secure local access shall be through an internal TCP/IP network connection.

b. Secure remote access through an Owner provided TCP/IP network connection service.

c. Remote connectivity with the offsite monitoring service shall be maintained by the Building Management System.

d. Alarm notification to designated stations and personnel through the TCP/IP network connection.

G. Information Technology (IT) compliance and control access.

1. BMS TCP/IP devices located in IT rooms shall be fully IT compatible devices that communicate directly on the IT infrastructure in the facility.

4. Embedded Software:

A. All controllers furnished by the BMS Contractor shall be programmable directly from any workbench embedded toolset.

B. The Owner shall have full licensing and full access rights for all network management, server, engineering and programming software required for the ongoing maintenance and operation of the FMCS and shall receive all Administrator level logins and passwords.

5. FMCS Information Management including:
- System programming
- DDC Device downloading

- DDC Device backup
- FMCS data archiving and retrieval
- Data Reporting functions.
- Standard applications for HVAC systems.
- Diagnostic monitoring and reporting of BMS functions.
- Offsite monitoring and management access.
- Energy management

6. The Facility Management Control System (FMCS) shall be comprised of a network of interoperable, stand-alone digital controllers communicating on an open RSTP Protocol Network to the Individual Building Master Network controller. Access to the various Building Management Control Systems shall be locally from any computer or from the existing computer located in the building or remotely from any web access site and shall be accomplished through a Graphical User Interface using Web browser technology via the Internet.

7. The School Districts' Information Technology Department will provide two (2) IP drops for integration into the Information Technology System. The School District Information Technology Department will provide a secure VPN into the network to all for remote monitoring of the system.

8. Provide Connections to all equipment requiring connections to the control medium whether furnished under this Section or not.

9. The system shall use the latest technologies available from the manufacturer in the implementation of Direct Digital Electronic Control for the HVAC system and its management.

10. The systems shall be installed by factory trained technicians, regularly employed by the manufacturer and factory trained in the installation and calibration of the product.

11. System shall be installed and serviced by technicians that are factory trained in the installation and calibration of the equipment.

12. Provide system in accordance with specifications.

13. The installing contractor shall be a Certified Installer by the DDC Control Equipment Manufacturer. The Contractor shall include the Certification Documents from the DDC Control Equipment Manufacturer in the Shop Drawing.

14. The installing contractor will be required to provide emergency service personnel on during normal working hours.

15. The installing contractor shall be NJ DPMC classified under Classification C043 – Control Systems with an aggregate amount equal to or greater than $15,000,000.00.

16. This Contractor shall be responsible for all software, data drops, programming, calibration, the proper operation and adjustment of all controls, dampers and appurtenances to provide required sequence of operations and protection against freeze-ups. Provide system in accordance with specifications.

17. This Contractor shall provide all labor, material, equipment and software not specifically referred to herein or on the plans, that are required to meet the functional intent of the 15930

specifications and shall be provided without any additional cost to the Owner. This Contractor shall furnish all electrical control and interlock wiring connected to the controls and instrumentation systems. All 110 VAC or greater voltage power wiring to main control panels shall be provided by this contractor, unless indicated otherwise in the Contract Documents.

18. All materials and equipment used shall be standard components, regularly manufactured for this and/or other systems and shall not be custom designed especially for this project. All components shall have been thoroughly tested and proven in actual use.

19. This Contractor shall be responsible for installation of all field equipment and the communication transmission bus. This Contractor shall supply all necessary electrical power to each controller and provide transformers as required from the electrical power panel source.

20. This Contractor shall have project's lead technician attend all commissioning meetings. This Contractor shall complete and provide to the CM all factory startup reports.

1.02 CONTROL CONTRACTOR

1. The facility management control system shall be engineered, programmed, and installed by CM3 Building Solutions.

1.03 WARRANTY

1. Provide the following warranties by the installing Automatic Temperature Controls (ATC) Manufacturer:

   A. Warranty on equipment.
   B. Warranty on software upgrades.
   C. Warranty on firmware upgrades.

2. Labor and materials for the control system specified shall be warranted as indicated in "General Conditions". Control system failures during the warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to the Owner. This Contractor shall respond to the Owner's request for warranty service with 4 hours during normal business hours.

3. All work shall have a single warranty date.

4. The Owner shall grant to the temperature control sub-contractor, reasonable access to the FMCS during the warranty period. The owner shall allow the contractor to access the FMCS from a remote location for the purpose of diagnostics and troubleshooting, via the Internet, during the warranty period.

1.04 QUALITY ASSURANCE

1. All system components shall be fault tolerant and provide satisfactory operation without damage at 110% and 85% of rated voltage and at + 3 hertz variation in line frequency.

2. Provide static, transient, and short circuit protection on all inputs and outputs. Communication lines shall be protected against incorrect wiring, static transients and induced magnetic interface. All bus connected devices shall be a.c. coupled or equivalent so that any single device failure will not disrupt or halt equipment operation.

3. The manufacturer of the Facility Management Control System shall provide documentation supporting compliance with ISO-9002 (Model for Quality Assurance in Design/Development, Production, Installation and Servicing). The intent of this specification requirement is to assure that the products from the Temperature Control System Manufacturer are delivered through a quality system and framework that will assure consistent quality in the products delivered for this project.

1.05 TRAINING

1. All training materials shall be by the FMCS manufacturer and shall utilize specified manuals, as-built documentation, and the on-line help utility

2. Operator training shall include eight (8) hours scheduled at the Owner's convenience encompassing:

   - Sequence of Operation review.
   - Sign On-Sign Off
   - Selection of all displays and reports.
   - Commanding of points, keyboard and mouse mode.
   - Modifying English text.
   - Use of all dialog boxes and menus.
   - Modifying alarm limits and start-stop times.
   - System initialization.
   - Download and initialization of remote controllers.
   - Purge and/or dump of historical data.
   - Troubleshooting of sensors (determining bad sensors).
   - Password modification.

1.06 SUBMITTALS

1. Shop drawings and Product Data: Submit under provisions of General Conditions, shop drawings.

2. Product Data: Catalog sheets, specifications, control/wiring, schematic drawings, installation instructions for each item furnished. Include the valve and damper schedules and communications layout of DDC Control System.

3. Shop Drawings:

   A. List of connected data points, including connected control unit and input device.

   B. System graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.

   C. System configuration with peripheral devices, batteries, power supplies, diagrams, modems and interconnections.

   D. Descriptive data and sequence of operation of operating, user and application software including Web Browser software/hardware integrations.

E. Flow charts showing the logic sequence for each panel. Provide a non-jargon description for each step in the sequence. In addition, identify which variables are built into the system programming, and which have variable names and can be changed by the operator(s) from the Central Processing Unit.

4. Maintenance Data and Operation Instructions: Upon completion of the work and prior to final acceptance, provide copies of "Systems Operation and Maintenance Manuals" for the installed control systems. Manuals shall consist of copies of all temperature control submittals, including schematic diagrams, panel drawings, components parts, Web Browser Networks, accessories, operation and maintenance instructions, recommended spare parts inventory and complete warranty information.

1.07 SYSTEM DESCRIPTION

1. This specification defines the minimum equipment and performance requirements for a complete Facility Management Control System for the listed buildings HVAC/Mechanical Systems including terminal equipment.

2. It shall be understood that the drawings and specifications describe the approximate locations of the work. Do not scale the drawings to determine exact positions and clearances.

3. Details of construction and of workmanship where not specifically described herein or indicated on the drawings shall be subject to review by the school district. It is the intent of these specifications to provide a complete system, left in good working order, ready for operation, including necessary labor and materials, whether or not specifically shown on the drawings or mentioned herein.

4. Before submitting proposals, examine the specifications and all drawings relating to the work and become fully informed as to the extent and character of the work and the relation of the work to that of other sections. Examine the drawings of other building control systems to become familiar with all the problems and details of the building construction.

5. Automatic temperature control field monitoring and control system using field programmable microprocessor-based units with web browser communications are the intent of this design.

6. Central and remote hardware, software, and interconnecting wire and conduit. User access to new control system shall be from new web browser network.

7. Entire system is to be installed by the System Manufacturer or factory authorized representative.

8. The installation shall comply with local, state, and federal code requirements as applicable.

9. This contract also includes the creation of Systems Graphics at the new FMCS front end computer. The Graphics Programming includes Graphics Creation and Dynamic Point editing to reflect all HVAC systems and Hardware System points specified in Part 4.

PART 2 PRODUCTS

2.01 FACILITY MANAGEMENT CONTROL SYSTEM

1. The Facility Management Control System (FMCS) shall be comprised of a network of interoperable, stand-alone digital controllers. All controllers and software within FMCS shall be ISO-9002 compliant and shall be supported by compliance documentation from the manufacturer. The Facility Management Control System must conform to the following:

   A. The device(s) must be able to auto-discover all BACnet devices that are connected to it.

   B. It must identify all trend logs, controller databases and objects.

   C. It must be able to forward controller databases and object settings to a secure offsite storage location with redundant backup to meet disaster recovery requirements.

2.02 SPECIFICATION NOMENCLATURE

FMCS	Facility Management Control System
SDC	Standalone Digital Controller
IDC	Interoperable Digital Controller
ILC	Interoperable Logic Controller
LIDC	Lighting Interface Digital Controller
GDC	Gateway Digital Controller
GP	Graphical Programmer
HMI	Human Machine Interface
PAC	Personnel Access Controller
GUI	Graphical User Interface

2.03 NETWORK - OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURES

1. The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed RSTcontrol system.

2. Ethernet communications protocol will be used on the communication network between FMCS controllers and other system devices to assure interoperability between all devices within the network.

3. The FMCS shall support the direct integration of standard and non-standard communicating systems. At a minimum, the FMCS shall deliver connectivity at the Lon, IP, and HMI levels through standard offerings. The FMCS shall offer as a standard available solution, a minimum of 300 individual communicating interfaces to third party products.

4. The FMCS shall provide a standard available test kit for development of additional interfaces by others, in addition to the FMCS manufacturer.

5. The FMCS shall provide compliance with the ASHRAE standard 135-P for BACnet interoperability with all devices within the FMCS. The FMCS shall provide a high-speed Network Interface that shall plug directly into the SDC which supports one of the following types of communication standards between SDCS.

6. The Owner will provide internet protocol connections (IP) along with addressing to all network control panels for Ethernet connection to the Building Information Technology Systems.

7. The Local Area Network (LAN) shall be either a 10 or 100 Megabits/sec Ethernet network supporting BACnet, Java, XML, HTTP, and CORBA IIOP for maximum flexibility for integration of building data with enterprise information systems and providing support for multiple Network Area Controllers (SCs), user workstations and, if specified, a local host computer system.

8. Local area network minimum physical and media access requirements:

   - Ethernet; IEEE standard 802.3
   - Cable; 10 Base-T, UTP-8 wire, category 5
   - Minimum throughput; 10 Mbps, with ability to increase to 100 Mbps

   A. Access

      1. For Local Area Network installations, provide access to the LAN from a remote location, via the Internet. The Owner shall provide a connection to the Internet to enable this access via high-speed cable modem, asynchronous digital subscriber line (ADSL) modem, ISDN line, T1 Line or via the customers' Intranet to a corporate server providing access to an Internet Service Provider (ISP).

      2. The Owner shall provide a connection to the Internet to enable this access via high-speed cable modem, asynchronous digital subscriber line (ADSL) modem, ISDN line or T1 Line.

   B. Ethernet

      1. The Network Interface shall employ Carrier Sense Multiple Access/Collision Detect (CSMA/CD) contention shall type protocol, which adheres to the industry standard format IEEE 802.3. 'nc content of messages be the manufacturer's standard. The Network Interface shall be fully Internet Protocol (IP) compliant allowing connection to currently installed IEEE 802.3 compliant Ethernet Networks.

      2. The Network Interface shall directly support connectivity to a variety of cabling types. As a minimum provide the following connectivity; IOBase2 (ThinNet RG-58 A/U Coaxial cabling with BNC Connectors), IOBaseT (Twisted-Pair RJ-45 terminated UTP cabling).

2.04 BUILDING CONTROLLER (BC)

1. The Building Controller (BC) shall provide the interface between the LAN or WAN and the field control devices and provide global supervisory control functions over the control devices connected to the BC. It shall be capable of executing application control programs to provide:

   - Calendar functions
   - Scheduling
   - Trending and Trending Backfill
   - Alarm monitoring and routing
   - Time synchronization

- Integration of BACnet® devices and BACnet® controller data
- Integration of MODBUS devices and MODBUS controller data

2. The Building Controller must provide the following hardware features as a minimum:

- 4.3 in. Active Matrix LCD Touchscreen, 16-bit color, 480 x 272 resolution
- ARM9 32-bit RISC CPU
- 64 MB flash memory
- 32 MB SDRAM memory
- SD/SDIO card slot for memory expansion
- Real-time clock (temperature compensated)
- UltraCap power backup for RTC and memory
- Port -10 / 100 Ethernet Switch BACnet®/IP and BACnet® over Ethernet protocols supported
- Two-(2) RS 485 ports supporting up to 99 BACnet® MS/TP devices each
- 2 USB host ports
- Module Status LED
- Reset Button
- The BC must be capable of operation over a temperature range of 0 to 55°C
- The BC must be capable of withstanding storage temperatures of between 0 and 70 °C
- The BC must be capable of operation over a humidity range of 5 to 95% RH, non-condensing

2.05 STANDALONE DIGITAL CONTROLLERS (SDC)

1. The SDC controllers shall permit the simultaneous operation of all control, communication facilities management and operator interface software, as programmed by the Contractor or User. Modification of on-board SDC controller database shall be performed on-line using the built-in interface. Systems that require the SDC to be removed from service while DDC control sequences are modified shall not be acceptable.

2.06 INTEROPERABLE LOGIC CONTROLLERS (ILC)

1. General

A. Controls shall be microprocessor based Interoperable LOGIC Controllers (ILC), bearing the applicable interoperability logo on each product delivered. ILCs shall be provided for VAV terminal boxes, unit ventilators, fan coil units, reheat units, unit heaters, exhaust fans and other applications as detailed in project specifications. The application control program shall be resident within the same enclosure as the input/output circuitry, which translates the sensor signals.

B. To simplify controls and mechanical service troubleshooting, the ILC shall be mounted directly in the control compartment of the unitary system. The ILC shall be provided with a sheet metal or polymeric enclosure that is constructed of material allowing for the direct mounting within the primary air stream, as defined by UL-465. The direct mounting shall allow all controls maintenance and troubleshooting to be made while at the unitary equipment.

C. The ILCs shall communicate with the SDC at a baud rate of not less than 78.8K baud. The ILC shall provide LED indication of communication and controller performance to the technician, without cover removal.

D. The ILCs shall be fully supported and communicate with any and all GUI(s) on the bus.

2.07 GRAPHICAL USER INTERFACE (GUI)

1. The Graphical User Interface shall reside on the communication bus to allow the operator to view, configure, and edit values from multiple controllers on the bus. The GUI shall be completely programmable using standard user-definable graphical icons associated with any displayed variable. Variables such as alarms, trends, setpoints, analog, and digital values may be displayed and/or edited using the GUI.

2. Multiple GUIs shall be capable of residing on the LAN and shall be capable of displaying common and/or unique parameters of the system controllers. The GUI shall be menu based displaying a minimum of 16 menus, and 256 unique system parameters.

2.08 HUMAN MACHINE INTERFACE (HMI)

1. Provide at a minimum one-(1) operator interface to be designated as the BAS Server with server application software. Additional operator interfaces shall be web-based or connect via a thick or thin-client application.

2.09 GRAPHICAL USER INTERFACE SOFTWARE

1. Operating System:

   A. The GUI shall run on Microsoft Windows NT Workstation 4.0, Service Pack 4 or later.

2. The GUI shall employ browser-like functionality for ease of navigation. It shall include a tree view (similar to Windows Explorer) for quick viewing of, and access to, the hierarchical structure of the database. In addition, menu-pull downs, and toolbars shall employ buttons, commands and navigation to permit the operator to perform tasks with a minimum knowledge of the HVAC Control System and basic computing skills. These shall include, but are not limited to, forward/backward buttons, home button, and a context sensitive locator line (similar to a URL line), that displays the location and the selected object identification.

3. Real-Time Displays. The GUI, shall at a minimum, support the following graphical features and functions:

   A. Graphic screens shall be developed using any drawing package capable of generating a GIF, BMP, or JPG file format. Use of proprietary graphic file formats shall not be acceptable. In addition to, or in lieu of a graphic background, the GUI shall support the use of scanned pictures.

   B. Graphic screens shall have the capability to contain objects for text, real-time values, animation, color spectrum objects, logs, graphs, HTML or XML document links, schedule objects, hyperlinks to other URL's, and links to other graphic screens.

   C. Graphics shall support layering and each graphic object shall be configurable for assignment to a layer. A minimum of six layers shall be supported.

D. Modifying common application objects, such as schedules, calendars, and set points shall be accomplished in a graphical manner.

1. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.

2. Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.

E. Commands to start and stop binary objects shall be done by right clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.

F. Adjustments to analog objects, such as set points, shall be done by right-clicking the selected object and using a graphical slider to adjust the value. No entry of text shall be required.

4. System Configuration. At a minimum, the GUI shall permit the operator to perform the following tasks, with proper password access:
   - Create, delete or modify control strategies.
   - Add/delete objects to the system.
   - Tune control loops through the adjustment of control loop parameters.
   - Enable or disable control strategies.
   - Generate hard copy records or control strategies on a printer.
   - Select points to be alarmable and define the alarm state.
   - Select points to be trended over a period of time and initiate the recording of values automatically.

5. On-Line Help. Provide a context sensitive, on-line help system to assist the operator in operation and editing of the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext. All system documentation and help files shall be in HTML format.

6. Security. Each operator shall be required to log on to that system with a username and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system administrator shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operators' access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto log-off time shall be set per operator password. All system security data shall be stored in an encrypted format.

7. System Diagnostics. The system shall automatically monitor the operation of all workstations, printers, modems, network connections, building management panels, and controllers. The failure of any device shall be annunciated to the operator.

8. Alarm Console

A. The system will be provided with a dedicated alarm window or console. This window will notify the operator of an alarm condition and allow the operator to view details of the alarm and acknowledge the alarm. The use of the Alarm Console can be enabled or disabled by the system administrator.

B. When the Alarm Console is enabled, a separate alarm notification window will supersede all other windows on the desktop and shall not be capable of being minimized or closed by the operator. This window will notify the operator of new alarms and un-acknowledged alarms. Alarm notification windows or banners that can be minimized or closed by the operator shall not be acceptable.

9. Web Browser

A. The system shall be capable of supporting an unlimited number of clients using a standard web browser such as Internet Explorer™ or Google Chrome™. Systems requiring additional software (to enable a standard web browser) to be resident on the client machine.

B. The web browser software shall run on any operating system and system configuration that is supported by the Web browser. Systems that require specific machine requirements in terms of processor speed, memory, etc., in order to allow the Web browser to function with the FMCS, shall not be acceptable.

C. The web browser shall provide the same view of the system, in terms of graphics, schedules, calendars, logs, etc., and provide the same interface methodology as is provided by the Graphical User Interface. Systems that require different views or that require different means of interacting with objects such as schedules, or logs, shall not be permitted.

D. The web browser client shall support at a minimum, the following functions:

1. User log-on identification and password shall be required. If an unauthorized user attempts access, a blank web page shall be displayed. Security using Java authentication and encryption techniques to prevent unauthorized access shall be implemented.

2. Graphical screens developed for the GUI shall be the same screens used for the Web browser client. Any animated graphical objects supported by the GUI shall be supported by the web browser interface.

a. HTML programming shall not be required to display system graphics or data on a Web page. HTML editing of the Web page shall be allowed if the user desires a specific look or format. Storage of the graphical screens shall be in the Building Controller (BC), without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.

4. Real-time values displayed on a web page shall be set to update automatically without requiring a manual "refresh" of the web page.

5. Users shall have administrator-defined access privileges. Depending on the access privileges assigned, the user shall be able to perform the following:

a. Modify common application objects, such as schedules, calendars, and set points in a graphical manner.

1. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.

2. Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.

b. Commands to start and stop binary objects shall be done by right clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.

c. View logs and charts

d. View and acknowledge alarms

1. The system shall provide the capability to specify a user's (as determined by the log-on user identification) home page. Provide the ability to limit a specific user to just their defined home page. From the home page, links to other views, or pages in the system shall be possible, if allowed by the system administrator.

2. Graphic screens on the web browser client shall support hypertext links to other locations on the internet or on intranet sites, by specifying the Uniform Resource Locator (URL) for the desired link.

2.10 HMI SYSTEM SECURITY

1. System Security shall be on an application-by-application basis. System Administrator shall setup and define access privileges per user, per application and per setpoint levels. The Users shall be assigned discrete password names and codes, both of which must be entered in order to have access to any particular application or function within the system. Access privileges shall also be assignable for entry into the standard MS Windows NT or array of applications such as File Manager, Task Manager or others. A minimum of 10,000 levels of assignable access must be provided. Systems not supporting this level of customization and flexibility for system security must define delivered capabilities and may not be accessible.

2.11 HMI DISPLAY FRAMES

1. The Dynamic Graphic portion of this HMI shall allow the operator to access any system information via a "system penetration" method. "System penetration" shall allow the operator to penetrate into the facility until the detailed color graphic display of a specific area of the facility is represented. All system travel shall be 100% accessible via the mouse, no keyboard commands shall be necessary to edit dynamic data configurable. Systems not providing this capability are required to provide an equivalent charting package with the HMI offering.

2.12 HMI ALARMING

1. The HMI shall provide, as standard, alarm annunciation of system data. On every display frame, the ability to view, acknowledge, delete and manipulate real-time and historical alarms shall be provided. The ability to provide a unique and custom alarm display for every display frame shall be provided. The ability to continuously or upon request, view the alarm display, shall be provided.

2.13 HMI TRENDING

1. The HMI shall automatically perform time based, user defined, and periodic collection of real time point data. The data shall be presented as an X/Y chart in the display frame. The data shall

be stored and archived in a file format that allows for the manipulation and utilization of the data by third party applications.

2.14 HMI REPORTING

1. The report section of the HMI shall be the window to the HMIs database for all solicited and unsolicited data collected and shall provide for an easy means of reporting and information management. The HMI shall provide daily, weekly, monthly scheduling of reports or intervals custom to the needs of the user. The report generator shall allow an operator to easily and quickly define the contents of a report as well as define a print time and date. Information contained in the reports, as a minimum, shall be derived from alarm history and trend data.

2. The operator shall be able to compile reports by user, company/department, time and date period, point or points, with the ability to print a combination report. The combination report option shall allow the operator to define any or all of the information types to be reported, within one compilation, sorted by the above definitions and displayed, archived and/or printed. A report definition shall be able to be printed once or printed on a time and date schedule with a cover page that automatically identifies the operator, the time and date, and the parameters by which the report was compiled.

2.15 DAMPERS

1. Modulating dampers shall be opposed blade type. Air handling unit outdoor, relief and return air dampers shall be parallel blade type arranged to combat stratification. Two (2) position dampers shall be parallel blade type. Damper frames shall be not less than 13-gauge galvanized steel. Damper blade shall not be over 8" in width and 48" in length.

2. Blade edges shall have inflatable seal edging rated for less than 10 CFM per square foot of damper area. Damper hardware shall be zinc plated; bearings shall be nylon, Teflon, Oilite or approved equal.

3. Damper operators shall be mounted outside of duct on device unless factory installed or internally mounted with access panels.

4. Damper operators shall be mounted outside of duct unless factory installed or internally mounted with access panels. All dampers on equipment exposed in finished spaces shall have internal mounted operators, increase duct size accordingly.

5. Damper end switches shall sense blade position and not controller output.

6. Dampers for outside air intakes for equipment shall be per equipment section specification.

2.16 VALVES

1. Valves shall have hardened and polished stainless-steel stems. Valves shall have brass bodies. Packing shall be Teflon, spring loaded self-adjusting type.

2. Where packing is required valves shall back seat to permit repacking under pressure.

3. Water flow control valves shall be fully proportional action two port and/or 3-way mixing or diverted valves. Valves designed for 150 psig WWP and pass required volume of water with not greater than 12' head loss. Indicate pressure drop on shop drawings. Valves to be ANSI Class 125.

4. All valves in systems where equipment and/or pipes which valves feed are subject to freezing conditions shall be normally open. Valves used as part of hot water system (loss of power), shall be normally open.

5. Furnish as part of shop drawing, valve schedule indicating Cv of valves, valve sizes, types and valve positions (N.O., N.C. last position).

2.17 PROTECTIVE FREEZESTATS, FIRESTATS AND SMOKE DETECTORS

1. Provide freezestat located on the inlet side of hydronic coils for all new air handling systems including rooftop units, air handlers and unit ventilators. When its setting is exceeded, perform the following:

   A. Open control valve on heating coil to full heating and/or close outside air damper and stop fans.

   B. All protective devices shall be manually reset and shall send an alarm signal to DDC system.

2. Smoke detector in system greater than 2,000 cfm shall have smoke detector installed in return downstream of filters.

3. Smoke detector well, interlock, control wiring and all appurtenances shall be by this Contractor.

4. Upon activation, the smoke detectors shall shut down the air distribution system and deenergize cooling systems/components.

5. Smoke detectors shall be supplied by electrical contractor and wired to fire alarm panel by electrical contractor. Smoke detectors shall be installed by HVAC contractor.

6. The electrical contractor shall verify smoke detector auxiliary contacts.

7. The interlocking of smoke detectors with HVAC equipment shall be by this Contractor.

2.18 CONTROL

1. Temperature, relative humidity and pressure transmitters shall be direct acting instruments capable of transmitting an electronic signal in direct proportion of the medium change.

2. All controls that are exposed to the outdoor elements shall be mounted in weatherproof boxes. These boxes will in no way interfere with the operation or sensing of these controls.

3. All controllers shall be externally mounted on indoor units (none in finished spaces). Controller mounted in finished areas shall be internally mounted in equipment and have access doors.

2.19 ELECTRONIC OPERATORS

1. Size electronic actuators to operate their appropriate dampers or valves with sufficient reserve power to provide smooth modulating action or two (2) position action as specified.

2. Provide unit outside air damper motors with adjustable minimum settings so that ventilation requirements may be adjusted for each space or room.

3. Provide spring return for outside air dampers.

2.20 ROOM SENSORS

1. Room sensors shall be electronic. Sensors shall be adjustable from rooms with limitations able to be set by DDC system. All sensors in non-supervised areas (toilet rooms, cafeteria, gym, corridors and similar areas) shall have lockable covers. For sensors on exterior walls, provide insulation (minimum 2" thick R=8.0). Provide with pushbutton occupied/unoccupied override.

   A. Wall Mounted Combination Sensors (Demand Control Ventilation System Only) - provide wall mounted combination sensors which shall contain a space temperature sensor and CO_2 sensors in a single, decorative housing. The CO_2 sensor shall use single-beam absorption infrared diffusion technology (non-dispersive infrared) and shall have integral programming to perform automatic baseline calibration without use interface. The recommended manual recalibration period shall not be less than five years. Other features of wall-mounted combination sensors shall include:

   - Operating Conditions: 60°F.- 90°F. (15°C to 30°C.) and O% to 95% RH, non-condensing
   - Power Supply: 18-30 VAC, 50/60 Hz (18-42 VDC polarity protected)
   - CO_2 Sampling Method: Diffusion
   - CO_2 Sensor Output: 4 to 20 mA or 0 to 10-volt signal
   - Sensitivity: ±20 ppm
   - Accuracy: ±100 ppm to 60°F.- 90°F. (15°C. to 32°C.) and 760 mmHg
   - CO_2 Sensor Calibration: Single point calibration via push button and LED
   - Space Temperature Sensor: 10K ohm ±2% at 77°F. (25°C.) thermistor

   B. Combination sensors shall be provided with the manufacturers' recommended carbon dioxide calibration kit. The quantity shall be suitable to initially calibrate each sensor provided for the project.

PART 3 EXECUTION

3.01 ELECTRIC WIRING

1. All power and control wiring in connection with the temperature control system shall be furnished and installed under this contract unless specified elsewhere within the bid documents. All wiring shall be per specifications and applicable NEC.

2. All electrical controls and switches shall be suitable either for 120 volts, 60 Hz or 24 VAC.

3. For control circuits of 115 volts and above, all wire shall be rated for 600 volts and may be either single or multi-conductor cable.

4. For control circuits below 30 volts, all wire shall be rated for 300 volts and may be either single or multi-conductor cable.

5. All electrical sensing element wire shall be in accordance with manufacturers' recommendation with the proper number of conductors, equivalent to Beldon No. 8770 and installed in "EMT" conduit in mechanical room. This cable shall not be installed in the same conduit with any conductors for voltages of 115 or above.

6. Electrical work provided shall include, but not limited to:

   A. Wiring from all control devices furnished to the respective equipment being controlled.

   B. Furnishing and installation of all necessary conduit and wire.

   C. Control interlocking wiring between rooftop units, exhaust fans, DSS and radiation as specified in the sequence of operations, shown on the drawings or otherwise required.

   D. Installation of smoke detectors by the mechanical contractor and wiring to fan starter by the FMCS contractor.

   E. Wiring of flow switches, sequence relays, thermostats and permissive circuits to boilers.

7. Metal raceways shall be installed where pipe cannot be installed in construction and shall be stamped one-piece metal minimum 18-gauge, factory painted color selected and secured to prevent vandalism.

8. In locations where wire cannot be installed above ceiling, wire shall be run in metal raceways.

9. Except for motor feeders and for existing wiring between motors, motor controllers, feeder panels, fuses, circuits breakers and buss bars, all of the new electrical work required for the facility management control system including but not limited to time switches, damper motors, damper switches, electric thermostats, electric relays, interlocking wiring, wire, conduit, etc. shall be provided and installed by the FMCS Contractor. It shall be the FMCS Contractor's responsibility to provide all wiring required to achieve the functions called for in these specifications.

10. All exposed wiring shall be in EMT or rigid conduit.

11. Control wiring in plenums shall be furnished and installed in EMT or conduit or an approved shielded cable for plenum use.

12. Contractor shall provide all wiring. Where union jurisdiction (110V and above) prohibits installation by this Contractor, the contractor shall provide the services of a licensed electrical contractor. Contactor may be same contractor as on job, or a different electrical contractor. All costs for providing this work shall be the mechanical contractors' responsibility.

13. Above suspended ceiling concealed wiring not in conduit shall not be installed between top of bar joist and/or steel and roof deck. All wiring concealed shall be properly supported in accordance with NEC.

3.02 ROOM SENSORS

1. Sensors shall be located so that they will not be influenced by the mechanical system or heat producing equipment. Sensors installed not in accordance with above shall be relocated and construction repaired at no additional cost to Owner.

2. Mount all sensors as required by ADA unless otherwise directed or required by code.

3. The exact location of sensors and/or thermostats to be determined in field with Owner and be coordinated with the final furniture layout. Submit location for review with shop drawings.

4. As part of bid, Contractor to include sufficient wire to relocate sensor 5' +/- from location shown and where interference occurs, sensors shall be relocated (after final installation) at no additional cost to Owner. This shall be for all sensors.

5. Where sensors are shown to be located behind grilles, provide hinged access and mark location.

3.03 DRAWINGS AND LAYOUT

1. This Contractor shall provide diagrams of the automatic temperature control system, which shall show all control equipment and the function of each item.

2. The following data/information shall be submitted in accordance with General Conditions;

   - Complete sequence of operation.
   - Color coded control system CAD generated drawings including all pertinent data to provide a functional operating system.
   - Valve and damper schedules showing size, configuration, pressure losses, capacity and location of all equipment.
   - A description of the installation materials including conduit, wire flex, etc.

3.04 EQUIPMENT CONTROLS

1. All controls required and/or specified to be installed by the Contractor in equipment to be furnished under this contract except those control specified to be provided by the equipment manufacturer. Coordinate with equipment manufacturer for devices to be sent to the equipment manufacturer and be factory installed.

2. The controls may be field assembled by DDC (FMCS) contractor. However, this Contractor shall assume all responsibility for proper operation of the mechanical equipment and coordination of the work where factory controls are not provided.

3. When controls, dampers, valves, etc., are mounted in equipment furnished by others, the Contractor shall provide all required electric wiring and appurtenances and include connection to the equipment as required for system to function as specified.

4. Where controls are to be field installed and controls are not factory installed and wired, the following is a recommended interface.

   A. The HVAC equipment suppliers shall provide a terminal strip in the control compartment of their equipment to allow their equipment to provide the specified sequence.

Economizer Control - The HVAC equipment shall accept a single 0-10-volt signal from the DDC system to modulate the outdoor air, return air, and relief air dampers. The dampers and actuators are to be provided by the HVAC equipment supplier and the damper actuators are to be spring return. The damper actuators shall be powered from the HVAC equipment and wired at the factory. A 0-volt signal shall make the outdoor and relief dampers fully closed and the return damper fully open.

Note - At contractors' option, alternate methods of interface may be used; submit for review.

5. It is the intent of these specifications that the controllers for rooftop units be located either in rooftop units or remotely located. Controllers for equipment other than rooftop units and controllers for rooftop units not installed in units shall be located as specified below.

   A. All unitary controllers shall be located as close to units they service. Controllers may be located above ceiling, except where there is no ceiling or where equipment is located in close proximity to normally unoccupied spaces (storage rooms, janitor closets, electric rooms, etc.) For these areas, controllers shall be located as high as practical below ceiling on walls. All controllers shall be accessible and clearly marked by permanent color-coded indicators on ceiling.

3.05 INSTALLATION OF VALVES AND DAMPER MOTORS

1. All control valves and damper motors shall be furnished by the FMCS contractor and installed by this Contractor or manufacturer of equipment in whose work it is to be mounted, regardless of who furnished equipment.

2. Where damper motors are provided by equipment manufacturer, they shall be completely integrated with the DDC system. The contractor is responsible for all coordination of work not in accordance with above at no extra cost to Owner.

3.06 VALVE, DAMPER AND CONTROL DEVICE LOCATION AND ACCESSIBILITY

1. All control equipment requiring service or adjustment located above suspended acoustical ceiling shall have their locations permanently marked on ceiling. Markings shall consist of a color scheme. The markings shall be permanently applied to surface with legend and location agreed to and provided to Owner. Provide in addition to chart, a permanently mounted graphic display as to locations of the devices.

2. All devices shall be located to be accessible and easily maintained and if found inaccessible, shall be relocated by this Contractor at no additional expense to Owner, regardless of the trades involved.

3. Where devices are behind general construction, provide access doors.

3.07 ATC PANELS

1. The location and quantity of ATC panels are to be determined and verified in field. Panels to have emergency power electrical connections. The final location and quantity of panels are to be verified with Owner. This Contractor shall be responsible to coordinate all power wiring requirements as to location, quantity, and wire size with electrical contractor. Extension of

services, new power wiring for additional panels, and all modifications to panels which affect electrical contractor shall be the responsibility of the ATC contractor.

2. All DDC panels, controllers, and equipment that require continuous uninterrupted power supply are to remain in operation and shall have battery and/or UPS back-up provided by this Contractor. The back-up shall be for a minimum of 3 hours and shall allow for an orderly shutdown. The resetting, rescheduling, and/or reprogramming of the controls will not be allowed; based upon failure to meet the intent of this specification.

3. No unit controllers or DDC panels shall be located above the ceiling.

3.08 ECONOMIZERS

1. All economizers shall be enthalpy type for rooftop units.

3.09 CO2 SENSORS

1. Where indicated on plans or specified for all units with field-installed controls and shall meet all sections of specifications and provide CO2 sensors. Where units are specified to be packaged, the unit manufacturer shall meet all sections of the specification, including the Sequence of Operation.

2. CO2 sensors are to be located in return air path and shall modulate outside air dampers.

3.10 ACCEPTANCE TESTING

1. Upon completion of the installation, this Contractor shall load all system software and start-up the system. This Contractor shall perform all necessary calibration, testing and de-bugging and perform all required operational checks to ensure that the system is functioning in full accordance with these specifications.

2. This Contractor shall perform tests to verify proper performance of components, routines, and points. Repeat tests until proper performance results. This testing shall include a point-by-point log to validate 100% of the input and output points of the DDC system operation.

3. Upon completion of the performance tests described above, repeat these tests, point by point as described in the validation log above in the presence of Owner's representative, as required. Properly schedule these tests so testing is complete at a time directed by the Owners' representative. Do not delay tests so as to prevent delay of occupancy permits or building occupancy.

4. System Acceptance: Satisfactory completion is when this Contractor has performed successfully all the required testing to show performance compliance with the requirements of the contract documents to the satisfaction of the Owners' representative. System acceptance shall be contingent upon completion and review of all corrected deficiencies.

5. Any found defective existing mechanical equipment and/or control devices (examples; control valves, freezestats, temperature sensors, actuators, CO2 sensors, humidity sensors, etc.) are to be listed and reported to Engineer and Owner.

3.11 ROOFTOP UNIT DEHUMIDIFICATION CYCLE (WHERE APPLICABLE)

1. Upon a rise above setpoint of room humidistat and unit in cooling occupied mode; energize units' hot gas reheat cycle and close outside air damper. Whenever outside relative humidity is higher than inside, outside air damper shall remain closed for minimum of 1 hour. After that time, CO2 sensor shall allow damper to be cycled between open and closed based on indoor humidity. Upon a continued rise above space humidity sensor and a fall below space temperature and hot water is available; modulate hot water valve heat coil to maintain room temperature. Upon a rise above setpoint, the reverse shall occur.

PART 4 HARDWARE POINTS

4.01 GENERAL

1. The Facility Management and Control System (FMCS) shall be designed, installed, and commissioned in a turnkey fully implemented and operational manner, including all installation labor and programming.

4.02 HARDWARE POINTS LIST - I/O Points by the FMCS Contractor (Specific I/O to follow):

1. Exhaust Fans

- Fan Start/Stop
- Supply Fan Status – Current Switch
- Automatic Damper Operation (where applicable)
- Room Temperature Setting (where applicable for ventilation)

2. Split System

Analog Input	-	Return Air Temperature
Analog Input	-	Space Temperature
Analog Input	-	Space Relative Humidity
Analog Input	-	Unit Discharge Temperature
Analog Input	-	Space C02
Analog Output	-	Heating Coil
Analog Output	-	Damper Control (outside return & relief)
Analog Output	-	Adjust Space Temperature
Analog Output	-	On/Off Operation
Analog Output	-	Fan Speed
Digital Output	-	DX Cooling System Variable Speed Operation
Digital Input	-	Supply Fan Operation
Digital Input	-	Freezestat
Digital Input	-	Fire Alarm
Digital Output	-	Fans Stop/Start
Digital Output	-	Drain Pan Alarm
		CO2 Sensor (Adjustment/Monitoring)

3. Ductless Split System Units

- Return Air Temperature & Relative Humidity
- Space Temperature & Relative Humidity
- Unit Discharge Temperature
- Heat Pump Enable (where applicable)
- Supply Fan Operation
- Fans Stop/Start /Speed Control
- Compressor Operation (Staged)
- Drain Pan Alarm
- Refrigerant leak detection sensor

PART 5A SEQUENCE – GENERAL

SPACE SETPOINTS

	SPACE SETPOINT
Occupied Heating	68°F.
Morning Warm-up	68°F.
Unoccupied Heating	60°F.
Occupied Cooling	74°F.
Cool-down	74°F.
Unoccupied Cooling	80°F.
Relative Humidity	55% RH

Note: All setpoints to be adjustable by Owner via FMCS.

OCCUPIED/UNOCCUPIED PERIODS

The purpose of this schedule is to establish a base line for equipment operation and sequencing. This is to allow system to provide optimum effectiveness and increase efficiency. The hours of operation shall be reviewed with the school prior to occupancy. The contractor shall provide as part of their training, instructions to Owner for changing and adjusting sequences and times of operation. The hours of operation shall also be able to be adjusted for individual equipment and/or zones (ie. Gymnasium, Auditorium).

Occupied Heating 6AM

Optimal start-up with adjustment based on system requirements.

Occupied Heating (Outside Air)

Operation of outside air system (damper open) delayed approximately one hour after occupancy (adj.) and one hour prior to end of school (adj.).

Unoccupied Heating 3PM

Schedule for after school usage shall adjust this period.

Occupied Cooling 7AM

Optimal smart start-up with adjustment based on system requirements.

Occupied Cooling (Outside Air)

Operation of outside air system (damper open) delayed approximately one hour after occupancy (adj.) and one hour prior to end of school (adj.).

In addition, where CO2 sensor below operational setpoint and outside relative humidity is higher, adjust damper opening time to allow for delayed opening.

Unoccupied Cooling 3PM

Schedule for after school usage shall adjust this period.

PART 5B – SEQUENCE OF OPERATIONS

5.01 FANS

1. Gang Toilet Room Fans - Interlock with respective occupancy schedule to operate during occupied schedule.

2. Single Toilet Rooms Exhaust Fans – Interlock ceiling exhaust fans to operate when light switch is turned on.

3. Kitchenette Exhaust Fan – Interlock ceiling exhaust fan to operate with 0-2 hour timer switch.

5.02 ELECTRIC UNIT HEATERS, RADIATORS, CONVECTORS AND CABINET UNIT HEATERS

1. Provide wall mounted thermostats which shall start fans and stage electric heating coils, whenever space temperature falls below set point.

5.03 HVAC SYSTEM EMERGENCY SHUT-DOWN SWITCH'S

1. Upon manual operation of single switch, shut down all HVAC equipment that uses outside air for ventilation, combustion air or any other purpose which may cause outside air to enter building by equipment use.

2. Switch shall be for all equipment.

3. Switch shall be a manual switch labeled and lockable and shall be located per Owners' direction.

4. Switch shall also send signal for quick closing outside air dampers to close.

5. Provide clear plastic liftable cover and a 12" x 4" engraved sign; "Emergency HVAC Shut Down."

5.04 DUCTED SPLIT SYSTEMS

1. The units shall be sequenced from occupied/unoccupied warm-up modes and cool-down modes from DDC system.

2. Occupied Cycle Heating - When indexed to occupied cycle and room sensor requires heat; outside air damper to be under control of CO2 sensor which shall open outside air damper from closed to minimum position, return air damper open, energize associated exhaust fans and energize heat pump unit, and then stage electric heat. Close outdoor air damper when the outdoor air temperature drops below 10^0F.

3. Occupied Cycle Cooling - When indexed to occupied cycle and room sensor requires cooling and the outdoor air is not suitable for economizer; initiate mechanical cooling, energize condensing unit and allow operation of outside air damper from $C0_2$ sensor. Modulate the variable speed compressor to match the cooling load of the space. When indexed to occupied cycle, room temperature requires cooling, and the outdoor air enthalpy is less than the return air/space enthalpy, the unit shall be in economizer mode. Unit mounted integrated enthalpy economizer shall modulate outside and relief air dampers and return air damper as required to provide free cooling during economizer mode. Upon a further rise in space temperature, close outside air damper to minimum position, return air damper to maximum, energize refrigeration in steps.

4. Unoccupied Cycle Heating - When indexed to unoccupied cycle; all exhaust fans de-energized, outside air damper closed, energize unit fan, energize heat pump and modulate electric heating coil.

5. Morning Warm-Up or Cool-Down - When indexed to morning warm-up or cool-down from central control; unit to run, all exhaust fans de-energized, all outside and relief air dampers closed; first energize electric heat in stages until morning warm-up sensor is satisfied, at which time system reverts to normal occupied mode.

6. Provide room humidistat which, upon a rise above its setpoint (in cooling mode), close the outdoor air damper, energize the units' refrigeration system and modulate the speed of the compressor to match the cooling needs of the space. Energize the electric reheat coil as needed to maintain space temperature.

7. Cooling Unoccupied Mode - When indexed to unoccupied mode by central computer or manual override. All associated exhaust fans to be de-energized, relief and outside air dampers closed. Upon a rise above night sensor, unoccupied cooling space temperature as sensed by ATC system, initiate economizer (conditions permitting) or mechanical cooling.

8. Economizer Operation - When indexed to occupied mode, cooling is required, and outdoor enthalpy is below indoor air enthalpy, unit shall provide cooling through economizer mode, opening the outdoor air damper to maximum position. If outdoor enthalpy is above indoor enthalpy, close outside air damper, and initiate mechanical cooling.

9. Fire Alarm Signal Shut-Down – On a smoke-detected signal from the Fire Alarm System, the ducted split system components shall be turned "off" and deenergized.

10. Meeting Room: Multiple units serve the space, stage units "on/off" and energize cooling/heating/dehumidifcation stages as required to meet the needs of the space.

11. Refrigerant Leak Detected - Upon a refrigerant leak detected signal from the associated sensor, and alarm shall be generated through the HVAC control system, and the unit controller shall perform the mitigation action requirements specified in ASHRAE Standard 15.

5.05 DUCTLESS SPLIT SYSTEM OPERATION

1. The unit shall energize mechanical cooling or heat pump operation based on the space temperature setpoint. Occupied and unoccupied operation and setpoints to be adjustable through the HVAC control system.

2. Refrigerant Leak Detected - Upon a refrigerant leak detected signal from the associated sensor, and alarm shall be generated through the HVAC control system, and the unit controller shall perform the mitigation action requirements specified in ASHRAE Standard 15.

5.06 PROTECTIVE FREEZESTATS, FIRESTATS AND SMOKE DETECTORS

1. Provide freezestat located on the inlet side of hydronic coils for all new air handling systems including rooftop units, air handlers and unit ventilators. When its setting is exceeded, perform the following:

   A. De-energize mechanical cooling, close outdoor air dampers, stop fans, and open control valve on heating coil to full heating.

   B. All protective devices shall be manually reset and shall send an alarm signal to DDC system.

2. Upon activation, the smoke detectors shall send an alarm to the fire alarm system, shut down the air distribution system and de-energize mechanical cooling.

END OF SECTION
15930.6470

SECTION 15015 – GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

1. The General, Supplementary, and Special Conditions, applicable portions of all divisions and the addenda thereto, are made a part of this Contract.

2. All work described in these specifications shall be the responsibility of the plumbing contractor unless otherwise indicated.

3. It is the intent of these specifications to include all material, service and labor necessary to form a complete and properly operating whole.

1.02 CONTRACT DRAWINGS

1. Examine all drawings and specifications and visit the site to become acquainted with the construction and the extent of the work.

2. In referring to drawings, figured dimensions take precedence over scale measurements. Discrepancies must be referred to the Engineer for decision. Each Contractor shall certify and verify all dimensions before ordering material or commencing work.

3. Any work called for in the specifications, but not mentioned or shown on the drawings, or called for on the drawings, but not mentioned in the specifications, shall be furnished as though called for in both.

4. When any device or part of equipment is herein referred to as a singular number, such as "the pump" such reference shall be deemed to apply to as many such devices as required to complete the installation.

5. The term "provide" shall mean "furnish and install". Neither term will be used generally in these specifications but will be assumed. The term "furnish" shall mean to obtain and deliver on the job for installation by other trades.

1.03 CODES AND STANDARDS

1. All work shall comply with all regulations and be subject to inspection and approval of authorities having jurisdiction.

2. Where items indicated on contract documents differ from code requirements, contractor shall inform engineer prior to installation. Any construction installed by contractor that is not in compliance with applicable codes, shall be removed, modified, and/or replaced at not additional cost.

3. All equipment shall be labeled by an approved agency.

4. Contractor shall give all notices, obtain and pay for all permits, deposits, and fees necessary.

5. Manufacturer's published data is made a part of these specifications.

6. Wherever a recognized national organization has published standards these shall be complied with (such as ASA Z 21.30 for gas piping).

1.04 REJECTED MATERIALS

1. See Specification Section 01300-Submittals and the AIA Document A201-2017 General Conditions of the Contract for Construction.

1.05 WORKMANSHIP

1. All work and the execution of same shall be completed in a first class, workmanlike manner and shall conform to the best mechanical practice.

1.06 SHOP DRAWINGS

1. See Specification Section 01300 – Submittals.

1.07 AS-BUILT DRAWINGS

1. See Specification Section 01700 – Project Closeout

1.08 WARRANTY

1. See Specification Section 01740 – Warranties and Bonds.

1.09 FIRE RATING

1. All materials used anywhere in the work must have N.F.P.A. rating as follows:

   A. Flame Spread - Not Over 25
   B. Smoke Developed - Not Over 50
   C. Fuel Contributed - Not Over 25

2. All materials shall be "Self Extinguishing".

1.10 EQUIPMENT SELECTION AND SERVICEABILITY

1. All equipment shall be located and installed so that it may be serviced. Demonstrate that there is room to remove all tube bundles, motor and similar equipment. Equipment which is too large or poorly located to permit servicing shall be replaced or repositioned at no additional cost to the Owner.

2. Where piping or control diagrams or sequencing differ from the recommended piping arrangements of the equipment manufacturer, and will directly affect the equipment performance, the manufacturer's recommendations shall be submitted in writing to the Architect/Engineer for approval, prior to purchasing the equipment involved. Contractor shall be responsible for obtaining such recommendations from the manufacturers in order to effect correct and perfect operation of the equipment at the capacities and temperatures indicated.

1.11 EQUIPMENT FURNISHED BY OTHER TRADES

1. All equipment furnished and/of installed by other trades requiring connections and services by Contractor shall have such services provided.

2. Contractor shall verify exact requirements with shop drawings.

3. Contractor shall verify all locations, sizes, requirements of services required for equipment in field with Contractor furnishing equipment.

1.12 FIRE SAFING

1. Provide fire safing and duct safing per 2021 IBC New Jersey edition. Proseal Systems - Proseal plug device per 93 UL Directory, No 545, F rating for precast concrete. 3M Brand Fire Barrier CP25WB and caulk CAJ 1044 and CAJ 5001, WL1003, WL5011, or approved equal.

PART 2 PRODUCTS

2.01 ELECTRICAL EQUIPMENT

1. Contractor shall furnish all his equipment complete with motor, controllers, capacitors and starting equipment.

2. Electric motors shall be open, drip proof induction motors rated for continuous duty at 15% overload with 40° C. rise; single phase motor shall be capacitor start-induction run. Motors one-half horsepower shall be single phase, unless otherwise noted (c.f. Division 16). Starting of magnetic across-the line starters equivalent to Furnas Bulletin 14 or approved equal, unless otherwise specified. Thermal overload type, motor rated manual switches shall be furnished for motors ¾ HP and less which do not require magnetic starters for control purposes.

3. Provide FPE/CDE Type 1C Power Factor correction capacitors size to increase full load power factor to 95%. Capacitors shall be fused, in NEMA enclosure, connected between safety switch and motor starter.

4. Where apparatus is specified as "Packaged", all electrical equipment shall be furnished, set and wired to a single point of connection for apparatus as a unit.

5. Contractor shall set all electrical equipment furnished by him unless same is to be mounted on an electrical panel board, junction box or similar piece of electrical equipment and is to be wired by others.

6. Where electrical characteristics are not shown, all electrical characteristics shall be as indicated on electrical plans. Where there is a conflict between model numbers which indicate electrical characteristics and electrical drawings, the electrical drawings shall take precedent.

7. Contractor shall verify all electrical characteristics of all equipment with electrical contractor. Contractor shall submit to electrical contractor location of all motor, starters, other electrical equipment voltage and phase required prior to submission of Contractors' and electrical contractors' shop drawings.

8. Should Contractor change type of equipment which results in change to electrical characteristics, then Contractor will be responsible to coordinate these changes with all other trades and pay for all required changes.

9. Should Contractor change electrical characteristics of equipment from that shown on electrical drawings, he is responsible for any extra cost resulting from such change.

2.02 ELECTRICAL WIRING

1. Contractor shall furnish and install all electric wiring required for his contract, with the exception of certain wiring shown under Division 16.

2.03 RELIEF VALVES

1. Provide ASME labeled relief valve on each closed fluid system, set to relieve full code capacity at design pressure. Pipe discharge to closed drain or approved receptor.

2.04 THERMOMETERS

1. Thermometers shall be 5" diameter dial type with stainless steel cases and separate wells. Ashcroft T-7173T or approved equal, adjustable to any angle.

2.05 TAGS

1. Contractor shall provide a 2" diameter brass tag with stamped service designation and numbers, fastened to each valve with brass chain and "S" hook.

2. Each control, starter, disconnect switch, etc., shall be provided with ¾" x 2½" metal name tag securely fastened to device.

3. Omit name tags on controls exposed in finished spaces.

2.06 UNDERGROUND GAS PIPE WITHIN BUILDING

1. All underground pipe within building shall be installed in an approved conduit system. Conduit shall be of a size that will allow for pipe to be installed without penetration of conduit. Conduit shall be made airtight. All end connections shall be sealed. Extend conduit outdoors as indicated on plans. Conduit shall be installed in accordance with gas company requirements.

2. Provide separate test of gas pipe within conduit as well as pressure test of conduit system. All testing shall be in accordance with gas company and International Fuel Gas Code.

PART 3 EXECUTION

3.01 METHOD OF PROCEDURE

1. The drawings accompanying these specifications are diagrammatic and intended to cover the approximate and relative locations of the system.

2. Installation, connection and interconnection of all components of these systems shall be complete and made in accordance with the manufacturer's instructions and best trade practices. Contractor shall erect all parts of equipment to be furnished by him under his Contract at such time and in such manner as not to delay or interfere with other Contractors.

3. Contractor shall lay out his work and be responsible for the establishment of heights, grades, etc., for all interior and exterior piping, drains, fixtures, conduit, etc., included in Contract Documents, in strict accordance with the intent expressed thereby; and all the physical conditions to be met at the building and finished grade, and shall be responsible for accuracy thereof. The establishment of the location of all work shall be performed in consideration of the finished work. In case of conflict, equipment and/or materials shall be relocated without cost to the Owner, as directed by the Architect, regardless of which equipment was installed first.

4. Contractor shall cooperate with other contractors for the proper securing and anchoring of all work included within these specifications. Extraordinary care shall be used in the erection and installation of all equipment and materials to avoid marring surfaces of the work of other trades, as Contractor will be held financially responsible for all such damage caused by the lack of precaution and due to negligence on the part of his workmen.

5. Do not run pipe or conduit for plumbing systems in any concrete slab 3" or less in thickness. Do not place any pipe or conduit in any slab where the outside diameter of the pipe or conduit is more than one-quarter the thickness of the slab.

6. All piping, conduit and other plumbing materials and equipment shown to be mounted below ceilings are to be kept as close to ceiling areas as possible unless otherwise noted.

7. Items such as valves, cleanouts, etc., that will be concealed in construction shall be installed and so arranged as to be fully accessible for adjustment, service and maintenance.

3.02 VISIT TO SITE

1. Due to the nature of the work involved under this Contract, all bidders are required to thoroughly examine the site. Bidding contractors shall thoroughly review Contract Documents prior to visiting the site, take Contract Documents to site and thoroughly explore to any extent necessary, the existing conditions as relating to fulfilling the requirements of this Contract.

2. If discrepancies are noted between requirements of Contract Documents and existing conditions, Contractor shall so indicate to architect during bidding period and receive clarification before bidding. Failure to comply with this requirement will result in Architect's interpretation during the construction period and architect's decision will be final and binding as the sole interpreter of the Contract requirements.

3. Extras will not be considered for any work relating to connections with existing systems or adaptability of new systems to existing structures.

3.03 CLEANING

1. Upon completion of the work, Contractor shall remove all excess material, debris, tools and equipment from the site, and leave the premises in a broom clean condition.

2. Flush out all piping systems with proper solvents to ensure removal of all foreign materials. Clean fixtures, equipment, piping and other surfaces soiled by the work. Remove debris and rubbish on a daily basis.

3.04 START-UP AND ADJUSTMENTS

1. After all testing is complete, start each system and make final adjustments for proper flow, temperature and quietness of operation. Record all final results including flows, balance settings, temperature adjustments, pertinent notes and recommendations. Furnish copies of report for review and record.

2. Report shall show actual data as recorded. Variations are expected due both to "normal" variations in field readings and to settings deliberately made to achieve proper operating conditions rather than design guidelines. Correct operation and maintained conditions will be sufficient evidence of proper setting.

3.05 OPERATING AND MAINTENANCE INSTRUCTIONS

1. Contractor shall prepare complete sets of bound operating and maintenance instructions including valve chart framed under glass or laminated with clear plastic mounted on masonite board, indicating number, location and purpose of each valve. Two (2) charts and one (1) mylar copy shall be provided for each mechanical room or as designated. The instructions prepared shall be black on white and shall be complete enough so that men generally familiar with the type of system will need no further data to properly perform the indicated procedures.

2. Contractor shall furnish qualified personnel to instruct the Owner in the operation of the system and must request from the Owner, in writing, a date for such instruction to begin. Contractor's personnel shall remain until such instruction is complete to Owner's satisfaction. Contractor shall receive from Owner written verification that the Owners personnel have been thoroughly instructed in the operation, maintenance and all facets of the system operation.

3. Manuals shall include all equipment, equipment parts lists, complete oiling, recommend spare parts, complete coiling, cleaning and servicing data compiled in a clearly indexed and easily understood form the data shall indicate the serial numbers of each piece of equipment and provide complete lists of replacement parts motor parts ratings and actual loads.

4. Provide operating instructions shall include wiring and control diagrams showing complete lay out of each system.

5. Any special emergency operating instructions and a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to the various parts of the system.

6. ASME and State pressure vessel inspection forms, all motor data, including standard and actual operating in service data and copies of all manufacturer's equipment, guarantees and warranties.

7. Provide separate manuals, reports, instructions, etc. for each school.

3.06 PAINTING AND FINISHING

1. All painting is to be done in accordance to Rust-Oleum Corporations or approved equal printed instructions. All surfaces to receive two (2) coats of primer, exposed surfaces one (1) finished coat. Aluminum or galvanized metal surfaces are considered finished where concealed.

2. All surfaces to be carefully cleaned and/or pickled and filled as required to provide a proper uniform surface. Factory finished equipment shall be touched up or refinished where required.

3.07 CONSTRUCTION SAFETY

1. All work shall be done in accordance with the following Federal regulations:

   A. Williams-Steiger Occupational Safety and Health Standards, Chapter XVII of Title 29, Codes of Federal Regulations.

2. Comply with local Health and Safety Regulations.

3.08 ENERGY CONSERVATION CODES

1. It is the intent of this specification that all equipment and materials furnished meet the latest enforced edition of the Energy Code or such code as locally applicable, if more restrictive.

3.09 FLASHINGS

1. All piping passing through roofs shall be provided with Stoneman "Stormtite" seamless lead flashing (or approved equal).

3.10 DELIVERY AND STORAGE OF EQUIPMENT

1. Contractor shall store, take deliveries and install all equipment in accordance with manufacturers requirements. (see general conditions)

3.11 STERILIZATION

1. After final testing for leaks, all new potable water lines shall be thoroughly flushed, by plumbing contractor, to remove foreign material. Before placing the system in service, Contractor shall engage a qualified service organization to sterilize the new water lines in accordance with the following procedure:

   A. Through a ¾" hose connection in the main entering the building, pump in sufficient sodium hypochlorite to produce a free available chlorine residual of not less than 100 ppm.

   B. Proceed upstream from the point of chlorine application opening all faucets and taps until chlorine is detected. Close faucets and taps when chlorine is evident.

   C. When chlorinated water has been brought to every faucet and tap with a minimum concentration of 100 ppm chlorine, retain this water in the system for at least two (2) hours.

D. At the end of the retention period, no less than 10 ppm of chlorine shall be present at the extreme end of the system.

E. Proceed to open all faucets and taps and thoroughly flush all new lines until the chlorine residual in the water is less than 1.0 ppm.

F. Obtain representative water samples from the system for analysis by a recognized Bacteriological Laboratory.

G. If all samples tested for coliform organisms are negative, a letter and laboratory reports shall be submitted by the service organization to the Contractor, certifying successful completion of the sterilization.

H. If any samples tested indicate the presence of coliform organisms, the entire sterilization procedure shall be repeated.

3.12 PLENUM AREAS

1. Any duct plenum area, ceiling or room plenum shall not contain any combustible material, and all insulation, wiring and/or piping shall be suitable and approved by local authorities for plenum installation.

3.13 SCHEDULE OF WORK

1. The exact times and dates and schedules that the schools will be available for Contractor to do work, shall be as indicated in General Conditions.

3.14 EQUIPMENT LIST

1. Refer to General Conditions. Exclusion of items on list does not relieve Contractor of the responsibility from providing equipment as specified, required to complete work as shown on drawings that is to be provided by Contractor.

	MANUFACTURER			
EQUIPMENT	NUMBER 1	NUMBER 2	NUMBER 3	NUMBER 4
Plumbing Fixtures	American Standard	Kohler		Or approved equal
Electric Water Cooler	Elkay	Haws	Sunroc	Or approved equal
Mop Receptor	Fiat			Or approved equal
Valves	Mueller	Stokham	Nibco	Or approved equal
Insulation	Owens/Corning	Johns Manville		Or approved equal
Carriers	Josam	J.R. Smith	Zurn	Or approved equal
Plumbing Specialties	Josam	J.R. Smith	Zurn	Or approved equal
Floor Drains	Josam	J.R. Smith	Zurn	Or approved equal
Lavatory Fittings	Sloan	American Standard	Kohler	Or approved equal
Hot Water Heater	Bradford White	AO Smith		Or approved equal
Water Mixing Valves	Bradley	Powers		Or approved equal

3.15 UNIT PRICES (See General Conditions)

1. See General Conditions.

3.16 ALTERNATE BID

1. See General Conditions. Refer to drawings and specifications for extent of work.

END OF SECTION
15015.6470

SECTION 15115 - BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 MATERIALS AND EQUIPMENT

1. All material and equipment used for this contract shall be unused and of the latest model or design available. Equipment shall be installed in strict accordance with manufacturer's recommendations and details.

2. Materials not specifically described but indicated or incidentally required shall be acceptable to the Architect and/or Engineer. Submit shop drawings. Materials shall be delivered, stored and handled so as to preclude injury by weather, dirt or abrasion.

3. Contractor shall use only specifically assigned areas for storage of materials and construction operation, unless other areas are authorized by the Owner. Such areas will be identified after the award of Contract by Owner. Comply with local municipal regulation regarding use of and parking on public streets.

4. Contractor shall repair streets, drives, curbs, sidewalks and any existing surface where disturbed by construction operations and leave them in as good condition after completion of the work as before operations started.

1.02 PROTECTION

1. No pipe shall be left open any longer than is required to affix the next piece. If pipe ends are to be left for a protracted period they shall be closed with approved plugs or caps.

2. All equipment shall be covered to protect it from damage; all damage is the responsibility of Contractor.

3. Any pipe, equipment or construction in existing building shall be done in such a manner to prevent injury to building personnel. Particular care must be taken for any work which will be done during building's normal operation.

1.03 IDENTIFICATION OF PIPING

1. Use color scheme for painting listed in "Scheme for Identification of Piping System", ANSI/ASME A13.1 and Rust-Oleum Corporation Form # 117 Or approved equal. Paint identifying bank of color near each valve and fitting, on both sides of pipes passing through wall, and on long pipe runs approximately every 30' (closer when directed), throughout building. Exposed piping in mechanical rooms and all other areas including insulation, hangers, supports, valves and all appurtenances shall be painted color selected.

Gas Pipe	Yellow (Note: Paint all exposed and rooftop gas pipe.)
Domestic Water	Light Blue
Domestic Hot Water	Orange
Fire	Fire Engine Red
Sanitary	Dark Blue
Compressed Air	Blue

2. Stencil on pipe, near each valve, name of pipe contents in abbreviated form, size of pipe, and arrow indicating direction of flow. Place legend in such location that it can be read from floor. Size of stencil letters shall vary with the size of pipe.

3. Seaton "SETMARK" pipe markers or approved equal are acceptable.

1.04 TESTING

1. At the completion of all work, and before any covering is applied, all piping except drainage shall be tested hydrostatically at a pressure equal to 150% of the working pressure or to material test pressure, if lower. All piping concealed in any manner shall be tested before being concealed. Maximum drop in pressure permissible shall be two (2) psi in 24 hours.

2. The drainage system shall have openings plugged and be filled with water to the level of the main gutter or top of vent pipes and allowed to stand at least thirty minutes. Each stack may be tested separately.

3. Testing shall be in accordance with ANSI B31.1 in all test gauges, traps and all other apparatus which may be damaged by the test pressure shall be removed or valved off from the system before tests are made.

4. In existing building all required tests on new and/or existing systems shall only be done after normal working hours. All tests done in building shall be done in such a manner as to avoid injury to building personnel and damage to existing and/or new construction. Protect all new and existing construction from damage which may occur as a result of the test or failure of test material.

5. Contractor shall be responsible for all costs associated with damage to materials or liability due to injury to personnel, as a result of tests or failure of tests.

1.05 PRESSURE RATINGS

1. All equipment and materials shall have a working pressure as determined by A.S.M.E. (or similar body), of not less than 125 psi.

1.06 SLEEVES

1. All pipes passing through construction shall be fitted with flush sleeves of sufficient diameter to pass the insulation. Sleeves shall be 20 USG galvanized iron, except in masonry, where steel pipe sleeves shall be used. Sleeves in waterproof construction shall be steel pipe, waterproofed with modular mechanical synthetic rubber seals equal to "Link Seals" (Thunderline, or approved equal). In floors they shall extend on inch above the floor.

2. In fire divisions, sleeves shall be constructed of fire-retardant material and shall be installed to maintain the fire integrity of the fire division.

3. All materials and construction methods shall be installed in accordance with the manufacturer recommendations and the requirements of the IBC Code or any other applicable codes.

PART 2 PRODUCTS

2.01 PIPE

1. Steel pipe shall be Schedule 40, electric welded, ASTM-A53, Grade A, plain or galvanized as specified under applicable system.

2. Copper tubing shall be hard temper "Type L" except that all piping underground shall be "Type K", conforming to ASTM-B-88.

3. Cast iron soil pipe shall be extra heavy Bell and Spigot spun type conforming to ASTM-A-74. Standard or medium weights may be used, if permissible under local code.

4. PVC Pipe

   A. Polyvinyl chloride pipe (PVC) shall be approved for use above ground and/or underground.

   B. Sound rating exposed PVC pipe in finished areas shall have sound rating equal to or less than the sound radiated from cast iron pipe (25-30 DB).

   C. Where sound ratings are greater, Contractor shall install insulation wrap to reduce the radiated sound to less than the sound radiated for cast iron pipe.

   D. Contractor to install PVC pipe with supports at intervals required by the applicable plumbing code.

   E. Provide fire listed fire stop devices or collars in accordance with ASTM E814 on both sides of pipe penetrations of fire rated assembly temperature.

   F. PVC pipe shall not be used where temperatures exceed 140°F.

   G. All underground pipe to be installed in accordance with ASTM D2321.

2.02 PIPE FITTINGS

1. All welded fittings shall be of the same thickness and material as the pipe meeting ASTM-A234. Branch connections shall be made with Weldolets or welding fittings.

2. All flanges shall conform to A.S.A. B-16 using gaskets suitable for the service.

3. Cast iron drainage fittings shall be standard weight galvanized cast iron, banded and recessed.

4. Malleable iron fittings shall be 150 psi wsp conforming to ASTM-A-338.

5. Fittings for copper tubing shall be wrought copper of the solder Type conforming to A.S.A. B16.22.

6. Extra heavy cast iron soil pipe fittings shall conform to ASTM-A-74, all changes in direction being made with "Y" branches or 1/8" (or less) bends.

7. Fittings for polyvinyl chloride (PVC) shall be socket fittings or solvent welded.

8. Fittings for polypropylene piping shall be flanged, thermal fusion or threaded, made from polypropylene plastic ASTM-D2146.

9. Fittings for PVDF piping shall be flanged, thermal fusion or threaded made from polyvinylidene fluoride material conforming to ASTM-D32222 Standard.

2.03 BALL, GLOBE AND CHECK VALVES

1. All valves 2" or smaller shall be ball valves; bronze solder end valves in copper tubing and screwed end in other lines. Globe and swing check valves shall be of similar construction with renewable composition disc.

2. All valves 2½" or larger shall be 125 psi WSP, 200 psi WOG bronze mounted, silicon bronze stem, outside screw and yoke, blotted bonnet and follower gland, iron body, flanged end, wedge gate valves. Valves shall be provided with back seat to permit packing under line pressure. Globe and Swing check valves shall be of similar construction with renewable, regrinding, bronze disc and seat.

2.04 PLUG AND BALL VALVES

1. Plug and ball valves shall be 150 psi WOG with full port. Valves to be lever operated, screwed or solder end in sizes up to 2". Valves used for balancing shall have infinite throttling handle and adjustable stops. All valves bubble tight shut-off.

2. Plug and ball valves shall be 150 psi WOG with full port. Valves to be lever operated, screwed or solder end in sizes up to 2", flanged end in 2½" to 6" size.

2.05 UNIONS

1. Unions shall be installed where needed to facilitate the removal of equipment.

2. Unions 2" and smaller in copper tubing shall be all brass, ground joint, solder end. In other lines, screw end, malleable iron, 125 psi WSP, 300 psi WOG of the ground type.

3. Unions 2½" and larger in copper tubing shall flanged pattern, all brass, solder end. In other lines, 125 psi WPS-175 psi WOG, cast iron flanged pattern, black or galvanized to match piping.

2.06 ESCUTCHEON PLATES

1. Where any pipe passes into a finished space, there shall be provided a solid brass, chrome plated, escutcheon plate held to the pipe mechanically or fastened to the building construction.

2.07 ANCHORS

1. Anchors of approved design shall be provided where shown or required for the proper control of the stress due to expansion. Anchors shall be heavy metal sections securely fastened to the building construction.

2.08 DRIP PANS

1. Provide drip pans for all pipes and equipment carrying liquid or, liquid vapors where pipes pass over areas or electrical equipment. Drip pans shall be constructed of galvanized metal. Provide drain line to closest sanitary line.

2.09 ACCESS PANELS

1. Furnish and install access panels not smaller than 18"x18", for access to all concealed valves, and equipment, accessories, etc.

2. Access panels shall be all steel construction with a No. 16-gauge wall or ceiling frame and a 16-gauge wall or ceiling frame and a 14-gauge panel door with not less than 1/8" insulation secured to inside of door.

3. Doors shall have concealed hinges and cylinder lock except doors for wall panels may be secured with suitable clips and countersunk screws.

4. Access panels shall be flush with finished wall or ceiling and shall be painted to match adjacent surfaces. Access panels behind finished surfaces shall have color coded marking on finished surface to indicate location of doors and type of equipment.

5. Access panels in fire rated construction shall be fire rated.

2.10 ANCHOR BOLTS

1. Contractor shall furnish and install anchor bolts as required for the equipment. Anchor bolts shall be DECO's standard anchor with floating nut, adjustable ½" in any direction. Grout all bases.

2.11 HANGERS

1. All piping shall be supported by hangers, concrete inserts, and insulation saddles conforming to MSS-SP-58.

2. Hangers for cast iron pipe shall be spaced at least one per length, but not more than 7'apart. For steel and copper pipe, pipe shall be spaced not over 8' apart.

3. Vertical runs of pipe shall be supported by riser clamps except that pipe 1¼" and smaller may be braced by galvanized malleable iron fasteners.

4. Hangers for copper tubing shall be copper plated, and completely encircle the tubing. A hanger shall be placed no further than 24" from each change in direction of piping.

5. Hangers shall not be connected to or supported from other pipe, conduit or equipment, but shall be supported from building structure.

2.12 STRAINERS

1. Strainers to be self-cleaning ("Y" type), cast iron body installed ahead of all control valves and pumps; screens to be Monel or stainless steel with proper perforations for the service, ends to be

screwed to 2" size, flanged for sizes 2½" and larger.

2. Provide ceramic magnets in each strainer used in systems containing iron.

PART 3 EXECUTION

3.01 EXCAVATION AND BACKFILL

1. Contractor shall do all excavating and backfilling necessary and repair finished surfaces that are disturbed. Contractor shall remove or distribute all earth remaining as directed, and/or provide required backfill.

2. Excavate all substances encountered to the depths and sections shown on drawings. Excavation for pipes, manholes, catch basins, drain inlets, and other accessories shall have 12" clearance on all sides.

3. Areas adjacent to any excavation shall be graded to prevent water running in. Excavation shall not be carried below the required level, and if so carried; shall be backfilled with gravel or sand and tap to proper compaction.

4. Contractor shall do bracing, sheathing, shoring, and pumping necessary for proper completion of the work and for protection of excavations or as required for safety. Temporary bridges or crossings shall be built where required to maintain traffic.

5. After proper inspection and tests all excavation shall be backfilled with approved material, free from large stones, clods or frozen earth, wood and other objectionable material. Contractor shall haul away excess material or provide additional fill as required.

6. Backfill for pipes shall be placed evenly and carefully around and over the pipe in six-inch minimum layers. Each layer shall be thoroughly and carefully rammed by hand until one-foot cover exists over the pipe. The remainder of the backfill shall then be placed, moistened and compacted to a density equal to that of adjacent original materials using mechanical tamping machines.

7. Backfill for sewage ejector and other structures shall be placed symmetrically on all sides in one-foot maximum layers and shall be compacted with mechanical or hand tampers to density equal to 90% of laboratory density in accordance with ASTM-D698 test.

8. Where trenches pass under footings backfill with tamped concrete, 2,500 psi minimum, around steel pipe sleeve.

3.02 INSTALLATION OF PIPING

1. All fittings, offsets, etc., may not be shown. Contractor shall determine their necessity by investigating conditions at the site.

2. Contractor shall use shop drawings for exact locations.

3. All piping above ground shall be run parallel with the lines of the building in the most direct manner, concealed in furred spaces where possible.

4. Pipes shall be cut accurately and placed without springing or forcing all burrs removed.

5. All water piping inside the building shall be properly graded to drain ½", hose outlet, angle drain valves.

6. All changes in size of piping shall be made by reducing fittings; no bushing will be permitted unless approved.

7. Contractor shall determine, with approval, where expansion joints, loops or anchors will be required due to space restrictions prohibiting proper run-out flexibility.

8. Valves, air vents, balancing cocks, etc., shall be placed in accessible positions, and flush metal access doors, (12"x12" minimum size), with necessary lintels, etc., provided where they are concealed.

9. All piping shall be located to prevent freezing. Where pipe is located in areas subject to freezing, provide freeze protection and insulation. Refer to Specification Section 15185.

3.03 CLEANING OF GRAVITY SYSTEMS – FINAL CLEANING

1. At completion of project, prior to owner occupancy, Contractor shall provide a hydro-jet cleaning and a video inspection of the newly installed gravity sanitary systems and storm systems.

2. Contractor is responsible for all work and all cost of work. Contractor shall utilize a certified independent sub-contractor using the latest technology to perform the hydro-jet cleaning and video inspection.

3. Work shall be done so that any debris and blockages encountered shall be removed. Take proper cautions (i.e. screening, etc.) to prevent the debris and material from entering the municipal sewer system.

4. Any blockages due to new construction work which cannot be removed by this hydro-jet cleaning shall be the responsibility of Contractor to remove. Remove and replace all existing construction, pipe and equipment necessary to access pipe system to clean pipes and clean system to the satisfaction of the owner, engineer and local authorities having jurisdiction.

5. Any leaks due to new construction and/or renovation work shall be the responsibility of Contractor to repair to the satisfaction of the owner, engineer and local authorities having jurisdiction.

6. At the completion provide video with a written test report to Owner.

3.04 DRAINAGE PIPING

1. All vent piping may not be shown. Contractor shall install all vents that may be required by local authorities.

2. All piping shall be so installed that any point in the system can be cleaned by a standard-length snake.

3. It is intended that no horizontal pipe be built into masonry.

4. Vent piping shall be extended full size (minimum 3") above the roof. Offset vents at roof to clear structure.

5. Provide cleanouts at all traps, the bases of all stacks and rain conductors, changes of direction greater than 45 degrees and other points shown on drawings or required by authorities having jurisdiction, on 4" dia. pipe or less, maximum 75' and 5" dia. pipe and larger; 100' maximum. Cleanouts in buried piping shall be brought up flush to finished floors, outside to 18" below finished grade. Cleanout shall be full size for pipe up to 4", and 4" in larger pipes.

6. Exterior cleanouts shall be cast brass raised plug type.

7. Interior cleanouts shall be similar with polished nickel bronze access cover for flush mounting.

8. In concrete floors cleanouts shall be cast brass countersunk plug type with nickel bronze adjustable head and heavy duty scoriated cover.
9. Provide two-way cleanouts at all sanitary laterals at exterior of building.

10. Coordinate locations of all cleanouts with other trades. Relocate or add cleanouts when interferences occur at no additional cost to Owner.

11. Where pipe is installed in previously compacted fill, Contractor shall be responsible, at no additional cost to Owner, to backfill and compact soil to within tolerances provided by Architect.

3.05 JOINING PIPE

1. Steel piping shall be of welded or flanged construction in sizes 2½" and larger; screwed or welded construction in sizes 2"and smaller. All screwed fittings to be cast iron unless otherwise specified. All threads shall be conformity with A.S.A. B-21.

2. All screwed pipe joints shall be made with Teflon Dry Thread Sealer (3M-#48) or approved equal applied to male threads only.

3. Soldered joints shall be made with non-acid flux and lead-free solder (ASTM 32-60AT). Fluxes shall be used sparingly, and excess wiped from copper.

4. For domestic hot and cold water pipe branches 1½" below, contractor may use Pro-Press system.

3.06 JOINING DISSIMILAR METALS

1. Where copper is jointed to steel, joints shall be made by means of brass or bronze adapter in a cast iron fitting or by means of an electrochemically insulated union.

2. Hangers supporting copper tubing shall be copper, or copperized. Copper tubing lines shall not be, even temporarily supported or secured to ferrous metals.

3.07 FOUNDATIONS

1. Foundations shall be provided by Contractor for all equipment mounted on concrete floors and shall be of concrete construction not less than 6" high unless otherwise shown.

2. Details of all foundations shall be submitted for approval.

3. Foundations or footings for structural steel supports shall be carried to a point not less than 12 inches below the underside of the floor slab, except where rock is encountered at less depth, then foundation may set on the rock.

4. All foundations shall be built to templates and reinforced as required by the load to be imposed upon them.

3.08 STRUCTURAL STEEL

1. Contractor shall furnish and install all structural steel, supports, braces, hangers, etc., required for his Contract unless shown as being supplied by others.

2. Structural steel shall conform to "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings", of the American Institute of Steel Construction, and where applicable, "Code for Welding Building Construction", of the American Welding Society.

3.09 ERECTION AND RIGGING

1. Contractor shall do all rigging, hoisting and setting-in place of all equipment furnished by him or as shown on drawings or as specified herein.

3.10 NATURAL GAS

1. The gas piping system shall be installed, and final connections made as part of the section titled, "GAS PIPING".

2. Any contractor supplying gas-fired equipment shall leave such equipment complete and ready to operate so that only the final connection of gas piping will be required.

END OF SECTION
15115.6470

SECTION 15185 - INSULATION

PART 1 GENERAL

1.01 SCOPE

1. All surfaces throughout the work shall be insulated with fiberglass insulation as indicated in applicable section.

2. Removal, repair and/or replacement of existing insulation on all existing pipe and equipment due to new work or connection of new work to existing.

1.02 SURFACE TEMPERATURE

1. Where surface temperature can exceed 350° F. substitute calcium silicate insulation.

PART 2 PRODUCTS

2.01 PIPE INSULATION

1. All piping throughout the work shall be insulated with fiberglass pipe insulation in thickness, indicated in 3.04, of high density and with jacket indicated in the applicable section. (Except that outside thickness shall be doubled.) Vapor barrier jackets shall have self-sealing lap joint, and joints between sections shall be covered with a 4" wide strip to self-sealing vapor barrier materials.

2. Aluminum bands shall be applied, two to a section on all indoor insulation.

3. On outdoor or attic installations, double insulation thickness and provide metal jacket banded or with sheet metal screws.

4. All pipe exposed in finished areas shall be painted color selected. Where insulation is subject to damage or is located below 7'- 0" AFF, insulation shall have stainless steel jacket with no exposed joints or seams.

5. All insulation shall be "plenum rated".

6. Provide double pipe insulation for storm lines above or within noise sensitive areas in classrooms, shops and laboratory areas.

PART 3 EXECUTION

3.01 INSTALLATION OF PIPE INSULATION

1. All pipe insulation shall be applied over dry, clean surface with joints tightly butted and jacket firmly and securely attached and smoothed. Insulation shall be continuous through wall, floor or ceiling openings and sleeves.

2. All valve bodies and fittings shall be insulated with preformed fittings of thickness equivalent to adjacent insulation and jacketed with same material. At Contractor's option, except in plenums, outdoors and where not permitted by code; provide precut fiberglass insulation blanket of same insulation thickness as adjacent insulation with a preformed snap on type molded PVC jacket, cover edges with vapor barrier adhesive or vapor barrier tape.

3. Provide metal shields under all hangers or pipe supports on outside of insulation; on roller supports provide pipe shoe cavity with insulation. Provide insert between support shield and piping on piping 1 1/2" dia. and larger. Insulation inserts shall be heavy duty insulation material length 12" up to 6" dia. pipe 16" long on 8" & 10" pipe, and 22" long on 12" pipe and larger. **HANGERS SHALL NOT PENETRATE PIPE INSULATION.**

4. On outdoor insulation, double insulation thickness, provide metal jacket; and prefabricated, removable and replaceable metal jacket at fitting and valves.

5. Locate insulation and cover seams in least visible locations, neatly finish insulation at supports, protrusions and interruptions.

3.02 EQUIPMENT INSULATION

1. All equipment containing fluids whose piping is specified to be insulated or whose surface temperatures will be low enough to cause condensation (60° F.), or high enough to burn persons touching same (110°F.), shall be insulated with a minimum of 1½" thick fiberglass block firmly butted and wired in place, and covered with ½" thick coat of insulating cement troweled over one inch galvanized hexagonal wire mesh and finished cement troweled smooth. Metal corners beads shall be applied to protect corners.

3.03 INSULATION THICKNESS

1. Minimum pipe insulation thickness shall be in accordance with the ASHRAE 90.1-2007, local requirements, or the following table:

PIPING SYSTEM CLASSIFICATION	FLUID TEMP. RANGE,F.	INSULATION THICKNESS IN INCHES FOR PIPE SIZES		
		1"and LESS	1-1/4 to 2	2-1/4 to 4 and over
Domestic Hot Water Supply and Return	120-200	1"	1"	1"
Domestic Cold Water	40-60	1"	1"	1"
Horizontal Storm Lines		1"	1"	1"

2. Where piping runs outdoors or in attic, double insulation thickness.

3. This Contractor shall provide heat tape (electric) to prevent freezing of outdoor piping and all other piping subject to freezing. Electric heat tape to be Chromalox Type M1 cable or approved equal, furnished with all controls, power wiring and appurtenances. Size and capacity per manufacturers' requirements.

END OF SECTION
15185.6470

SECTION 15410 - WATER SUPPLY SYSTEMS (INTERIOR)

PART 1 GENERAL

1.01 SCOPE

1. The work under this heading shall include furnishing and installation of:

   A. All domestic water piping, insulation, plumbing material and specialties required for the proper functioning of the work. Connections to all equipment requiring domestic water connections, whether furnished under this section or not. Sloped piping and valves to permit drainage of entire system.

PART 2 PRODUCTS

2.01 PIPING MATERIAL

1. Water Services - Copper Tubing Type "L", Type "K" underground. All exposed piping under and adjacent to fixtures shall be chrome plated brass pipe. All pipe shall have lead-free solder.

2.02 HIGH EFFICIENCY CONDENSING WATER HEATER

1. Furnish and install ultra-low nox packaged domestic hot water heater.

2. Unit shall have dual fan configuration, dual heat exchanger, built-in digital control and high temperature kit.

3. Unit shall be suitable for mounting on interior of building.

4. Provide inlet, strainer and water filter on incoming main.

5. Provide vertical thru-roof concentric vent termination kit.

6. Unit shall comply with ultra-low nox requirement. (10NG/JNO)

7. Provide 2-year warranty.

8. Provide built in hot water recirculation pump (set to external mode).

2.03 WATER HEATER EXPANSION TANK

1. Provide expansion tank on domestic hot water heaters where required and where heaters are installed with check valve on cold water and/or on installations with backflow preventers on main water service.

2. Expansion tank to be installed on cold water inlet to storage heater.

3. Tank shall be equipped with air inlet and water drain off and shall be diaphragm type tanks (Amtrol Therm-X-Trol Model ST or approved equal), where required provide ASME tanks.

4. Minimum tank volume shall either be as required by Amtrol Form ST-8-89 or .11 gallons expansion tank per gallon of storage tank capacity, whichever is greater. Volumes based on 140°F. water temperature, for higher temperatures adjust volumes accordingly.

2.04 MIXING VALVES

1. Provide new domestic water tempering valves; Powers Model MM434; Self-contained power station, single valve, 68 GPM, 10 PSI with internal bypass and gauges and mounted on heavy duty welded struts (factory assembled).

2.05 CONDENSATE NEUTRALIZING KIT

1. Provide condensate neutralizing tubes for each hot water condensate drain and all flue pipe condensate drains.

2. The condensate tubes shall be designed to raise the PH level 10-30 times more toward the neutral point of the PH being discharged by the hot water heating.

3. The neutralizer tube or tubes shall be Model JM, sized pre-manufacturer and as manufactured by JMM Boiler Works, Weil McLain model or approved equal.

4. Connect all vent condensate drains with P- Traps and unions before the neutralizing tubes.

5. All piping from heater and/or flue. Tube shall be PVC and supplied/installed by Contractor. All PVC joints shall be glued in place and all barbed fittings shall be secured with tie wraps.

6. The condensate drains shall not be combined into one neutralizer. All piping shall be per manufacturer's piping diagrams and directions. All neutralizing tubes shall be secured to the floor or wall, so as not to be exposed to damage or within a normal walkway.

7. The Contractor shall inform the Owner of any maintenance or scheduled recharge of the tube's limestone aggregate as described in the manufacturers' Operation and Installation manual.

8. Maintenance of tubes shall be for the 2-year maintenance agreement per General Conditions.

PART 3 EXECUTION

3.01 INSULATION

1. See Section titled "INSULATION".

2. Domestic Cold Water, Hot Water and Hot Water Recirculating Line - Fiberglass with all service jacket.

3.02 STERILIZATION

1. After the tests have been completed, and before the system is put into operation, the entire water system shall be sterilized as required in Section 15015.

3.03 MINIMUM COVER FOR EXTERIOR LINES

1. Water Lines - three feet six inches (3'6").

3.04 BALANCE COCKS AND RECIRCULATION SYSTEM

1. Balancing plug valves shall be installed in each branch of the recirculating system. Install thermometer in each branch of recirculating system near plug valve to facilitate balancing.

3.05 EXPOSED LINES

1. All domestic water pipe in finished areas shall be concealed in drywall and/or concrete block walls. Where installed in concrete block walls, pipe to be installed within cores and done without cutting block. Where it is not possible to locate in wall without removing block, Contractor shall coordinate with general contractor location and sizes required. Contractor shall cut and repair block. Finishing of block shall be suitable for painting.

2. Where it is determined by construction manager and/or architects that pipe must be exposed in finished area, it shall be enclosed in sheet metal chase constructed per architectural details by Contractor.

3. No pipe shall be allowed in finished areas, except where specifically indicated (backflow preventers, etc.) Pipe shall be insulated and protected per Specification Section 15185. Exposed pipe runouts to fixtures shall be chrome plated.

3.06 PIPING IN ATTIC

1. All domestic water pipe located above ceiling and in attic shall be insulated and run below attic insulation.

2. For all piping above attic insulation provide heat tracing to maintain temperature and prevent freezing.

END OF SECTION
15410.6470

SECTION 15420 - SOIL AND WASTE SYSTEM

PART 1 GENERAL

1.01 SCOPE

1. The work under this heading shall include the furnishing and installation of:

   A. All soil, waste and vent piping, including connections to sewers. All materials and specialties required for the proper functioning of the work. Connections to all equipment requiring soil, waste or vent connections whether furnished by this Contractor or not.

PART 2 PRODUCTS

2.01 PIPING MATERIALS

1. Drainage Systems - Cast iron soil pipe. Galvanized steel, copper tube, etc., may be acceptable if locally approved.

2. PVC shall be used for Training piping. Pipe shall be suitable for use above ground. Other uses as permitted by code.

2.02 JOINTS

1. Neoprene gasket joints may be acceptable if locally approved.

2. "No Hub" pipe, fitting and joint material may be acceptable if locally approved.

PART 3 EXECUTION

3.01 MINIMUM COVER FOR EXTERIOR LINES

1. Soil Lines – 3'

3.02 PIPE INSTALLATION

1. Provide a minimum slope of 1/8" per foot or as required by local code. Install cleanouts at lower ends of stacks, at each change of direction, where indicated, or required by local code. Support cast iron pipe risers at base of stack and at hubs.

2. Offset vent lines through roof to obtain minimum visibility from front of the building. Extend vents a minimum of 2' above roof line.

3. Flash vents passing through roof with sheet lead (6 pounds per square foot). Extend lead vertically up pipe and turn down into bore 2" or terminate in special flashing collar. See Section titled "General Requirements - Flashings".

END OF SECTION
15420.6470

SECTION 15440 - GAS PIPING SYSTEM

\PART 1 GENERAL

1.01 SCOPE

1. The work under this heading shall include the furnishing and installation of:

   A. All gas piping including all materials and specialties required for the proper functioning of the work. Connections to all equipment requiring gas connections whether furnished by this Section or not.

   B. Gas service in accordance with local regulations including meter pits if required or shown.

PART 2 PRODUCTS

2.01 PIPING MATERIALS

1. Steel pipe with malleable iron fittings unless otherwise required by local authorities. All underground piping shall be coated in accordance with the recommendations of the local utility. Use approved connectors and/or connection details for all equipment. All pipe above 2" dia. shall be welded.

2. All gas pipe shall be painted "yellow" including but not limited to pipe on roof and above ceilings.

3. Label all gas pipes with "GAS – Gas Pressure".

4. Provide check valve on discharge of regulator for each line feeding labs.

2.02 UNDERGROUND PIPE WITHIN BUILDING

1. All pipe underground below slab inside building shall be enclosed in a continuous enclosure. Enclosure to be capped at both ends when penetrating floor slab.

2. Provide gas pipe connect to enclosure to vent enclosure.

3. Vent shall be concealed, labeled "underground gas line vent" and pipe shall be vented to atmosphere outside of building.

4. All pipe outside shall be protected from damage.

5. All penetrations of building construction to be installed per details on architectural plans for pipe penetrations.

6. All pipe and enclosure shall be installed and tested in accordance with all regulations of the Fuel Gas Code and NFPA 30.

2.03 GAS REGULATORS

1. All gas regulators shall be sized to handle the maximum connected load of equipment regulator serves and for the minimum and maximum pressure requirements of equipment.

2. All gas regulators shall be 15# burst rated. Indoor regulators shall be vented to outdoors and pipe type, termination locations, pipe size per regulator manufacturer.

3. All regulators shall be shipped with the proper spring (color coded), field installation not allowed.

4. All outdoor valves shall have pipe at vent to prevent moisture infiltration.

5. All regulators located outdoors shall be suitable for outdoor operation.

6. All valves to be installed in strict accordance with all gas company requirements.

PART 3 EXECUTION

3.01 PIPE INSTALLATION

1. All gas piping shall be installed in accordance with the International Fuel Gas Code, NFPA-54 and the recommendations of the local utility including coating, ventilation and/or protection.

2. All gas pipe shall be painted "yellow" including but not limited to pipe on roof and above ceilings.

3. Label all gas pipes with "GAS - Gas Pressure".

3.02 CONNECTIONS TO EQUIPMENT

1. All connections to equipment shall have shut offs and drip legs and shall be in accordance with equipment manufacturer's requirements. All shutoff valves shall have ⅛" NPT plugged tapping for pressure testing. Verify final location and type of connection in field.

2. All connections to movable equipment shall have flexible connections, quick disconnects. All kitchen equipment shall have stainless steel flexible connections.

3.03 GAS SERVICE AND METERS

1. Coordinate all requirements for metering with local gas company. All new meters are to be installed in accordance with gas company's requirements.

2. The size, capacity, and pressure of the existing gas service and meter to be coordinated with gas company based on new loads.

3. Provide a label at service entrance - Natural Gas - CAS-74-82-8 with indication of gas pressure.

3.04 EXPANSION LOOPS

1. Provide expansion loops for all rooftop mounted pipe.

3.05 ROOFTOP PIPE

1. Provide roof supports per details on architectural plans and/or gas company requirements. Provide expansion loops.

3.06 COMBUSTION AIR

1. All-natural gas-fired appliances located indoors shall have adequate provisions for combustion air. All combustion air installations shall be installed per NFPA-54/ANSI-Z-223.1, National Fuel Gas Code latest edition, and per local gas company requirements.

3.07 GAS PRESSURE

1. All gas-fired equipment furnished under this Contract shall be rated to operate at minimum 5.0" w.c. gas operating pressure, unless otherwise noted.

2. Prior to installation of gas pipe, this Contractor shall verify the pressure requirement of all gas-fired equipment furnished under this Contract or under other Contracts

3. Where gas pressure exceeds 6.0" WC or where high pressure in excess of 14" WC is utilized, provide pressure regulators in all gas lines where appliances are not rated for higher gas pressure. Pressure regulators shall be sized and installed per manufacturers' requirement. All regulators installed indoors shall be vented outdoors.

END OF SECTION
15440.6470

SECTION 15450 - PLUMBING FIXTURES AND EQUIPMENT

PART 1 GENERAL

1.01 SCOPE

1. Furnish and install complete with all necessary trim, hangers, etc., all plumbing fixtures and equipment required for the Contract.

2. All handicapped fixtures shall be installed per American Disabilities Act (ADA) and applicable guidelines.

3. Install all fixtures at heights indicated on architectural plans.

4. Provide all offset piping and special tail pieces per manufacturer requirements to comply with clearances per ADA.

5. Adjust heights of carriers due to depressed floors in toilet rooms.

6. All fixtures, equipment and appurtenances where manufacturer and manufacturers' model numbers are specified shall be "or approved equal".

PART 2 PRODUCTS

2.01 SUPPLIES, TRAPS, CARRIERS, ETC.

1. Provide chrome plated supplies with screw driver stops for all fixtures.

2. Provide traps, deep seal where required, for all fixtures, chrome plated where exposed.

3. Provide Josam carriers for all wall hung fixtures. All bases, where required, to be block type.

2.02 **P-1** - WATER CLOSETS

1. American Standard Madera Model 3465001.02 (or approved equal) floor mounted vitreous china, 16.5" high with Sloan (or approved equal) Model 111-1.6 manually operated flush valve, 1.6 gal./flush.

2.03 **P-2** - HANDICAPPED WATER CLOSETS

1. Wall mounted fixtures to be mounted so that height of water closet shall be 17" to 19" above finished floor to top of seat.

2. Seats shall not be sprung to return to a lifted position.

3. Flush valves and controls shall be installed in accordance with ADA guidelines Section 4.16.5 and 4.27.4.

2.04 CLOSET SEATS

1. Heavy duty, open front, cut out back, seat no cover, stainless steel check hinge, solid section, high impact polystyrene white seats.

2. Handicapped Applications - Provide seat cover where required to meet requirements of ADA, Section 4.16.5 and 4.27.4.

2.05 URINALS

1. **P-3** - American Standard "Lynnbrook" 6601.012 or approved equal; vitreous china blowout urinal, wall hung, 1¼" top spud with Sloan #180-SMO or approved equal battery powered sensor operated flush valve, 1.0 gallon/flush.

2.06 **P4/5** - COUNTERTOP LAVATORIES

1. Oval Lavatories – Corian one-piece counter and bowls by contractor.

2.07 **P-6** WALL HUNG LAVATORIES

1. American-Standard "Lucerne", 20"x18" (or approved equal), vitreous china wall hung lavatory for concealed arms.

2. Handicapped Applications - Mount unit as required to maintain ADA clearances per local codes.

3. All 20"x18" wall hung china lavatories shall be furnished with "TRUEBRO, INC. LAV SHIELD protective enclosure, Model #2018-ASL-1 or approved equal. Lav Shied shall be constructed of rigid high-impact, stain-resistant PVC, 0.093" nominal wall thickness, shall have UV protection and shall be furnished and installed with seven (7) virtually indestructible – tamper resistant stainless screws with wall anchors. Color shall be china white. Lav Shield shall fit all ADA-conforming 20"x 18" wall hung china lavatories. Lavatories shall paintable with acrylic enamel or latex paint. Lav Shield shall be UL listed in accordance with ADA Article 4.19.4 Flammability ratings; UL-94 V-0, 5VA ASTM D-635-91 4 (ATB) 2.1 (AEB). Lav Shield shall be listed for bacteria/fungus resistance per ASTM G21 and G22 – Result 0 growth.

2.08 LAVATORY TRIM

1. **P-4/5/6** – Sloan BASYS (or approved equal) sensor metering solar powered with battery powered hand washing faucet, sensor operated pedestal Model EFX-375.100.0100 (or approved equal) with below deck Model 170LF (or approved equal) thermostatic lead-free mixing valve and faucet and brass grid strainer.

2. **P-4/6** - "Handicapped Installation" - Insulate waste and hot water pipes under sink.

2.09 **P-7** - MOP SERVICE BASINS

1. Fiat 24"x24" molded stone mop service basin Model MSBID2424 (or approved equal) with Chicago Faucet Model 897-RCF (or approved equal), hose, hose bracket, mop hanger, bumperguard, and stainless steel wall guards..

2.10 **P-8** - ELECTRIC WATER COOLER

1. Elkay Model LMABF8WS (or approved equal), stainless steel, ADA mounted, refrigerated, filtered and filtered bottle filling station.

2.11 **P-9** STAINLESS STEEL SINKS

1. Where indicated on plans, undercounter stainless steel sink to be furnished by Contractor and installed by Contractor, see Section 15015.

2. Provide Chicago Faucet Model 527-ABCP (or approved equal) deck-mounted manual faucet with 8" centers, 6-1/4" rigid/swing double-bend spout and vandal proof 2-3/8" lever handles.

2.12 **P-10** FLOOR DRAINS

1. Finished Spaces - Josam 30000-S (or approved equal) with square nickaloy strainer of recommended size with auxiliary inlet for trap primer.

   A. Floor drains installed in tiled floors shall be Josam 30000A with square nickaloy strainer of recommended size and installed and coordinated with tile layout, so drains are located within the tile pattern in a manner to minimize cutting of tile.

2. Provide deep seal traps and trap seal devices for ALL floor drains.

2.13 SAFEWASTE DRAINS

1. At all safewaste drains, provided trap and funnel and trap primer JR Smith 2699 (or approved equal) on closest water line with ½" dia. cold water to safewaste.

2.14 SHOCK ABSORBERS

1. Josam 75000 Series (or approved equal) in size recommended by P.D.I. on each group of fixtures.

2. Install above chase in ceiling or install where accessible for service.

3. Owner shall reimburse contractor for cost of material.

2.15 Wall Hydrant

1. Josam Series 71300 (or approved equal), non-freeze type, chrome-plated, ¼-turn, stainless steel box, with integral vacuum breaker – backflow preventer. Provide ¾" inlet connection.

PART 3 EXECUTION

3.01 INSTALLATION

1. All fixtures shall be installed after finished surfaces are complete; they shall be set neat and flush without damage to adjacent surface.

2. All equipment shall be installed in a neat workmanlike manner.

3. All floor mounted fixtures to be set on silicone caulking as further waterproofing.

END OF SECTION
15450.6470

SECTION 15560 - FIRE PROTECTION SYSTEMS (INTERIOR)

PART 1 GENERAL

1.01 SCOPE

1. The work under this heading shall include the furnishing and installation of:

   A. All piping, equipment and materials necessary, including connections to all equipment required for the proper functioning of the work.

1.02 CODES AND REGULATIONS

1. All work done, all equipment and materials used and all tests shall be done to meet the approval of the insurer as well as local authorities having jurisdiction.

1.03 INSPECTION

1. All work shall be inspected by the Insurer and any local authorities having jurisdiction; certified copies of these approvals shall be delivered to the Owner before final payment.

1.04 SHOP DRAWINGS

1. This Contractor shall prepare shop drawings showing all runs of piping and necessary details and elevations.

2. Shop drawings shall be prepared and sealed by a registered Professional Engineer and shall be submitted and approved by the inspecting authorities before submission to the Architect and/or Engineer for record only. Architect and Engineer will not review shop drawings.

3. This Contractor shall submit along with shop drawing the calculations required for engineering of the system.

4. Shop drawings shall be submitted to all Contractors, Sub-Contractors and/or any other entity which require drawings for coordination of their work with the fire protection. The drawings shall be submitted in a timely manner so as to impede the progress of any other trades.

5. If shop drawings are submitted for coordination prior to approvals and there is a change to the system required due to the approvals; this Contractor shall pay for all cost incurred by other Contractors, Sub-Contractors and/or Suppliers incurred due to changes.

1.05 QUALIFICATIONS

1. This Contractor shall be licensed to install sprinkler systems and be experienced in installation of sprinkler systems.

1.06 APPROVALS

1. This Contractor shall prepare and be responsible for all drawings, documents and work required, etc., to obtain State and Local approvals. Copies of the above shall be submitted to the Architect and/or Engineer after approvals are obtained.

PART 2 PRODUCTS

2.01 FIRE DEPARTMENT CONNECTION

1. Where Fire Department connections are shown in walls, they shall be 4" storz; Guardian Model 6624 with cap. Alternate manufacturers will be accepted but must be approved by Fire Marshall. Remote fire department connection shall be 4" storz; Guardian Model 6634. All connections shall be polished brass and shall be installed with rubber seated check valve and ball drip. The final location and thread type shall be per local authorities

2.02 PIPING MATERIALS

1. All piping above ground to be black steel, all dry sprinkler pipe, Schedule 40, with screwed or flanged joints; all fittings to be cast iron - 175 psi W.W.P. approved type. Victaulic or similar grooved piping may be used, provide separate price and submit for approval, if locally acceptable (except for in exposed pipe in finished areas).

2. All piping underground shall be cast iron water pipe. Alternate materials may be acceptable if locally approved.

3. All valves, checks, etc., shall be of the approved type, designed for not less than 175 psi W.W.P.

4. Use of unions is prohibited unless specifically approved by the Owner, the Architect and/or the Engineer, and the inspecting authority all in writing.

2.03 ELECTRIC HEAT TAPE

1. Provide electric heat trace tape for those portions of fire protection system subject to freezing. Provide NFPA approved heat trace.

2. This Contractor shall be responsible for all electrical wiring outlets, etc., as required for the proper functioning of the work.

2.04 BACKFLOW PREVENTORS

1. Provide as indicated or as required by local codes, and/or approving agency (on the plans) packaged, double check valve backflow preventers for protection against backflow of pollutants through cross connections due to back pressure or back siphonage.

2. Units shall have two counter-weighted check valves which will maintain 1 psi back pressure. Check valve body and trim shall be iron. Units shall have OS & Y indicating type gate valves on inlet and outlet. Provide 4 corporation stops, air vents, galvanized check valve bodies and cover. All valves shall be supervised.

3. System shall be ASSE, FM approved UL classified rated at 175 psi WWP. Ames and Waterworks Silve Bullet Series or approved equal, size as required by NFPA or approved equal.

4. Owner shall reimburse contractor for cost of material.

PART 3 EXECUTION

3.01 MINIMUM COVER

1. Minimum cover for underground lines shall be as required by the inspecting authorities, but not less than 3'6".

3.02 APPURTENANCES

1. Contractor shall furnish all appurtenances as required for the proper operation of the system in accordance with NFPA local codes and insuring agency requirements including, but not limited to field tests; painting disinfections identification signs.

3.03 WIRING

1. All control wiring, interlocking wiring, wiring between valves, sensors, panels and alarms shall be by this Contractor. All work per National Electrical Code.

END OF SECTION
15560.6470

SECTION 16100 - GENERAL ELECTRICAL

1. GENERAL PROVISIONS

1.1 The applicable provisions of the Division 1 General Conditions, Supplemental Conditions, Special Contract Requirements, Amendments and Additions to the General Conditions, and all project addenda are hereby made an integral part of this section.

1.2 These specifications apply to all electrical work performed.

1.3 When apparent conflict exists between these specifications and the contract drawings, within the specifications, or within the drawings, the engineer will determine the intent.

1.4 The term "provide" means "furnish and install". The terms "contractor", "E.C.", and "EC" mean "electrical contractor", unless otherwise noted. All work indicated in specifications division 16000 and on the electrical drawings is by the electrical contractor, unless otherwise noted.

1.5 The terms "unless otherwise noted" or "unless otherwise indicated" in any form of wording mean "unless specifically indicated otherwise on the electrical drawings, in the electrical specifications, or in the General Conditions and Requirements to the specifications and/or contract". These terms do not mean "unless indicated otherwise on the general construction, mechanical construction, or other disciplines' drawings or specifications", except where specifically so worded on the electrical drawings or electrical specifications.

1.6 Materials and equipment manufacturers and catalog numbers specified constitute the type and quality of design, material, workmanship, ruggedness of construction, resistance to vandalism, exact operating and performance characteristics, features, configuration, dimensions, etc.. Where multiple manufacturers are shown in the drawings and/or specifications, not all manufacturers shown may be capable of providing materials and equipment meeting the specifications, field conditions, etc.. Manufacturers not specifically shown on the drawings or specifications shall be considered, provided the products are equivalent or superior to the requirements of the drawings and specifications (including equivalent or superior to products and/or manufacturers specifically shown on drawings and specifications). Manufacturers, whether shown on the drawings or specifications or not, are acceptable only if they can meet the specifications, conditions, and requirements specific to this project. The terms "equivalent", "equal", "equaling", and "approved equal" mean "equivalent or superior to the item/process specified when approved by the engineer", unless otherwise noted.

1.7 For any equipment indicated on the drawings or specifications as furnished by the owner (or furnished by any other party, including other contractors, subcontractors, or third parties), contact the furnishing party prior to submitting bid to obtain all requirements of such equipment as necessary to provide a complete installation. Provide all ancillary equipment as necessary which is not furnished but which is required for a complete installation of owner furnished equipment.

2. SCOPE OF WORK

2.1 The work governed by these specifications consists of providing all labor, materials, equipment, services, and related items/work necessary to complete all the electrical work as indicated and described in the drawings and specifications.

2.2 Electrical work includes but is not limited to:

A. Electric service and service equipment
B. Power distribution and wiring
C. Interior and exterior lighting
D. Emergency power and lighting
E. Utilization equipment connections
F. Fire alarm system
G. Telephone raceway/pathway system
H. Temporary power and lighting

3. CONTRACT DRAWINGS AND SPECIFICATIONS

3.1 Drawings are diagrammatic and indicate the general arrangement of the various systems and approximate and relative locations of the materials and equipment defined by the specifications. Coordinate with and obtain the approval of the owner, architect, and engineer for the exact locations of all materials and equipment. Check the drawings, specifications, and all fabrication and shop drawings (including fabrication and shop drawings of other trades) to verify space conditions, headroom requirements, characteristics, and for coordination. Where space conditions and headroom requirements appear inadequate, notify the engineer before submitting a bid. No extra consideration, claims, charges, or compensation will be granted under any circumstance for failure to notify the engineer, or for any alleged misunderstanding of the requirements above. Completely furnish, install, connect, and interconnect all components of all systems in accordance with contract requirements, manufacturer's instructions, applicable codes and standards, and best practices of the trade.

3.2 Minor deviations, variations, changes, and corrections from layouts shown on the drawings (based on coordination, conditions, manufacturer's instructions, codes and standards, shop drawings, and verification of measurements and conditions) are permitted to facilitate construction provided the changes do not represent potential changes in scope of work (see the section of these specifications "Changes to the Scope of Work") and provided the changes are acceptable to the owner, architect, and engineer.

3.3 Before submitting bid, examine and check all drawings and specifications relating to all work, including electrical, mechanical, plumbing, general construction, fire protection, and any other trades' drawings and specifications (as well as Division 1 General Conditions) and become fully informed as to the extent and character of work required and its relation to the work of other trades. No extra consideration, claims, charges, or compensation will be granted under any circumstance for any alleged misunderstanding of the work to be performed, or the force and intent of these specifications.

3.4 Fully coordinate (prior to releasing doors and hardware) with the general contractor to ensure that all doors to rooms housing new large electrical equipment swing open in the direction of egress and are equipped with proper "panic" hardware (as per NEC Articles 110.26(C)(3) and 110.33(A)(3), where applicable).

4. VISIT TO SITE

4.1 Before estimating work, visit the project site and verify all measurements and field conditions affecting the work. The contractor is fully responsible for the correctness of all measurements and for any connections to existing work. Submission of bid is considered evidence that this contractor has visited and examined the site. No extra consideration, claims, charges, or compensation will be granted under any circumstance for extra work as a result of the contractor's failure to visit the site or verify conditions and measurements.

5. VERIFICATION OF MEASUREMENTS AND CONDITIONS

5.1 The electrical contractor is solely responsible for verifying field measurements, conditions, and drawing and specifications information (for all trades) before ordering materials and equipment and before commencing work. The electrical contractor is solely responsible for verifying shop drawings (including shop drawings of other trades) before releasing related materials and equipment and before rough in. No extra consideration, claims, charges, or compensation will be granted under any circumstance due to any differences between the actual dimensions and any dimensions indicated on the drawings.

5.2 Report any apparent discrepancies or conflicts found at once to the engineer for consideration and wait for a decision before proceeding with any work in the affected area.

5.3 The engineer's decisions in cases of discrepancies, conflicts, and related to verification of measurements and conditions are final and binding upon the contractor, make all installation accordingly.

6. EXISTING CONDITIONS AND UTILITIES

6.1 Information and data indicated on the drawings regarding existing conditions (including underground utilities) is from the best available sources. However, no assurance is made as to completeness and/or accuracy.

6.2 Contact all utility companies operating in the project vicinity (water, gas, sewage, electric, telephone, cable television, etc.) and the owner's maintenance department (where applicable) and verify all existing underground systems before any excavation commences. Utilize applicable "one-call" or "before you dig" utilities marking services, including paying all associated fees.

6.3 Relocate any existing underground electrical feeders and wiring in areas of construction and around proposed foundations as applicable. Include all costs in bid. If any third-party owned wiring or equipment interferes with construction, notify the engineer.

7. ITEMS NOT SHOWN OR SPECIFIED

7.1 Provide any items of material not indicated on the drawings and/or not specified, but which are required for the complete and proper installation and/or operation of any part of the work, as if indicated and specified.

7.2 Provide any work not indicated on the drawings and/or not specified, but which is required for compliance with applicable codes and regulations, as if indicated and specified.

7.3 No extra consideration, claims, charges, or compensation will be granted under any circumstance for performing work required for complete and proper installation/operation or required for compliance with applicable codes and regulations.

8. REGULATIONS AND CODES

8.1 Perform work in accordance with all respective requirements of the latest adopted editions (as of the date of electrical construction permit approval) of all applicable federal, state, and local codes, standards, regulations, ordinances, laws, etc. and industry standards. This includes applicable requirements of the National Electrical Code (NEC), National Fire Protection Association (NFPA), American National Standards Institute (ANSI), Americans with Disabilities Act (ADA) (as well as all related state disabled access and/or barrier free codes and standards and ANSI A117.1), International Building Code (IBC), International Energy Conservation Code (IECC), International Residential Code (IRC), Factory Mutual (FM), Illuminating Engineering Society of North America (IES, IESNA), Institute of Electrical and Electronic Engineers (IEEE), Insulated Power Cable Engineer's Association, National Electrical Contractors' Association (NECA) "Standard of Installation", National Electrical Manufacturer's Association (NEMA), National Electrical Safety Code (N.E.S.C.), Underwriter's Laboratories (UL), United States Department of Labor Occupational Safety and Health Administration (OSHA), utility companies requirements, etc..

8.2 Where listing or labeling (in any form, i.e. UL, CSA, ETL, etc.) is indicated in the drawings or specifications or is otherwise required by the NEC or other applicable code, provide equipment and materials as either listed or labeled by a qualified product evaluating organization (UL, CSA, ETL, or approved equal) acceptable to local authorities having jurisdiction. Include all costs in bid. No extra consideration, claims, charges, or compensation will be granted under any circumstance associated with providing listed equipment.

A. The electrical contractor is fully responsible for verifying (before submitting bid) the applicability and extent of code required listing with local authorities. Specifically verify if the municipality has any requirements that "listable" (capable of being listed) products must be "listed". Provide accordingly where applicable.

B. Submission and/or approval of shop drawings (which may or may not show listing) do not relieve the contractor of the responsibility to meet listing requirements.

C. Where products required (by specifications/code) as listed are installed without listing or as non-listed (without prior written approval), the contractor shall remove the products and install listed products at no cost to the owner. Written approval will only be considered if all of the following are satisfied:

1) The contractor is fully responsible for (including all costs) and must prepare and submit any and all information necessary for review and evaluation of products (by the authority having jurisdiction, engineer, architect, and owner). This includes all processing costs for all parties involved and costs for any special or independent third party inspections, investigations, evaluations, engineering services (including sealing by a registered professional engineer), etc. which may be required or requested in conjunction with approval. In the absence of listing, the contractor is fully responsible for proving that products are acceptable.

2) The contractor must show one (1) or more of the following:
   a) That listed products are not available.
   b) That providing available listed products involves excessive costs or hardships.
   c) That listing of products involves requirements that unreasonably exceed the requirements of the specifications, codes, and project conditions.

3) Products must meet or exceed all specified requirements, industry standards, code requirements, and conditions specific to the project.

4) There must be no change in contract price (except that the owner reserves the right to require credit pricing).

5) Where acceptable to the owner.

8.3 Where NEC article numbers are referenced in the drawings and specifications, they apply to the latest edition. Where the authority having jurisdiction has not adopted the latest edition, refer to the corresponding applicable code requirement article.

9. PERMITS, CERTIFICATES, AND FEES

9.1 Apply for, obtain, pick-up, and pay for (pay all costs associate with) all permits, licenses, certificates, etc., required for execution of the project. Procure all permits immediately upon notice to proceed with the contract. The contractor is fully responsible for verifying all permits, licenses, certificates, etc. which are required. Submit (see the section of these specifications "Summary of Submissions") copies of all permits, licenses, certificates, etc. in conjunction with this project for record. Prepare all information and data for submittal to any authority in order to obtain permits and certification of compliance for the permits. This specifically includes this contractor reproducing contract drawings for permit submission, which shall be sealed by the electrical engineer upon request.

9.2 Obtain and submit (see the section of these specifications "Summary of Submissions") six (6) copies of inspection certificate(s) from authorities having jurisdiction indicating approval of the electrical installation. Arrange and pay for all electrical inspections (performed by an approved Underwriters Inspection Agency) associated with inspection certificate(s).

9.3 Applicable utility service charges will be paid directly by the owner. Obtain and submit (see the section of these specifications "Summary of Submissions") written estimates from all respective utility companies prior to utilities performing work.

9.4 If and when requested by the owner or owner's representative, the electrical contractor shall submit to the owner any information necessary as part of the owner's application or submission for applicable grants, rebate programs, reimbursement programs (including, but not limited to, energy rebate programs such as "smart start" or "clean energy"), or other similar/related programs. Submit all required documentation, including, but not limited to, detailed pricing information on materials and/or labor, bills of materials, invoices, receipts, counts, take-offs, other related cost information, submittals, shop drawings, etc.. Compile information in format as directed by the owner or owner's representative including tables and other formats accordingly.

10. GUARANTEE AND WARRANTIES

10.1 The electrical contractor is fully responsible to guarantee all electrical equipment and work (applies to all materials and equipment, including lamps for luminaires) and is fully responsible for all manufacturers' warranties from material purchase (by the contractor), through the date of final acceptance by the owner, to the expiration date(s) of the guarantee and warranties. Guarantee and provide warranties for a period after the date of final acceptance by the owner as per Division 1 General Conditions, unless longer periods are specifically indicated otherwise on the electrical drawings or specifications. Guarantee/warranty periods of less than two (2) years after date of final acceptance are not permitted under any circumstance.

10.2 Wherever "warranties" are indicated elsewhere in the specifications, provide and submit (see the section of these specifications "Summary of Submissions") written manufacturers' warranties for equipment. Include all costs in bid associated with providing specified warranties periods (including purchasing any required extended or special warranties to meet the specified periods). Submission of written warranties showing periods, conditions, or coverage of less than the periods, conditions, and coverage specified does not relieve the contractor or manufacturers' of the responsibility to provide warranties with periods, conditions, or coverage as specified. Manufacturers' warranties do not relieve the contractor of any responsibility associated with the electrical contractor's guarantee.

10.3 The electrical contractor shall guarantee and respective manufacturers shall warranty equipment and materials from defects in workmanship, materials, and operation. Provide guarantee/warranties including all service, maintenance (excluding routine maintenance), materials, labor, travel, all other work, and all expenses required as part of guarantee/warranties. Provide all guarantee/warranties service at no extra cost to the owner under any circumstance. Provide all guarantee/warranties service in timely manner.

10.4 Completely replace or repair, to the satisfaction of the owner, any equipment (as part of this project) improperly installed or damaged before or after installation until expiration of the guarantee period. Completely replace or repair, to the satisfaction of the owner, any equipment (including existing equipment and equipment installed by any other contractor or party) damaged by the electrical contractor (or any subcontractor thereof).

11. SEQUENCE OF WORK

11.1 Perform work in areas or general sequences (including applicable project phasing) as determined and directed by the owner and architect. Submit (see the section of these

specifications "Summary of Submissions") a complete schedule of construction for approval, showing delivery of equipment, erection of equipment, pertinent work related to installation, and when equipment will be placed in operation. Fully coordinate exact sequencing, phasing, and scheduling with all contractors, the architect, and the owner in detail and obtain approval of sequencing, phasing, and scheduling before starting work.

11.2 Perform all work in such a manner and associated with sequencing, phasing, and scheduling as applicable and include all costs and manpower allocations in bid. For example, to complete a particular sequence or phase of the work, it may be necessary to perform work in physical areas of the project areas which are covered by and/or part of prior phases or subsequent phases of work (i.e. work in initial phases of the project may involve installing the electrical service and electrical distribution equipment in areas which are proposed for renovation as part of a later phase; this would require installing the electrical service and electrical distribution equipment as part of the initial phase). Verify all such conditions, implications, requirements and include costs in bid. No extra consideration, claims, charges, or compensation will be granted under any circumstance for sequencing, phasing, and scheduling.

11.3 Maintain service at all times (except as provided elsewhere in the drawings and specifications for shutdowns) and minimize disruptions to all active areas, activities, and operations in and around the scope of work. This specifically includes activities and operations of the owner, third parties in the vicinity of the project, roads and highways surrounding the project, and utility companies serving the project. Coordinate specific requirements with the owner before submitting bids.

11.4 Maintain service of life safety systems (specifically emergency lighting and fire alarm) at all times.

A. As a minimum, maintain the following during construction (except brief periods, not exceeding one (1) working day, while making connections to or transitions between existing, proposed, and temporary systems [where applicable]):

1) Maintain code compliant emergency lighting in all occupied areas of the building. Emergency lighting is not required in unoccupied areas and other areas closed to use by building occupants.

2) Maintain manual fire alarm operation throughout the entire building (including areas under construction). This includes manual pull stations (existing, proposed, and/or temporary) at all active building means of egress exits (i.e. exits from each floor to stairwells or the exterior). This includes audible signaling devices to adequately warn building occupants and construction personnel (visual signaling is not required and signaling is not required to comply with the ADA during construction).

3) Maintain supervision of all active sprinklers in the building. This includes monitoring flow, tamper, and pressure switches.

4) Maintain service to automatic fire detection as much as practical. Automatic fire detection is not required to operate in areas of construction at times when construction personnel are present (who can activate manual fire alarms).

Other shutdowns of automatic fire detection may be considered, if approved in writing by the owner.

4) Whenever ADA approved signaling is not operational during construction, the electrical contractor's construction personnel shall be instructed with and shall carry out procedures to manually notify any disabled building occupants of fire emergencies (*this provision does not apply if the existing fire alarm system is not ADA compliant or is not present*).

5) Whenever HVAC duct smoke detection systems are not operational during construction, the electrical contractor is responsible for maintaining clear and unobstructed access to HVAC controls and/or disconnecting means (to facilitate manual operation in the event of a fire).

B. To satisfy requirements above, any existing and proposed life safety systems may be used as much as practical. Where requirements cannot be satisfied using existing/proposed systems, provide suitable temporary life safety systems (including all associated temporary wiring) as applicable.

C. Whenever unable to meet the above requirements, the electrical contractor (at the electrical contractor's expense) shall provide continuous fire watch.

12. CHANGES TO THE SCOPE OF WORK

12.1 Changes to the scope of work include any change effecting the overall nature or cost of the project. Examples of changes to the scope of work include, but are not limited to, additions or deletions of equipment or items of work, substitutions not equivalent or superior to equipment specified, substitutions with characteristics or operation varying from equipment specified, changes which effect the ultimate use or functioning of equipment or areas of the building, changes considered to be "substantial", any change which any party (contractors, sub-contractors, owner, architect, engineers, etc.) believes may involve a possible change in contract price, etc..

12.2 Make all changes to the scope of work in complete accordance with the general conditions of the specifications. Submit (see the section of these specifications "Summary of Submissions") changes to the scope of work immediately upon proposal of changes. Do not proceed with any work associated with or affected by changes to the scope of work unless the owner approves changes in writing or authorizes proceeding in writing.

12.3 All applicable provisions of the contract drawings and specifications, including addenda and prior changes, apply to all changes to the scope of work, unless specifically indicated otherwise.

12.4 In addition to all requirements of the general conditions, submit all pricing related to changes to the scope of work as indicated below. Pricing will not be reviewed until the required breakdowns (summarized below) are submitted.

12.5 Submit pricing for a proposed change to the scope of work with detailed breakdown as follows.

A. Submit a complete detailed breakdown of all material associated with the proposed change in scope of work. Itemize each unit of material and the respective cost.

B. Submit a complete detailed breakdown of all labor associated with each respective item of the above material breakdown. Itemize labor hours and classification for each item of material. Summarize total labor costs, broken down by worker classification and/or billing rate.

12.6 Where instructed to proceed with a change to the scope of work on a time-and-material (T&M) basis, submit pricing with detailed breakdown as follows.

A. Submit a complete detailed breakdown of all material. Submit copies of all receipts, invoices, and stock material lists.

B. Submit a complete detailed breakdown of all actual labor hours. Submit copies of time sheets. Summarize total labor costs, broken down by worker classification and/or billing rate.

13. TEMPORARY POWER AND LIGHTING

13.1 For this specification section only, the term "responsible" (in any form) means "responsible to pay all costs (pay to the electrical contractor) to erect the described work". For this specification section only, the term "erect" (in any form) means "furnish, install, maintain, and remove".

13.2 The electrical contractor is responsible for temporary power and lighting service/source and distribution during construction. Provide service capacity sufficient for construction. Provide service including any required utility or private metering.

13.3 The electrical contractor is responsible for all temporary lighting, all 120 V power for small construction tools, and all other temporary power not exceeding 120 V or 20 A. Power for large tools and equipment exceeding 120 V or 20 A (including arc welders, etc.) is the responsibility of the contractor requesting such power. Temporary power during construction (exceeding 120 V or 20 A) to permanent equipment installed as part of this project (for installing, testing, operating, etc., including mechanical equipment, elevators, etc.) is the responsibility of the contractor requesting such power.

13.4 Where a general contractor's construction trailer is present, the electrical contractor is responsible for a minimum 60 A, maximum 200 A single phase service to the trailer. Provide service including any required utility or private metering. Temporary service to any other contractor or subcontractor trailer is the responsibility of the contractor requesting such service.

13.5 Where utility power is not available and during shutdowns of utility power, the contractor requesting power under these conditions is responsible for providing portable generator(s), associated temporary wiring, and fuel (sufficient to meet power requirements during these conditions). Generator power to owner loads during construction is not required (unless specifically indicated on the drawings).

13.6 The electrical contractor is responsible for temporary power to existing and/or other owner loads, equipment, and wiring as indicated on the drawings.

13.7 The electrical contractor shall erect all temporary power equipment and wiring for a complete temporary power installation, regardless of the contractor who is responsible for the temporary power.

13.8 Erect all temporary power and lighting during construction in accordance with OSHA and the NEC. This includes required ground fault circuit interrupter (GFCI) protection for personnel and "assured grounding program".

14. TESTING

14.1 After completing installation of equipment and wiring and prior to energizing or placing in service, test all electrical equipment, conductors, systems, and each and every part thereof to insure continuity, proper splicing, freedom from unwanted grounds, acceptable insulation values, proper operation and functioning, and a complete workmanlike installation to the satisfaction of the engineer and owner.

14.2 Completely test all equipment installed. This includes all equipment furnished and installed by the electrical contractor as well as equipment furnished by others and installed by the electrical contractor and equipment furnished and installed by others and wired by the electrical contractor.

A. Electrical tests of panels, switches, and circuit breakers rated 800 A and less and 600 V and less are not required, except that meg-ohm meter testing is required.

B. Electrical tests of motors 75 kW (100 hp) and less are not required.

C. Electrical tests of individual motor starters are not required. This does not apply to motor control centers (where applicable), where complete testing is required.

D. Visual and mechanical checks are required for all equipment (including all panels, switches, circuit breakers, motors, motor starters, and all other equipment) without exception.

14.3 Test all equipment and wiring as per the latest edition of InterNational Electrical Testing Association (NETA) standards (Acceptance Testing Specifications (NETA-ATS) for new equipment/wiring and Maintenance Testing Specifications (NETA-MTS) for existing equipment/wiring), unless indicated otherwise. For each piece of equipment, perform testing as shown for that equipment in respective NETA standards. Where equipment is not specifically shown in NETA standards, perform testing as shown for equipment most closely resembling the equipment to be tested. Perform all tests shown in respective NETA standards, unless indicated otherwise. Tests shown as "optional" in NETA standards are not required unless specifically indicated otherwise on the drawings or specifications. Utilize suitable instruments in making all tests, as per NETA standards. Battery, magneto, or similar hand-held testers may be used for preliminary conductor continuity checking but are not acceptable for final results, which must be obtained utilizing proper equipment only (i.e. meg-ohm meter, etc.).

14.4 Provide all testing performed by a NETA accredited independent testing firm employed by the electrical contractor, unless indicated otherwise. Provide visual and mechanical checks shown in the NETA standards, testing of transformers 225 kVA and less (with primary and secondary voltages 600 V and less only), and testing of panels, switches, and circuit breakers 1,200 A and less and 600 V and less performed by the electrical contractor's direct employees or by the independent testing firm (at the contractor's option). Provide continuity and insulation resistance meg-ohm meter testing of 600 V and less conductors performed by the electrical contractor's direct employees only.

14.5 If requested by the owner or engineer, utilize a recording type (i.e. "Dranetz") meter to measure phase-to-phase voltage, phase to neutral voltage, phase currents, harmonic content, and surges in the system. Perform testing for a period of one (1) week. Completely set up and take down meter and submit printout tapes formal test results.

14.6 For all testing performed, submit (see the section of these specifications "Summary of Submissions") complete typewritten and tabulated test results for review and approval by the engineer and owner. Submit test result bound together in a single three-ring binder (one (1) binder per set of test results) including a table of contents. Submit quantity of sets as directed in the General Construction specifications, but in no case less than three (3) sets. Submit results upon project completion, except under conditions below.

14.7 Where any abnormal, questionable, "failing", or "borderline" test results are encountered or where discrepancies are noted during testing, submit results immediately to the engineer before energizing equipment. Do not energize until authorized in writing by the engineer. Test results submitted under these circumstances are not required to be bound or complete.

14.8 Where connecting to or otherwise modifying existing wiring, test wiring as follows.

A. Test existing wiring before performing work to confirm integrity (where testing is performed, the electrical contractor is not responsible for the prior existing condition of wiring).

B. Test new wiring before connecting to existing wiring.

C. Test connections of new to existing wiring (test new wiring and existing wiring together) and modified existing wiring after performing work.

Where this testing is not performed, the condition of existing wiring will be assumed to be a direct and sole result of work preformed and the electrical contractor will be held fully responsible for the condition of existing wiring. Where this testing is not performed and where existing wiring is not in acceptable condition for maintained use or service, the electrical contractor shall repair or replace wiring to the satisfaction of the owner at no cost to the owner.

14.9 Provide oscilloscope testing of all variable frequency drives (VFD's) installed as part of this project (with power wiring installed by the electrical contractor), including VFD's furnished by the mechanical contractor, other contractors, or the owner and including VFD's in motor control centers (where applicable). Perform oscilloscope testing to determine the presence/magnitude of voltage surges (at the VFD carrier frequency level, approximately

15 kHz to 25 kHz) associated with reflected wave phenomenon. Perform testing by making oscilloscope measurements at the VFD load terminals and at the motor line terminals (or at the disconnecting means local to the motor where motor terminals are not practical). Record oscilloscope readings with a suitable digital camera or direct image capture (or other recording means which accurately displays equivalent graphic information) and compare readings at the VFD with readings at the motor. Submit photographs with test results. Oscilloscope testing is not required for a VFD located directly adjacent to the motor served, provided the VFD and motor manufacturers submit written certification showing that the complete motor/VFD installation is fully coordinated (including considering reflected wave phenomenon); the electrical contractor is responsible for obtaining this written certification.

15. SUBSTITUTIONS

15.1 Materials and equipment manufacturers and catalog numbers specified constitute the type and quality of design, material, workmanship, ruggedness of construction, resistance to vandalism, exact operating and performance characteristics, features, configuration, dimensions, etc.. The engineer will consider substitutions of similar equipment superior to specified equipment (meeting or exceeding all characteristics of the specified equipment).

15.2 Submit shop drawings associated with substitutions complete with documentation necessary to establish compliance with the specifications (see the sections of these specifications "Shop Drawings" and "Summary of Submissions"). Submit samples of substitutions where requested (see the sections of these specifications "Samples" and "Summary of Submissions"). If documentation and/or samples are not submitted when required, the substitution will be denied.

15.3 Determination of compliance with specifications rests with the engineer. When a request for substitution is denied, furnish the equipment specified. The engineer's decisions in cases of substitutions are final and binding upon the contractor, provide equipment accordingly.

15.4 Pay all costs associated with a substitution where granted. For the provisions of this section, "substitutions" includes equipment where characteristics or operation vary significantly from equipment specified (including equipment of the specified manufacturer). This includes costs incurred by any party (electrical contractor, other contractors, sub-contractors, owner, architect, engineers, etc.), costs resulting from differences of details, configuration, ratings, operation, characteristics, and dimensions between the specified and substituted equipment, costs to provide features of the specified equipment which may be manufacturer's options of the substituted equipment, and costs to remove and replace work already installed and any other remedial work as a result of substitutions. Approval of substitutions is conditional upon there being no cost change to the contract, unless specifically indicated on the shop drawings submittal and corresponding approval. The electrical contractor is fully responsible for coordinating with the owner, architect, and other trades to identify all possible cost impacts associated with any substitution before releasing equipment and before any party proceeds with work effected by the substitution.

15.5 Submit bid based on the items as specified. Substitutions will be considered only after a contract has been awarded.

16. SHOP DRAWINGS

16.1 Submit a product list indicating all proposed items of products, materials, and equipment as directed in the general construction specifications.

16.2 Submit (see the section of these specifications "Summary of Submissions") shop drawings of all equipment and materials proposed to be furnished for review and approval by the engineer. Submit in electronic PDF format.

16.3 Submit shop drawings for all equipment and materials including, but not limited to luminaires, solid state energy saving ballasts, raceways, conductors, cable, termination methods, grounding, wiring devices, safety switches, enclosed circuit breakers, branch and distribution panels, transformers, contactors, time clocks, photocells, fire alarm system, emergency power and lighting system equipment, engraved plastic nameplates, and any other items requested by the owner, architect, any code official, or engineer. Submit detailed computer-generated illumination foot-candle calculations for luminaires where requested by the architect, owner, or engineer.

16.4 Stamp or mark shop drawings with the contractor's approval, as evidence that they were checked for accuracy and that all dimensions, characteristics, ratings, operation, features, data, relation to existing conditions, and coordination with work and shop drawings of other trades were completely verified before submission. Approval of shop drawings by the engineer does not relieve the contractor of responsibilities to review shop drawings in detail, to comply with drawings and specifications, for errors contained in shop drawings, for coordination, and to provide equipment as listed.

16.5 Where any characteristics, ratings, operations, or features differ from the specified equipment (where not equivalent or superior to the characteristics, ratings, operations, and features of the specifications and specified equipment), circle, highlight, or otherwise clearly designate and identify the specific differences.

16.6 In the event that shop drawings are not acceptable to the engineer (including as provided below for conditional approval), submit acceptable shop drawings within seven (7) days of notification.

16.7 Approval of shop drawings, including approval of substitutions, is conditional that there is no cost change to the contract, unless specifically indicated on the shop drawings submittal and corresponding approval.

16.8 Approval of shop drawings is conditional upon the contractor fully and completely complying with all review comments by the owner, architect, and engineer. Where the contractor fails to or is unable to fully and completely comply with every review comment, then the shop drawings are *disapproved* (whether or not they are stamped or noted as "approved" in any manner in any review comment) and must be resubmitted as within seven (7) days (as indicated above). Immediately upon receipt of shop drawing review comments, the contractor is responsible for carefully reviewing all comments in detail and for complying with comments. Where unable to fully satisfy any comment or where the contractor takes exception to any comment, revise and resubmit acceptable shop drawings (or, where taking exception, notify the engineer in writing) within seven (7) days. Where

the contractor fails to comply with these requirements (including resubmitting/notifying within the seven (7) day period specified), the contractor shall provide acceptable equipment meeting all specified requirements and all review comments (including removing unacceptable equipment [if installed] and replacing with acceptable equipment) at no cost to the owner.

16.9 Do not release equipment until shop drawings are approved. The electrical contractor is responsible for all changes where equipment is released before approval and/or where equipment does not comply with all approval conditions.

16.10 In addition to the quantity of shop drawings submitted for approval (see above), submit one (1) copy of *approved* shop drawings to the general contractor, the mechanical contractor, and each other contractor and trade for review and coordination. The electrical contractor is not required to submit copies direct to subcontractors or vendors to other contractors (this is the other contractors' responsibility). The electrical contractor is responsible for all changes and other costs where the electrical contractor fails to submit shop drawings to other parties for coordination.

16.11 Obtain copies of all shop drawings relating in any way to electrical work from all other contractors, subcontractors, and trades. Review shop drawings and coordinate with electrical work. Notify the architect and engineer immediately where discrepancies are found. The electrical contractor is responsible for all changes and other costs where the electrical contractor fails to obtain shop drawings or fails to coordinate shop drawing information. Approval of other trades submittals by the architect or engineers (or lack of review by the architect or engineers) does not relieve the electrical contractor of the responsibility to review other trades shop drawings in detail and for coordination.

16.12 No extra consideration, claims, charges, or compensation will be granted under any circumstance associated with any party's failure or delay in properly submitting, transmitting, obtaining, reviewing, and/or coordinating shop drawings.

17. SAMPLES

17.1 Submit (see the section of these specifications "Summary of Submissions") samples of materials and equipment for approval only where specifically requested by the owner, architect, or engineer. Submit samples along with complete catalog data, installation instructions, operating and maintenance (O&M) information, etc. specifically applying to the samples submitted, to facilitate proper evaluate the quality of the sample. Specifically designate and identify each sample as to the service and location where each sample is to be used on the project.

17.2 Submit samples within 30 days of request, except where the sample is for a substitution. Where sample is for a substitution, submit samples within seven (7) days of request.

18. AS-BUILT DRAWINGS, MANUALS, AND DEMONSTRATION

18.1 Prepare and submit (see the section of these specifications "Summary of Submissions") as-built record drawings showing conditions exactly as installed.

A. Indicate the exact locations and elevations of all equipment and devices and underground, concealed, and hidden work (including raceways, junction and pull boxes, etc.).

B. Indicate exact layout, connections, and conductor routing for all grounding.

C. Indicate all substitutions and changes, including updated lighting fixture/luminaire schedule, symbol list, list of alternates, etc..

D. For underground work, specifically indicate exact conditions accurately. Where underground wiring does not run straight and direct between visible and obvious equipment, objects, or markers (i.e. markers specifically placed to identify underground work [specifically note the presence and approximate location of all markers on as-built drawings]), clearly, accurately, and exactly *mark* and *dimension* exact underground work (including all bends) from visible permanent landmarks. Acceptable visible permanent landmarks include building walls, retaining walls, curbs, foundations, pole bases, etc.. Lines, joints, and markings on pavements are not considered permanent (since they would be covered by re-paving). Acceptable markers for placement to identify underground work include a 0.9 m (3'0") long piece of 102 mm (4") conduit installed vertically in the ground (top flush with grade) completely filled with concrete (or other similar means providing equivalent or superior visibility, durability, and permanence approved by the engineer). Where the contractor does not include this exact marking/ dimensions on as-built drawings or where marking/dimensions are inaccurate (allowing for a tolerance of not greater than 0.6 m (2'0") away from actual locations), the electrical contractor will be held responsible if underground facilities are damaged in the future (where due to lack of or inaccurate marking/ dimensioning).

18.2 During the progress of work, maintain accurate records of all deviations, variations, changes, and corrections from layouts shown on the drawings/specifications on a "record working" set of drawings and specifications kept at the job site for this purpose.

18.3 Upon completion of work, incorporate all information from the "record working" drawings/specifications onto a "marked-up as-built" set of drawings/specifications. Submit the "marked-up as-built" drawings/specifications to the engineer for review, comment, and approval.

18.4 Following approval of "marked-up as-built" drawings/specifications, prepare "final as-built" drawings (utilizing the latest version of Autocad (or compatible) software) and specifications (utilizing the latest version of Microsoft Word (or compatible) software). Submit one (1) set of "final as-built" drawing/specifications originals, sets of "final as-built" copies as directed in the general construction specifications (but in no case less than three (3) sets), and "final as-built" drawings/specifications in electronic Autocad (drawings), Word (specifications), and PDF (drawings and specifications) formats. Submit photocopies of all panel circuit directories with "final as-built" drawings.

18.5 Submit operating and maintenance (O&M) manuals for all new equipment furnished as part of this contract. Provide O&M manuals including installation, operating, and maintenance instructions for the equipment. Wherever "proof-of-purchase" is required as part of any

manufacturer's warranty (whether manufacturer's warranty is specified or not), submit with O&M manuals. Where any proof-of-purchase is required but not submitted (or where insufficient information is submitted), the electrical contractor is fully responsible and liable for providing the warranty. Submit all O&M manuals bound together in a single three-ring binder (one binder per set of manuals) including a table of contents. Submit quantity of sets as directed in the general construction specifications, but in no case less than three (3) sets.

18.6 Explain and demonstrate the complete electrical system and all work installed by the electrical contractor to the owner's operating and maintenance personnel. Demonstration is to instruct owner's personnel in the operation and maintenance of systems as well as to prove to the owner correct and adequate operation of all parts of the electrical system. Provide a demonstration period of one (1) full working day for the general electrical installation (including, but not limited to, contactors, time clocks, customer metering equipment, lighting controllers, dimming cabinets, motor controls [where furnished by the electrical contractor], transformer fan controls, generators, transfer switches, key interlocking schemes, and similar equipment, where applicable). Wherever demonstrations are indicated elsewhere in the specifications for equipment furnished by the electrical contractor (i.e. for fire alarm, dimming, sports lighting, stage lighting, UPS units, MCC's, VFD's, metal clad switchgear, power management, sound/paging, security, CCTV, and similar systems, where applicable), provide the specified additional demonstrations during additional periods of time (above and beyond the period above for the general electrical demonstration). Conduct all demonstrations at the project site and after all systems are fully operational.

19. SUMMARY OF SUBMISSIONS

19.1 Submit items as indicated elsewhere in the specifications (applicable sections are shown for convenience) and as summarized as follows. Information below indicates relative schedule of submission.

19.2 Submit upon commencement of construction (as per general construction specifications); resubmit within seven (7) days of notification:

A. Permits, licenses, certificates (see 16100-9)
B. Schedule of work (see 16100-10)
C. Product list (see 16100-17)
D. Shop drawings (see 16100-17)

19.3 Submit within 30 days of request (within seven (7) days for substitutions):

A. Samples (see 16100-18)

19.4 Submit during the project as applicable (refer to respective specifications sections for conditions and schedule of submission):

A. Utility service charge estimates (see 16100-9)
B. Scope of work changes, w/ breakdowns (see 16100-11)
C. Test results, abnormal/failing only (16100-15)

D. Short circuit, coordination, and arc flash report (where specified for adjustable circuit breakers)

19.5 Submit upon substantial completion of the project:

A. Approved inspection certificate(s) (see 16100-9)
B. Written manufacturers' warranties (see 16100-14)
C. Test results (see 16100-15)
D. As-built drawings (see 16100-19)
E. O&M manuals (see 16100-19)
F. Spare parts (where specified elsewhere)

20. SAFETY

20.1 Perform all work and work practices in strict accordance with all applicable local, state, and federal codes, standards, regulations, and requirements including OSHA (including the proper use and maintenance of personal protective equipment (PPE) and clothing), state labor and industry, the NEC, ASTM, the National Electrical Safety Code, NFPA, etc..

20.2 The term "live" means "energized or capable of being energized at any time for any reason, either intentionally or accidentally".

20.3 Suitably protect all live equipment against accidental contact at all times. Install and maintain covers on all live equipment. Where covers are not installed, provide suitable insulating barriers at all live parts. Suitable barriers include arc-resistant NEMA GPO-2 or GPO-3 and UL 94 V-0 electrical grade fiberglass reinforced epoxy compound sheets, rubber insulating blankets, suitable thermoplastic insulating materials, etc. as per OSHA, ASTM, and the NEC. Cardboard and similar materials are not acceptable. Provide listed OSHA approved signs reading "Danger: High Voltage" at locations of live parts and on doors/gates leading to rooms/fences/areas containing the equipment and keep doors/gates locked at all times.

20.4 Protect and enclose equipment operating at over 600 V at all times. Equipment is considered adequately protected where all requirements of NEC Articles 110.26 through 110.34 (including all other articles and codes referenced therein) are satisfied at all times. Where equipment must be exposed for work, or where work is to be performed around normally exposed live parts, provide suitable insulating barriers (suitable for the voltage involved), listed warning signs, and door/gate locking, etc. as shown above. Provide listed OSHA approved warning tape (reading "Danger: High Voltage") around the equipment and all code required working spaces at equipment.

20.5 When working on equipment or wiring, properly identify and use lockout devices and tags (in accordance with OSHA requirements) to prevent unauthorized or accidental energizing of equipment and wiring.

20.6 Perform all work in or associated with confined spaces (including manholes, hand holes, vaults, crawl spaces, etc.) in accordance with all safety codes referenced above. Obtain appropriate permits where required by the above codes and/or the owner.

20.7 Perform all excavation and work in and associated with excavation in accordance with all safety codes referenced above (include all required sloping, benching, shoring, bracing, supporting, shields, protective systems [fall protection, protection of personnel in excavation, protection of structures, etc.], ramps, access/egress, warning systems, rescue equipment, etc.). Provide suitable barricades and safety procedures to restrict pedestrian and vehicular access to areas where work is being performed (including open excavations, lay-down areas, clearance space around operating excavation equipment, etc.). Do not leave excavations open when not actually performing associated work (including at night, during week ends, or when working away from excavations). Leaving excavations open for short periods of time will be considered only when approved in writing by the owner and only where suitably protected. Any request for approval must include a written plan on proposed protection and safety procedures. No extra consideration, claims, charges, or compensation will be granted under any circumstance for any multiple excavations and backfilling needed to satisfy safety requirements.

20.8 When working in, on, or near areas subject to vehicular traffic (including public and private roadways, driveways, parking lots, etc. and including loading and unloading equipment/materials in the vicinity of traffic), perform all work and provide appropriate work zone traffic control in accordance with all safety codes referenced above as well as state department of transportation regulations, requirements, and recommendations. Where requested by the owner, architect, or engineer, submit a traffic control plan detailing proposed work zone traffic control and associated safety procedures.

21. HAZARDOUS MATERIALS

21.1 The electrical contractor is not responsible for and is not required to remove equipment contaminated by hazardous materials, except as indicated below. For this specification section, the term "hazardous material(s)" applies to any materials classified by federal, state, or local authorities having jurisdiction as environmental or health hazards (including, but not limited to, polychlorinated biphenyls (PCB's), asbestos, mercury, radioactive materials, etc.). For this specification section, the term "contaminated" (in any form) means "contains or is contaminated by hazardous material(s)".

21.2 The electrical contractor (and all applicable subcontractors) shall be fully insured for performing all work related to, on, and around contaminated equipment and for all work specifically shown in this specifications section as by the electrical contractor. Submit proof of insurance to the owner as part of or along with other applicable insurance submittals (as per Division 1 General Conditions, Supplemental Conditions, and Special Contract Requirements).

21.3 Immediately notify the owner if any electrical equipment or wiring to be removed or modified as part of this project is contaminated or suspected as contaminated. Identify all areas where disruptive work is proposed (including, but not limited to, excavation, cutting, penetration, drilling, etc.) in advance of performing work so the owner can arrange to have any necessary abatement completed, include all costs and schedule time accordingly. No extra consideration, claims, charges, or compensation will be granted under any circumstance for any delays resulting from abatement of hazardous materials.

21.4 When performing work with, on, and around equipment contaminated or suspected as contaminated, assume that the equipment is contaminated until/unless proven otherwise by testing. Exercise care and suitably guard and protect equipment at all times from the start of work until the equipment is either proven by testing as not contaminated or is removed from the project site.

21.5 Where existing equipment is specifically shown on the drawings as containing or filled with electrical insulating fluid ("oil", including transformers marked "OA") and where the equipment is specifically indicated on the drawings as being removed, utilize the services of a qualified testing agency (see the section of these specifications "Testing") to sample and test the oil. Test only for content of PCB's in the oil, unless indicated otherwise. Test a sample from each separate tank/compartment containing oil. Verify exact conditions (including the quantity and arrangement of tanks, compartments, and enclosures, the presence of sampling, drain, or fill valves or plugs, removable covers or access panels, etc.) in field prior to submitting bid. Submit written certified test results to the owner.

21.6 Where equipment is proven by testing as contaminated or is indicated on the drawings as contaminated, perform work as follows:

A. Completely de-energize, disconnect, and make the equipment electrically safe.

B. The owner, at the owner's discretion, shall perform one (1) of the following two (2) options:

1) Completely remove and dispose of the contaminated equipment.

2) Completely "abate" the contaminated equipment by removing hazardous materials from the equipment in complete accordance with all applicable federal, state, and local laws, ordinances, and regulations.

C. Once equipment is abated of hazardous materials by the owner and certified by the abating vendor as no longer contaminated, the electrical contractor shall then remove the equipment as if the equipment was never contaminated.

21.7 When removing existing luminaires containing ballasts (fluorescent, H.I.D., etc.), consider all ballasts as being contaminated by PCB's, unless ballast factory nameplate specifically indicates that the ballast does not contain PCB's. The electrical contractor shall completely disconnect, remove, and dispose of all ballasts not contaminated by PCB's. For ballasts considered as contaminated by PCB's, remove ballasts from luminaires, cut all ballast wiring leads within 51 mm (2") of the ballasts, and neatly place ballasts in owner furnished drum containers (i.e. 55-gallon). The owner shall dispose of PCB contaminated ballasts in drum containers. For luminaires (with ballasts considered as contaminated by PCB's) where there are signs of ballast rupture or leakage, carefully remove the entire luminaire and turn over to the owner (owner shall dispose of luminaires where PCB leakage is suspected).

END OF SECTION

SECTION 16200 - ELECTRICAL WORK PRACTICES

1. GENERAL PROVISIONS

1.1 The applicable requirements and conditions of specifications section "General Provisions" of specifications division 16100, General Electrical, are hereby made an integral part of this section.

1.2 The work governed by these specifications includes but is not limited to that as defined in specifications section "Scope of Work" of specifications division 16100, General Electrical.

2. INSTALLATION

2.1 Provide all equipment and materials in accordance with the recommendations and instructions of the respective manufacturers. This includes recommendations and instructions for equipment furnished by other trades or the owner and installed or connected by the electrical contractor.

2.2 Perform all work in an approved first class and workmanlike manner and conform to the best practices of the trade and to all requirements of the NEC.

2.3 Protect and preserve all existing, new and proposed raceways, wiring, materials, devices, luminaires, and equipment from corrosion, dirt, paint, building materials, acid, solvents, chemicals, water, ice, tools, overload, freezing, heat, combustion, theft, damage, abrasion, inadvertent removal, improper installation (including where installation has not been completely or properly coordinated), conflicts, interference, vandalism, etc. at all times. Repair or replace all equipment and materials lost or damaged as the result of inadequate protection. Cap and plug open ends of raceways and equipment during construction until wiring is ready to be installed.

2.4 Coordinate with and obtain approval of the owner and architect for all exact locations of all outlets, raceways, materials, and equipment. Fully determine and coordinate all exact routing of raceways. Determine routing before submitting bid and bid accordingly, including allowance to avoid any obstructions which may be encountered. The contractor is solely responsible for routing (any routing of raceways which may be shown on any electrical drawing is for reference only to show the recommended basis of design and does not relieve the contractor of the responsibility for fully determining/coordinating all exact routing, nor does it preclude the use of alternative routing). Prior to purchasing conduit or prior to any installation, submit detailed sketches/drawings of proposed raceway routing, equipment locations, and all other details of installation (submit in convertible electronic computer aided drafting (CAD) format as part of the shop drawings process at the same time switchgear submittal is submitted). Fully coordinate layouts with all contractors and trades before submitting and identify any areas of potential conflict. Any raceways routed in a location not previously approved shall be removed and reinstalled by the Contractor at the Contractor's own expense (no extra consideration, claims, charges, or compensation will be granted under any circumstance associated with routing of raceways).

2.5 Completely coordinate installation and routing of all wiring, materials, and equipment in the field and with shop drawing information of all trades prior to rough in of wiring or releasing equipment. Completely inspect equipment and materials upon receiving in the field (including equipment received by other trades where installed or connected to by the

electrical contractor) and verify exact installation requirements and details (compare to installation and routing as coordinated above) prior to installing, preparing installation, modifying, or handling in any manner which would restrict the ability to return material or equipment in the event of potential installation complications.

2.6 Cooperate and fully coordinate all work with the work of all other trades, contractors, subcontractors, and the owner, including work as part of other contracts and projects related to and/or in the vicinity of the specified work. Coordinate the locations of pipes, ducts, structure, reinforcement, foundation components, floor/wall/ceiling construction, raceways, branch and distribution panels, luminaires, devices, electrical outlets, air outlets, motor controls, and all other equipment in order to avoid conflicts, interference, or placing services at the wrong locations. Coordinate all demolition, disconnection, removals, relocations, extension, and re-feeding associated with existing equipment and wiring. Coordinate with shop drawings of all trades. Install all wiring and equipment in such a way to maintain clearance and clear access to all equipment requiring access by code or for operating, servicing, maintaining, replacing, examining, etc.. This includes access to electrical equipment and devices as well as mechanical, architectural, and other equipment including, but not limited to, valves, dampers, sensors, meters, gauges, clean-outs, access doors and panels, operating mechanisms, motors, pumps, fans, air handling and other mechanical equipment, etc.. This specifically includes coordinating wall mounted electrical devices and outlets with wall mounted HVAC equipment (including baseboard, radiation, cabinets, etc.).

2.7 Provide all work indicated on the electrical drawings and electrical specifications but involving disciplines of other trades performed by the electrical contractor (or applicable sub-contractors to the electrical contractor), unless specifically indicated otherwise. Perform work in complete accordance with all general construction specifications applicable to the work. This applies to all work including, but not limited to, cutting and patching, excavation, backfill, surface restoration (including paving), concrete, metal fabrication, fire stopping and sealing, painting, etc..

2.8 Properly isolate all materials and equipment against the transmission of vibration or noise to, from, or between any parts of the building.

2.9 The electrical contractor is fully responsible for determining and verifying all exact details of installation. Where installation details or similar information is shown on the drawings or is otherwise forwarded to the contractor (including during construction), the information represents the minimum criteria required and serves as a guide to the contractor but does not relieve the contractor of the responsibility for determining and verifying installation details.

3. GROUNDING

3.1 Completely ground and bond all equipment (specifically including all metallic raceways, cable armor, cladding, and shielding, supports, transformers, cabinets, cable trays, service equipment, and the neutral conductor) in strict and complete accordance with all applicable requirements of the NEC.

3.2 Provide insulated grounding conductors run with all wiring (not applicable to "BX" armored cable [type "AC"] where permitted elsewhere in this specification).

3.3 Install all metallic raceways in such a way to provide a continuous grounding path without the use of the insulated grounding conductor required above. Include all bonding jumpers and conductors (in addition to the insulated conductor required above) for flexible conduit, loosely jointed raceways, etc.. Provide suitable raceway/conduit fittings for a completely grounded raceway system, including the use of fittings approved and/or listed for grounding, grounding bushings, grounding lock nuts, etc..

3.4 Provide all grounding and bonding materials and connections as per specifications section "Grounding Materials" of specifications division 16300, Electrical Materials.

3.5 Wherever connections to grounding electrodes or electrode systems are required by code, connect and bond to and interconnect the following.

A. Provide new driven (made) grounding rod electrodes, for all services and where equipment is located on or below the second floor of a building.

B. Connect to the domestic cold water piping system and any other metal piping system where required by the NEC (excluding piping prohibited from bonding/grounding by the NEC).

C. Connect to the structural steel and/or metal building frame, where applicable.

D. Connect to all existing grounding electrode systems, where applicable.

3.6 Wherever the following is installed as part of this project (including where installed by other contractors), connect and bond to the grounding electrode system.

A. Ground new metal piping systems where required by the NEC.

B. Ground new structural steel and/or metal building framing.

C. Wherever any new foundation and/or footing is installed with continuous length of 3.0 m (10'0") or more or covering area of 3.3 m^2 (36 sq. ft.) or more, provide concrete-encased electrode(s) as per NEC Article 250.52(A)(3). Provide consisting of not less than 6.0 m (20'0") of #4 AWG bare copper conductor encased in not less than 50 mm (2") of the foundation/footing concrete, except that concrete reinforcement may be substituted for the copper conductor where the size, length, type, and installation of reinforcement complies with NEC Article 250.52(A)(3) for use as a grounding electrode.

D. Ground existing or new computer room style raised floors where within the project scope. In addition, connect to grounding for all panels and electrical equipment serving the raised floor area.

3.7 Where driven (made) grounding rod electrodes are installed, provide grounding resistance not exceeding 1.0 ohm (maximum). Verify proper ground resistance by testing as per the section "Testing" of this specifications division 16100. Where the measured resistance exceeds the maximum value, install additional ground rod(s) at the location and/or set ground rods in suitable listed and NEC approved chemical ground enhancement material in order to obtain proper values, include all costs in bid.

3.8 Detail all grounding on as-built record documents.

3.9 Wherever new wiring or equipment is installed at or near roofs of buildings with lightning protection system(s), bond wiring/equipment to the lightning protection system(s) as per lightning protection codes and standards.

4. WIRING METHODS

4.1 The wiring methods in this section apply to all systems (including power, lighting, emergency, over 600 V, control, telecommunications, data, fire alarm, sound, security, CCTV, and any other system), unless specifically indicated otherwise.

4.2 In finished areas, run all wiring hidden or concealed in/behind ceilings, walls, and floors, include all required cutting and patching. In unfinished areas, wiring may run exposed. Run exposed wiring following building lines.

4.3 Utilize steel rigid metal conduit (RMC) for all wiring unless indicated otherwise. Utilize only steel RMC for all exposed visible exterior raceways, for raceways in wet locations above ground, for exposed visible raceways in damp locations, and for all raceways in NEC hazardous (classified) locations (NEC Chapter 5). Utilize only steel RMC (encase in a 76 mm (3") 20 MPa (3,000 p.s.i.) concrete envelope) for raceways in or below grade that are subject to vehicular traffic (except that reinforced concrete encased PVC RNC or concrete encased steel IMC may be utilized as indicated below). Utilize only steel RMC for all wiring over 600 V (except that PVC RNC may be utilized for underground wiring over 600 V as indicated below). Utilize only steel RMC (with concrete encasement where required by code) where field conditions do not facilitate maintaining NEC required minimum cover for underground PVC RNC. For conduits 53 mm (2") and larger, where concrete encasement is not required above, embed all underground 45 degree or greater conduit bends (field fabricated or factory elbows) in a 155 mm (6") 20 MPa (3,000 p.s.i.) concrete envelope.

4.4 Steel intermediate metal conduit (IMC) may be utilized for all wiring except conditions indicated above as requiring only steel RMC. Steel IMC may be utilized in any condition where PVC RNC is permitted by these specifications. As an alternate to steel RMC, steel IMC (encase in a 76 mm (3") 20 MPa (3,000 p.s.i.) concrete envelope) is permitted under roadways, parking lots, and other areas subject to vehicular traffic. For conduits 53 mm (2") and larger, where concrete encasement is not required above, embed all underground 45 degree or greater conduit bends (field fabricated or factory elbows) in a 155 mm (6") 20 MPa (3,000 p.s.i.) concrete envelope.

4.5 Where permitted by code, schedule 40 or schedule 80 polyvinyl chloride rigid nonmetallic conduit (PVC RNC) may be used underground. Changing PVC RNC thickness (i.e. from schedule 40 to schedule 80 or vice versa) in the middle of any run of PVC RNC is not permitted. Encase all PVC RNC in a 76 mm (3") 20 MPa (3,000 p.s.i.) concrete envelope, unless indicated otherwise. As an alternate to steel RMC, PVC RNC encased in steel reinforced 76 mm (3") 20 MPa (3,000 p.s.i.) concrete envelope is permitted under roadways, parking lots, and other areas subject to vehicular traffic. Provide steel reinforcement consisting of a 12.7 mm (#4) reinforcing rod at each of four (4) "corners"

around each conduit in cross section (where encasement includes more than one (1) conduit, rods located between conduits may be "shared"). Provide reinforcing rods continuous for the entire length of the reinforced encasement, join rods where required by overlapping not less than 155 mm (6") and wrapping with suitable reinforcing tie wire. In unpaved areas not subject to vehicular traffic, schedule 80 PVC RNC may be installed without concrete encasement. In unpaved areas not subject to vehicular traffic, schedule 40 PVC RNC 27 mm (1") and smaller may be installed without concrete encasement. For conduits 41 mm (1.5") and larger, where concrete encasement is not required by these specifications, embed all underground 45 degree or greater conduit bends (field fabricated or factory elbows) in a 155 mm (6") 20 MPa (3,000 p.s.i.) concrete envelope.

4.6 Where runs of PVC RNC protrude exposed and visible above grade or floors, in indoor or outdoor locations, utilize steel RMC for the portions above grade/floor to a minimum depth of 155 mm (6") below finished grade/floor. This requirement does not apply where protruding PVC RNC is completely concealed/hidden within equipment enclosures, walls, or ceilings. Where exposed visible runs of PVC RNC are installed by the contractor (without prior written approval) the contractor shall remove the PVC RNC and install new steel RMC (including cutting and patching to a minimum 155 mm (6") depth and including replacing or reinstalling conductors) at no cost to the owner.

4.7 Where permitted by code, electrical metallic tubing (EMT) may be used for interior feeder and branch wiring in locations not subject to abuse or injury. Utilize steel RMC for conditions indicated above as requiring only steel RMC.

4.8 Utilize flexible conduit for flexible connections to motors, equipment requiring flexibility, equipment subject to vibration (including transformers), and where required for adjustment, in lengths not to exceed 1.8 m (6'0"). Flexible conduit may be utilized for flexible connections to luminaires only where wiring is concealed or located above accessible ceilings (in lengths not to exceed 1.8 m (6'0")). Exposed visible flexible conduit is not permitted for luminaires, except adjustable luminaires. Flexible conduit may be used where existing walls are fished in lengths not to exceed the portion in the wall plus 0.9 m (3'0"). Utilize liquidtight flexible metal conduit (LFMC, "seal-tight"), unless indicated otherwise. Utilize only LFMC in damp, wet, and outdoor locations, mechanical rooms, and for NEC hazardous (classified) locations (except as indicated below). Utilize flexible metal conduit (FMC, "green-field") in dry locations only (except conditions indicated above as requiring only LFMC). Where flexible connections are required in NEC Class I, Division 1 hazardous (classified) locations, utilize only flexible unions listed as suitable for the application. Flexible conduit/fittings of any type are not permitted as a substitute for conduit bends or offsets under any circumstance.

4.9 Where permitted by Code and approved by local authorities having jurisdiction and the owner, armored cable (type "AC", i.e. "BX") and metal clad cable (type "MC") may be used for interior branch wiring concealed in walls/ceilings and hidden above accessible ceilings in dry locations only. Where applicable, comply with NEC Article 518 "Assembly Occupancies". Utilize raceway for all feeder wiring (#4 AWG and larger). Types "AC" and "MC" cables are not permitted in wet, damp, or exterior locations. Types "AC" and "MC" cables are not permitted in exposed visible locations. Type "AC" cable is not permitted for use on circuits exceeding 250 V or for use on DC circuits. Hide cables at panels in electrical rooms and electrical closets as per the section "Branch Panels" of specifications division 16300, Electrical Material. Contact local authorities for approval

before submitting bid and include all costs in bid (no extra consideration, claims, charges, or compensation will be granted under any circumstance associated with wiring methods not approved by local authorities).

4.10 Provide surface raceway with integral wiring devices (including receptacles, power outlets, telephone/data outlets, switches, etc.) and/or surface raceway plug-in strips where specifically indicated on the drawings.

4.11 Surface raceway without integral wiring devices is permitted only where all of the following conditions are met or where specifically indicated on the drawings. Surface raceway without integral wiring devices is permitted where physically impossible to run wiring hidden or concealed, where impossible to hide or conceal wiring by cutting, patching, and painting, where approved by code, in dry locations only, and where specifically approved by the owner and architect in writing. Permission to use surface raceway without integral wiring devices is conditional upon there being no cost change to the contract, unless specifically indicated on the written approval.

4.12 Nonmetallic-sheathed cable (types "NM", "NMC", and "NMS", i.e. "romex") is not permitted under any circumstance. Electrical nonmetallic tubing (ENT), liquidtight flexible nonmetallic conduit (types LFNC-A and LFNC-B), high-density polyethylene (HDPE) conduit, type "A" nonmetallic conduit, and type "EB" nonmetallic conduit are not permitted under any circumstance.

4.13 Provide all wiring within air handling plenum spaces in complete accordance with the NEC. Provide wiring methods utilizing metal conduit raceways (as permitted by the specifications) only. Type "MC" cable, where otherwise permitted, may be utilized in plenum ceilings (but not other plenum spaces). Type "AC" cable is not acceptable in plenum ceilings or other plenum spaces.

4.14 Provide all wiring in hazardous (classified) locations or similar locations as defined by the NEC (where applicable) in strict accordance with all applicable requirements of NEC Chapter 5. Utilize wiring methods specified above, installed according to the NEC. Provide a complete installation including all required fittings, all required conduit and cable seals, etc. as indicated in the NEC. The applicable scope of hazardous (classified) locations shall be as indicated on the drawings.

4.15 Provide conduit and cable seals (utilize a NEC hazardous (classified) locations type, even if location is not classified) for all wiring within or passing through walk-in refrigerators/freezers, cold rooms, other refrigerated spaces, and any other location where wiring is exposed to widely different temperatures, in accordance with NEC Article 300.7(A). Consider these areas as wet locations and utilize aluminum RMC or PVC coated steel RMC for all wiring within or passing through these areas.

4.16 Provide all systems wiring (including only fire alarm, telecommunications, data, sound, security, and CCTV, where applicable) in complete accordance with all requirements of other sections of the electrical specifications, except as modified below. Where permitted by Code and approved by local authorities having jurisdiction and the owner, suitable code approved systems type cables (without conduit) may be used for interior systems wiring concealed in walls/ceilings and hidden above accessible ceilings in dry locations only. Contact local authorities for approval before submitting bid and include all costs in bid (no

extra consideration, claims, charges, or compensation will be granted under any circumstance associated with wiring methods not approved by local authorities). Systems type cables without conduit are not permitted in wet, damp, or exterior locations. Systems type cables without conduit are not permitted in exposed visible locations. Run wiring in pathways as indicated on the drawings and specifications.

A. Provide wiring as directed, recommended, and approved by the respective system manufacturer/utility company and meeting all minimum requirements of the system manufacturer/utility (including where manufacturer/ utility requirements exceed the requirements of the specifications and the NEC).

B. Provide all cables as multi-conductor style having an overall jacket (of a color other than red; red is reserved for fire alarm) and utilize only cables approved by the NEC for use with the system.

C. Provide all wiring in plenum spaces in complete accordance with the NEC. In dry location plenum ceilings, utilize only plenum rated cables. For damp and wet location plenum ceilings and in all other duct and plenum spaces, run wiring (utilize a non-plenum type suitable for the damp/wet location) in metal conduit. Plenum rated cables may be utilized for other (i.e. non-plenum) applications, but only in dry locations. Plenum cables, even when installed in conduit, are prohibited in damp and wet locations.

D. In damp locations, utilize only cables specifically listed and identified for use in damp or wet locations. Provide all cables in wet locations (including underground and embedded in concrete slabs at or below grade, whether in conduit or direct buried) specifically designed for outdoor and submerged use and specifically listed and identified for use in wet locations.

4.17 Except as indicated otherwise on the drawings, 21 mm (3/4") raceways are the minimum permitted. No raceway smaller than 21 mm (3/4") is permitted under any circumstance (except where specifically approved in writing by the owner and engineer for the individual condition encountered). Where luminaires, devices, or equipment have factory knockouts or hubs smaller than 21 mm (3/4") size (or smaller than conduit sizes specified on the drawings), provide suitable reducing conduit fittings or provide field knockouts at equipment to match conduit size.

4.18 Except as indicated otherwise on the drawings, #12 AWG conductors are the minimum permitted for power and lighting and #14 AWG conductors are the minimum permitted for control and signal systems. #10 AWG conductors are the minimum permitted for outdoor wiring, night lighting circuit wiring, and emergency power and lighting wiring. #10 AWG conductors are the minimum permitted where circuits exceed 23 m (75'0") for 120/208/240 V circuits or exceed 46 m (150'0") for 277/480 V circuits, measured to the center of the load.

4.19 Provide a separate neutral conductor with each branch circuit where a neutral is required or indicated on the drawings. Multi-wire branch circuits with a shared common neutral are not permitted, unless specifically indicated otherwise on the drawings. Utilize multi-wire branch circuits with a shared common neutral conductor for lighting controlled by "dual switching" where the lighting is connected to two (2) circuits.

4.20 Multiple branch circuits may be installed in the same raceway (including surface raceways) where permitted by code and provided all of the following conditions (A through D below) are met.

A. Apply appropriate NEC de-rating factors and adjust conductor sizes accordingly. Wiring sizes indicated on the drawings are based on each circuit run in an individual raceway (and are not adjusted for de-rating factors), except where multiple branch circuits in a common raceway are specifically indicated on the drawings (wiring is adjusted for applicable de-rating factors in this case, but only for the specific wiring combination shown on the drawings).

B. Provide no conductor (after de-rating adjustment) exceeding #10 AWG, except grounding conductors as provided below (or as otherwise specifically approved in writing by the engineer).

C. Common equipment grounding conductors are permitted in lieu of individual equipment grounding conductors for each individual circuit. Provide minimum single equipment grounding conductor size two (2) standard wire sizes larger than the size as determined in accordance with the NEC. Provide isolated grounding conductors (where required) individually for each circuit and in addition to common equipment grounding conductors.

D. Provide raceway fill (after de-rating adjustment) not exceeding 30% (provide maximum number of conductors permitted not exceeding 75% of the maximum number permitted by Code [i.e. refer to NEC Chapter 9 and Annex C] to allow for future wiring). Adjust minimum conduit size to maintain 30% maximum fill.

4.21 Minimum raceway sizes indicated in the specifications and on the drawings are applicable to all conduit types specified, except schedule 80 PVC RNC (unless the drawings specifically indicate schedule 80 PVC RNC). Where schedule 80 PVC RNC is utilized and the specified conduit size is 63 mm (2.5") and smaller, increase conduit to the next higher trade size. Where schedule 80 PVC RNC is proposed and the specified conduit size is 78 mm (3") and larger, submit raceway fill calculations; where raceway fill with the specified conduit size exceeds 40%, increase conduit to the next higher trade size.

5. WIRING INSTALLATION

5.1 Securely support and fasten all raceways, cables, outlets, boxes, equipment, etc. in place as per the NEC. Support at intervals as per the NEC, but in no case exceeding 3.0 m (10'0"). Refer to the section of this specification "Fastenings, Supports, and Hangers" for information.

5.2 Where any run of wiring passes vertically through more than one (1) floor level (including where installed in open vertical chases), support at every floor level. For conduits 63 mm (2.5") and larger, utilize only suitable pipe riser clamps (B-Line #B3373 series or approved equal), suitable wall bracket offset pipe clamps (NPHC-National Pipe Hanger Corp. figure #430 series or approved equal), or engineer approved heavy duty steel brackets (fabricated of not less than 6.5 mm (1/4") thick steel and of type, design, and arrangement suitable for

the specific application and weights involved) for these floor level supports. Conduit clamps and strut type supports are not acceptable for this application. Equipment as manufactured by B-Line, Erico, and NPHC (or approved equal) shall be considered.

5.3 Make all changes in direction of 27 mm (1") and larger conduits with standard elbows or case metal fittings. Fabricate field-made bends and offsets in conduit with suitable hickey/conduit-bending machine. Make conduit bends of the long radius type without kinks, flattening or crushing. Do not install crushed or deformed raceways. Avoid trapped raceways in damp and wet locations. Exercise care to prevent the accumulation of plaster, dirt, or trash in raceways, boxes, fittings and equipment during the course of construction. Entirely free clogged or obstructed raceways or replace raceways

5.4 Provide raceway ends cut squarely and reamed. Provide raceway installation (including pull boxes as applicable) so there is no more than a total of 360 degrees of bends in any run of raceway. Provide pull boxes at intervals not greater than every 30 m (100'0"), unless otherwise indicated on drawings.

5.5 Maintain a separation of not less than 155 mm (6") between all raceways and hot water lines, steam lines, and any other surface with temperature exceeding 104 degrees F (40 degrees C), whenever possible. When not possible to maintain the 155 mm (6") separation, provide insulation pipe covering on the electrical raceways. Maintain a separation of not less than 102 mm (4") between all cables, raceways, and boxes and any roof or floor metal-corrugated sheet decking (in exposed and concealed locations), whenever possible. When not possible to maintain the 102 mm (4") separation, utilize only steel RMC or steel IMC with cast steel boxes.

5.6 Provide a suitable insulating or grounding type (as applicable) bushing on each conduit terminating in a pressed steel box and for each conduit stub. Bushing is not required where conduit terminates in a suitable conduit connector/termination fitting which includes an integral bushing or which provides smoothly rounded surface suitable and approved for use without a bushing.

5.7 Wherever raceways pass across structure expansion joints, provide suitable conduit expansion fittings. Where expansion fittings are not listed for grounding, provide external flexible copper grounding strap. Wherever expansion fittings are installed, provide a suitable junction box located not farther than 7.6 m (25'0") from the expansion fitting location. Coil suitable slack conductors in this junction box to allow functioning of expansion fittings. For continuous runs of PVC RNC exceeding 27 m (90'0"), provide expansion fittings at intervals not exceeding 15 m (50'0") to compensate for linear thermal expansion and contraction.

5.8 Where metal raceway is installed in contact with or entering earth or concrete in outdoor, wet, or damp locations, coat raceway with engineer approved coal tar or epoxy based corrosion resistant coating (3M, Benjamin Moore, Carboline, or approved equal).

5.9 Running threads are not permitted.

5.10 Do not run wiring horizontally across floors or the ground, to avoid tripping hazards and facilitate cleaning floors.

5.11 Horizontal runs of raceway at rooftops are not permitted (to facilitate future roofing repairs/replacement) except where specifically approved in writing by the architect and owner. Horizontal runs may not exceed 2.4 m (8'0") length. Do not install any wiring or electrical equipment of any type (specifically including disconnecting means and receptacles) within 4.5 m (15'0") of any edge of any roof under any circumstance, to avoid tripping and fall hazards. Equipment and wiring is only permitted within 4.5 m (15'0") of any edge of any roof where necessary to serve utilization equipment within the space and only where specifically approved in writing by the engineer and architect (where approved suitable protective means are included to prevent fall hazards). Support raceways at roofs in a manner to avoid harming, impacting, or compromising the roofing weatherproof integrity (fully coordinate requirement with roofing contractor/supplier [where present], architect, and owner). Where wiring is installed atop roofing material, utilize only pre-cast concrete paving units measuring not less than 12" x 12" x 2" (300 mm x 300 mm x 51 mm) laid on the roof and bonded to the roof using suitable roofing adhesive. Running rooftop wiring on wood blocks or bricks is not permitted under any circumstance.

5.12 In all kitchens, food preparation, and similar areas, run wiring concealed as much as possible. Where necessary to run wiring exposed, maintain space between raceways and building surfaces and run raceways *vertically only* in such a way to facilitate cleaning walls, ceilings, and floors and to avoid accumulation of foreign materials.

5.13 Install wiring in such a manner to avoid infiltrating water into the wiring system (during or after construction). Install wiring in such a manner so any water which does infiltrate cannot become trapped or accumulate and cannot drain into electrical or other equipment.

5.14 Install exposed wiring (including visible wiring and wiring in accessible ceiling spaces or other accessible locations) parallel or perpendicular to walls, structural members, or intersections of vertical planes and floors or ceilings.

5.15 Install concealed wiring (except as provided above for wiring in accessible spaces) as straight and direct as possible. Detail routing of all concealed wiring on record (as-built) documents.

5.16 Space raceways embedded in concrete slabs, walls, beams, etc. or run underground not closer than 76 mm (3") between outsides of raceways and install to avoid changing locations of reinforcement. Except when plans of raceways are approved by the engineer, provide embedded raceways, other than those merely passing through, not larger in outside diameter than one-third the thickness of the slab, wall, beam, etc. in which embedded.

5.17 Embedded raceways are not permitted to cross, except where the 76 mm (3") spacing and one-third thickness provisions above are maintained or exceeded.

5.18 In building exterior walls and roofs, do not install any wiring, other than that merely passing through, in veneer cavity or other interstitial spaces of the building envelope.

5.19 Provide all splices only in suitable code-sized junction or outlet boxes. Splices are not permitted in any type of conduit body under any circumstance.

5.20 Do not install any wires in raceways until all raceway work is completed and closed in such a manner as to prevent the possibility of water or other foreign matter entering raceways.

5.21 Wherever empty or spare raceways are installed, provide suitable pull wires with identification tags securely attached to each end. Where empty or spare raceways do not terminate in boxes or enclosures, provide suitable conduit caps. Utilize only conduit fitting type caps appropriate for the conduit involved. Rubber and plastic conduit plugs, duct sealing compounds, and tape are not acceptable.

6. FASTENERS, SUPPORTS, AND HANGERS

6.1 Provide all fastenings, supports, hangers, clamps, and anchors of the type made for the specific purpose for which they are used.

A. Utilize wood screws for fastening to wood.
B. Utilize toggle bolts or bolt fastenings for fastening to hollow tile, terra cotta, hollow masonry units, lath, and similar construction.
C. Utilize machine screws/bolts with nuts for fastening to structural steel.
D. Utilize metallic expansion shield anchors and machine screws/bolts for fastening to concrete, brick, and solid masonry. Wooden plugs with screws and plastic expansion shield anchors are not acceptable.
E. Threaded studs driven in by a powder charge and provided with washers and nuts may be used in lieu of expansion anchors, machine screws, and wood screws under the applications indicated above.
F. Utilize engineer approved adhesive fastening on roofing areas (mechanical fasteners are not be permitted to be driven into roofing surfaces).
G. Threaded C-clamps are not permitted.
H. Additional acceptable supports for a single 21 mm (3/4") EMT only include common nails for wood, spring-tension clamps for steel and nail-type nylon anchors for masonry.
I. Additional acceptable supports for not more than two (2) cables (where cable wiring methods are permitted elsewhere in this specification) only include nails for wood, spring-tension clamps for steel, and nail-type nylon anchors for masonry. A single cable only may be secured directly to wood with NEC approved cable staples.

6.2 To prevent swaying, vibrating and/or sagging, rigidly and firmly install raceway and cable (where cable wiring methods are permitted elsewhere in this specification).

A. Support with malleable or wrought steel clamps, hangers, or with fabricated strut type supports (steel only, aluminum is not acceptable unless specifically indicated on the drawings). Provide strut type supports as B-Line, Kindorf, Power-Strut, or Unistrut (or approved equal).
B. Stamped metal one-hole and two-hole straps are permitted to secure EMT and cable wiring methods permitted by the specifications in exposed and concealed dry indoor locations not subject to abuse or injury only.
C. Stamped metal wrap around "mineralax" type hangers are permitted to secure EMT and cable wiring methods permitted by the specifications in hidden and concealed dry indoor locations not subject to abuse or injury only. Stamped metal wrap around type hangers are not permitted for visible exposed wiring.
D. Additional manufactured fastening systems specifically designed for the purpose shall be considered to secure cable wiring methods permitted by the specifications, but only where submitted for review and approval before commencing work.
E. Do not weld raceways, clamps, hangers, or straps to steel structure.

F. Wire (including ceiling support wires), perforated pipe straps, plastic ties, "J" hooks, and bridle rings are not acceptable.

6.3 Provide all supports and fasteners of the following materials, unless indicated otherwise.

A. Utilize stainless steel for all applications, unless indicated otherwise. Utilize stainless steel only when underground or in contact with earth or floors in outdoor areas, mechanical rooms, kitchens, and other areas subject to the possible presence of water on the floor/ground.
B. Steel protected by hot-dip or mechanical galvanizing after fabrication may be utilized for all conditions except conditions indicated above as requiring only stainless steel. Clean areas where galvanizing is cut or damaged and touch-up with suitable zinc dust/zinc oxide paint.
C. Steel protected by pre-galvanizing before fabrication, epoxy coating, zinc electrolytic plating, or other engineer approved corrosion resistant coating may be utilized for interior locations not subject to abuse or injury.
D. Other materials providing equivalent or superior strength and corrosion resistance to the above shall be considered.
E. Supports and fasteners without corrosion protection, protected only by painting, or protected only by oil coating are not acceptable under any circumstances.
F. For electrical fasteners (at conductors and all current-carrying parts), utilize only materials and types approved by the NEC and listed for the application.

6.4 Provide all fastening, supports, wall brackets, ceiling trapeze, and hangers for the installation of all equipment and wiring. Install all fastenings, supports and hangers in such a way and at such intervals as per NEC or otherwise required to support the equipment. The electrical contractor is responsible for verifying that supports are adequate for the load supported, based upon weight, stresses which may be applied to the support (including when installing equipment, pulling wiring, physical impacts to equipment, and seismic/earthquake loads as per IBC Section 1613), vibration, etc. Submit calculations for any supports where requested by the engineer.

6.5 In new concrete structure, engineer approved cast-in-place type inserts (furnished and installed by the electrical contractor and coordinated with and under the direct supervision of the general contractor) may be utilized in concealed locations, unfinished spaces, and other locations where approved by the architect and owner. Inserts may be of the spot or continuous types. Continuous type may be used to directly support raceways.

6.6 For all telephone and equipment backboards indicated on the drawings and wherever plywood backboards are installed to support and/or mount electrical equipment, utilize only fire resistant plywood.

6.7 Where the contractor installs fasteners or supports not meeting specified requirements (without prior written approval) the contractor shall remove the fasteners and supports and install new fasteners and supports as specified at no cost to the owner.

7. CHASES, RECESSES, AND OPENINGS

7.1 Provide, including all excavation, cutting, patching, fire stopping, sealing, backfill, surface restoration, and painting, all required openings, chases, and recesses in the construction for all work.

7.2 Where openings are required in new or modified structure, furnish the exact location, size, and other necessary information to the contractor installing or modifying the structure in ample time to have them incorporated during construction as approved by the architect and engineer. If the electrical contractor fails to comply with these information requirements, then the electrical contractor shall perform the necessary cutting and patching at his own expense under the direct supervision of the general contractor.

7.3 Where openings in masonry are required, make by coring only.

7.4 Locate and provide all openings (including openings for junction and outlet boxes and luminaires) in such a manner to maintain any required fire/smoke rating, waterproof, and sound transmission integrity in accordance with all applicable codes and standards (including, but not limited to IBC/BOCA, NFPA, and UL). Where boxes are located in opposite sides of fire/smoke/sound rated walls, maintain minimum spacing between boxes as per NEC. The general contractor shall provide fire/smoke rated enclosures around luminaires and boxes where required to comply with fire/smoke ratings.

8. CUTTING, PATCHING, FIRE STOPPING, AND PAINTING

8.1 Perform all required excavation, cutting, patching, fire stopping, sealing, backfill, surface restoration, and painting associated with the electrical installation. Perform in accordance with general construction specifications and as indicated elsewhere in this specification. Coordinate all requirements with the general contractor. This includes cutting and patching associated with suspended ceiling tiles and grid.

8.2 Completely restore (including painting where applicable) all surfaces to match existing condition as directed and approved by the owner, architect, and engineer.

8.3 Completely seal and fire stop all penetrations of all fire and/or smoke rated walls, floors, ceilings and any other construction (including all construction required to be rated by any code) to a rating matching or exceeding the fire rating of the construction. Refer to architectural drawings and specifications for information on fire ratings of building construction and include all costs in bid. Provide the complete installation (including fire stopping methods and materials) complying with all applicable fire rating codes and standards (including the NEC, NFPA, IBC/BOCA, and UL (including the UL "Fire Resistance Directory").

8.4 Completely seal and weatherproof all penetrations of exterior, at or below grade, and wet location walls and floors and roof penetrations.

8.5 Paint all exposed raceways, boxes, enclosures, etc. as directed by the owner and architect.

8.6 Provide baked enamel painted finish for all equipment and materials as directed by the owner and architect. Wherever finish colors are indicated on the drawings (including symbol list and luminaire schedule) as being selected by the architect ("as per architect", etc.), include costs in bid to utilize any of the available standard and/or optional colors listed in manufacturers' catalogs (excluding any colors identified in manufacturers' catalogs as "custom" or "premium").

8.7 Touch up damages to prime and/or finished paint coats on equipment. This includes touching-up stainless steel surfaces to avoid superficial surface rust (i.e. at cut surfaces and welds).

9. SLEEVES

9.1 Provide sleeves in all construction. Provide sleeves of minimum 0.85 mm (22 ga.) galvanized steel, sized for passing raceway/cable, and of the proper design for sealing and flashing around the sleeves where required. Locate and set sleeves extending approximately 51 mm (2") above floor in concealed locations, unfinished rooms, and mechanical spaces. Locate and set all sleeves flush with finished surfaces in finished areas unless otherwise directed by the owner and architect.

9.2 Seal the space between the raceway/cable and sleeve and between the sleeve and structure in an engineer and code approved manner. Seal and fire-stop all penetrations to a fire rating not less than the wall, ceiling, floor, or member penetrated. Completely seal and waterproof all penetrations of exterior walls, roofs, mechanical room floors, or any other area subject to weather or water.

10. FLASHING AND ACCESS PANELS

10.1 Where a general contractor is present, base flashing is by the general contractor, otherwise base flashing is by the electrical contractor. Counter flashing (provide of 0.47 mm (28 ga.) copper) is by the electrical contractor under all circumstances.

10.2 Provide access panels for all items requiring accessibility for operation and maintenance or where required by code. Provide access panels of not less than 1.6 mm (16 ga.) steel frame and not less than 1.9 mm (14 ga.) steel panel, with tamper-proof fasteners, and compatible with the type of construction in which they are installed. Where installed in fire rated walls or ceilings, provide access panels with fire rating matching or exceeding the fire rating of the wall/ceiling involved.

10.3 Where a general contractor is present, the electrical contractor shall furnish all access panels and the general contractor shall install access panels under the direction of the electrical contractor.

11. LOCATIONS AND MOUNTING HEIGHTS

11.1 The approximate locations of luminaires, pipes, switches, radiation, receptacles, outlets and other equipment and materials are indicated on the drawings. Provide actual locations and mounting heights as determined by, confirmed with, and approved by the owner and architect during field construction (prior to rough-in). Where equipment or devices are installed without prior approval/confirmation or without prior written notification (see below) and the location or mounting height is not acceptable to the owner and architect, relocate the equipment and all associated wiring as directed by the owner and architect at no cost to the owner.

11.2 Provide mounting heights complying with all applicable federal, state, and local disabled ("handicapped") access codes, standards, and requirements, including the Americans with Disabilities Act (ADA).

11.3 Provide mounting heights for all equipment as follows. Utilize standard mounting heights indicated below for all equipment, unless indicated otherwise on the drawings or otherwise directed by the owner and architect. Where installation conditions and/or obstructions make it impossible to install equipment at the standard height, the mounting height may be adjusted to suit conditions, provided the mounting height falls within the listed maximum and minimum heights. Notify the architect and engineer in writing of all conditions where deviating from standard mounting heights. Provide mounting heights not greater than the maximum mounting height and not less than the minimum mounting height under any circumstance, unless specifically approved in writing by the owner, architect, and engineer.

11.4 All mounting heights listed below are above finished floor, unless indicated otherwise. Mounting heights listed as "to bottom" are measured to the lowest operable part of the equipment or the lowest visual indicating device on the equipment. Mounting heights listed as "to top" are measured to the highest operable part of the equipment or the highest visual indicating device on the equipment.

	Mounting Heights		
	Standard	Minimum	Maximum
Control Devices			
Wall Switches & lighting controls	46" (1.17m) to ctr.	15" (0.38m) to bot.	48" (1.22m) to top
Thermostats & other controls	46" (1.17m) to ctr.	15" (0.38m) to bot.	48" (1.22m) to top
Receptacles and Outlets			
Receptacles, tele/data, & similar *	18" (0.46m) to ctr.	15" (0.38m) to bot.	48" (1.22m) to top
Wall mounted telephones	46" (1.17m) to top	27" (0.69m) to bot.	48" (1.22m) to top
Card Readers	40" (1.02m) to ctr.	15" (0.38m) to bot.	48" (1.22m) to top
Electrical Equipment			
Safety switches **	See max./min.	15" (0.38m) to bot.	48" (1.22m) to top
Enclosed circuit breakers **	See max./min.	15" (0.38m) to bot.	48" (1.22m) to top
Devices with fuses/breakers **	See max./min.	15" (0.38m) to bot.	48" (1.22m) to top
Contactors **	See max./min.	15" (0.38m) to bot.	48" (1.22m) to top
Transfer Switches **	See max./min.	15" (0.38m) to bot.	48" (1.22m) to top
Time clocks, individual **	See max./min.	15" (0.38m) to bot.	48" (1.22m) to top
Annunciators and displays	46" (1.17m) to ctr.	15" (0.38m) to bot.	48" (1.22m) to top
Equip. indicated with (**) where group mounted	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
Equip. indicated with (**) where too large to mount at above heights	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
Branch panels	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
Wall mounted distribution panels	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
Controllers & grouped controls	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
Individual meter sockets ***	48" (1.22m) to ctr.	36" (0.92m) to ctr.	60" (1.52m) to ctr.
Meter centers ***		Contact engineer	
Fire Alarm Equipment			
Fire alarm controls	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
Pull stations	48" (1.22m) to top	42" (1.07m) to bot.	48" (1.22m) to top

Horns/speakers/strobes/bells ****	80" (2.03m) to bot.	80" (2.03m) to bot.	96" (2.43m) to bot.
All equipment mounted above counters	*****	15" (0.38m) to bot.	44" (1.17m) to top
Other Equipment			
Other equipment mounted on standard electrical outlet boxes	46" (1.17m) to ctr.	15" (0.38m) to bot.	48" (1.22m) to top

Contact the engineer for any equipment not listed or similar to equipment above.

* Specifically coordinate with any wall-mounted radiation, if present

** Applies where equipment is mounted individually, see below for group mounted equipment.

*** Provide metering equipment mounting heights conforming to utility company requirements, where applicable, regardless of mounting heights indicated above.

**** For ceilings lower than 90" (2.29m), mount fire alarm signaling devices 6" (0.15m) below the ceiling. Fire alarm signaling devices may be ceiling mounted if mounted on the lowest portion of the ceiling, if mounted not higher than 9.14 m (30'0") above the lowest floor level in the room and if located and spaced in accordance with NFPA requirements.

***** Standard mounting height for above counter equipment is 6" (0.16m) above back splash or 8" (0.20m) above counter where no back splash is present, but not higher than the maximum shown above.

11.5 Where any equipment or device protrudes more than 100 mm (4") from the finished wall surface, mount at height conforming with the ADA and in accordance with the following. Contact the engineer where maximum and minimum heights listed above conflict with mounting requirements summarized below.

A. Mount so the bottom of equipment/device is 0.68 m (2'3") AFF or less.

B. Mount so the bottom of equipment/device is 2.0 m (6'8") AFF or greater.

C. Projecting equipment/devices are permitted mounted with the bottom between 0.68 m (2'3") and 2.0 m (6'8") AFF where protected with a suitable warning barrier in accordance with ADA requirements.

D. Projecting equipment/devices are permitted mounted with the bottom between 0.68 m (2'3") and 2.0 m (6'8") AFF without warning barrier protection only where specifically approved in writing by the engineer.

12. ELECTRIC SERVICE

12.1 Perform all electrical service work complying with applicable electric utility company standards and requirements, including metering equipment locations, equipment specifications, service/meter applications, inspections, notification, scheduling, and service pole/manhole.

12.2 Utility service-related work shown on the drawings is approximate as a guide to pricing only and is not fully coordinated with respective utility companies. Submit to utility companies for approval all required service/meter application forms and shop drawings on all service-related equipment and materials (service drop, lateral, and entrance conductors

and raceways, metering equipment of any kind, any equipment containing a service disconnect or service overcurrent device, any equipment on the line side of a service disconnect, pole risers, transformer pads, transformer connections, any equipment subject to utility company standards/regulations, and any other equipment requested by utilities). Fully coordinate all service-related work in detail with utility companies, and obtain written approval (specifically including formal response to service/meter application) from utility companies, before releasing equipment and before associated rough-in of work. The electrical contractor is solely responsible to fully coordinate and verify service requirements with utility companies (include all costs in bid). No consideration, claims, charges, or compensation will be granted under any circumstance associated with failure to fully coordinate with or obtain full approvals from utility companies.

12.3 Reference single line diagram for description of the proposed electrical system.

12.4 Where pole risers are indicated on the drawings, provide a complete riser in accordance with all applicable utility company requirements. Verify exact riser requirements with utility company prior to submitting bid (include all costs in bid). Provide riser including all ancillary equipment as directed by the utility company, including (but not limited to) raceways stubbed and/or run up pole, molding, grounding, suitable slack conductors, location of riser around circumference of pole, etc..

12.5 Provide protective bollards for all pad mounted outdoor equipment. Provide quantity and location as per utility company standards (for both utility and customer owned equipment) unless otherwise indicated on the drawings. Provide consisting of not smaller than 102 mm (4") steel RMC filled with concrete, protruding at least 1.2 m (4'0") above finished grade, set in not less than 0.3 m (1'0") diameter x 0.9 m (3'0") deep concrete base, and in no case less than the minimum construction required by utility company standards. Provide bollards even if not shown on electrical drawings.

13. UTILIZATION EQUIPMENT CONNECTIONS

13.1 Provide complete power wiring and final connections for utilization equipment as indicated on the drawings. This includes, but is not limited to, all mechanical, kitchen, manufacturing, computer, medical, office, copier, fixed, and portable equipment and apparatus. Coordinate all requirements with the contractor supplying the equipment (the supplying contractor).

13.2 Provide connections complete and including power wiring from the electrical contractor provided local disconnecting means to each piece of equipment. If required, pass power wiring through supplying contractor furnished control equipment (including thermostats, relays, timers, integrated controllers, starters, contactors, VFD's, etc.). Provide a single point connection or multiple-point connections (by separating one larger circuit into smaller circuits at controller and/or equipment) as applicable (include all costs in bid). The electrical contractor is responsible for taking deliveries of all control equipment (which power wiring passes through) from the supplying contractor and for mounting and passing power wiring through this control equipment. Locate control equipment as indicated on mechanical or other trades documents or as otherwise coordinated with and approved by the owner, architect, mechanical engineer, and the supplying contractor.

13.3 All control wiring and associated raceway is by the supplying contractor (regardless of voltage), unless specifically indicated on the drawings. All central/common control panels are by the supplying contractor (power wiring is by the electrical contractor), unless specifically indicated on the drawings.

13.4 Provide safety switches as local disconnecting means at all equipment. Provide switches regardless of whether shown on the drawings or not. Provide switches regardless of whether or not the equipment includes integral unit switches or circuit breakers. Provide outdoor switches as NEMA-3R and indoor switches as NEMA-1.

13.5 For all equipment rated 120 V or 277 V and 20 A or less, provide either direct connection, including thermal overload switch where disconnecting means is required, or suitable receptacle where equipment is supplied with cord and plug (combination of plug and receptacle serves as disconnecting means), include all costs in bid.

13.6 Prior to rough in of raceway or purchasing any associated electrical equipment, obtain shop drawings from the supplying contractor and verify all requirements. The electrical contractor is fully responsible for contacting and obtaining copies of approved shop drawings from the supplying contractor. This includes fully coordinating the locations of all equipment and wiring in/serving elevator shafts, pits, and machine rooms.

13.7 Where equipment is served by variable frequency drives (VFD's), other solid-state controllers, or other special starters or controllers, wiring indicated on the drawings is as a guide to pricing only. Prior to rough in of raceway or purchasing associated electrical equipment, verify all requirements in writing with the supplying contractor. Provide exact circuit breaker trip amperes (or fuse amperes, where applicable) for circuits feeding this equipment as coordinated with and directed and approved by the manufacturer, include all costs in bid. Where the required circuit breaker/fuse amperes exceed the ampacity of the specified wiring, notify the engineer in writing. Provide all safety switches connected on the load side of VFD's with auxiliary contacts and interconnect (including providing all required wiring in separate 21 mm (3/4") raceway from power wiring) with VFD controls (to prevent and stop operating VFD with load disconnected). Provide all power wiring on the load side of any VFD as a dedicated circuit (from individual VFD to motor served) with no other circuit or wiring (of any kind) in the same raceway.

13.8 Where heat trace, control power transformers and control power supplies (rated 500 VA and less), electric alarm bells, plug-in condensate pumps, ultraviolet germicidal lamps in HVAC equipment, electrically operated security devices, door hardware, dampers (including smoke and fire dampers), and valves (including sinks/toilets/urinals), switchgear/switchboard strip/space heaters, etc. are specified on mechanical, plumbing, fire protection, electrical, or architectural drawings or specifications, provide appropriate wiring and power connections (whether shown on electrical drawings or not). Verify and coordinate voltage and wattage/amperes in field and provide wiring accordingly. Obtain power from a suitable nearby branch circuit. Include all disconnecting means switches, junction boxes, receptacles, and other equipment as per code or manufacturer recommendations. Provide ground fault protection (utilizing protective devices complying with the NEC) for all heat tracing.

13.9 For ductless split ("mini") style HVAC equipment the electrical contractor shall coordinate in detail with the supplying mechanical contractor before submitting bid to ensure that the

equipment is compatible with power wiring shown on the electrical drawings. The supplying contractor shall furnish only equipment which is capable of separate and independent power supply to indoor and outdoor ductless split units (powering indoor unit from outdoor unit is not acceptable, unless specifically indicated on the electrical drawings). The supplying contractor shall furnish only equipment which is arranged so the incoming power wiring is energized all of the time and so the incoming power wiring is not used to control any of the equipment involved. All control wiring between indoor and outdoor units (and branch controllers, where applicable) is by the supplying contractor (see specifications section 13.3 above). Where ductless split equipment is supplied which is normally arranged to control one unit from another by directly switching power wiring, the supplying contractor shall include any necessary suitable relays (and associated wiring and modifications) to accommodate independent power supply. The electrical contractor is responsible for ensuring that this is coordinated in advance and that the ductless split style HVAC equipment, control wiring, and relaying is furnished by the supplying contractor accordingly. No extra consideration, claims, charges, or compensation will be granted under any circumstance associated with coordination of interconnection of ductless split style HVAC equipment.

14. DEMOLITION, REMOVAL, RELOCATION, AND RE-FEEDING

14.1 Disconnect, remove, relocate, and/or re-feed existing wiring and electrical equipment as indicated on the drawings (including, but not limited to, as indicated in electrical notes on the drawings) and otherwise provided in contract documents. Assume that all demolition and new construction requires disconnecting, removing, relocating, and re-feeding unless verified otherwise in the field. No consideration, claims, charges, or compensation will be granted for any alleged misunderstanding of the scope of disconnecting, removing, relocating, and re-feeding or as a result of failure to verify existing conditions.

14.2 Fully verify all requirements associated in any way with demolition, removals, relocations, and re-feeding and include all costs in bid. Visit site prior to submitting bid and investigate and verify all existing conditions (including verifying conditions above all accessible "drop" ceilings and in accessible chases). Completely remove from the site and properly dispose of all equipment and materials removed.

14.3 Prior to commencing any removals, completely verify all conditions and exact requirements related to re-feeding, maintaining, or affecting service to existing electrical equipment, devices, and wiring and mechanical, architectural, and other equipment and system in the field during construction. Where equipment or wiring is removed which is required to re-feed equipment, maintain service, or effects systems to remain, replace or reinstall the equipment and wiring. No extra consideration, claims, charges, or compensation will be granted to re-feed, reinstall, replace, reconfigure, etc. wiring and equipment where removed without first verifying all conditions.

14.4 Wherever electrical equipment and wiring is removed from visible finished surfaces, patch and restore the surface to the original condition matching existing adjacent surfaces. This includes all required painting, filling all openings (including channels and filling holes left from supports), etc..

14.5 Where existing ceilings are removed and reinstalled (either partly or entirely), remove all existing electrical equipment (including lighting fixtures, fire alarm devices [including, but

not limited to, smoke and heat detectors, signaling devices, indicators, etc.], security/CCTV cameras, motion detectors, speakers, and all other electrical devices, equipment, and apparatus) from the ceiling grid and ceiling tiles. Leave in place at the ceiling and temporarily support (in a code approved and local authorities having jurisdiction approved manner) to facilitate ceiling removal. Once ceiling is reinstalled, permanently reinstall all electrical equipment in the ceiling. Where new equipment is shown on the drawings, completely disconnect and remove existing equipment (being replaced) and all associated wiring and provide all new equipment and associated wiring as shown on the drawings. Ceilings may be left open for a long period of time (i.e. there may be several months or more between the time of removal and the time of reinstalling ceilings). When ceilings are not in place, maintain (as operational) all fire alarm devices and equipment and normal and emergency lighting (temporarily install fire alarm devices, supported from structure and provide temporary lighting or temporarily support existing lighting from structure as applicable). When ceilings are not in place, safely secure everything which is exposed by the absence of ceilings (new and existing) and keep all areas clean when occupied. This ceiling work is not shown on electrical plans (see architectural drawings and ceiling plans and other trades drawings for information). This ceiling work applies regardless of the party removing the ceiling and regardless of whether or not ceiling removal is shown on drawings. Coordinate with all contractors and trades to confirm the extent of ceiling work and include all costs in bid. This ceiling work also applies where any contractor chooses to install new ceiling in lieu of reinstalling the existing ceiling.

14.6 Where existing ceilings are removed and new ceilings are installed (either partly or entirely), remove all existing electrical equipment (including lighting fixtures, fire alarm devices [including, but not limited to, smoke and heat detectors, signaling devices, indicators, etc.], security/CCTV cameras, motion detectors, speakers, and all other electrical devices, equipment, and apparatus) from the ceiling grid and ceiling tiles. Leave in place at the ceiling and temporarily support (in a code approved and local authorities having jurisdiction approved manner) to facilitate ceiling removal. Once new ceiling is installed, permanently reinstall all electrical equipment in the ceiling. Where new equipment is shown on the drawings, completely disconnect and remove existing equipment (being replaced) and all associated wiring and provide all new equipment and associated wiring as shown on the drawings. Ceilings may be left open for a long period of time (i.e. there may be several months or more between the time of removal and the time of installing new ceilings). When ceilings are not in place, maintain (as operational) all fire alarm devices and equipment and normal and emergency lighting (temporarily install fire alarm devices, supported from structure and provide temporary lighting or temporarily support new or existing lighting from structure as applicable). When ceilings are not in place, safely secure everything which is exposed by the absence of ceilings (new and existing) and keep all areas clean when occupied. This ceiling work is not shown on electrical plans (see architectural drawings and ceiling plans for information).

14.7 Where electrical work involves removal and reinstallation of existing ceilings, removal and relocation is the responsibility of the electrical contractor. As an alternative (at the electrical contractor's option) to reinstalling ceilings removed to facilitate electrical work, the electrical contractor may install a new ceiling of a type matching the existing ceiling provided there is no cost change to the contract (wherever new ceiling involves additional cost to the contract, new ceiling is not acceptable).

15. EXCAVATION, BACK-FILLING, AND RESTORATION

15.1 Perform all required excavation, cutting, patching, backfill, surface restoration, and painting associated with the electrical installation, perform in accordance with general construction specifications. Coordinate all requirements with the general contractor. Refer to the section of this specification "Cutting, Patching, Fire-Stopping, and Painting" for additional information.

15.2 Install all underground wiring to maintain a minimum cover of 0.8 m (2'7") to top of raceways. Where field obstructions do not facilitate the above minimum cover, minimum cover as indicated in NEC Article 300.5 is permitted. Provide foil-backed detectable plastic warning tape installed 205 mm (8") below finished grade above the top of underground wiring and underground conduit duct banks (minimum 155 mm (6") wide and with color coding and wording according to the use of the wiring; Thomas & Betts #NAF-0700 series or equivalent).

15.3 Perform all excavation and work in and associated with excavation in accordance with all applicable safety codes, standards, regulations, and requirements (refer to specifications section "Safety" of specifications division 16100, General Electrical).

15.4 Completely restore all surfaces to a condition matching or exceeding the original condition to the satisfaction of the owner, architect, and engineer. Backfilling and restoration below does not supersede or serve as a substitute for concrete encasement of raceways specified elsewhere.

A. Earth (and other unpaved surfaces) excavation: Backfill with suitable on-site material, preferably utilizing excavated material, and compact during backfill. Provide additional material to provide a flush surface after compacting or settlement. Provide seeding (as directed by the owner and architect) to restore grass surfaces.

B. Sidewalk (and other paved surfaces not subject to vehicular traffic) excavation: Where pavement construction joints are spaced not greater than 1.8m (6'0") apart, remove complete blocks of paving to the construction joints to facilitate excavation. Where construction joint spacing exceeds 1.8 m (6'0"), either saw cut pavement at a convenient location or remove to construction joints to facilitate excavation. Backfill with suitable on-site material, preferably utilizing excavated material and compact during backfill. Replace pavement sub-base with new materials to match existing sub-base materials. Replace pavement with new materials to match existing pavement.

C. Roadway and parking lot (and other surfaces subject to vehicular traffic) excavation: Saw cut pavement 76 mm (3") deep prior to excavation. Remove pavement 300 mm (1'0") beyond the edges of below grade excavation ("cut-back" pavement 300 mm (1'0") on both sides of trench). Backfill with suitable on-site material, preferably utilizing excavated material and compact during backfill. Replace pavement sub-base with new materials to match existing sub-base materials. Replace pavement with new materials to match existing pavement, filling the entire width of the excavation with "cut-backs".

D. Optional roadway and parking lot (and other surfaces subject to vehicular traffic) excavation: The following may be substituted for the methods indicated in item "C" above at the contractor's option. Saw cut pavement 76 mm (3") deep prior to excavation. Remove pavement to the same width as the edges of below grade excavation (without any "cut-back"). Back fill with concrete only to the bottom of the sub-base. Replace pavement sub-base with new materials to match existing sub-base materials. Replace pavement with new materials to match existing pavement.

15.5 Completely remove and properly dispose of any material excavated and not utilized for backfill, include all costs in bid.

16. HOUSEKEEPING AND EQUIPMENT PADS

16.1 Mount all fully or partially freestanding electrical equipment on pads as follows. Where equipment is installed without pad (without prior written approval) the contractor shall remove the equipment, provide a suitable approved pad, and reinstall the equipment (including providing temporary power [including the use and cost of a generator if required] to maintain service) at no cost to the owner.

16.2 Provide all floor/roof mounted equipment on 100 mm (4") concrete housekeeping pad.

16.3 Provide all outdoor ground mounted equipment on a suitable pad. Level grade around pad. Provide top of pad 155 mm (6") nominal above finished grade (100 mm (4") minimum at any point).

16.4 Provide all housekeeping and equipment pads in complete accordance with equipment manufacturer's requirements and recommendations. This includes, but is not limited to anchor bolts, reinforcement, minimum thickness, pad openings/cutouts, raceway stubs, overall dimensions/shape, steel leveling channels, concrete characteristics, grounding (including grounding grids and loops), and structural details. Where applicable, provide pads as per utility company standards. For any equipment exceeding 500 kg (1,100 lb), submit shop drawings of exact pad construction, fabrication, and characteristics. This includes sealing (by a registered professional engineer) these shop drawings where requested by local authorities having jurisdiction for review.

16.5 Where approved by the manufacturer, engineer, and utility company (where applicable), pre-cast concrete pads and foundations may be utilized for outdoor installation. Install and set all pre-cast concrete pads on a smooth, compacted, and level base of not less than 155 mm (6") of crushed stone (or sand, for manhole style vault foundations 1.2 m (4'0") or deeper) according to manufacturer's (and utility company, where applicable) recommendations.

16.6 Where the project schedule, shutdown considerations, or other project conditions do not allow the time required for a cast-in-place indoor housekeeping pad, utilize a suitable custom pre-cast housekeeping pad (include all costs in bid). Pre-cast housekeeping pads may also be used under other conditions where approved in writing by the engineer and owner. Submit shop drawings for review and approval. Provide complete with openings pre-cast or cored in advance to facilitate conduit stub-ups (where applicable). Secure pad to the floor utilizing suitable concrete anchors. Set pad on wet bed of grout/mortar (to

provide a firm and level surface regardless of floor surface conditions/irregularities) and utilize shims (to level pad and avoid pad settling before/while grout/mortar cures). Where a new cast-in-place pad will be poured adjacent to a new pre-cast pad, provide 10 mm (3/8") (minimum) reinforcement cast into and stubbed out from the pre-cast pad (extending at least 230 mm (9") and spaced not farther than 230 mm (9") on center) in the direction of proposed poured pad.

END OF SECTION

SECTION 16300 - ELECTRICAL MATERIALS

1. GENERAL PROVISIONS

1.1 The applicable requirements and conditions of specifications section "General Provisions" of specifications division 16100, General Electrical, are hereby made an integral part of this section.

1.2 The work governed by these specifications includes but is not limited to that as defined in specifications section "Scope of Work" of specifications division 16100, General Electrical.

1.3 Provide all materials and equipment (products) as new, the best in grade and quality, and manufactured in the United States of America with standards and ratings as specified herein. No substitution or deviation from the materials and equipment specified is permitted except by written permission from the engineer. Provide all materials and equipment as listed and/or labeled where applicable.

1.4 Replace or repair, to the satisfaction of the owner, any materials and equipment damaged before or after installation.

1.5 Materials and equipment manufacturers and catalog numbers specified constitute the type and quality of design, material, workmanship, ruggedness of construction, resistance to vandalism, exact operating and performance characteristics, features, configuration, dimensions, etc.. Where multiple manufacturers are shown in the drawings and/or specifications, not all manufacturers shown may be capable of providing materials and equipment meeting the specifications, field conditions, etc.. Manufacturers not specifically shown on the drawings or specifications shall be considered, provided the products are equivalent or superior to the requirements of the drawings and specifications (including equivalent or superior to products and/or manufacturers specifically shown on drawings and specifications). Manufacturers, whether shown on the drawings or specifications or not, are acceptable only if they can meet the specifications, conditions, and requirements specific to this project. The terms "equivalent", "equal", "equaling", and "approved equal" mean "equivalent or superior to the item/process specified when approved by the engineer", unless otherwise noted.

2. RACEWAYS

2.1 Steel Rigid Metal Conduit (RMC) and Steel Intermediate Metal Conduit (IMC)

A. Provide steel RMC as full weight, heavy wall, mild steel pipe, galvanized inside and outside.

B. Provide steel IMC as standard wall steel pipe; otherwise the same as steel RMC.

C. Provide fittings for steel RMC and steel IMC of high grade steel, having rust resistant finish, providing ample wiring space, having smooth round edges, and having full threaded hubs.

D. Utilize only fully threaded screw-on fittings with steel RMC and steel IMC (coat field-cut threads as per NEC Article 300.6(A)). Compression, set screw, bolt on, or other thread-less fittings are not permitted.

2.2 Electrical Metallic Tubing (EMT)

A. Provide EMT of high grade steel and galvanized inside and outside. Enamel coating only is not acceptable.

B. Provide fittings for EMT of high-grade steel, having rust resistant finish, providing ample wiring space, and having smooth round edges. For EMT in damp locations (i.e. concealed), utilize only fittings of the thread-less compression type without set screws. For EMT in dry locations only, thread-less set screw steel type fittings are permitted. Die cast, set screw, and indenter fittings are not permitted.

2.3 Flexible Metal Conduit (FMC) and Liquidtight Flexible Metal Conduit (LFMC)

A. Provide FMC (commonly referred to as "green-field") of high-grade steel, galvanized inside and outside, having a smooth interior, and providing a continuously effective ground. Provide fittings for FMC of high grade steel, having rust resistant finish, providing ample wiring space, having smooth round edges, of the two (2) screw type, listed and NEC approved for grounding.

B. Provide LFMC (commonly referred to as "seal-tight") with an overall PVC sheath; otherwise the same as FMC. Provide fittings for LFMC of high grade steel, having rust resistant finish, providing ample wiring space, having smooth round edges, listed and NEC approved for grounding, and of the sealing compression gland type.

C. Where applicable, provide FMC and LFMC manufactured to comply with NEC Article "Places of Public Assembly".

2.4 Polyvinyl Chloride Rigid Nonmetallic Conduit (PVC RNC)

A. Provide PVC RNC of virgin PVC (or material reground from the manufacturer's own products), heavy wall, schedule 40 or schedule 80.

B. Provide fittings for PVC RNC of schedule 40 virgin PVC, providing ample wiring space, and having smooth round edges. Make all interfaces between PVC RNC and raceways, enclosures, boxes, other conduit types, etc., utilizing adapter fittings designed for the purpose.

C. Make all joints utilizing solvent welding method, installed to be completely watertight and pressure-tight to 172 kPa (25 p.s.i.).

D. High density polyethylene (HDPE) conduit and type "EB" encased burial and type "A" PVC conduits are not permitted under any circumstance.

2.5 Surface Raceway

A. Surface raceway with integral wiring devices: Provide steel or aluminum type as indicated on the drawings. Utilize one (1), two (2), or three (3) compartment types (with dividers as applicable) as indicated on the drawings.

B. Surface raceway without integral wiring devices: Provide steel type. Utilize Wiremold types #V700, #V2000, #V2100, or #V2400 (or approved equal) sized

according to the number of conductors to be run in the raceway. Utilize the smallest size raceway facilitating conductors. Raceway smaller than #V700 type is not acceptable.

C. Surface raceway plug-in strips: Provide steel type, Wiremold #V2000 series (or approved equal). Provide with #12 AWG through wiring suitable for use on 20 A branch circuits. Provide with 15 A, 120 V single receptacles 300 mm (12") on center, unless indicated otherwise. Provide one (1) or two (2) circuit type as indicated on the drawings.

D. Provide all steel surface raceways in factory ivory finish. Provide final painting (over the ivory factory finish) as directed by the owner and architect in the field. Provide all aluminum surface raceways in natural brushed aluminum finish.

E. Nonmetallic surface raceways are not permitted, unless specifically indicated otherwise on the drawings.

F. Provide all installations of surface raceways complete including all required fittings, accessories, details of installation, etc.. Include costs in bid for installing surface raceways around all obstructions encountered.

G. Provide fittings for surface raceways manufactured by the surface raceway manufacturer and specifically designed to be used with and compatible with the surface raceway and the actual installation conditions encountered. Provide fittings for surface raceways having rust resistant finish, providing ample wiring space, and having smooth round edges. Provide device box type fittings as per the section of this specification "Outlet, Switch, and Junction Boxes".

H. Perform all cutting, bending, and offsetting of surface raceways and components utilizing tools specifically designed and manufactured for the purpose by the surface raceway manufacturer. Cutting with hacksaws and bending/offsetting with standard conduit benders is not acceptable. Where the manufacturer does not manufacture or supply tools to perform work required (as indicated in manufacturer's standard catalogs), use only tools specifically recommended and approved for the purpose by the manufacturer.

I. Fasten and secure all surface raceways utilizing hardware concealed by the surface raceway. Visible securing and fastening hardware is not acceptable except that Wiremold #V5703 (or approved equal) supporting "back clip" type fasteners are permitted with #V700 style surface raceway without integral wiring devices only. One (1) or two (2) hole straps over the raceway are not acceptable.

J. Specifications are based on equipment as manufactured by Wiremold. Equipment as manufactured by Hubbell and Mono-Systems (or approved equal) shall be considered.

3. OUTLET, SWITCH, PULL, AND JUNCTION BOXES

3.1 Provide boxes of proper types and sizes to facilitate installation and as per code at all outlets and junctions indicated on the drawings and as otherwise required.

3.2 In unfinished areas, mount boxes flush or exposed. In finished areas, mount boxes flush in ceilings, walls, and floors, include all required cutting and patching. Where impossible to mount flush in finished areas or where surface wiring is required to serve equipment in finished areas, finished style (Wiremold #V5730 to #V5760, equipment as manufactured by Hubbell or Thomas & Betts (or approved equal) shall be considered) surface boxes are permitted. Standard style pressed steel boxes are not permitted in finished areas. Where the contractor installs improper boxes in finished locations (without prior written approval), the contractor shall remove the boxes and install new boxes flush mounted (including cutting and patching to flush mount boxes and wiring and including replacing or reinstalling wiring) at no cost to the owner.

3.3 Utilize boxes of either unit or ganged construction and sized for devices and wiring installed and not smaller than the minimum sizes as per the drawings and specifications (and in no case smaller than the minimum size permitted by the NEC). Provide boxes as galvanized pressed steel (unless indicated otherwise), not less than 4" square, and with the proper size knockouts to facilitate wiring.

3.4 For flush mounted boxes, provide box shape permitting surfacing materials to be on straight lines and to fit closely around the box. Provide boxes in plastered, drywall (GWB), and similar walls, partitions, and ceilings with suitable plastering rings.

3.5 Utilize cast and/or malleable rust-resisting steel boxes for wiring in exterior, wet, or damp locations and for exposed visible steel RMC and IMC runs. Utilize aluminum or alloy boxes only where aluminum conduit is permitted by the specifications and used.

3.6 For all boxes in floors, utilize only boxes specifically designed, NEC approved, and listed for floor installation (including maintaining fire rating of the floor).

3.7 Provide all boxes for lighting outlets with studs of a size suitable for the weight of the luminaire supported (in no case less than 10 mm (3/8")). Provide the stud of integral construction with the box or of the type inserted from the back of the box. Studs held to the box with bolts to support luminaire weight are not permitted.

3.8 100 mm (4") diameter "octagon" boxes are not acceptable, except under the following conditions. Octagon boxes are permitted in conjunction with luminaire mounting studs where studs are required above. Octagon boxes are permitted where required to mount equipment where equipment is not compatible with square or ganged type boxes (including the use of adapter rings on square boxes).

3.9 Secure boxes firmly in place and set true, square, and flat or flush (as applicable) with finished surfaces. Keep all unused knockouts closed or close with suitable threaded plugs (for threaded knockouts or hubs) or knockout seals (for unthreaded knockouts). Install flush mounted boxes so the covers are flush with the finished surface.

3.10 Provide all boxes with cover plates as specified below.

4. COVER PLATES

4.1 Provide cover plates for switches, receptacles, outlet and junction boxes, and other devices of 1.0 mm (0.04") thick metal with paint finish or of stainless steel (as directed by the

owner and architect, include costs in bid for painted or non-magnetic stainless steel), unless indicated otherwise.

4.2 Utilize suitable pressed galvanized steel code gauge raised covers for exposed wiring methods in unfinished areas and accessible hidden locations. Flat pressed galvanized steel code gauge covers may be utilized on junction boxes (where devices are not installed) or for ganged devices (three (3) gang or greater only). Tile and/or plastering rings style covers are not permitted for exposed wiring methods under any circumstance.

4.3 Utilize cast rust-resisting steel or #302 stainless steel covers with gaskets for boxes in wet, damp, or exterior locations or other locations where cast steel boxes are utilized.

4.4 Provide suitable blank covers on all unused boxes and boxes for future use (including boxes where devices are not installed at the time that electrical work is completed; specifically including telephone/data outlets where jacks and covers are not installed).

5. CONDUCTORS AND CABLE (600 V)

5.1 Provide all wiring (for all systems) utilizing multiple single conductors in raceway, unless indicated otherwise. Conductor sizes indicated in the specifications and on the drawings are the minimum that will be accepted (conductor sizes are identified based on the NEC, as either American Wire Gauge [AWG] or thousands of circular mils [MCM or kcmil]). Where the contractor installs conductors smaller than the minimum size, the contractor shall remove conductors and install new conductors of the specified size at no cost to the owner.

5.2 Provide all conductors (including conductors in cables, where permitted) as 600 V, having flame retardant, heat resistant, and moisture resistant insulation, and listed and marked in accordance with industry standards and the NEC. Unless indicated otherwise, provide all conductors identified both as type "THHN" and as type "THWN" ("THHN/THWN"), rated 90 degrees C for dry and damp locations and rated 75 degrees C for wet locations. Conductors identified as type "XHHW" (in lieu of type "THHN/THWN") are permitted only where conductors are of the compact stranded type (type "XHHW" is not permitted for solid conductors or for standard concentric or compressed stranded conductors). Provide all conductors for all systems of a type suitable for installing in dry, damp and wet locations. Conductors suitable for dry locations only and conductors suitable for dry and damp locations only are not acceptable (except as specifically otherwise provided for plenum rated systems cables).

5.3 Provide all conductors of soft drawn copper (Cu, CU) wire of 98% conductivity. Aluminum (Al, AL) conductors are not acceptable, unless specifically indicated otherwise on the drawings.

5.4 For wiring installed in high temperature locations subject to temperature exceeding 60 degrees C (140 degrees F), utilize conductors with special heat resistant insulation based on and listed for exact temperature conditions and location classifications encountered (consult engineer for exact conductor type; include costs in bid to utilize any of types "FEPB" (glass braid type only), "MI", "PFA", "SA", "THWN-2", "Z", and "ZW"). Install wiring in high temperature locations in conduit raceways (surface raceways and cable wiring methods without conduit are not permitted, except type "MI" cable); provide respective conduit sizes in accordance with NEC raceway fill requirements. Transition to standard conductor types

are permitted (in a suitable junction box) beyond the minimum distance as per NEC Article 310.15(A)(2), Exception, measured from the first point where normal ambient temperature occurs.

5.5 Where permitted elsewhere in this specification, provide metal clad cable (type "MC") having interlocked steel or aluminum cladding and having conductors as specified above, including an insulated grounding conductor. Provide conductors #10 AWG and smaller as solid and conductors #6 A.W.G and larger as stranded. Conductors #8 AWG may be solid or stranded. Provide type "MC" cable listed and NEC approved to provide an acceptable grounding path. Provide fittings for type "MC" cable of suitable pressure pad/clamp type, high grade steel, having rust resistant finish, providing ample wiring space, having smooth round edges, and having full threaded hubs. Fittings utilizing set screws are not acceptable. "Snap-in" fittings of any kind (including, but not limited to, fittings designed to fasten in knockouts or hold cable with spring tension, fittings without treaded hubs, and fittings designed to be installed without the use of tools) are not acceptable. Provide type "MC" cable as listed and install in complete accordance with NEC Article 330. Where permitted by the NEC (including Article 604), listed manufactured wiring systems consisting of cables identified as type "MC" may be utilized wherever specifications allow the use of type "MC" cables. Where permitted by the NEC (including Articles 725 and 770), listed type "MC" cables containing Class 2 and Class 3 cable and/or optical fiber members in addition to power conductors may be utilized wherever specifications allow the use of type "MC" cables.

5.6 Where permitted elsewhere in this specification, provide armored cable (type "AC") having interlocked steel or aluminum armor and having conductors as specified above along with a code sized copper or aluminum (compatible with armor material) armor bonding wire. Provide conductors #10 AWG and smaller as solid and conductors #6 A.W.G and larger as stranded. Conductors #8 AWG may be solid or stranded. Provide type "AC" cable listed and NEC approved to provide an acceptable grounding path. Provide fittings for type "AC" cable of suitable pressure pad/clamp type, high grade steel, having rust resistant finish, providing ample wiring space, having smooth round edges, and having full threaded hubs. Fittings utilizing set screws are not acceptable. "Snap-in" fittings of any kind (including, but not limited to, fittings designed to fasten in knockouts or hold cable with spring tension, fittings without treaded hubs, and fittings designed to be installed without the use of tools) are not acceptable. Provide type "AC" cable as listed and install in complete accordance with NEC Article 320. Where permitted by the NEC (including Article 604), listed manufactured wiring systems consisting of cables identified as type "AC" may be utilized wherever specifications allow the use of type "AC" cables.

5.7 Where direct buried cables/conductors are specifically indicated on the drawings, provide conductors as 600 V, having flame retardant, heat resistant, moisture resistant, and sunlight resistant insulation and identified and listed as types "RHH/RHW-2/USE-2". Where messenger supported aerial multiplex cables are specifically indicated on the drawings, provide conductors as 600 V (with flame retardant, heat resistant, moisture resistant, and sunlight resistant insulation of a type in accordance with the NEC) with bare messenger to support the cable (hard drawn for copper conductors or ASCR for aluminum conductors).

6. SPLICES, TAPS, AND CONNECTIONS

6.1 Make all splices, taps, and connections at locations indoor and above ground only. Splices, taps, and connections are not permitted below grade (including below any floor level where

the floor is in direct contact with earth, i.e. basement slabs, slabs on grade, etc.), or where subject to being submerged (except as specifically provided as follows). Route raceways and wiring accordingly and include all costs in bid. Where physically impossible to install wiring to make splices/taps above grade, splices/taps below grade shall be considered where specifically requested in writing in advance (prior to installing conductors) by the contractor and where approved in writing by the engineer. Specifically and individually identify each and every case involved for below grade splices/taps in the request(s) and submit shop drawings for splices/taps (as indicated below). Where below grade splices/taps are installed by the contractor (without prior written approval) the contractor shall remove the raceways, wiring, splices, and taps and install new raceways and wiring in such a manner to completely avoid below grade splices/taps at no cost to the owner.

6.2 Perform all splices/taps in suitable code sized outlet and junction boxes only, not in raceways, conduit bodies, or equipment cabinets. Clean each strand of conductors carefully before connecting.

6.3 Where aluminum wiring is permitted elsewhere in this specification or where connecting to existing aluminum wiring, utilize only suitable crimp-on compression connectors/lugs. Bolted pressure type connectors/lugs are not acceptable under any circumstance. Where aluminum wiring terminates in factory installed bolted pressure lugs at equipment, utilize suitable crimp-on compression adapters (Ilsco #CPM, #ACM, and #ACO types or approved equal).

6.4 Insulation piercing type splices, taps, and connections of any kind are not permitted under any circumstance (including where applied after removing insulation).

6.5 Provide connections at equipment, apparatus, and devices for a complete installation and as follows. Coordinate all requirements with equipment to connect.

A. Where equipment includes factory "pig tails" for connections, make connections as specified above for splices and taps.

B. For stranded wiring #10 AWG and smaller, utilize suitable crimp-on "stacon" type terminals. Where equipment terminals include pressure pads, wiring may terminate directly at equipment without crimp-on terminals. Connecting stranded wiring directly at wire binding screw terminals (i.e. wrapped around screw) is not permitted under any circumstance.

C. For solid wiring #8 AWG and smaller, provide wiring connecting directly at terminals.

D. For wiring #6 AWG and larger and #8 AWG stranded wiring, utilize suitable crimp-on compression lugs. Where equipment is provided with factory-installed lugs, wiring may connect directly at factory lugs.

6.6 Where equipment (including equipment furnished by other contractors or the owner) is provided with factory installed lugs and the factory-installed lugs do not facilitate the specified wiring sizes, provide complete connections as summarized for the following options. Options "A" and "B" apply where the specified conductors are either larger than the maximum conductor for the lug or smaller than the minimum conductor for the lug. Option "C" applies where the specified conductors are larger than the maximum conductor for the lug.

A. Remove factory lugs and provide new suitable field-installed lugs. This option is not permitted where removal and replacement of lugs would violate equipment listing or where factory lugs are not removable.

B. Utilize suitable crimp-on compression reducing adapters to splice between specified conductors and conductors compatible with factory lugs. Perform this splice within the equipment enclosure containing the factory lugs (where there is sufficient NEC required space for splices) or in a code sized junction box outside of the equipment enclosure (where sufficient space is not available). Install splices as indicated above for splices and taps. Provide conductors between the reducing adapters and the factory lugs insulated, as short as practical, and sized as per the NEC and the factory lugs. Utilize Burndy types #YSV, #YRV-L, #Y-R (Cu), and #YRB (Cu/Al) reducing adapters (or approved equal). Coordinate exact types and sizes with actual conductors involved.

C. Utilize suitable crimp-on compression pin type adapters on the end of conductors connecting in the factory-installed lugs. Utilize Burndy types #YE-P, #YE-P-FX (Cu), #AYP, and #AYPO (Al) pin adapters (or approved equal). Coordinate exact types and sizes with actual conductors and factory lug size involved.

6.7 Provide splices and taps at indoor locations and outdoor locations above ground (excluding exposed outdoor splices/taps) as follows.

A. For stranded wiring #10 AWG and smaller and solid wiring #8 AWG and smaller, make splices/taps by twisting conductors together and utilizing suitable pressure type "wire nut" connectors. Tightly over-wrap with vinyl insulating tape. Utilize listed wire nuts with internal coiled square metal binding spring ("all plastic" and porcelain wire nuts are not acceptable under any circumstance). For splices/taps in wet locations, utilize only "self-sealing" wire nuts with integral water repellent non-hardening sealant (Ideal #60 "DB Plus" or approved equal).

B. For wiring #6 AWG and larger and for #8 AWG stranded wiring, make splices/taps utilizing suitable crimp-on compression connectors. Bolted type connectors are not permitted, except where available crimp-on compression connector configurations do not correspond to combinations and arrangement of conductors to be connected. Wrap with rubber insulating tape or vinyl mastic of type, thickness, and insulation level equaling or exceeding the original insulation then tightly over wrap the entire assembly with vinyl insulating tape covering all rubber tape/mastic without gaps or voids.

6.8 Provide all splices and taps underground, below grade, and subject to being submerged (where specifically approved in writing by the engineer) as follows. Provide splices/taps of direct buried and open aerial wiring (where specified elsewhere) as follows. Submit shop drawings for all proposed splice/tap products and methods. Where any splice/tap is installed in any underground, below grade, submerged, or exposed wet or outdoor location for which shop drawings are not previously submitted, the contractor shall disconnect and remove the installed splices/taps and provide new acceptable splices/taps (as directed by the engineer) at no cost to the owner.

A. Utilize manufactured or pre-engineered splices/taps specifically designed and listed for the application, including being suitable for installation underground, direct

buried, submerged, and in wet locations. Provide outdoor exposed splices/taps also as sunlight resistant. Pre-molded, heat-shrink, and cold-shrink manufactured kits and engineer approved pre-engineered hand-wrapped tape kits shall be considered.

B. For underground splices/taps of stranded wiring #10 AWG and smaller and solid wiring #8 AWG and smaller only, splices/taps may be made as follows. Permanently electrically connect conductors by either of the following options:

1) Twist conductors together then solder conductors. Utilize suitable pressure type wire nut connectors with integral water repellent non-hardening sealant (Ideal #60 "DB Plus" or approved equal) to mechanically bind the soldered splice/tap and tightly over wrap with vinyl insulating tape.

2) Splice/tap conductors with suitable insulated crimp-on connectors and tightly over wrap with vinyl insulating tape.

Once electrically connected, embed splices/taps in sealant compound. Utilize only engineer approved hardening flexible sealant (i.e. "bondo" traffic detector loop style sealant; contact the engineer for information and submit shop drawings for approval). Place sealant (uncured liquid) in a suitable container, immerse splices/taps in sealant in the container, and rigidly support splices, taps, and conductors in place until sealant has set.

C. Self-sealing wire nuts (used alone and/or when over wrapped with vinyl insulating tape) are not an acceptable substitute for splices/taps as specified in items "A" and "B" above.

6.9 Splices, taps, and connections (and associated materials) as manufactured by Burndy, Elastimold, G&W, Homac, Ideal, Ilsco, Mac Products, O-Z/Gedney, Plymouth, Raychem, Skotch/3M, and Thomas and Betts/Blackburn (or approved equal) shall be considered.

7. GROUNDING MATERIALS

7.1 Provide all material used for grounding of non-ferrous copper. Aluminum is not acceptable, unless specifically indicated on the drawings.

7.2 Provide all driven (made) grounding rod electrodes of copper or copper clad steel, minimum 19 mm (3/4") diameter by 3.0 m (10'0") long.

7.3 Provide all grounding conductors in accordance with the section of this specification "Conductors and Cable (600 V)", except as follows. Grounding conductors may be insulated or bare, except as follows. Wherever grounding conductors #6 AWG and smaller are insulated, provide insulation colored green. Provide "isolated" grounding conductors as insulated only (green with yellow tracer). Provide grounding conductors run in raceway/cable with wiring as insulated only (bare conductors are not permitted for grounding conductors run with wiring, except cable wiring methods permitted elsewhere in the specifications where insulated grounding conductors are not available).

7.4 Provide all grounding connections as per the section of this specification "Splices and Taps", except as modified below. Grounding connections do not require insulation.

7.5 For wiring #4 AWG and larger, provide all grounding connections utilizing exothermic weld process (Erico/Cadweld, Thermoweld, Thomas & Betts, or approved equal). Crimp-on compression type connectors may be used only where available exothermic weld process connection configurations do not correspond to combinations and arrangement of conductors to be connected. Bolted type connectors are not permitted, except where available exothermic weld process and crimp-on compression connector configurations do not correspond to combinations and arrangement of conductors to be connected. Where equipment is provided with factory installed lugs, #4 AWG and larger wiring may terminate directly at factory lugs.

7.6 Utilize only exothermic weld process connections for all concealed grounding connections (compression, mechanical, and other grounding connections are not permitted concealed). Where available exothermic weld process connection configurations do not correspond to combinations and arrangement of conductors to be connected in concealed locations, utilize combinations and arrangement of conductors necessary to facilitate exothermic weld process connections and extend from the concealed connection location to an accessible location where crimp-on compression or bolted type connections may be utilized (as permitted above).

7.7 Accessible connections of wiring #6 AWG and smaller to piping and similar materials/equipment may utilize multiple-bolt type ground clamps. Accessible connections of wiring #6 AWG and smaller to driven (made) grounding rod electrodes may utilize one-piece, single bolt "acorn" type ground clamps.

7.8 Provide conduit grounding bushings of galvanized malleable iron with integral screw pressure connector or provisions to accept factory or field installed lug where required.

8. IDENTIFICATION, NAMEPLATES, AND TAGS

8.1 Provide all new electrical equipment with engraved three (3) layer laminated plastic nameplates describing the equipment, load/device served, ratings, circuit(s) feeding the equipment, etc. as indicated below. Provide engraved plastic nameplates for existing electrical equipment where modified or connected to as part of this project or where specifically indicated on the drawings. Provide these engraved plastic nameplates in addition to any code required or manufacturers' standard nameplates.

8.2 Provide engraved plastic nameplates for all electrical equipment, including, but not limited to, safety switches, enclosed circuit breakers, branch panels, distribution panels (including branch circuit breakers and circuit breaker spaces), transformers, any equipment containing fuses, power outlets, thermal overload switches, contactors, time clocks, photocells, meter sockets, modular meter centers, fire alarm equipment and devices, lighting controllers, dimming cabinets, capacitors, snow melting equipment, generators, motor control centers, motor controls (starters, variable frequency drive [VFD] units, etc.) where furnished by the electrical contractor, high voltage equipment, etc. (where applicable). Provide engraved plastic nameplates for all receptacles and switches where dedicated to serving specific equipment. Provide engraved plastic nameplates for convenience receptacles (only where indicated on the drawings).

8.3 Secure engraved plastic nameplates with suitable screws or rivets, self-adhesive nameplates are not acceptable. Provide engraved plastic nameplates with white letters on black

background, unless indicated otherwise. Provide engraved plastic nameplates with 6.5 mm (1/4") minimum lettering, unless indicated otherwise. Provide engraved plastic nameplates on the front and/or cover of the equipment plainly visible when the cover (where applicable) is closed, unless indicated otherwise.

8.4 Submit shop drawings showing proposed sizes (overall and lettering sizes) and exact proposed wording (including exact arrangement of wording) of all engraved plastic nameplates for review and approval.

8.5 Provide all engraved plastic nameplates in accordance with the following example. Equipment names are the alphanumeric designation for equipment indicated on the drawings (i.e. "MDP", "PP1", "EF-1", etc.). Equipment descriptions identify the equipment in "plain English" (see example). Indicate the operating voltage of the equipment, including phase and wires (see example). Where equipment includes overcurrent devices (i.e. main breaker panels, fused switches, enclosed circuit breakers, etc.) show the appropriate amperes on the engraved plastic nameplate. Where equipment does not include overcurrent devices (i.e. main lug panels, unfused switches, contactors, transformers, etc.) show the amperes of the overcurrent device protecting the circuit serving the equipment. Remarks include information as described below.

EXAMPLE ENGRAVED PLASTIC NAMEPLATE WORDING

Equipment Name (use 10 mm (3/8") lettering):	PP1
Equipment Description:	POWER PANEL
Equipment Voltage, Phase, Amperes:	120/208V-3PH-4W, 100A
Remarks:	FED FROM MDP

A. Branch Panel: Provide engraved plastic nameplate showing panel name and use (description) as indicated on the single line diagram and/or respective panel schedule. Remarks indicate the panel and circuit number or transformer feeding the panel.

B. Distribution Panel: Provide "master" engraved plastic nameplate on the front cover showing information as indicated above for branch panels. For multiple section panels, locate master nameplate on the section containing the main breaker or incoming line main lugs. Remarks indicate the panel and circuit number or transformer feeding the panel (i.e. sub-distribution panel) or indicate "Service Disconnect" if a service entrance distribution panel. Provide additional nameplates for all branch circuit breakers and circuit breaker spaces (see below).

C. Branch Circuit Breaker in Distribution Panel: Provide engraved plastic nameplate for each new circuit breaker within a distribution panel (including breakers in existing panels connected to as part of this project). Show the name and description of equipment/load fed. Voltage and phase are not required on these nameplates. Amperes are not required on these nameplates if the rating is clearly and visibly indicated on the circuit breaker. Where adjustable trip circuit breakers are used, show the proper ampere setting on this nameplate. Remarks indicate the approximate location of the equipment/panel served. Where the distribution panel includes a hinged overall cover door, provide these nameplates mounted inside the hinged door.

D. Circuit Breaker Space in Distribution Panel: Provide engraved plastic nameplate for each circuit breaker space within a new distribution panel. Show the word "SPACE" and the maximum circuit breaker poles and frame size ampere rating. Equipment name, description, voltage, and remarks are not required on these nameplates. Where the distribution panel includes a hinged overall cover door, provide these nameplates mounted inside the hinged door.

E. Safety Switch/Enclosed Circuit Breaker: Provide engraved plastic nameplate with the name and description of equipment/load fed. Remarks indicate the panel and circuit number or transformer feeding the switch/breaker. Ampere rating may be omitted if the proper rating is clearly indicated on the switch/breaker and is visible with the cover closed. Where fusible switches are used, show the fuse ampere rating. Where adjustable trip circuit breakers are used, show the proper ampere setting.

F. Fusible Device: On the inside cover of each fused device, provide an engraved plastic sign indicating the proper fuse size (as indicated on the drawings or otherwise required). Provide nameplate reading, "USE ___A FUSE ONLY" (fill in the proper fuse rating).

G. Transformer: Provide engraved plastic nameplate with the name and description of equipment/load fed. Show both the primary and secondary voltages and phase as well as the transformer kVA rating. Ampere ratings are not required. Remarks indicate the panel and circuit number feeding the transformer.

H. Metering: Wherever new metering equipment is installed (including meters, meter sockets, meter boards, digital panel metering units, etc.), provide engraved plastic nameplate showing panel name(s) served by the meter as indicated on the single line diagram and customer buying electricity (description) as verified with the owner. Remarks indicate the panel and circuit number or transformer feeding the panel (or indicate "Fed From Service" if a utility meter). Show service voltage and phase of the metered feeder (not necessarily the meter voltage). For transformer rated metering installations, show current transformer (CT) ratio in place of ampere rating (i.e. "400:5 CT"). For self-contained metering (without CT's), show ampere rating of the metered feeder.

8.6 Provide engraved plastic nameplates for power outlets, thermal overload switches, and for receptacles and switches where dedicated to serving specific equipment. Show the equipment served, the voltage and ampere rating, and the circuit feeding the equipment. Utilize 3.2 mm (1/8") high minimum lettering. Provide as per the following example:

Equipment Name and Description:	MO-1 MICROWAVE OVEN
Equipment Voltage and Amperes:	120V 20A FED FROM PP1

8.7 Where specifically indicated on the drawings only, provide engraved plastic nameplates for convenience receptacles showing the voltage and ampere rating and the circuit feeding the receptacle. Utilize 3.2 mm (1/8") high minimum lettering. Provide as per the following example:

Equipment Voltage and Amperes:	120V, 20A
Equipment Circuit:	PP1-14

8.8 Provide engineer approved wrap-around adhesive or tube type wire tags or markers for all conductors, except conductors in feeders tagged as indicated below. Provide tags/markers indicating the panel or device where the wiring originates and the conductor circuit number (or other identifying number/letter/designation unique to the conductor). Tag/mark neutral and grounding conductors with the respective circuit number(s) of the corresponding phase conductor(s).

8.9 Provide engineer approved tags for all panel feeders (regardless of ampere rating) and other circuits (600 V and less) rated 100 A and larger, at both ends and at all intermediate junction and pull boxes. Provide tags indicating the circuit designation or equipment served, panel name and circuit number (or other source of feeder), and stating the voltage, phase, and amperes of the circuit. Provide tag wording and layout similar to engraved plastic nameplates as indicated above.

8.10 Where any conductor size differs from the conductor size normally expected for the respective overcurrent device (for any reason, whether specified or not, including voltage drop, NEC "tap rule" application, ampacity de-rating, etc.), provide engineer approved tags at the point where the wiring terminates at the overcurrent device reading, "WIRING IS ADJUSTED FOR VOLTAGE DROP/TAP RULE/DE-RATING, USE MAXIMUM ___A FUSE/CB" (indicate the proper reason for the adjustment and fill in the proper overcurrent device ampere rating). For feeders, this information may be included on the tags specified above.

8.11 Provide engineer approved plastic tags for all primary feeders (over 600 V) identifying the feeder number/designation and service voltage. Provide feeder numbers and exact tag configuration and information as designated by the owner and/or engineer during construction. Apply tags after applying cable fire protection tape, where applicable.

8.12 Provide all new and existing branch panels (where connected to or modified as part of this project) with accurate and descriptive typewritten circuit directories. For existing panels, provide directories including all modifications as part of this project as well as all previous "penciled in" changes and information. Actual tracing and identifying of existing circuits is not required, unless specifically indicated on the drawings. Submit photocopies of circuit directories as part of as-built record documents.

8.13 Provide all new electrical equipment with all caution, danger, and warning signs or indications required by any applicable regulation, code, standard, or manufacturer's recommendation (provide as listed where applicable and refer to specifications section "Regulations and Codes" of specifications division 16100, General Electrical). This includes, but is not limited to NEC Articles 100, 110, 200, 230, 250, 450, 490, 504, 513, 516, 550-552, 585, 620, 647, 665, 669, 690, 692, 700, 705, etc., as applicable.

8.14 Identify conductors in complete accordance with the NEC and as indicated below (including identifying "high-leg", grounding, and grounded (i.e. neutral) conductors, where applicable). For conductors #6 and smaller, identify by natural insulation color. For conductors #4 and larger (and for cable wiring methods where applicable colors are not readily available from cable manufacturers), identify by natural insulation color or by a 155 mm (6") long (minimum) band of colored vinyl electrical tape on conductors at all terminations and in all boxes and enclosures. Where "tracers" are required, identify by natural insulation color including narrow stripes of the tracer color. Where conductors including tracer stripes are not readily available, provide a 25 mm (1") band of tape (apply

over and in the center of the 55 mm (6") band of tape, where applicable) of the tracer color at all terminations and in all boxes and enclosures.

8.15 Identify phases of all conductors where more than one phase conductor is present (in raceways, cables, boxes, enclosures, etc.) with methods as indicated above. Utilize standard color-coding throughout the project as follows:

120/208/240 V SYSTEM

A-phase	Black
B-phase	Red (utilize orange if 120/240V-3PH-4W midpoint grounded delta (i.e. "high-leg") system)
C-phase	Blue
Neutral	White
Ground	Green

277/480 V SYSTEM

A-phase	Brown
B-phase	Orange (utilize purple where orange is used for 120/240V-3PH-4W delta system above)
C-phase	Yellow
Neutral	White with brown tracer(s)
Ground	Green

Isolated ground conductors (any system): Green with yellow tracer(s)

OVER 600 V SYSTEMS

Utilize multiple 51 mm (2") wide bands of colored tape to identify phases. Utilize yellow for 5 kV nominal, red for 15 kV nominal, and orange for 25/35 kV nominal.

A-phase	Single band
B-phase	Two (2) bands
C-phase	Three (3) bands

8.16 The electrical contractor shall provide new OSHA approved "DANGER - HIGH VOLTAGE" signs on all doors which directly enter any room containing exposed live parts or containing new or existing equipment operating at over 600 V (where connected to or modified as part of this project). Provide new signs even if existing signs are present (except that new signs are not required where existing signs are OSHA approved type complying with *current* OSHA standards).

9. LOCKS AND KEYS

9.1 Provide all locks for lighting and power panels, fire alarm and signaling cabinets and all other electrical systems or locked apparatus with keys which are alike.

10. RECEPTACLES AND SWITCHES

10.1 Provide all receptacles and switches as industrial and specification grade, totally enclosed in non-flammable and heat resistant heavy-duty thermoset or thermoplastic case, with terminal screws on the side of the case. Pigtail conductor connections are not permitted (except for specialty devices where side terminal screws are not available options in the

manufacturer's catalog), unless specifically indicated otherwise. Provide color as selected and approved by the owner and architect.

10.2 Provide receptacles as duplex, parallel blade, side wired, three (3) wire, grounding type, 20 A, 120 V, and listed as "tamper-resistant", unless specifically indicated otherwise on the drawings. Listed combination receptacle and separable snap-in wiring terminal assemblies (Hubbell "SNAPConnect" style, Pass & Seymour "PlugTail" style, or approved equal) may be used and may utilize pigtail connections on the wiring terminal assemblies.

10.3 Provide weatherproof receptacles listed as weather-resistant type and mounted in a weatherproof box with gasket and single spring-hinged weatherproof-while-in-use cover over both receptacle positions.

10.4 Provide receptacles at accessory buildings (at or below grade), bathrooms (including rooms containing bathtubs or showers), boat hoists, boathouses, crawl spaces, dishwashers, garages, janitor closets, kitchens, kitchenette counters, laundry areas, outdoors, rooftops, unfinished basements, wet locations, within 6'0" of any sink, and as indicated on the drawings or required by the NEC with integral ground fault circuit interrupter (GFCI) protection for personnel with trip characteristics as per the NEC and UL standards. Utilize only weather-resistant type receptacle mounted in a weatherproof outlet box with single spring-latched weatherproof-while-in-use cover for boat hoists and in all outdoor, rooftop, and wet locations. Feed-through protection of standard type receptacles from other GFCI receptacles is not acceptable (unless specifically indicated otherwise on the drawings). Protection of standard type receptacles in readily accessible locations from GFCI circuit breakers is not acceptable (see below for inaccessible receptacles). For inaccessible receptacles (locations which are not readily accessible as per the NEC, for example where located behind equipment, appliances, or obstacles) the use of GFCI type receptacles is prohibited and protection of standard type receptacles from GFCI circuit breaker must be used (identify receptacles as protected as per the NEC). Provide compliant GFCI protection wherever required by the NEC whether indicated on the drawings or not.

10.5 Where indicated on the drawings, provide isolated ground type receptacles with the receptacle grounding terminal electrically isolated and insulated from the receptacle mounting yoke. Where indicated on the drawings, provide with integral transient voltage surge suppressor (TVSS, with integral light emitting diode (LED) indicating integrity of TVSS protection) with TVSS components rated 150 V, 210 J (at 10 x 1,000 μs), and 13 kA (minimum) and complying with UL-1449. Provide all wiring serving isolated ground receptacles with separate equipment and isolated grounding conductors as per specifications section "Grounding" of specifications division 16200, General Electrical. Where isolated ground type receptacles are shown in nonmetallic raceways or nonmetallic boxes, either ground the metal receptacle yoke (in addition to grounding the receptacle ground terminal) with the equipment (raceway) grounding conductor (utilizing methods approved by the NEC) or substitute a standard (i.e. non-isolated-ground) type receptacle (but with TVSS where specified) so the receptacle yoke is grounded by the isolated ground conductor, at the contractor's option.

10.6 Provide wall switches as single pole, three-way, or four-way as applicable, heavy duty flux tumbler type, UL "T" rated, specification grade, and rated 20 A, 277 V and 120 V.

10.7 Provide horsepower rated single-pole thermal overload switches (manual motor starters, O/L switches, etc.) with thermal overload heater element coordinated with equipment

served. Where overload protection is not required (where the switch acts only as disconnecting means) provide overload heater element rated in excess of the branch circuit breaker amperes.

10.8 For all switches where locking provisions are required by Code or indicated on the drawings and for all thermal overload switches, provide a suitable handle locking guard capable of visibly padlocking in the open or closed position (with switch handle position visible when locked).

10.9 Provide dimmer switches of thin profile slide type ("off" when slider is in the lowest position), Lutron #NT series (or approved equal by Hubbell or Leviton), unless indicated otherwise. Dimmer switches of the rotary type, with raised profile (with raised cooling fins), and/or with on/off toggle separate from slider are not acceptable. Provide with full wattage rating as indicated on the drawings, do not "de-rate" by removing cooling fins or heat sink sections (unless specifically indicated on the drawings). Where multiple dimmer switches or dimmer switch(es) along with standard type switches (single pole, three-way, and four-way) are shown grouped together on the drawings, gang switches together with a single overall cover plate (conform with NEC Article 404.8(B) "Voltage Between Adjacent Switches", where applicable). Utilize special cover plates based on the combination of switches involved. Where ganged with dimmer switches, utilize single pole, three-way, and four-way switches of the slide type with appearance and manufacturer matching dimmer switches.

10.10 For all receptacles at any location in hospitals and in patient care and/or treatment areas in other occupancies (doctors/nurses offices, athletic training, first aid rooms, etc.) provide receptacles as hospital grade (in addition to requirements above) and provide wiring feeding the receptacles complying with NEC Article 517.13

11. SAFETY SWITCHES

11.1 Provide all safety switches (disconnect switches) of the quick-make and quick-break type, with contacts not marked or shielded, designed to function if the operating spring fails or is removed, with mechanical interlock so operation is impossible when the cover is open (provide means to manually bypass/defeat the interlock), with provisions for padlocking in both the open and closed positions, and of the heavy duty type. Provide switches with voltage ratings equaling or exceeding the operating voltage. Provide indoor switches with NEMA-1 enclosures. Provide outdoor switches with NEMA-3R enclosures. Where NEMA-4X enclosures are specifically indicated on the drawings only, provide of the stainless steel type only.

11.2 Provide fuse clips in fusible switches to facilitate fuses as per the section of this specification "Fuses". Provide suitable "rejection" type clips to prevent replacing fuses with short circuit ratings lower than specified.

11.3 Provide safety switches with ground busses. Where neutral conductor is present, provide safety switches with separate neutral busses (with provisions for bonding, bond where required by the NEC).

11.4 For all safety switches on the load side of variable frequency drive (VFD) units, provide safety switches with integral "electrical interlock" auxiliary contacts (one (1) N.O. and one

(1) N.C., minimum) which "break" before safety switch opens. Provide two (2) #14 AWG interlock conductors run (in raceway with line side power conductors) from auxiliary contact to VFD unit. The VFD supplying contractor shall connect interlock wiring at VFD unit to shut down VFD unit if safety switch is opened to prevent operating VFD without load connected.

11.5 For safety switches serving elevators, provide safety switches with integral "electrical interlock" auxiliary contacts (one (1) N.O. and one (1) N.C., minimum) which "break" before switch opens. Provide two (2) #14 AWG interlock conductors run (in raceway with load side power conductors) from auxiliary contact to elevator controller. Elevator contractor shall connect interlock wiring at elevator controls.

11.6 Equipment as manufactured by ABB/GE, Eaton, Schneider, and Siemens (or equivalent) shall be considered.

12. FUSES

12.1 Provide an NEC cartridge fuse for each fuse-gap in the work. Furnish three (3) spare fuses of the rating installed to the owner for each fused device. Specifications are based on equipment as manufactured by Eaton/Bussman. Equipment as manufactured by Mersen and Littlefuse (or approved equal) shall be considered.

12.2 Provide fuses of the dual element time delay, current limiting, and non-renewable type with voltage rating not less than the operating voltage and coordinated with the respective fuse clips and with short circuit rating of 200,000 A. Provide fuses as class "RK1" (600 A and less, Eaton/Bussman #LPN/S-RK series) or class "L" (over 600 A, Eaton/Bussman #KRP-C series). Class "CC" fast acting (Eaton/Bussman #LP-CC series) or time delay (Eaton/Bussman #KTK-R series) fuses, as recommended by manufacturer, are permitted for control applications.

13. CIRCUIT BREAKERS

13.1 This section applies to all circuit breakers installed within or in conjunction with branch and distribution panels, enclosed circuit breakers, contactors, starters, and any other electrical equipment, unless indicated otherwise.

13.2 Provide all circuit breakers of the molded case type unless specifically indicated otherwise. Provide readily removable from the front of panels and equipment without disturbing adjacent units, having quick-make and quick-break toggle mechanisms and non-fusible contacts, having inverse time and short circuit characteristics, which trip free on overload or short circuit so that they cannot be held closed on overload, clearly indicating whether they are in the open, tripped, or closed position. Provide automatic release obtained through the medium of a bimetallic thermal type element (ambient compensated) engaged in the releasing latch of the breaker or mechanism.

13.3 Provide circuit breakers in branch and distribution panels with short circuit ratings as indicated in the respective equipment specifications. Provide circuit breakers as part of enclosed circuit breakers, contactors, starters, and any other electrical equipment with short circuit ratings not less than the short circuit rating of the first overcurrent device on the line side of the breaker, unless indicated otherwise on the drawings.

13.4 Provide field-installed handle locking devices for all circuit breakers not requiring switch control, for all circuit breakers feeding emergency lighting equipment (including battery equipment) and fire alarm controls, and for all circuit breakers fed from an emergency generator system (where applicable).

13.5 Provide 15 A and 20 A circuit breakers "SWD" and "HID" rated. Provide branch panel (250 V and less) circuit breakers rated 70 A and less as "HACR" rated. Provide enclosed circuit breakers and circuit breakers in distribution panels rated 250 A and less as "HACR" rated.

13.6 For all 120 V, 20 A and 120 V, 15 A circuits (including multi-wire branch circuits feeding 120 V loads) serving any new or existing outlets (receptacle outlets, lighting outlets, fan outlets, equipment outlets, utilization outlets, etc.) in any dwelling unit family room, dining room, living room, parlor, library, den, bedroom, sunroom, recreation room, closet, hallway, or similar room or area, provide branch circuit breakers of the arc fault circuit interrupter (AFCI) type. This does not apply to circuits rated 208 V and greater or circuits rated 30 A and greater. For the purposes of this section, bedrooms include all bedrooms, hotel/motel guest rooms, dormitory rooms, and any other room capable of being converted to or used as a bedroom or for sleeping. Provide as NEC approved and listed for the purpose. Provide whether indicated on the drawings (including panel schedules) or not, include all costs in bid.

13.7 Provide all circuit breakers over 250 A of a type with interchangeable trip units. Provide all circuit breakers rated 1,000 A or larger and operating at over 250 V with integral ground fault protection for equipment. Unless alternative means for arc energy reduction are specifically indicated otherwise on the drawings or specifications, provide all circuit breakers rated 1,200 A or larger with an individual energy-reducing maintenance switch with local status indicator.

13.8 Short Circuit, Coordination, and Arc Flash Report: Where circuit breakers include or facilitate adjustable settings, adjust and set as follows (short circuit, coordination, and arc flash report is NOT required if all new circuit breakers are fixed with no adjustable settings). Set adjustable continuous current settings (where applicable) to ratings shown on drawings. For adjustable instantaneous, short time, and ground fault settings (where applicable), the electrical contractor is responsible for (include all costs) a short circuit, coordination, and arc flash study performed by the respective circuit breaker manufacturer. Set breakers and label all associated electrical equipment as per this study. Provide study in accordance with applicable ANSI and IEEE standards. Gather all information required by the manufacturer to perform this study. Submit a written report of the study to the engineer for review prior to releasing equipment for manufacture. The coordination study may be limited to a minimum of coordinating each adjustable setting circuit breaker with the nearest line side overcurrent device directly feeding the breaker and all nearest load side overcurrent device(s) fed directly by the breaker. The short circuit study and arc flash study is required for all electrical equipment containing new circuit breakers which include or facilitate adjustable settings, for all equipment fed from ("downstream of") new circuit breakers which include or facilitate adjustable settings, for all equipment which feeds ("upstream of") new circuit breakers which include or facilitate adjustable settings back to all utility and/or generator source(s) (except that other unrelated equipment which branches off of "upstream" equipment is not required to be included in the study, unless specifically indicated otherwise), and as otherwise required to complete the coordination study and

confirm proper settings. Setting adjustable circuit breaker settings to the minimum or factory "default" settings (i.e. as shipped from the factory) is not acceptable. Where the short circuit, coordination, and arc flash report is not submitted by the contractor or where devices are not set accordingly (for example, including where devices are set to the minimum or factory default settings) the electrical contractor may be held liable for nuisance tripping which may occur.

14. ENCLOSED CIRCUIT BREAKERS

14.1 Provide each enclosed circuit breakers consisting of a molded case circuit breaker, with a trip rating as indicated on the drawings, with provisions for padlocking in both the open and closed positions, within a listed enclosure manufactured for the purpose of housing a circuit breaker. Provide indoor breakers with NEMA-1 enclosures. Provide outdoor breakers with NEMA-3R enclosures.

14.2 Provide circuit breakers (including short circuit ratings) as specified elsewhere in this specification. Provide circuit breakers of the bolt-on type.

14.3 Provide enclosed circuit breakers with ground busses. Where neutral conductor is present, provide safety switches with separate neutral busses. Provide neutral bus with provisions for bonding and bond where required by the NEC.

14.4 Equipment as manufactured by ABB/GE, Eaton, Schneider, and Siemens (or equivalent) shall be considered.

15. BRANCH PANELS

15.1 Provide branch panels (panel boards) of dead front completely enclosed safety type construction, listed (with all components bearing labels), of a type suitable for use as service entrance, and containing thermal-magnetic "bolt-on" type circuit breaker branches as per the respective schedules on the drawings.

15.2 Provide circuit breakers as specified elsewhere in this specification.

15.3 Provide cabinets consisting of code gauge galvanized sheet steel boxes of sufficient depth, width, and length to mount the panels as indicated on the drawings and to facilitate wiring, with suitable lugs for mounting panel interiors, and with wiring gutters at top, bottom, and sides of sufficient size to adequately accommodate the raceways, conductors, and cables entering and leaving (provide all gutters at least 100 mm (4")).

15.4 Provide panel faces with adjustable indicating type clamps and of door-in-door construction, with inner door opening over the circuit breaker section and outer door over wiring space (both secured with locks and pulls as per specifications section "Locks and Keys"), hung with heavy hinges, and with faces and doors not less than 2.7 mm (12 ga.) thick.

15.5 Provide metal frame circuit directory holders welded to the inside of the cabinet doors with transparent covers. Place typewritten directories in these holders.

15.6 Provide bus bars with ampacity as indicated on the drawings (or corresponding to main breaker, where applicable) and with all current carrying parts sized per UL 67 heat rise testing.

15.7 Provide panels with copper or aluminum bus bars.

15.8 Provide panels with separate ground and neutral busses. Provide neutral bus with provisions for bonding and bond where required by the NEC.

15.9 Provide panels with 10,000 A short circuit rating (A.I.C., I_{sc}), unless indicated otherwise on the drawings. Provide panels fully short circuit rated, series short circuit rating of panels are not acceptable (unless specifically indicated otherwise).

15.10 Equipment as manufactured by ABB/GE, Eaton, Schneider, and Siemens (or equivalent) shall be considered.

15.11 Where indicated on the drawings or required by code, provide with integral factory installed transient voltage surge suppression (TVSS). Provide for all emergency panels whether shown on not on drawings.

15.12 Where branch wiring fed from the panel utilizes cable wiring methods (i.e. types "AC" or "MC" cables, where permitted elsewhere by the specifications) avoid visible exposed cables in electrical closets and electrical rooms by either of the following options:

A. Provide suitable sheet metal panel "skirt" enclosure(s) above and/or below the panel to completely enclose cable wiring methods so not more than a 300 mm (12") total length of each cable is visible. Provide skirt enclosures fabricated of galvanized sheet steel not less than 0.55 mm (26 ga.) thick.

B. Provide a nearby junction box for branch wiring as indicated below.

15.13 Where panels are flush mounted, provide an adjacent junction box for branch wiring as indicated below.

16. JUNCTION BOXES FOR BRANCH PANELS

16.1 Provide suitable junction boxes (and/or wiring troughs) for branch wiring at branch panels as follows. The electrical contractor must provide junction boxes for all flush mounted panels. The electrical contractor may utilize junction boxes (as an option to metal panel skirts) to avoid exposed visible cables in electrical closets and electrical rooms. The electrical contractor may utilize junction boxes at other locations and applications if desired, but the boxes and raceways (wherever used) must comply with all of the following requirements.

16.2 Locate each junction box above an accessible drop ceiling (or an access panel if ceiling is inaccessible) directly above or as close as practical to the panel. Where junction box is installed to satisfy requirements to hide cable wiring methods, locate outside of the electrical closet/room or inside the closet/room at a perimeter wall so there are no visible cables in the closet/room (except that not more than 300 mm (12") total visible length of each cable is permitted leaving the junction box).

16.3 Provide junction boxes and raceways between boxes and panel as indicated below.

Panel Size (Branch Cct. Poles)	Junction Box Min. Dimensions	Quantity and Size of Conduits
43-Poles & Over (All Double panels)	48"W x 8"H x 8"D (1.2m x 205mm x 205mm) *	(8) 53 mm (2")
31-to 42-Poles	24"W x 8"H x 8"D (0.6m x 205mm x 205mm)	(4) 53 mm (2")
19-to 30-Poles	24"W x 6"H x 6"D (0.6m x 155mm x 155mm)	(3) 53 mm (2")
18-Poles and less	18"W x 6"H x 6"D (460mm x 155mm x 155mm)	(2) 53 mm (2")

* Two (2) 24"W x 8"H x 8"D (0.6 m x 205 mm x 205 mm) junction boxes may be substituted. Provide (2) 78 mm (3") conduit nipples between the junction boxes.

16.4 Adjust wiring sizes between each junction box and panel in accordance with NEC de-rating factors. Utilize #8 AWG wiring for branch circuits rated 25 A or 30 A. Utilize #6 AWG wiring for branch circuits rated over 30 A but less than 60 A. Coordinate routing of wiring between junction box and panel with the engineer during construction for all circuits rated over 30 A. Where wiring sizes change due to de-rating considerations, splice wiring in the junction box.

16.5 Do not pass the incoming panel feeder and any branch circuits rated 60 A and larger through junction boxes, run this wiring directly into panels. Do not terminate any branch wiring conductors (including grounding conductors associated with each branch circuit) in junction boxes. Terminate conductors only at circuit breakers, ground bus, and neutral bus in panels. Do not splice conductors in junction boxes, except straight-through splicing of two (2) conductors as provided above for de-rating.

16.6 Bond each junction box to the panel enclosure with a grounding conductor run in one of the raceways between the panel and junction box. Provide bonding conductor not smaller than the grounding conductor for the panel feeder.

17. DISTRIBUTION PANELS

17.1 Distribution panel (distribution panel boards and switchboards) specifications are based on Schneider "I-Line" type. Additional equipment including ABB/GE "AV-Line" type and "Spectra" series, Eaton "Pow-R-Line" type, Schneider #QED type, and Siemens "P-series" (or equivalent) shall be considered.

17.2 Provide distribution panels of dead front completely enclosed safety type construction, listed (with all components bearing labels), and of a type suitable for use as service entrance.

17.3 Provide thermal-magnetic branch circuit breakers featuring "bolt-on" type modular mounting, facilitating mounting of breakers regardless of breaker frame sizes or poles.

17.4 Provide circuit breakers as specified elsewhere in this specification.

17.5 Where new "spaces" or "provisions" for circuit breakers are indicated on the drawings or specifications, include all circuit breaker mounting brackets, hardware, bus bar straps, screws, and any other material, equipment, and accessories required to install circuit

breakers in the future (install in panel spaces). Provide so the only necessary component not furnished as part of provisions is the circuit breaker(s) themselves.

17.6 The quantity of provisions (of each respective frame size) specifically indicated on the drawings is the minimum acceptable. If necessary, provide additional branch distribution sections to provide the specified minimum quantity. After satisfying specified minimums, provide additional provisions (of 100 AF, 225/250 AF, and/or 400 AF frame sizes; in any combinations at the manufacturer's/contractor's discretion) so all remaining available circuit branch breaker mounting space in the panel (for the full height of the panel enclosure) consists of provisions.

17.7 Provide all compartments (and all main and branch circuit breakers and other equipment therein) completely accessible from the front, unless otherwise indicated on the drawings (regardless if panels are shown against a wall or free-standing).

17.8 Provide enclosure consisting of code gauge steel box(es) of galvanized sheet steel of sufficient dimensions to mount panels and to facilitate wiring.

17.9 Provide bus bars with ampacity as shown on the drawings (or matching main breaker, where applicable) and with all current carrying parts sized per UL 67 heat rise testing.

17.10 Provide panels with copper or aluminum bus bars.

17.11 Provide panels with separate ground and neutral busses. Provide neutral bus with provisions for bonding and bond where required by the NEC.

17.12 Provide bus bars braced to withstand 100,000 A short circuit current. Provide panels with 100,000 A short circuit rating (A.I.C., I_{sc}), unless indicated otherwise on the drawings (rating on drawings does not apply to bus bracing, provide bracing as indicated above). Provide panels fully short circuit rated, series short circuit rating of panels is not acceptable.

17.13 Identify each branch circuit breaker individually with an engraved plastic nameplate as indicated in the section of this specification "Identification, Nameplates and Tags".

17.14 Where indicated on the drawings, provide panels with integral factory fitted electronic metering units with appropriate metering transformers. Provide metering units to meter current (in all three phases), voltages (phase-to-phase and phase-to-neutral/ground in all three phases), power (kW), apparent power (kVA), energy consumption (kWH), power factor, peak demand power (kW peak), and harmonic THD and K-factor, and featuring true RMS metering. Provide meter with communications capability via RS-485 port and via Ethernet (10/100 Base-T UTP) communications card. Provide a telephone/data outlet (see symbol list on drawings) at panel (whether shown on the drawings or not). Provide metering units as Schneider/Power Logic #PM820 (with #PM8ECC communications card, ABB/GE, Eaton, Siemens, or equivalent).

17.15 Where indicated on the drawings or required by code, provide equipment ground fault protection for main and/or branch circuit breakers.

17.16 Where indicated on the drawings or required by code, provide with integral factory installed transient voltage surge suppression (TVSS). Provide for all emergency panels whether shown on not on drawings.

17.17 Where draw-out construction or draw-out circuit breakers are shown on the drawings or otherwise specifically noted, provide panels accordingly. Refer to the section of this specification "Unit Substation" for information.

18. DRY TYPE TRANSFORMERS

18.1 Provide dry type transformers (indicated "AA" on the drawings) with primary and secondary voltages, connections (i.e. single phase, three-phase wye, three-phase delta, etc.), and kVA rating as indicated on the drawings.

18.2 Provide with 150 degrees C temperature rise above 40 degrees C ambient. Provide all insulating materials in accordance with NEMA St20-1972 standards for a 220 degree C listed component recognized insulation system and provide transformers listed for the specified temperature rise. The maximum temperature of the top of the enclosure may not exceed 50 degrees C rise above 40 degrees C ambient.

18.3 Provide with primary full capacity taps, a minimum of two (2) 2.5% taps above and two (2) 2.5% taps below rated voltage.

18.4 Provide coils of continuous wound construction impregnated with non-hydroscopic, thermosetting varnish. Provide copper or aluminum coil windings.

18.5 Provide core constructed of high grade, grain oriented, non-aging silicon steel laminations with high magnetic permeability, featuring low hysteresis losses and low eddy current losses, and constructed to maintain magnetic flux densities well below the saturation point. Provide core laminations clamped together with structural steel angles. Provide the core and coil fastened to the enclosure base utilizing an appropriate engineered permanent fastening and vibration isolating/absorbing system (i.e. including rubber mounts). Metal-to-metal contact of any kind between the core and coil and the enclosure is not acceptable. Isolating systems requiring the complete removal of all fastening devices are not acceptable. Provide core and all ferrous parts suitably protected to resist corrosion by painting or plating.

18.6 Provide core visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable NEMA, IEEE, and ANSI standards.

18.7 Provide transformers mounted in heavy gauge, sheet steel, ventilated enclosures designed for floor mounting or designed for both floor and wall mounting (wall mounting only is not acceptable, unless specifically indicated on the drawings). Provide ventilating openings to prevent access to live parts in accordance with UL, NEMA, and NEC standards (specifically including NEC Articles 110.27 and 450.8 [and 110.31(B)(1) if over 600 V]) for ventilated enclosures in locations accessible to unqualified persons (whether installed in such locations or not), including the use of an enclosure bottom plate (open bottom is not acceptable under any circumstance). Include custom/special enclosures or enclosure modifications to satisfy this requirement (where enclosures are installed which not meeting this requirement [without prior written approval], the contractor shall remove the enclosure and provide a new acceptable enclosure at no cost to the owner).

18.8 Provide the entire enclosure degreased, cleaned, phosphatized, primed, and finished with gray baked enamel.

18.9 Provide manufacturer guaranteed sound levels not exceeding 45 dB.

18.10 For transformer coils rated 600 V and less, provide basic impulse level (B.I.L.) rating as per applicable industry standards. For transformer coils rated over 600 V, provide 95 kV B.I.L. rating.

18.11 Provide all transformers rated 15 kVA and larger as energy efficient NEMA TP1 rated. Provide all transformers rated 480V-3PH-3W to 120/208V-3PH-4W and 500 kVA and less with UL K-13 rating, minimum, unless specifically indicated otherwise.

18.12 Where transformers are indicated as part of a unit substation, provide with suitable coordinated flanges for assembly to high voltage and low voltage compartments. Provide all hardware, bus, connectors, etc. for complete assembly.

18.13 Where transformers are indicated with forced-air cooling ("AA/FA" on the drawings) provide complete with integral cooling fans, automatic fan controls, and integral control power transformer for fans. Provide forced-air cooling for increased capacity 33.3% above the base (AA) transformer rating. Provide automatic fan controls including over temperature alarm with indicating light and horn and with contacts for external monitoring. Provide nameplate reflecting fan rating.

18.14 Where transformers are indicated with provisions for future forced air cooling ("AA/FFA" on the drawings) provide with core and coils rated based on future addition of fans, with integral provisions for mounting future cooling fans, with blank plate in enclosure as provisions for mounting future fan controls, and provisions for connecting future control power transformer. Provide all required heat sensing equipment installed in transformer coils. Future forced-air cooling shall provide increased capacity 33.3% above the base (AA) transformer rating once fans are installed. Provide nameplate reflecting future fan rating.

18.15 Equipment as manufactured by ABB/GE, Eaton, Schneider, Siemens, and Sola (or equivalent) shall be considered.

19. CONTACTORS AND OUTDOOR LIGHTING CONTROLS

19.1 INTEGRATED OUTDOOR LIGHTING CONTROLLER: Provide integrated outdoor lighting controller of the combination photocell and time clock type as shown below (unless other type(s) are specifically indicated on the drawings). Provide lighting contactors, time clocks, fusing, and remote photocells as indicated in respective sections elsewhere in this specification. Provide an engraved laminated plastic nameplate on the front cover (refer to the section of this specification "Identification, Nameplates, and Tags") describing the controller ("OUTDOOR LIGHTING CONTROLLER - 120V, 5A - CONTROLS FED FROM PP1 - CCT. 4 - SEE INSIDE FOR CONTROLLED CIRCUITS - PHOTOCELL ON ROOF AT NORTH SIDE OF BUILDING"). Describe the location of the remote photocell, where applicable. Provide engraved laminated plastic nameplates at each switch indicating the switch function and respective switch positions. Provide engraved laminated plastic nameplates at each pilot light indicating the light function. Switch/pilot light nameplates may utilize 1/8" letters. Provide a typewritten circuit directory affixed within the enclosure listing each respective contactor pole, panel, circuit

number, and description of each controlled circuit. Equipment as manufactured by ABB/GE, ASCO/Schneider, Eaton, Schneider, and Siemens (or equivalent) shall be considered.

A. Combination Photocell and Time Clock Lighting Controller: Provide combination photocell and time clock controlled integrated outdoor lighting controller including two (2) 20 A, 12-pole lighting contactors (one (1) for photocell and time clock lighting and one (1) for photocell only lighting), an integral one (1) channel digital time clock, two (2) hand-off-auto (HOA) selector switches (one (1) for each lighting contactor above), suitable terminal blocks for all field wiring (including 120 VAC incoming controller power wiring, connections to remote photocell, etc.), fused (rating as per manufacturer) control power circuit, and complete factory internal wiring. Provide all components above enclosed within an overall NEMA-1 enclosure with hinged cover and locking (keyed to match branch panel keys) hasp (provide HOA switches mounted on the front cover). Provide ASCO/Schneider #641AS outdoor lighting controller (or approved equal).

B. Photocell Only Lighting Controller: Provide photocell controlled integrated outdoor lighting controller including one (1) 20 A, 12-pole lighting contactor, one (1) hand-off-auto (HOA) selector switch, suitable terminal blocks for all field wiring (including 120 VAC incoming controller power wiring, connections to remote photocell, etc.), fused (rating as per manufacturer) control power circuit, and complete factory internal wiring. Provide all components above enclosed within an overall NEMA-1 enclosure with hinged cover and locking (keyed to match branch panel keys) hasp (provide HOA switches mounted on the front cover). Provide ASCO/Schneider #641S outdoor lighting controller (or approved equal).

C. Time Clock Lighting Controller: Provide time clock controlled integrated outdoor lighting controller including one (1) 20 A, 12-pole lighting contactor, an integral one (1) channel digital time clock, one (1) hand-off-auto (HOA) selector switch, suitable terminal blocks for all field wiring (including 120 VAC incoming controller power wiring, connections to remote photocell (where applicable), etc.), fused (rating as per manufacturer) control power circuit, and complete factory internal wiring. Provide all components above enclosed within an overall NEMA-1 enclosure with hinged cover and locking (keyed to match branch panel keys) hasp (provide HOA switches mounted on the front cover). Provide ASCO/Schneider #641A outdoor lighting controller (or approved equal). Where a photocell is indicated on the drawings, provide complete interconnections between controller and photocell. Where a photocell is not indicated on the drawings, provide a field jumper in place of photocell contact connection.

D. Lighting Controller Emergency Contactor: Provide outdoor lighting controller including an electrically held emergency lighting contactor in a separate NEMA-1 enclosure to control emergency outdoor lighting. Maintain complete separation between normal and emergency source wiring as per code. Provide emergency lighting contactor consisting of a 20 A, 12-pole electrically held and electrically operated (mechanically held contactor of any type is not acceptable for emergency use) lighting contactor with all normally closed (N.C.) contacts so emergency lighting circuits energize upon loss of control voltage to this contactor. Interconnect emergency contactor with a normally closed auxiliary contact in the normal photocell controlled lighting contactor wired in series with an auxiliary contact in the generator

automatic transfer switch (contact opens when generator is in the "emergency" position). Provide all interconnecting field wiring.

19.2 LIGHTING CONTACTORS: Provide lighting contactors with number of poles and ampere ratings as indicated on the drawings. Provide contactors mechanically held and electrically operated with integral solid-state control modules for two (2) wire control, unless indicated otherwise. Utilize electrically held and electrically operated contactors only where specifically indicated on the drawings (and provide with not less than one (1) N.C. and one (1) N.O. auxiliary contacts). Provide contactors with silver alloy double break contacts, with all contacts rated 600 V, and with coil clearing contacts. Provide 120 VAC coil voltage, unless indicated otherwise. Provide contactors mounted in NEMA-1 enclosures, unless indicated otherwise. Provide all contacts normally open, unless indicated otherwise.

A. Provide an engraved laminated plastic nameplate on the front cover (refer to the section of this specification "Identification, Nameplates, and Tags") describing the contactor ("OUTDOOR LIGHTING CONTACTOR - 120V, 5A - CONTROLS FED FROM PP1 - CCT. 4 - SEE INSIDE FOR CONTROLLED LIGHTING CIRCUITS - *"). Describe the device(s) controlling the contactor and controlling device(s) location(s), where applicable. Provide a typewritten circuit directory affixed within the enclosure listing each respective contactor pole, panel, circuit number, and circuit description of each controlled circuit. Nameplate is not required for contactors integral to a lighting controller where the controller includes a similar nameplate.

B. Provide contactors rated 20 A as ASCO/Schneider #918 series (or approved equal). Provide contactors rated 30 A and larger of the non-fusible combination type, with integral disconnect switch, Schneider Class #8903 type "S" (or approved equal). Equipment as manufactured by ABB/GE, ASCO/Schneider, Eaton, Schneider, and Siemens (or equivalent) shall be considered.

19.3 TIME CLOCKS: Provide one (1), two (2), or four (4) channel time clocks, as indicated on the drawings. Provide time clocks with one (1) single pole, double throw (SPDT) contact for each respective channel (to facilitate control of mechanically held, electrically operated contactors), with digital control (electromechanical type is not acceptable), of the seven (7) day type with 365 day single and block holiday scheduling, with astronomic feature, indicating "on" or "off" condition with an illuminated light emitting diode (LED) visible with the enclosure cover open, with integral manual override capability, with integral automatically recharging nickel cadmium (NiCd) battery providing minimum 72 hour reserve power. Provide coil and contact voltage rated 120 V, unless indicated otherwise. Provide time clock with NEMA-1 metal or NEMA-3 "Noryl" enclosure, unless indicated otherwise. Provide contacts rated 20 A where directly switching branch circuit load or rated 10 A (resistive) minimum where controlling contactor(s). Utilize Tork #DZS100BP (one channel), #DZS200BP (two channel), or #K400Z (four channel) time clocks (or approved equal). Provide an engraved laminated plastic nameplate on the front cover of each time clock (refer to the section of this specification "Identification, Nameplates, and Tags") describing the time clock ("OUTDOOR LIGHTING - 120V, 5A - CONTROLS FED FROM PP1 - CCT. 4 - SEE INSIDE FOR CONTROLLED LIGHTING CIRCUITS - *"). Describe the device(s) controlled by the time clock and controlled device(s) location(s), where applicable. Where time clock switches branch circuits directly, provide a typewritten circuit directory affixed within the enclosure listing each respective contact pole, panel, circuit number, and circuit description of each controlled circuit. Nameplate is

not required for time clocks integral to a lighting controller where the controller includes a similar nameplate. Specifications are based on equipment as manufactured by Tork. Equipment as manufactured by Intermatic and Paragon (or approved equal) shall be considered.

19.4 PHOTOCELLS: Provide photocells of the utility-grade twist-lock type with integral time delay feature (nominal 3-5 s), with molded sealed infrared (IR) silicon electronic sensor and 360 J integral utility grade metal oxide varistor (M.O.V.) over-voltage surge protection, arranged to "fail-on", listed, and rated 120-305 V (suitable for 120 V, 208 V, 240 V, and 277 V operation), 1,000 W tungsten, 1,800 VA ballast, and 1,000 W LED, unless indicated otherwise. Provide a suitable twist-lock photocell receptacle and mount atop a suitable weatherproof box. Utilize Tork #5237M photocells and Tork #2223/4 photocell twist-lock receptacles (or approved equal). Provide an engraved laminated plastic nameplate at photocell twist-lock receptacles (refer to the section of this specification "Identification, Nameplates, and Tags") describing the device(s) controlled by the photocell and the circuit feeding the photocell ("SEE LIGHTING CONTROLLER IN ELECTRICAL ROOM - 120V, 5A - PP1, CCT. 4"). Nameplate may utilize 3.2 mm (1/8") letters. Specifications are based on equipment as manufactured by Tork. Equipment as manufactured by Intermatic and Paragon (or approved equal) shall be considered.

20. PRIMARY CABLE AND TERMINATIONS

20.1 Provide primary cable, terminations, and splices as indicated on the drawings. Provide cable of a type approved by the utility company. Provide as 105 degrees C rated type "MV-105" cable (90 degrees C type "MV-90" may be considered where type "MV-105" is not included in manufacturer's standard catalogs for the cable style specified) utilizing ethylene propylene rubber (EPR) insulating material only, unless indicated otherwise on the drawings. Where specifically indicated on the drawings only, tree-retardant cross-linked polyethylene (XLP) insulating material is permitted; XLP insulated cable other than tree-retardant type is not acceptable under any circumstance.

20.2 Submit shop drawings of primary cable, terminations, and splices for review and approval. Where the contractor installs cables, terminations, or splices not meeting all requirements of the drawings and specifications (without prior written approval), the contractor shall remove the cables and install new cables of the specified type (including all splicing and terminations) at no cost to the owner.

20.3 Provide splices and terminations conforming with the section of this specifications "Splices, Taps, and Connections", except as modified below. Provide splices and taps insulated to a voltage level equaling or exceeding the cable voltage rating. Provide all splices and terminations utilizing crimp-on compression lugs and connectors. Bolted pressure type connections of any kind are not acceptable under any circumstance. Provide splices and terminations suitable for 105 degrees C (compatible with "MV-105" cable and facilitating use of NEC 105 degrees C ampacity determination).

20.4 Provide terminations where required including complete connections to equipment as per the cable manufacturer and the equipment manufacturer and in accordance with utility company standards. Provide termination types and manufacturers as directed and approved by the cable manufacturer and the utility company. Utilize only manufactured or pre-engineered terminations specifically designed and listed for the application. Provide

outdoor exposed terminations as suitable for installation in wet locations and sunlight resistant. Pre-molded, heat-shrink, and cold-shrink manufactured kits and engineer approved pre-engineered hand-wrapped tape kits shall be considered. Verify all requirements prior to ordering materials.

20.5 Avoid splices as much as practical in primary cables. Splices are not permitted under any circumstance except where specifically indicated on the drawings or impossible to otherwise install cable. Where required, provide splice types and manufacturers as directed and approved by the cable manufacturer and the utility company. Utilize only manufactured or pre-engineered splices specifically designed and listed for the application, including being suitable for installation underground, direct buried, submerged, and in wet locations. Provide outdoor exposed splices also as sunlight resistant. Pre-molded, heat-shrink, and cold-shrink manufactured kits and engineer approved pre-engineered hand-wrapped tape kits shall be considered. Verify all requirements prior to ordering materials.

20.6 Provide primary cable fire protection where two (2) or more primary feeders are present in the same manhole, hand hole, box, or enclosure, where cables are installed in pull or junction boxes within buildings, and where specifically indicated on the drawings. Provide fire protection by wrapping all visible portions of cables with non-asbestos expanding elastomer fire and electric arc resistant tape and then over-wrap with glass cloth electrical tape (to bind in place). Install in complete accordance with tape manufacturer's instructions and recommendations. Individually wrap each feeder; wrapping two (2) or more different feeders together with common tape is not acceptable. Where the three (3) phase cables of a feeder are bundled together, wrapping common tape around bundled cables is permitted. Where cables of a feeder are separated and for all splices, individually wrap each cable/splice.

END OF SECTION

SECTION 16400 - LIGHTING SYSTEM

1. GENERAL PROVISIONS

1.1 The applicable requirements and conditions of specifications section "General Provisions" of specifications divisions 16100, General Electrical, and 16300, Electrical Materials, are hereby made an integral part of this section.

1.2 Provide lighting systems consisting of all components necessary for a complete installation. Refer to the lighting fixture/luminaire schedule on the drawings for additional information.

1.3 Luminaires including, but not limited to, those manufactured by the following shall be considered: Abolite, Cooper, Columbia, Contech, Elliptipar, Emergilite, GE Lighting, Hubbell, Insight, Kenall, Kim, Kirlin, Kurt Versen, Light Guard, Lightolier, Lithonia, LSI, Prescolite, Sim-Kar, Sterner, Stonco, Tivoli, Williams, Winona, and ZSLI (or approved equal).

2. DRIVERS, BALLASTS, AND WIRING

2.1 Completely coordinate exact lamp types (including configuration, dimensions, bases, pins, etc.), drivers, ballasts, starters, capacitors, sockets, luminaire construction and arrangement (as related to facilitating lamps and related equipment), and all applicable ancillary equipment and provide a complete and compatible installation.

2.2 Submit shop drawings of all drivers/ballasts proposed for use (multiple manufacturers and series are permitted, provided all drivers/ballasts conform to the specifications). Where luminaires are installed by the contractor which include drivers/ballasts that do not meet the specifications (without prior written approval) the contractor shall remove drivers/ballasts and provide new drivers/ballasts meeting the specified criteria at no cost to the owner.

2.3 Provide all drivers/ballasts of the high power factor solid-state electronic energy saving type, unless indicated otherwise on the drawings. Low power factor drivers/ballasts are not permitted unless specifically indicated on the drawings. Magnetic or any other type drivers/ballasts not identified/listed as energy saving type are not permitted under any circumstance. "Hybrid" or magnetic energy saving types are not permitted unless specifically indicated on the drawings.

2.4 Provide luminaires installed outdoors, in garages, or wherever "cold weather" drivers/ballasts are indicated on the drawings with -18 degrees C (0 degrees F) maximum rated cold weather solid state electronic energy saving drivers/ballasts, unless indicated otherwise.

2.5 Multiple-lamp luminaires may utilize quantity of drivers/ballasts at the contractor's discretion (i.e. one (1) multiple-lamp driver/ballast or several 1- or 2-lamp drivers/ballasts), unless indicated otherwise.

2.6 For lighting controlled by "dual switching", provide with two (2) separate drivers/ ballasts to facilitate switching. For "dual switched" three-lamp and four-lamp luminaires, provide internal wiring so the first switch controls inboard lamp(s) and the second switch controls outboard lamps. For "dual switched" two-lamp luminaires, provide internal wiring so the first switch controls the "left side" lamp and the second switch controls the "right side" lamp. For one-lamp luminaires, multiple lamp luminaires available only with a single

driver/ballast, and other luminaires where unable to wire lamps separately which are controlled by "dual switching", connect to one (1) of the two (2) switches as directed by the engineer during construction (coordinate with the engineer prior to rough-in). Where branch wiring serving lighting controlled by "dual switching" installed by the contractor does not comply with the above, the contractor shall modify or remove and reinstall wiring to provide proper switching at no cost to the owner. Where luminaires controlled by "dual switching" are installed by the contractor and do not have drivers/ballasts and/or internal wiring to comply with the above, the contractor shall modify or replace drivers, ballasts, internal wiring, and/or the luminaires to provide proper switching at no cost to the owner.

2.7 For lighting shown with 0-10 V dimming, provide with drivers/ballasts to facilitate dimming. For all light types shown or specified with 0-10 V dimmable drivers/ballasts (wherever 0-10 V dimming is indicated on the drawings [including luminaire schedule] or specifications), provide both power wiring and 0-10 V control wiring to all luminaires. Run control wiring from all lights with 0-10 V dimmable drivers/ballasts to the respective dimmer or switch controlling the lighting. Where dimmers are shown on the drawings (including combination sensors/dimmers), interconnect control wiring with dimmers as per manufacturer. Where dimmers are not shown on the drawings, install control wiring to the switch (non-dimmed) location and safely insulate and cap off control wiring (to facilitate future replacement of non-dimmed switch with dimmer).

3. LAMPS (LIGHT ENGINES)

3.1 Provide all lamps (the term "lamp" includes all light engines of any type which directly emit illumination) as follows. Completely coordinate exact lamp types (including configuration, dimensions, bases, pins, etc.), ballasts, drivers, starters, capacitors, sockets, luminaire construction and arrangement (as related to facilitating lamps and related equipment), and all applicable ancillary equipment and provide a complete and compatible installation.

3.2 Provide lamps for luminaires as indicated on the drawings. Provide all luminaires with lamps (even if lamp types and/or quantities are not shown on drawings) to provide a complete installation.

3.3 Acceptable lamp manufacturers include GE Lighting, Osram/Sylvania, and Philips (or equivalent).

3.4 Maintain compatibility and consistency of lamp types and manufacturers (as well as lamp colors, except where different lamp colors are indicated on the drawings) throughout the project as much as possible. Provide luminaires so lamps are completely interchangeable between different luminaire types shown on the luminaire schedule with the same type lamps, wherever possible. For each combination of lamp type and color utilized on the project, provide all lamps of a single manufacturer. Different manufacturers are permitted for different lamp type and color combinations. Utilizing more than one (1) manufacturer for any lamp type and color combination is not permitted (except where specifically approved in writing by the engineer and owner).

3.5 Provide all lamps (of all types) of the energy saving light emitting diode (LED) type, unless specifically indicated otherwise on the drawings. Lamps which are not energy saving LED

are not permitted (unless specifically approved in writing by the owner, architect, and engineer. Provide all lamps of a type suitable for use ("burning") in any position (unless specific burning positions are indicated on the drawings).

3.7 Provide screw-in lamps where indicated on the drawings and as specified below. Provide of the medium base type, unless indicated otherwise. Utilize only LED.

A. Provide all A-lamps of the energy saving LED type.

B. Provide all PAR-lamps and R-lamps of the energy saving LED type. Provide standard flood beam spread ("FL") unless indicated as "NFL" (narrow flood), "SP" (spot), or "NSP" (narrow spot), or as otherwise indicated in the luminaire schedule.

C. Provide all MR-lamps of the energy saving LED type. Provide standard flood beam spread ("FL") unless indicated as "NFL" (narrow flood), "SP" (spot), or "NSP" (narrow spot), or as otherwise indicated in the luminaire schedule. For LED, provide of a type with no ultraviolet (UV) emissions.

4. LUMINAIRES

4.1 Provide luminaire types and manufacturers as indicated on the drawings. Where a luminaire type designation (i.e. letter) is not shown at a luminaire symbol, include costs in bid to provide any applicable type of luminaire used for the same symbol anywhere else on the drawings.

4.2 Support all luminaires (including outlet boxes and/or conduits used to support luminaires, where permitted) in complete accordance with all applicable requirements of the NEC (including, but not limited to, code requirements for mounting and support of luminaires, outlet and other boxes, conduits, raceways, and devices). Provide all required mounting hardware, including pendant kits, fasteners, hangers, wall mounted brackets, concrete foundations, conduits, supplementary supports, grounding, etc., for a complete installation. Support all luminaires completely independent of suspended ceilings and direct from the structure (suspended ceilings are permitted to provide supplemental lateral support to luminaires which are vertically supported direct from the structure). Supporting luminaires with or from conduits or raceways is not permitted, except that luminaires specifically designed for conduit support may be supported utilizing only rigid steel conduit (supporting with any other type conduit or raceway, including IMC, EMT, PVC, surface raceway, and flexible conduit, is not permitted under any circumstance). Supporting luminaires from screw shells of lamp holders is not permitted under any circumstance. Supporting luminaires or wiring from trees or vegetation is not permitted under any circumstance.

4.3 Refer to architectural drawings, reflected ceiling plans, and details for exact locations of all luminaires. Verify final location of all luminaires with the owner, architect, and lighting designer (where applicable) prior to rough-in.

4.4 Perform field measurements, verify proper clearances, and verify all exact mounting and installation conditions and requirements prior to ordering luminaires.

4.5 Provide integral thermal protection for all recessed luminaire housings.

4.6 Perform aiming of all adjustable interior luminaires. Include all costs to aim to the satisfaction of the owner, architect, and engineer. This aiming may be performed during normal working hours.

4.7 For surface mounted luminaires wired utilizing surface mounted wiring methods, provide wiring entering the side of luminaires. Where fixtures do not facilitate side entry of wiring, provide fixture with manufacturer's back mounting adapter (so wiring enters side of adapter and then enters rear of fixture by passing through adapter). Installing the fixture on surface outlet boxes (in such a way that there is a significant "gap" between the fixture and the wall/ceiling surface) is not acceptable.

4.8 All finish colors are selected by the architect/owner. Verify and coordinate any finish colors shown on the drawings (including electrical symbol list, remarks/descriptions on luminaire schedule, or colors represented by any catalog number) specifically in detail with the architect/owner before releasing lights. Include costs in bid to utilize any of the available standard and/or optional colors listed in manufacturers' catalogs (excluding any colors identified in manufacturers' catalogs as "custom" or "premium").

4.9 Where luminaires are specified or furnished by the contractor with tamper resistant hardware (including, but not limited to, torx, spanner, allen/torx with center reject pin, etc.) which must be removed in order to access lamps or drivers/ballasts for replacing or servicing, furnish and turn over to the owner not less than two (2) tamper resistant screw drivers of each type required.

4.10 Where track lighting, continuous linear lighting, and similar luminaires are indicated on the drawings, provide complete and coordinated installation. Install in continuous lengths with even appearance as shown on the drawings utilizing general sections as shown on the drawings (or if not shown as otherwise required and available from the manufacturer). Include all joining/extension fittings (corners, tees, crosses, straight extensions, etc., with lens and/or louver where applicable), end caps, aligning/attaching hardware, ceiling flanges, grid rails, yokes, etc. (where applicable). For luminaires installed continuous between building members (walls, ceiling soffits, or other architectural structures and details), individually measure exact dimensions at each and every locations and order and install luminaires accordingly. Fully coordinate the installation with the architect and general contractor.

5. EXTERIOR LIGHTING

5.1 All provisions of the section of this specification "General Lighting" apply to exterior lighting as modified herein.

5.2 Provide all pole mounted and "bollard" type ground mounted luminaires with suitable concrete foundations complete with embedded (during pour) "J-hook" anchor bolts. Anchors installed or set after foundations are cast are not acceptable under any circumstance. Notify the owner, architect, and engineer after excavation and prior to pouring concrete to facilitate inspection. Provide conduit mounted ground luminaires with conduit secured in minimum 300 mm x 300 mm x 300 mm (12" x 12" x 12") concrete poured below grade and embedding conduit 90 degree bends at luminaire locations.

Provide embedded conduit bends, conduit exposed above grade, and conduit between embedded bends and the portion exposed above grade as rigid steel only.

5.3 Install luminaire poles and bollard luminaires on foundations utilizing leveling nuts (nuts above and below base); shims are not acceptable. Grout between the foundation and pole/bollard base utilizing suitable non-shrink mortar finished vertically to the outside of the base, with a drain hole. Where grouting is not required or recommended by the pole/bollard manufacturer, grouting may be omitted where pole base cover or bollard housing completely covers the space between foundation and base.

5.4 For all concrete pole and bollard foundations, submit shop drawings (based on foundations shown on the drawings) of exact foundation construction, fabrication, and characteristics. Base pricing on foundation dimensions below grade as shown on foundations detail(s) on the drawings. Dimensions below grade may be reduced from the width/diameter and depth dimensions shown on the detail(s) where approved by the lighting manufacturer and in accordance with structural foundation shop drawings. Prepare and submit structural foundation shop drawings (sealed by a registered professional engineer from the state where the project is located) showing that the foundation is sufficient to fully support the forces involved based on actual soil conditions present at each respective foundation location (whether or not dimensions are reduced). Provide soil boring test results at each foundation location. The electrical contractor is fully responsible for all costs associates with engaging the services of structural registered professional engineer and performing soil borings for this purpose.

5.5 For all luminaire poles and bollards, provide approved tags for wiring (inside hand holes, where applicable). Provide tags indicating the panel name and circuit number (or other source of feeder), and stating the voltage, phase, and amperes of the feeder. Provide feeder tags wording and layout similar to engraved plastic nameplates (see specifications section "Identification, Nameplates, and Tags" of specifications division 16300, Electrical Materials).

5.6 Perform night aiming of all adjustable exterior luminaires. Include all costs in bid (including overtime costs for work at night) to aim to the satisfaction of the owner, architect, and engineer.

6. EMERGENCY AND EXIT LIGHTING

6.1 Provide all emergency and exit lighting as indicated on the drawings.

6.2 Verify exact mounting, quantity of faces, and directional arrows of all exit signs prior to ordering.

6.3 Install all exit signs at general locations as shown on the drawings. Coordinate and obtain approval for exact locations with the architect and local authorities having jurisdiction before installation. Install exit signs to ensure they are completely and clearly visible from the entire covered areas and egress paths.

6.4 Perform aiming of all adjustable emergency luminaires. Include all costs to aim to the satisfaction of the owner, architect, engineer, and local authorities having jurisdiction. This aiming may be performed during normal working hours.

6.5 Wherever any battery units or battery packs are installed (including batteries integral to luminaires), connect power to the battery units/packs on the line side of all lighting and other control switches so it is impossible to de-energize by turning any switch off.

6.6 Where indicated on the drawings (see also the luminaire schedule), provide emergency luminaires with integral and/or field-installed driver/ballast generator transfer device with 0-10 V dimming bypass (BGTD). Provide as Philips/Bodine #GTDU (or equivalent). Provide incoming emergency source wiring from emergency panel to light as shown on drawings (3 #10, 3/4" C, unless otherwise noted). Provide incoming normal source wiring (with constantly energized un-switched "constant hot" conductor, switch controlled "switched hot" conductor, neutral conductor, and grounding conductor) run from the normal switch location to the first normal-only light controlled by the switch then to the driver/ballast generator transfer device at emergency luminaires (4 #12, 3/4" C, unless otherwise noted). Provide internal luminaire wiring run from generator transfer device to controlled driver/ballast within each emergency luminaire.

END OF SECTION

SECTION 16500 - FIRE ALARM

1. GENERAL PROVISIONS

1.1 The applicable requirements and conditions of specifications section "General Provisions" of specifications divisions 16100, General Electrical, and 16300, Electrical Materials, are hereby made an integral part of this section.

1.2 Extent of fire alarm and detection system work is indicated on the drawings and schedules. Types of fire alarm and detection equipment includes the following:

A. Control panel
B. Remote annunciator
C. Audio/visual horn/strobes and visual strobes
D. Manual pull stations
E. Smoke, heat, and other automatic fire detectors
F. Duct type smoke detectors
G. Fire suppression (i.e. sprinklers, etc.) system flow, tamper, pressure, and other supervisory switch connections
H. Magnetic door holders

1.3 Provide the fire alarm system (including operation, equipment, devices, wiring, installation, and manufacturer's representative services [programming, testing, adjustment, equipment start-up, as-built documentation, and operation and maintenance documentation and instructions]) in complete accordance with all applicable federal, state, and local codes and standards (including National Electrical Code (NEC), Institute of Electrical and Electronic Engineers (IEEE), National Fire Protection Association (NFPA), Underwriter's Laboratories (UL), Factory Mutual (FM), American National Standards Institute (ANSI), National Electrical Contractors' Association (NECA) "Standard of Installation", Americans with Disabilities Act (ADA), United States Department of Labor Occupational Safety and Health Administration (OSHA), all local municipal authorities having jurisdiction (local authorities), etc.). Provide fire alarm system controls and all new and existing system components (including devices, equipment, modules, interfaces, etc.) listed to operate together. Provide all signaling devices of an ADA approved type providing ADA approved audible and visual coverage throughout all areas of the project.

1.4 These specifications are based on a fire alarm system of the addressable analog type.

1.5 Equipment as manufactured by GE Infrastructure (Edwards/EST), Honeywell (Fire Control Instruments (FCI) and Notifier product lines only), Siemens, and Simplex/Grinnell/Tyco (or approved equal) shall be considered.

1.6 Only fire alarm equipment which can be programmed by any approved service vendor and which utilizes non-proprietary coding/programming shall be considered. Only fire alarm manufacturers authorizing at least three (3) independent service vendors in the project area shall be considered. Submit a list of local approved service vendors with shop drawings. Perform manufacturer's representative services (specifically including programming, testing, adjustment, equipment start-up, as-built documentation, and operation and maintenance documentation and instructions) throughout the entire duration of the project, up through final testing and acceptance of the system by the owner and local authorities having jurisdiction, include all costs in bid. *No extra consideration, claims, charges, or*

compensation will be granted under any circumstance for manufacturer's representative services (including programming, testing, adjustment, equipment start-up, as-built documentation, and operation and maintenance documentation and instructions) during the project (specifically including where associated with changes to the scope of work, alternates, unit prices, allowances, etc.) performed before final testing and acceptance of the system. Extra claims and/or compensation shall only be considered for changes which are initiated after final testing and acceptance of the system.

1.7 Where existing and new fire alarm systems/components interface with one another, only fire alarm equipment (including control panel where devices directly connect to the control panel, interface modules which connect between the control panel and devices or between control panels, and fire alarm devices) which are listed as compatible (in accordance with NFPA fire alarm code and applicable manufacturer's listing requirements for compatibility) between new and existing devices/systems may be used. As an alternative, existing non-compatible devices may be replaced throughout the building accordingly with new compatible devices. As another alternative, a complete new fire alarm system with all new devices may be installed to replace the entire existing fire alarm system. Both of these alternatives are provided there is no additional cost to the project. No extra consideration, claims, charges, or compensation will be granted under any circumstance associated with the contractor's election to utilize this alternative (include all costs in bid, where this alternative is desired)

2. SUBMITTALS

2.1 Submit shop drawings including, but not limited to, shop drawings on equipment and devices (specifically showing manufacturers, model numbers, and listing information), rough in diagrams, detailed project-specific riser and wiring diagrams (specifically showing conductor/cable types and sizes), installation layout drawings (specifically showing locations of all equipment and devices on floor plans [drawn to scale], equipment, and wiring and information on ceiling height and construction [on architectural background plans which shall be made available to the contractor for this purpose], information showing ADA compliant signaling device audible and visual coverage (specifically show all audible device decibel (dB) and visual device candela (cd) settings), and specifically showing interfaces with all fire suppression systems [sprinklers, etc.]), installation instructions, written warranty, detailed zone or addressable device lists (showing each system point identifiable from the control panel and the associated numbered address and detailed description), sequence of operation, power supply wiring information, and power consumption/supply/battery sizing and voltage drop calculations. Submit quantity as indicated elsewhere in the specifications to the engineer for review and approval. In addition to submitting to the engineer, submit additional sets (quantity as per local authorities) to the local authorities having jurisdiction for review, approval, and permits.

2.2 Include all costs in bid associated with preparing and submitting shop drawing information. This includes sealing (by a registered professional engineer) all submittal information which is submitted to local authorities having jurisdiction for review.

2.3 Upon project completion, submit operation and maintenance (O&M) manuals (include with other project O&M manuals). Submit at least three (3) original copies of all fire alarm system software.

2.4 Upon project completion, submit certification of the entire system to the owner and local authorities having jurisdiction.

3. FIRE ALARM AND DETECTION SYSTEMS

3.1 Provide Class "B" alarm and detection system products of types, sizes and capacities indicated, which comply with manufacturer's standard design, materials, and components.

3.2 The fire alarm riser diagram on the drawings is approximate as a general guide to system architecture and functioning. Quantities of devices shown on the riser are approximate. Provide exact quantities as specified (based on floor plan drawings, etc.).

3.3 Additional/Spare Devices: Include providing (furnish, install, and wire including manufacturer's representative services [programming, testing, adjustment, equipment start-up, as-built documentation, and operation and maintenance documentation and instructions]) additional devices (in addition to devices shown on drawings or otherwise required by specifications) as follows. Include at least of 10% (of the respective quantity of each type device specified or otherwise used on the project) of each respective type notification, initiation, supervisory, and control device from specifications section 16500-4 (excluding control panel and annunciator), but in no case less than a minimum of two (2) of each type device); where additional and/or spare device quantities greater than zero (0) are specifically shown on the drawings those quantities take precedence over the percentage above. Include 15.2 m (50'0") of the appropriate type of fire alarm wiring for each additional device. If additional devices are not completely used by the conclusion of the project (after final acceptance by the owner), turn any remaining additional fire alarm devices over to the owner as spares. Additional devices may be used at any time during the project, include all costs in bid.

3.4 Provide a complete fire alarm system with the following sequence of operation and functions.

A. Fire Alarm Activation: Actuation of any initiating device (including manual pull stations, automatic smoke, heat, and other fire detectors [including duct detectors, except as specifically provided below], and fire suppression flow/activation switches, etc.) initiates a "fire alarm" and activates all fire alarm signaling, output, and notification devices (including, but not limited to, horns and strobes, elevator interfaces, HVAC equipment shut-downs, door releases, and central station and fire department alarm notification).

B. Trouble Alarm Activation: Any trouble conditions in the fire alarm system (including actuation of fire suppression system tamper/status supervisory switches) initiates a "trouble alarm" and activates central station (and fire department where required) trouble notification and an audio and visual signal at the control panel and remote annunciator (where applicable). "Trouble alarms" do not activate alarm signaling devices or output devices (do not activate elevator interfaces or door releases [or HVAC equipment shut-downs, except as specifically provided as follows]). Only where code officials specifically require in writing that duct smoke detectors NOT initiating a general "fire alarm", duct detectors shall initiate a "duct

smoke supervisory alarm" audio and visual signal at the control panel and remote annunciator and activate appropriate central station (and fire department where required) trouble notification.

C. Elevator Interfaces: Provide detectors, devices, wiring, conduit, relaying, final connections, and associated equipment between fire alarm controls, elevator controls, and shunt trip devices for the functions below. Perform all connections at elevator controls under the supervision of the elevator supplier. Functions below summarize operation only. Provide exact operation in strict accordance with all applicable codes and standards (including fire and elevator codes) and as directed by local authorities having jurisdiction. Functions shown are typical of each elevator. Provide individual and distinct signals from the fire alarm system to elevator controls for each of the following functions:

1) Recall, Designated Floor: Recall elevator to the "designated" level upon one (1) of the following two (2) options, as directed by local authorities having jurisdiction (contact local authorities and verify which option is required during construction, include all costs in bid):

a) Option #1: Upon any "fire alarm"
b) Option #2: Upon activation of elevator lobby (except the designated level, see below). See also shaft/machine room recall below.

2) Recall, Alternate Floor: Recall elevator to the "alternate" level upon activation of designated level elevator lobby smoke detector(s).

3) Recall, Shaft/Machine Room: Recall elevator to the designated level upon activation of elevator pit or elevator machine room smoke detector(s) (except as follows). Where the alternate level is above the designated level, recall to the alternate level upon activation of pit detector(s). Where the elevator machine room is located on the designated level, recall to the alternate level upon activation of machine room detector(s). This signal shall be made via a supervised relay having multiple output contacts to facilitate initiating the required elevator functions and to facilitate activating elevator indicating lights (lights and all wiring by the elevator supplier) indicating fire in the elevator shaft and/or machine room.

4) Shut-Down: Operate shunt trip device(s) to disconnect incoming power to elevator(s) upon either of the following.

a) Heat Detectors: *Provide the following heat detectors (whether or not shown on the drawings), unless the use of sprinkler flow switches is specifically shown on electrical/fire protection drawings.* Provide location and quantity of heat detectors as follows (locations/quantity are not shown on drawings). Locate so there is a heat detector within 610 mm (2'0") of every sprinkler head. Utilize only heat detectors having minimum listed spacing rating of 7.6 m (25'0") and lower temperature rating and higher sensitivity (i.e. lower response time index (RTI)) than elevator shaft/room sprinkler heads. Fully coordinate all requirements with the sprinkler contractor and provide detectors accordingly (include

costs in bid for special heat detectors). Heat detectors may be of the addressable type or may be of the conventional type connected to the fire alarm system through a common addressable interface module (minimum one (1) module for each individual shaft/room opening).

b) Sprinkler Flow Switches: *Where specifically shown on electrical/fire protection drawings, the following may be utilized in lieu of heat detectors.* Where sprinkler piping is dedicated to serving elevator shafts/machine rooms and where this dedicated sprinkler piping is provided with code-approved flow/pressure sensing switch(es), utilize switch(es) to activate shut-down function.

5) Any means to bypass or override recall/shut-down functions are part of elevator controls (not the fire alarm system, N.I.C.).

D. HVAC Equipment Shut-Down: Upon any "fire alarm" (or duct smoke detector activation where duct detectors do not activate fire alarm), shut down HVAC equipment (including all air handling equipment operating at 0.94 m^3/s (2,000 cfm) or greater and any other equipment specifically indicated on the drawings or mechanical/ATC specifications) and open/close motorized dampers in accordance with all applicable codes and standards. Provide wiring, conduit, relaying, and final connections from the fire alarm system to ATC controls. Perform all connections at the ATC controls under the supervision of the mechanical/ATC contractor. For equipment operating at 7.08 m^3/s (15,000 cfm) or greater provide at least two (2) detectors per unit (supply and return).

E. Door Release: Upon any "fire alarm", release all magnetic door holders.

F. Central Station and Fire Department Notification: Provide the fire alarm system to facilitate notifying the local fire department in accordance with codes and local authorities having jurisdiction, through the services of an appropriate and central station. Coordinate all requirements (relating to fire alarm system equipment and wiring) with the owner, the owner's central station vendor (where applicable), and local authorities having jurisdiction. As a minimum, provide an individual and distinct signal from the fire alarm system for each of the following functions in addition to any other functions required by code:

1) Fire Alarm: Upon any "fire alarm" condition initiated any fire alarm device (excluding fire suppression flow/activation and duct smoke detection).

2) Sprinkler Alarm: Upon any "fire alarm" condition initiated by any fire suppression flow/activation switch.

3) Duct Detector Supervisory: Upon activation of any duct smoke detector.

4) Trouble Alarm: Upon any "trouble alarm" condition.

G. Smoke Control: Where smoke control systems (i.e. atrium and/or stairwell smoke control) are *specifically shown on the drawings (only)*, provide the fire alarm system arranged to send a signal to the HVAC/ATC controls (at a control interface point(s)

located at the controlled mechanical equipment) to activate the smoke control system as follows. Send one (1) signal, with two (2) states (state #1 is the normal condition, with the smoke control system inactive and state #2 is with the smoke control system operating). Provide an approved hand-off-auto switch mounted directly adjacent to the fire alarm control panel with an engraved laminated plastic nameplate reading "ATRIUM SMOKE CONTROL SYSTEM" (properly describe the system) and functioning as follows.

1) When in the "hand" position, activate the smoke control system (state #2) regardless of the status of the fire alarm system and regardless of the status of other ATC controls. Sound a trouble alarm in the fire alarm system whenever the switch is in the "hand" position.

2) When in the "off" position, the smoke control system shall not operate (state #1), regardless of the status of the fire alarm system and regardless of the status of other ATC controls. Sound a trouble alarm in the fire alarm system whenever the switch is in the "off" position.

3) When in the "auto" position, the fire alarm system shall automatically operate (state #2) the smoke control system upon activation of any automatic fire detector or sprinkler flow switch in or serving the smoke control system area, regardless of the status of other ATC controls. Coordinate exact devices involved with the mechanical engineer during construction. Resetting the fire alarm system shall automatically reset the smoke control system to the normal (state #1) condition. Activation of any manual pull station (anywhere in the building) or activation of automatic fire alarm devices not in or associated with the atrium shall <u>not</u> activate the smoke control system.

4) When in the "auto" position and when the fire alarm system is not in an alarm condition as noted above, equipment may be controlled by HVAC/ATC controls. However, any activation of the fire alarm system or of the hand/off/auto switch must override HVAC/ATC controls.

5) The HVAC/ATC system (not by the E.C.) shall operate and respond to signals from the fire alarm system as indicated in the mechanical specifications and as directed by the mechanical engineer.

6) The electrical contractor shall provide all wiring associated with the smoke control system from the fire alarm control panel to and from the hand-off-auto switch and from the fire alarm control panel to supervised fire alarm control relays located at each piece of controlled HVAC equipment. All wiring from relays to HVAC unit control circuits shall be by the mechanical/ATC contractor.

H. <u>Pre-Action Sprinkler Releasing Service:</u> Where specifically shown on the drawings (only), provide the fire alarm system arranged to *directly* enable and activate all of the pre-action sprinkler fire suppression systems present in the building. Include all equipment and wiring (by the electrical contractor) to the pre-action controllers (controllers furnished and installed by the sprinkler contractor) for operation and according to code. Refer to fire suppression specifications for additional information

and fully coordinate all work and all requirements with the sprinkler contractor and fire suppression engineer. These provisions do not apply where sub-panels (installed by the fire suppression contractor) are used to control pre-action sprinklers. These provisions only apply where building fire alarm system detectors are used to initiate pre-action release and where **NO** automatic fire alarm initiating devices (smoke or heat detectors) directly connect to any pre-action controller (i.e. where the only initiating devices are part of this fire alarm system (by the E.C.) and these devices activate the pre-action controls).

4. MATERIALS, EQUIPMENT, AND DEVICES

4.1 CONTROL PANEL: Provide fire alarm control panel surface mounted where indicated on the drawings and including the following items and/or features:

A. Addressable analog type
B. UL Listed
C. Modular design, solid-state construction
D. Visual alarm and trouble indicators
E. Automatic ground detection
F. Double supervision
G. Alarm verification
H. Dead front construction
I. Supervised signal circuit modules (complete and including modules to synchronize visual indicating devices), Class B type
J. Output devices (elevator interfaces, HVAC equipment shut-downs, door releases, etc.) relaying, field programmable
K. Complete power supply including incoming power overvoltage surge (lightning) protection
L. Battery backup (to operate the system under "normal", "trouble", and "alarm" conditions as per code, but not less than a minimum of 24 hours and then operate the system in "alarm" condition for a minimum of 15 minutes at the end of the 24 hour period), including charger and batteries, fully supervised and automatic
M. Auxiliary contacts, minimum of 10, field programmable
N. Equipment, devices, modules, and wiring for central station and fire department notification and tie-in; including telephone dialer, telephone line interface, transmitter, telephone line wiring, etc.. Provide a telephone/data outlet (see symbol list on drawings) at control panel for tie-in.
O. Device termination module
P. Detector loop module, Analog type
Q. Integral keyboard display and interface module
R. Provide power to (obtain from power circuit for main control panel) and smoke detector(s) located to provide protection/coverage (in accordance with NFPA-72 requirements) for the main fire alarm control panel, all sub- or slave- control panels, all power supplies, all remote indicating controllers, and related equipment, whether shown on the drawings or not.

Where remote indicating control appliance relays and/or modules are required for control of ADA signaling devices, mount integral to the control panel enclosure or in a single separate enclosure directly adjacent to the control panel. Batteries may be mounted in the control panel enclosure or in a separate single enclosure.

4.2 REMOTE ANNUNCIATOR: Provide annunciator of the alphanumeric type (minimum 80 character), flush mounted, and including the following options:

A. Lamp test key switch
B. Drill switch key switch
C. Audible/visual trouble alarm with silencing switch

Provide annunciator displaying the activated device(s) address(es) and "zone indication" as shown on the fire alarm riser diagram for any alarm or trouble condition. Submit shop drawings of annunciator layout for review and approval prior to ordering.

4.3 COMBINATION HORN AND STROBE ASSEMBLIES: Provide combination horn and flashing strobe audible and visual notification appliances with code approved wording "FIRE". Provide listed, flush mounted (mount on flush outlet box), ADA approved type wired using Class "B" supervised circuits. Provide listed for wall or ceiling mounting as applicable. Only appliance types featuring both listed wall mounting models and listed ceiling mounting models or models listed for both wall and ceiling mounting shall be considered. For all dwelling units and for sleeping areas in other occupancies, utilize only NFPA compliant low-frequency (nominal 520 Hz) devices. Provide audibly and visually synchronized (utilizing synchronized type appliances in conjunction with suitable synchronizing control modules in signaling circuits) to prevent photosensitive reactions and ensure distinct audible patterns. Provide with adjustable output settings (90, 95, and 99 dBA audible and 15, 30, 75, and 95 or 110 cd visual). Base pricing and wiring and power supply sizing on maximum settings. Lower output settings shall be considered only where they provide audible and visual coverage meeting or exceeding ADA and code requirements (throughout all areas of the project where coverage is required or otherwise shown on the drawings) and where the manufacturer submits calculations/criteria showing compliant coverage. Include costs in bid to provide additional signaling appliances where necessary to provide compliant coverage.

4.4 STROBE ONLY ASSEMBLIES: Provide flashing strobe visual notification appliances with code approved wording "FIRE". Provide listed, flush mounted (mount on flush outlet box), ADA approved type wired using Class "B" supervised circuits. Provide visually synchronized (utilizing synchronized type appliances in conjunction with suitable synchronizing control modules in signaling circuits) to prevent photosensitive reactions. Provide with adjustable output settings (15, 30, 75, and 95 or 110 cd). Base pricing and wiring and power supply sizing on maximum settings. Lower output settings shall be considered only where they provide audible and visual coverage meeting or exceeding ADA and code requirements (throughout all areas of the project where coverage is required or otherwise shown on the drawings) and where the manufacturer submits calculations/criteria showing compliant coverage. Include costs in bid to provide additional signaling appliances where necessary to provide compliant coverage.

4.5 MANUAL PULL STATIONS: Provide station semi-flush mounted (mount on flush outlet box), of the non-coded double-action type with key reset switch. Provide each pull station individually addressed and interfaced to addressable fire alarm system utilizing a suitable addressable monitor module (integral to station or a separate module mounted in the station outlet box).

4.6 SMOKE DETECTORS: Provide detector of the dual chamber, solid state photoelectric, addressable, and analog type arranged for two-wire, non-polarized installation. Provide detector of low profile design, white in color, and with twist-lock base for mounting on standard flush outlet box.

4.7 HEAT DETECTORS: Provide detector functioning on both fixed temperature (rating as indicated on the drawing, unless otherwise required as noted below) and rate-of-rise principals of operation. Provide addressable and analog type arranged for two-wire, non-polarized installation, of low profile design, white color finish, and with twist-lock base for mounting on standard flush outlet box. For areas where ambient temperatures may normally exceed 38 degrees C (100 degrees F), such as unconditioned attic spaces or spaces which are not insulated, utilize detectors with temperature ratings as recommended by the detector manufacturer for the application (detectors rated 80 degrees C (175 degrees F) or greater may utilize fixed temperature sensing only [rate-of-rise sensing is not required for these detectors]). Verify all requirements associated with temperature ratings with manufacturer in detail before purchasing detectors or rough-in (no extra consideration, claims, charges, or compensation will be granted under any circumstance associated with temperature ratings of heat detectors).

4.8 DUCT TYPE SMOKE DETECTORS: Provide suitable duct housing with detector (as indicated above), sampling tubes (coordinate with ductwork), addressable relay for HVAC shutdown interface, and remote mounted test/reset/indicating station. Arrange addressable relay to shutdown HVAC equipment upon addressable signal from the fire alarm control panel. Provide addressable HVAC shutdown relay either integral to (and part of) duct housing or separately mounted directly adjacent to the duct housing. Detector or housing auxiliary contacts or relay operating only when the individual duct smoke detector is in alarm condition are not acceptable. Where either the HVAC equipment and/or any associated ductwork are new or modified, mechanical contractor shall install detector on ductwork and provide all HVAC shutdown interface wiring from relay to HVAC equipment. Where both the HVAC equipment and all associated ductwork are existing to remain, electrical contractor shall install detector on ductwork (as directed by and under the supervision of the mechanical contractor and mechanical engineer) and provide all HVAC shutdown interface wiring from relay to HVAC equipment (making final connections at HVAC equipment as directed by and under the supervision of the mechanical contractor and mechanical engineer). Electrical contractor shall furnish detector and associated equipment, provide all wiring and connections to fire alarm system, and install the remote test/reset/indicating station in all circumstances.

4.9 FIRE SUPPRESSION SUPERVISORY AND OTHER ACTUATION DEVICES: Interconnect and monitor every fire suppression system (including systems utilizing sprinklers [including fire pump where applicable], carbon dioxide, foam, chemical, halogen, deluge, pre-action, standpipes, etc. where applicable) supervisory device (including flow, pressure, tamper, etc. switches) to the fire alarm system. Interconnect and monitor every fire actuation device part of or installed along with architectural or mechanical equipment and apparatus (including smoke and/or fire dampers [including those in ducts, at shafts, and for ceiling radiation], smoke and/or fire doors, gates, grills, and shutters, fan control, and other similar equipment/apparatus) to the fire alarm system. Provide suitable addressable monitor modules and all wiring for complete connections between each monitored device and the fire alarm system. Supervisory and actuation devices shall be furnished and installed on fire suppression systems, equipment, and

apparatus by the respective installing contractor and wired to the fire alarm system by the electrical contractor. Connect supervisory and actuation devices whether shown on the electrical drawings or not. Review fire protection, mechanical, and architectural drawings and coordinate with fire protection, mechanical, and general contractors before submitting bid and include all costs in bid.

4.10 SUPERVISORY AND CONTROL DEVICES: Interconnect each supervisory and control device (other than fire suppression system devices) specifically indicated on the drawings to the fire alarm system. Provide suitable addressable monitor modules and all wiring for complete connections between each monitored device and the fire alarm system.

4.11 RELAY INTERFACES: Provide a suitable addressable output module for control relay interconnection to the addressable fire alarm system. Provide all wiring for complete connections to the respective controlled device. Provide output modules for all HVAC/elevator recall and shutdown connections, magnetic door holders, etc.

4.12 Wherever non-addressable ("conventional") style devices remain, are specified, or are otherwise required for the project (i.e. to satisfy code requirements or where addressable devices are not approved by NFPA, UL, or FM for the application) in conjunction with the addressable system, provide each device individually addressed utilizing a suitable addressable monitor module. Verify all requirements before submitting bid and include all costs in bid.

5. LOCKS AND KEYS

5.1 Refer also to the section of this specification "Locks and Keys" of specifications section 16300 "Electrical Materials".

5.2 Provide all fire alarm equipment cabinets and enclosures with locking covers/doors. Provide enclosures and key operated devices (including pull stations and duct detector test/reset stations) keyed alike.

6. INSTALLATION

6.1 Provide fire alarm wiring in complete accordance with all requirements of other sections of the electrical specifications, except as modified below. Utilize wiring methods in accordance with specifications section 16200 "Electrical Work Practices".

6.2 Provide all fire alarm system wiring as directed, recommended, and approved by the system manufacturer and meeting all system manufacturer minimum requirements (including where manufacturer's requirements exceed the requirements of the specifications and the NEC). #14 AWG conductors are the minimum permitted. Provide all wiring utilizing solid conductors. Stranded conductors are permitted only where in accordance with NEC Article 760. The fire alarm system may utilize individual conductors wiring in conduit and/or multi-conductor cables (in conduit where otherwise required by the specifications).

6.3 Provide multi-conductor cables (where utilized) as follows. Provide insulation rated not less than 300 V. Utilize only cables having an overall red jacket and approved by the NEC

and NFPA for use with fire alarm systems. Plenum rated cables may be utilized, but only in dry locations (plenum cables, even when installed in conduit, are prohibited in damp and wet locations). In damp locations, utilize only cables specifically listed and identified for use in damp or wet locations. Provide all cables in wet locations (including underground and embedded in concrete slabs at or below grade) specifically designed for outdoor and submerged use and specifically listed and identified for use in wet locations.

6.4 Provide raceways for the fire alarm system dedicated to fire alarm wiring. Do not run other systems (including power, lighting, controls, telecommunications, etc.) in fire alarm raceways. Where fire alarm wiring is recommended or required by the manufacturer to be separated from other fire alarm wiring due to noise, interference, or other concerns, install wiring in separate raceways (or physically separate wiring as per manufacturer recommendations where wiring is permitted elsewhere to run without raceway). Paint outlet, junction, device, and other boxes, conduit bodies, and covers associated with the fire alarm system red. Paint exposed fire alarm raceways red.

6.5 Identify fire alarm equipment, devices (as listed below), and wiring as indicated in specifications section "Identification, Nameplates, and Tags" of specifications division 16300, Electrical Materials.

A. Provide an engraved laminated plastic nameplate on the front cover of the fire alarm control panel reading, "FIRE ALARM CONTROL PANEL - 120V, 20A - PP1, CCT. 4"). Indicate the panel and circuit number feeding the control panel. Provide similar nameplates at all power supply units, auxiliary power supplies, and signaling circuit power extender modules.

B. Provide red engraved laminated plastic nameplates with 6.5 mm (1/4") high (minimum) white letters at each pull station reading "IN CASE OF FIRE: SOUND ALARM AND CALL 911" (or "IN CASE OF FIRE: SOUND ALARM AND CALL THE FIRE DEPARTMENT" where the building telephone system does not facilitate directly dialing 911), "FIRE ALARM DOES NOT CALL FIRE DEPARTMENT", or with other wording as directed by the local authorities having jurisdiction.

C. Provide two (2) engraved laminated plastic nameplates for each duct type smoke detector, one (1) on the detector housing and one (1) on the remote test/reset/indicating station. List the name and description of the equipment served (i.e. "#AHU-1 - AIR HANDLING UNIT", etc.). Utilize 3.2 mm (1/8") high minimum lettering.

D. Suitably label (in an engineer and owner approved method) all addressable fire alarm devices (manual pull stations, smoke detectors, heat detectors, duct type smoke detector housings, duct smoke detector test/reset/indicating stations, supervised output relay modules, identification modules, etc.) with the respective system address. Labeling annunciator(s) is not required. Labeling signaling devices and magnetic door holders is not required, except that labeling is required for any associated addressable relays.

6.6 For all existing fire alarm devices (initiating or signaling, of any kind), components, and functions required to remain active and/or operational (by code, by the owner, or by local authorities having jurisdiction) which are not shown as new or replaced by the new fire

alarm system, interface and connect (utilizing wiring and new system modules, etc.) existing devices, components, and functions to the new fire alarm system to maintain operation. Provide whether shown on the drawings or not.

6.7 Where replacing existing fire alarm devices with new devices, existing locations may be used where practical, provided NFPA required coverage is maintained and provided it does not represent a change in scope of work. Where replacing devices in existing drop ceilings which remain, reuse existing ceiling tiles and install new devices in existing holes in tiles (reuse existing holes). Relocate tiles within ceiling for proper device locations. Removing existing devices in such a manner which leaves exposed openings (holes) in tiles is not acceptable. Patching holes in tiles and using blank cover plates to close holes in tiles are not acceptable. Where required to avoid leaving holes, patching, and blank covers, provide (at the electrical contractor's expense) new ceiling tiles to match existing (submit shop drawings [and samples, if requested] of ceiling tiles to the architect and owner for review and approval).

7. QUALITY ASSURANCE

7.1 Completely test the entire system as per "Testing" in specifications section 16100 "General Electrical". Perform the following additional testing.

7.2 Completely test the entire system to demonstrate proper operation, functioning, capability, and compliance with all code and specification requirements. Inspect equipment, devices, relays, signals, etc. for malfunctioning. Correct malfunctions and retest to demonstrate satisfying the above requirements. Perform all testing in complete accordance with all applicable NFPA-72 standards and testing procedures.

7.3 The electrical contractor and manufacturer's representative shall fully certify (in writing) the entire system and system operation, including documenting successful testing of the system. Submit copies of certification to the owner and local authorities having jurisdiction.

7.4 Provide manufacturer's representative services performed by specially trained personnel employed by the fire alarm system manufacturer's representative. Perform manufacturer's representative services (specifically including programming, testing, adjustment, equipment start-up, as-built documentation, and operation and maintenance documentation and instructions) throughout the entire duration of the project, up through final testing and acceptance of the system by the owner and local authorities having jurisdiction, include all costs in bid. *No extra consideration, claims, charges, or compensation will be granted under any circumstance for manufacturer's representative services (including programming, testing, adjustment, equipment start-up, as-built documentation, and operation and maintenance documentation and instructions) during the project (specifically including where associated with changes to the scope of work, alternates, unit prices, allowances, etc.) performed before final testing and acceptance of the system.* Extra claims and/or compensation shall only be considered for changes which are initiated after final testing and acceptance of the system.

7.5 Provide a demonstration period of one (1) full working day to instruct owner's personnel in the operation and maintenance of the system.

8. WARRANTY AND SERVICE CONTRACT

8.1 Provide a written warranty on all equipment in accordance with "Guarantee and Warranties" in specifications section 16100 "General Electrical".

8.2 Make a service contract available to the Owner after the warranty expires. The owner may accept or decline service contract at the owner's discretion.

END OF SECTION

SECTION 16550 - SYSTEMS PATHWAYS

1. GENERAL PROVISIONS

1.1 The applicable requirements and conditions of specifications section "General Provisions" of specifications divisions 16100, General Electrical, and 16300, Electrical Materials, are hereby made an integral part of this section.

1.2 This specifications section applies to all pathways and related work for communications systems wiring (including only telecommunications, data, sound, security, and CCTV, where applicable), whether the wiring of each respective system is installed by the electrical contractor, the owner, the owner's vendor(s), or other contractors. The term "wiring installer" applies to the party installing wiring of the respective system. The installer of each system shall be as indicated elsewhere in these specifications and/or the drawings.

1.3 This specifications section does not apply in any way to wiring as part of power, lighting, emergency, over 600 V, control, fire alarm, and any other systems.

2. RACEWAYS AND SLEEVES

2.1 Provide all raceways and sleeves (including all fittings, conduit bodies, boxes, supports, etc.) for communications systems wiring in complete accordance with other sections of this specification except as modified below and unless specifically indicated otherwise.

2.2 Provide minimum sizes for conduits and sleeves as follows, unless indicated otherwise. Provide pull strings in all raceways.

A. 103 mm (4") for main service, trunk line, and primary pathway conduits/sleeves.
B. 21 mm (3/4") for branch secondary pathway conduits.
C. 27 mm (1") for branch secondary sleeves, unless indicated otherwise.

2.3 Install conduits so bends in conduit runs do not exceed a maximum total of 180 degrees between manholes, pull boxes, junctions boxes, conduit bodies, etc..

2.4 Flexible conduit is not permitted for communications systems wiring, unless specifically approved in writing under the following circumstances only. Where flexible conduit is utilized, minimum sizes permitted are 129 mm (5") for main service, trunk line, and primary pathways and 27 mm (1") for branch secondary pathways.

A. Where existing walls are fished.
B. Where physically impossible to install rigid/fixed (non-flexible) conduit.

3. SEALING AND FIRE-STOPPING

3.1 Seal and fire-stop all raceways and sleeves in complete accordance with other sections of this specification and as per code except as modified below and unless specifically indicated otherwise.

3.2 Seal once wiring is installed. Where wiring is not installed at this time, seal all empty conduits.

3.3 Seal all underground conduits and conduits entering the building with suitable rubber conduit plugs as soon as conduits are installed and prior to installation of wiring in conduits. Once wiring is installed, reseal conduits with suitable rubber conduit plugs, water plugs, or duct sealer. Provide all seals water and gas tight.

4. GROUNDING

4.1 Provide all grounding as per other sections of this specification and as per code except as modified below and unless specifically indicated otherwise.

4.2 Provide a ground bus at all communications rooms and backboards. Provide one (1) ground bus assembly for every linear 2.4 m (8'0") of backboard at each respective location. Provide Ilsco #NB-350-42 ground bus assembly with #R16 mounting block (Burndy, Ideal, Thomas and Betts/Blackburn, or approved equal). Bond each ground bus to the building electrical service grounding electrode system with #6 AWG minimum conductors. The ground bus facilitates connecting systems cable surge protectors, where used.

4.3 Provide a #4/0 bare copper ground wire the length of all telephone and data risers, bond to the building grounding electrode system.

4.4 Maintain complete mutual separation between the communications systems grounding system, and the electrical power grounding system, except at a single point of connections to the electrical power grounding electrode system as close a possible to the grounding electrode and/or electrical service.

4.5 Bond all raceways, conduits, cable trays, messengers, etc. to the communications systems ground busses or ground wires.

5. RECEPTACLES/LIGHTING/EQUIPMENT IN COMMUNICATIONS ROOMS

5.1 Locate all equipment to avoid conflicts with risers and cabling. Confirm all exact receptacles, luminaires, smoke detectors, and other equipment locations in writing with the owner prior to rough in.

6. OUTLET BOXES

6.1 Provide minimum depth of outlet boxes as 70 mm (2.75") to facilitate terminating category-5 and similar cables. Smaller boxes are permitted only with written approval and only where construction will not allow use of 70 mm (2.75") deep boxes.

7. WIRING ACCESS PATHWAYS

7.1 Provide complete pathways for communications systems wiring. This includes all raceways, sleeves, cable trays, and other wiring access. Provide pathways as specified below. Provide pathways extending between communications rooms, closets, and

backboards and from these locations to each and every communications systems outlet. Refer to the drawings for additional information.

7.2 Prior to rough in, coordinate all proposed cable routing with the owner and wiring installer.

7.3 Service Pathways: Provide incoming service wiring access pathways as indicated on the drawings, refer to the riser diagram.

7.4 Trunk Pathways: Provide trunk line wiring access pathways between communications closets, rooms, and backboards as indicated on the drawings, refer to the riser diagram.

7.5 Primary Pathways: Provide primary wiring access pathways out from communications closets, rooms, and backboards to serve branch outlets as follows:

A. Provide steel strand supporting messengers along all proposed routes of primary wiring access pathways. This includes all corridors used for telephone, data, and security wiring access. Suitably secure messengers at intervals not exceeding 2.4 m (8'0") utilizing "J" clips or other approved hardware. Messenger installation and routing is not shown on the drawings, provide installation and routing as applicable. Securely support all messenger ends and bends utilizing suitable strain relief clamps. Size messengers as per NEC requirements. Messengers are not required where cable trays and conduits are installed (see below).

B. Provide conduits and cable trays for primary wiring access pathways shown on the drawings.

7.6 Secondary Pathways: Provide secondary wiring access pathways from each individual branch outlet to the nearest primary pathway as follows:

A. Provide conduits from each respective outlet, from communications compartments of surface raceways, and from communications raceways of modular furniture stubbed and capped into corridor drop ceiling spaces (or other primary pathway locations) or into communications closets, as indicated on the drawings, refer to the symbol list.

B. Conduits are permitted to stub into accessible ceiling spaces in other rooms, away from primary pathway locations. Where conduits do not stub directly into corridors or other primary pathway locations, provide sleeves through all walls and obstructions leading from the conduit stub location to the primary pathway location. Provide sleeve sizes based on the quantity of outlets to be wired as follows. Provide multiple sleeves to facilitate the total quantity of outlets.

Sleeve Size	Maximum Quantity of Outlets
27 mm (1")	2
35 mm (1.25")	3
41 mm (1.5")	5
53 mm (2")	9
63 mm (2.5")	13
78 mm (3")	19
91 mm (3.5")	26
103 mm (4")	34

C. The wiring installer shall provide support for secondary pathway cable runs, except that where quantity of outlets served exceeds twelve (12), the electrical contractor shall provide supports as indicated above for primary pathways.

8. WIRING

8.1 The wiring installer (the electrical contractor, the owner, the owner's vendor(s), or other contractors as applicable to each respective system) shall provide only wiring complying with the all of the following.

8.2 Provide wiring for each respective system as directed, recommended, and approved by the respective system manufacturer and meeting all minimum requirements of the system manufacturer (including where manufacturer's requirements exceed the requirements of the specifications and the NEC).

8.3 Provide all cables as multi-conductor style having an overall jacket (of a color other than red; red is reserved for fire alarm) and utilize only cables approved by the NEC for use with the respective system.

8.4 Provide all wiring in plenum spaces in complete accordance with the NEC. In dry location plenum ceilings, utilize only plenum rated cables. For damp and wet location plenum ceilings and in all other duct and plenum spaces, run wiring (utilize a non-plenum type suitable for the damp/wet location) in metal conduit. Plenum rated cables may be utilized for other (i.e. non-plenum) applications, but only in dry locations. Plenum cables, even when installed in conduit, are prohibited in damp and wet locations.

8.5 In damp locations, utilize only cables specifically listed and identified for use in damp or wet locations. Provide all cables in wet locations (including underground and embedded in concrete slabs at or below grade, whether in conduit or direct buried) specifically designed for outdoor and submerged use and specifically listed and identified for use in wet locations.

END OF SECTION

SECTION 16600 - EMERGENCY GENERATOR SYSTEM

1. GENERAL PROVISIONS

1.1 The applicable requirements and conditions of specifications section "General Provisions" of specifications divisions 16100, General Electrical, and 16300, Electrical Materials, are hereby made an integral part of this section.

1.2 Provide a complete emergency power system consisting of generator set with controller, transfer switch, generator annunciator, all ancillary and accessory equipment, emergency power distribution panels, and all related equipment and wiring. Provide power distribution panels, related equipment, and wiring according to other sections of this specification.

1.3 Provide generator system prototype tested, factory built, production tested, site tested, of the latest commercial design, and with all accessories necessary for complete installation as shown on the drawings and specified herein. Provide equipment meeting the requirements of the National Electrical Code (NEC), the Life Safety Code (NFPA-101), the Standard for Emergency and Standby Power Systems (NFPA-110), and all other applicable codes, standards, and regulations. Provide the complete emergency power system providing a source of power of capacity, reliability, and quality within minimum time following loss of normal power as specified and as per NFPA-110 for a Type 10 system (i.e. within 10 seconds maximum).

1.4 Provide only equipment supplied through a single local manufacturer's representative (distributor) with factory trained and authorized service personnel on staff and single source responsibility for warranty, parts, and service. Submit manufacturer's representative qualifications with shop drawings for review and approval.

1.5 Provide only new equipment of current production of a national firm which manufactures the generator set, generator controls, and transfer switch and assembles the generator sets as a matched unit. The transfer switch (only) may be of a different manufacturer (from the generator set and controls) only where the single manufacturer's representative above is factory authorized by both the generator and transfer switch manufacturers (to provide required single-source responsibility for warranty, parts, and service). Refer also to the sections of this specification "Submittals" and "Warranty" for additional information.

1.6 Specifications are based on equipment as manufactured by Kohler. Equipment as manufactured by Caterpillar, Cummins/Onan, Generac, and MTU Onsite Energy (Katolight/Detroit-Diesel/MDE) (or approved equal) shall be considered. For transfer switches only, equipment as manufactured by ASCO and Zenith (or approved equal) shall be considered in addition to the manufacturers listed above.

1.7 **Provide generator operating on natural gas fuel and configured for outdoor installation. Natural gas generator is ONLY acceptable for use where the natural gas utility company is capable of delivering a flow rate exceeding 125% of the full load fuel consumption of the generator at natural (without the use of pressure boosting devices or pumps) *service* pressure (on the load side of utility meter and main regulator) of 5 kPa (20 in. H_2O, 0.725 p.s.i.) or greater for generator rated 350 kW and less. Higher natural pressure is needed for generator rated greater than 350 kW**

(coordinate service pressure limitations with mechanical engineer). Generator operates at slightly lower operating pressure (verify exact operating pressure range with generator manufacturer) via a regulator (if necessary) located at the generator. These *service* pressure limitations apply even where the actual generator *operating* pressure range is lower. WHERE AVAILABLE NATURAL GAS UTILITY COMPANY SERVICE PRESSURE DOES NOT MEET THE MINIMUM STANDARDS ABOVE, A NATURAL GAS GENERATOR IS *UNACCEPTABLE* (AND A DIESEL GENERATOR MUST BE USED).

2. SUBMITTALS

2.1 Submit shop drawings including catalog cuts and specification sheets showing all standard and optional accessories to be provided, prototype test certification, schematic wiring diagrams, dimension drawings, interconnection diagrams identifying (by terminal number) all interconnections between the generator set, generator controller, transfer switch, and the remote annunciator panel, letter certifying compliance with specifications (see below), and load calculations (see below).

2.2 **Submit (along with shop drawings) sufficient information for the mechanical contractor and mechanical engineer to size and confirm proper natural gas fuel piping installation (including sizing of piping and sizing and required operating characteristics for gas regulators). Coordinate the exact information which must be submitted with the mechanical engineer before submitting shop drawings.**

2.3 Submit (along with shop drawings) a letter from the manufacturer certifying compliance with all requirements of the specifications. Submit certification identifying equipment by serial number and including no exceptions to the specifications, except those stipulated with the submittal.

2.4 Submit (along with shop drawings) a computer generated load calculation prepared by the manufacturer. Generator and related equipment will not be approved unless calculations are submitted. Based on reviewing electrical drawings, list on the load calculation all loads proposed for connection to the generator. The electrical contractor shall verify and obtain all detailed information on loads needed by the manufacturer to complete the load calculation. Itemize and categorize loads based on operating characteristics. Provide load calculation identifying running and starting loads (including applicable steps of applying loads) and comparing calculated values with generator set maximum ratings. Generator sizing shown on the drawings is based on computerized load calculations performed by the electrical engineer prior to issue of the drawings (based on specified generator system equipment and specified load characteristics) and represents the minimum that will be accepted. Calculations from the manufacturer are required due to variations of standard ratings and electrical characteristics (specifically with respect to motor starting) of generator system equipment available from manufacturers listed in the specifications.

2.5 Submit (along with shop drawings) qualifications of the manufacturer's representative supplying the equipment including factory authorization, summary of warranty coverage, service contacts and procedures (including emergency service telephone numbers), nearest service center location, etc.

2.6 Submit written results for all testing, prior to placing the generator in service.

2.7 Submit complete operation and maintenance (O&M) manuals prior to completion of the project. Submit quantity of sets as indicated elsewhere in the specifications. Submit O&M literature including the following:

A. Installation, operating, & maintenance instructions
B. Overhaul literature
C. General maintenance literature
D. NFPA-101 literature

3. QUALITY ASSURANCE

3.1 To assure the equipment has been designed and built to the highest reliability and quality standards, subject equipment to three (3) separate tests:

A. Design prototype tests
B. Final production tests
C. Site tests

3.2 Design Prototype Tests: Do not subject components of the system (including the generator set, transfer switch, and accessories) to prototype tests since the tests are potentially damaging. Provide prototype tests performed by the manufacturer on similar design prototypes and pre-production models, which will not be sold. Submit certified test data.

A. Generator Set:

1) Maximum power (kW) and apparent power (kVA).
2) Maximum motor starting (kVA) at 30% instantaneous voltage dip.
3) Alternator temperature rise by embedded thermocouple and by resistance method per NEMA MG1-22.40 and 16.40.
4) Governor speed regulation under steady state and transient conditions.
5) Voltage regulation and transient response.
6) Fuel consumption at 25%, 50%, 75%, and 100% (full) load.
7) Harmonic analysis, voltage wave form deviation, and telephone influence factor (TIF).
8) Three-phase short-circuit.
9) Alternator cooling air flow.
10) Torsion analysis testing to verify freedom from harmful torsion stresses.
11) Endurance testing.

B. Automatic Transfer Switch:

1) Overload, endurance, and short circuit (withstand and closing) at operating voltage as per UL-1008 when enclosed.
2) Temperature rise after the overload and endurance tests to confirm the ability of the transfer switch to carry rated current within allowable temperature limits of insulation in contact with current-carrying parts.

3.3 Final Production Tests: Test equipment as part of this project at the factory prior to shipping. Submit certified test data. If requested by the owner, make arrangements for the owner to witness testing.

A. Generator Set: Perform the following tests under varying load with guards and exhaust system in place.
1) Single-step load pickup.
2) Transient and steady state governing.
3) Safety shutdown devices testing.
4) Voltage regulation.
5) Rated Power.
6) Maximum Power.
7) Rated power factor testing.

B. Automatic Transfer Switch:

1) Ensure proper operation of the individual components, proper overall sequence of operation, and verify that the operating transfer time, voltage, frequency, and the time delay settings comply with the specifications.
2) Perform dielectric strength test per NEMA Standard ICS 1-109.05.
3) Test the control panel for meeting or exceeding the voltage surge withstand capability in accordance with ANSI C37.90a-2978 and the impulse withstand voltage in accordance with NEMA Standard ICS 1-109.

3.4 Site Tests: The electrical contractor is responsible (include costs in bid) for having the manufacturer's local representative perform installation checks, start-up, and load tests at the site. Notify the engineer and owner in advance of the time and date of tests. Perform tests including:

A. Check fuel and fuel system, lubricating oil, coolant and cooling system, exhaust system, generator ventilation, engine electrical system, and heaters (block, generator, and battery) for compliance with manufacturer's recommendations under the environmental conditions present and expected.

B. Adjust all transfer switch and generator timers for proper system coordination before testing.

C. Check accessories that normally function while the set is standing by prior to cranking the engine including block heater(s), battery charger, generator strip heater(s), remote annunciator, etc..

D. Start-up under test mode to check for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement and vibration during starting, running, and stopping, normal and generator system voltages, and phase rotation.

E. Confirm proper functioning under loads with the following two (2) tests. For each test, perform the following. Test by simulating power outage to confirm automatic starting of the generator set, transfer of load, retransfer of load, and generator set shutdown. Monitor engine coolant temperature, oil pressure, battery charge level, voltage, amperes, and frequency throughout the test.

1) Test under full (100%) load conditions by connecting the generator set to external load bank(s). Include load bank use in bid. Include installation and removal of temporary wiring to load bank(s) in bid. Where the project utilizes a single transfer switch, connect the load bank on the load side of the transfer switch. Where the project includes multiple transfer switches, connect either multiple load banks (one for each transfer switch, on load sides) or a single load bank (connected directly to the generator), at the contractor's option.

2) Test under actual building load conditions. Perform this testing when sufficient building load is available. Include costs in bid to perform this testing any time from the date of tests listed above to the date of expiration of project guarantee.

4. WARRANTY

4.1 Provide a written warranty (including duration) on all equipment in accordance with "Guarantee and Warranties" in specifications section 16100 "General Electrical", except that the manufacturer's warranty period shall in no case be less than five (5) years or 1,500 hours of operation (whichever occurs first). Provide warranty complete, comprehensive, and covering all components of the generator system (including engine generator set, controller, annunciator, transfer switch, and all accessories), including parts, labor, and travel, for the entire duration of the warranty. Excluding any component from the warranty is not acceptable. Reducing warranty duration for any component is not acceptable.

4.2 Where the generator set and transfer switch are furnished by separate manufacturers, provide warranties from each manufacturer which are substantially identical, which both meet all provisions of these specifications, and which are both supported by the required single manufacturer's representative. Where warranties substantially differ, do not both meet all provisions of these specifications, are not both supported by the single manufacturer's representative, or where either warranty is voided or restricted based on equipment being furnished by different manufacturers, then provide all equipment as the product of a single manufacturer and covered by a single warranty.

5. ENGINE GENERATOR SET

5.1 Generator Set: Provide engine generator set consisting of engine, generator, controller and indicating panel, and all accessories specified herein. Provide generator set rated as a unit (engine plus generator) for continuous standby duty (defined as continuous for the duration of any power outage). Provide generator set with voltage, phase, and wires (match electrical system ratings) and with minimum kW and kVA ratings as indicated on the drawings. Provide generator set with minimum motor starting kVA rating (at 90% sustained voltage) not less than 400% of the generator kW rating, or as otherwise indicated on the drawings.

5.2 Engine: Provide liquid cooled four (4) stroke cycle natural gas fueled engine, including engine piston displacement (cubic inches/liters), horsepower at governed speed, quantity and arrangement of cylinders, compression ratio, bore, and stroke to drive the generator to

obtain ratings indicated on the drawings and specifications. Provide engine naturally aspirated, turbo-charged, or turbo-charged and after-cooled, and with carburetor. Provide engine with the following:

A. Engine speed controlled by an isochronous governor capable of +/-0.25% steady-state frequency regulation.

B. Positive engagement solenoid shift starting motor.

C. Automatic battery charging alternator with solid-state voltage regulation, voltage and ampere rating as applicable.

D. Positive displacement full pressure lubrication oil pump, replaceable cartridge oil filters, and dipstick.

E. External oil drain either extending outside of generator frame or which facilitates connecting a drain hose to drain oil into a suitable container outside of the generator frame.

F. Heavy duty dry type replaceable air cleaner elements; air filters containing or utilizing oil are not acceptable.

G. Liquid cooled with unit-mounted high ambient radiator rated 49 degrees C (120 degrees F) or greater, blower fan, coolant pump, thermostat, fan guard, and radiator duct flange to properly cool the engine with up to 120 Pa (0.5" water column) static pressure on the fan.

H. Vibration isolators between the engine-generator and steel base or between the base and the floor.

I. **The generator must be capable of operating on the natural gas fuel supply service available at the captioned project. Where the top pressure limit of the generator's rated natural gas pressure operating range (as shown in shop drawings) exceeds 5 kPa (20 in. H_2O, 0.725 p.s.i., for generator rated 350 kW and less) or exceeds the available utility service pressure (on the load side of utility meter and main regulator), the generator is <u>not acceptable</u> under any circumstance. For generator rated over 350 kW, contact the engineer for rated operating pressure limitations.**

5.3 Generator: Provide permanent magnet generator (PMG) of the salient-pole brush-less type, 12-lead connectable, self-ventilated of drip-proof construction, with amortisseur rotor windings, and skewed for smooth voltage waveform. Provide insulation meeting NEMA standard (MG1-22.40 and 16.40) for Class H and with epoxy varnish fungus resistant as per MIL 1-24092. Provide temperature rise of the rotor and stator limited to NEMA class F ratings. Provide excitation system of brush-less construction controlled by a solid-state voltage regulator capable of maintaining voltage within +/-2% at any constant load from 0% to 100% of rating. Provide regulator isolated to prevent tracking when connected to SCR loads and provide individual adjustments for voltage range, stability, and volts-per-hertz and protected from the environment by conformal coating. Provide generator with the following:

A. Voltage dip not exceeding 20% and recovering to 2% of rated voltage upon one-step application of any load up to 90% of the rated load at 0.80 power factor.

B. Capable of sustaining at least 250% of rated current for at least 10 seconds under a three-phase symmetrical short by inherent design or by the addition of a current boost system.

C. Factory installed line current sensing line circuit breaker(s) (capable of being manually reset) of the fully-adjustable solid state electronic trip type with inverse time versus current response protecting the generator from damage due to its own high current capability and for coordination with down-stream overcurrent devices. Mount circuit breaker(s) integral to generator set. Provide circuit breaker quantity and rating as indicated on the drawings or as otherwise required to protect the generator. Provide so the breaker will not trip within the 10 seconds at 250% current specified above to allow selective tripping of down-stream overcurrent devices under fault conditions. Automatic resetting breaker is not acceptable (to prevent restoring voltage to a fault or if performing maintenance). Field current sensing breaker is not acceptable.

D. With single maintenance-free bearing, directly connected the engine flywheel to the generator rotor with a semi-flexible coupling.

E. "Oversized" if necessary to provide specified starting kVA rating for motors and similar equipment and facilitating large single phase loads.

F. Arranged to provide 1% voltage regulation.

G. Factory provisions for bonding the neutral conductor at the generator set. Bond as a "separately derived system", as per the NEC.

6. CONTROLLER AND INDICATING PANEL

6.1 Provide controller with integral indicating panel mounted on or integral to and vibration isolated from the generator set. Provide facing to the rear of the generator set (opposite end from the cooling radiator).

6.2 Provide microprocessor based solid-state logic controller with all control panel circuitry of plug-in design for quick replacement. Utilize relays only in high-current circuits. Provide circuit boards moisture proof and capable of operation from -40 to +85 degrees C (-40 to +185 degrees F).

6.3 Provide NFPA-110 controller with complete diagnostic testing to facilitate owner's maintenance personnel testing controller performance without operating the generator set. Utilize one (1) of the following two (2) options at the manufacturer's discretion:

A. Provide diagnostic functions accessed directly from the control panel utilizing alphanumeric display (minimum 32 character) with selection push-buttons integral to the controller (Caterpillar "EMCP II" series, Cummins/Onan "PowerCommand" series, Katolight #MPC 8-32 #KDGC-2000 series, or approved equal).

B. Provide diagnostics utilizing a plug-in diagnostic testing device. Provide controller with suitable connection harness to facilitate plug-in testing device. Furnish and turn over to the owner one (1) plug-in testing device (Kohler "Fast Check" series or approved equal).

6.4 Provide with the following features:

A. Fused DC circuit.

B. Complete supervised start/stop control operating on closure of remote contact(s).

C. Speed sensing and a second independent starter motor disengagement system protecting starter from engaging with a moving flywheel. Battery charging alternator voltage is not acceptable for this purpose.

D. Starting system designed to restart in the event of a false engine start, by permitting the engine to completely stop and then reengage the starter.

E. Cranking cycle control with 15-second ON and OFF cranking periods.

F. Over-crank protection to open the cranking circuit after 75 seconds if the engine fails to start.

G. Protection to shut down the engine upon overvoltage (15% or more overvoltage for one (1) second or more), high coolant temperature, low oil pressure, and over-speed. Provide "pre-alarm" signals to warn of impending high coolant temperature and low oil pressure shutdown.

H. All controller accessories to facilitate instrument panel devices and indicators specified below.

I. Switch(es)/push-buttons to select from the following minimum functions:

1) AUTO: Permits normal functioning, generator operates based on remote starting contact position
2) OFF: Disables operation regardless of the status of remote starting contacts and provides immediate shutdown in case of emergency
3) RUN: Starts and runs the engine regardless of the status of remote starting contacts
4) RESET: Resets the controller after any controller or generator fault condition (this function may be combined with the OFF function above)

6.5 Provide instrument panel integral to the controller including:

Dual range voltmeter 90 mm (3.5"), 2% accuracy *
B. Dual range ammeter 90 mm (3.5"), 2% accuracy *
C. Voltmeter-ammeter phase selector switch *
D. Where dual scale voltmeters or ammeters are used, provide light emitting diode (LED) indicating lights for high or low meter scale

E. Frequency meter 3.5", 0.5% accuracy; either direct reading pointer style with 45 to 65 Hz scale or digital reading measuring to 1/100 Hz (i.e. "60.00 Hz") *
F. Battery charging voltmeter, 51 mm (2"), 2% accuracy *
G. Coolant temperature gauge, 51 mm (2"), 2% accuracy *
H. Oil pressure gauge, 51 mm (2"), 2% accuracy *
I. Running time meter
J. Tachometer *
K. Watt meter *
L. Panel illuminating light(s)
M. Speed potentiometer (in conjunction with isochronous governor)
N. Voltage adjust rheostat
O. Local emergency stop feature (NEC Article 445.18(B) and (C) mushroom style push-button with tamper cover, mounted on exterior of generator enclosure)
P. Alarm horn with silencer switch per NFPA 110

* Indicates that where the metered parameter is displayed on an alphanumeric display (minimum 32 character) integral to the controller or where the switch function is replaced by push-button functions at the alphanumeric display, omitting the instrument will be considered. NOTE: If a device is proposed for omission under this provision, specifically request this on the manufacturer's submittal cover sheet or a manufacturer's letter attached to the submittal; otherwise the omission will not be considered.

6.6 Provide LED indicating lights (incandescent is not acceptable) integral to the controller for each of the following, along with test button for indicating lights:

A. Auxiliary Shutdown (Red) *
B. Auxiliary Pre-alarm (Yellow) *
C. Switch "Not-in-Auto" (Flashing Red)
D. Over-crank (Red) *
E. Emergency Stop (Red)
F. High Coolant Temperature (Red) *
G. Pre-high Coolant Temperature (Yellow) *
H. Over-speed (Red) *
I. Low Oil Pressure (Red) *
J. Pre-low Oil Pressure (Yellow) *
K. Battery Charger Fault (Red) *
L. Low Battery Voltage (Red) *
M. Low Fuel (Red) *
N. System Ready (Green) *
O. Low Coolant Temperature (Red) *

* Indicates that where the condition is displayed on an alphanumeric display (minimum 32 character) integral to the controller, omitting the indicating light will be considered. If any indicating light is omitted, provide a "common pre-alarm" light and a "common alarm" light on the control panel. NOTE: If a light is proposed for omission under this provision, specifically request this on the manufacturer's submittal cover sheet or a manufacturer's letter attached to the submittal; otherwise the omission will not be considered.

6.7 Provide relays/contacts for each indicating light signal above, plus additional relays/contacts for the following:

A. Run relay kit (minimum three (3) SPDT contacts)
B. Common failure relay kit (min. one (1) SPDT contact)
C. Dry contact kit (minimum three (3) SPDT contacts)

7. ACCESSORIES

7.1 Provide the following accessory equipment integral to the generator set:

A. Complete oil drain kit.

B. Engine block/coolant heater, with thermostat control.

C. Battery rack, battery cables, and battery capable of delivering the manufacturer's recommended minimum cold-cranking amperes at -18 degrees C (0 degrees F).

D. Battery heater, with thermostat control.

E. Generator strip heater.

F. 10 A (minimum) automatic float and equalize battery charger with +/-2% constant voltage regulation from no load to full load over +/-10% AC input line variation, current limited during engine cranking and short circuit conditions, temperature compensated for ambient from -40 to +50 degrees C (-40 to +122 Degrees F), 5% accurate voltmeter and ammeter, fused, reverse polarity and transient protected. Provide optional alarm circuit board to meet the requirements of NFPA 110 for low battery voltage, high battery voltage, and battery charger malfunction. Mount the battery charger integral to generator outdoor enclosure only. Do not mount the battery charger at transfer switches or remote from the generator.

G. The electrical contractor shall furnish and the mechanical contractor shall install gas-proof, seamless, stainless steel, and flexible exhaust connections, exhaust silencer rated for hospital grade (industrial, residential, and critical grade silencers are not acceptable) application (reducing total engine exhaust noise by approximately 32 to 42 dBA), tailpipe/rain cap kit, and insulation blankets on turbocharger (where applicable), exhaust manifold, and factory exhaust elbows.

7.2 The electrical contractor shall furnish and the mechanical contractor shall install the following accessory equipment. The electrical contractor shall wire equipment, including all control wiring interconnections to the generator.

A. Flexible fuel lines, fuel line gas strainer, and NFPA-110 manual valve and gas solenoid bypass.

7.3 Provide the complete generator set (including all accessories) installed within an overall weatherproof and **sound attenuating** housing enclosure.

A. Provide allowing the generator set to operate at full rated load in the ambient conditions specified. Provide to reduce the sound level of the generator set operating at full rated load to a maximum of 71.8 dBA at any location 7 m (23'0") from the generator in a free field environment. Housing configuration and materials used may be of any suitable design which meets application needs, except that acoustical materials shall be oil and water resistant. Foam materials are not permitted unless they are demonstrated to have the same durability and life as fiberglass.

B. Provide the enclosure including hinged doors or removable panels for access to both sides of the engine, alternator, and control equipment for servicing and to prevent tampering. Provide all doors/panels as lockable.

C. Provided the exhaust silencer mounted inside of the enclosure (unless external muffler is specifically approved in writing by the engineer, architect, and owner).

D. Provide all sheet metal primed or for corrosion protection and finish painted with the architect/owner approved color using a two (2) step electro-coating paint process, or equivalent or superior meeting the performance requirements specified below. Include costs in bid for any standard or optional factory finish or for primer coating only to facilitate final painting in field by the general contractor. Do not paint hoses, clamps, wiring harnesses, or other non-metallic service parts. Utilize only corrosion resistant fasteners designed to minimize marring of painted surfaces when removed for normal installation or service work. Provide all surfaces of all metal parts primed and painted. Provide a coating meeting or exceeding the following requirements:

1) (0.5-2.0 mils) primer thickness. (0.8-1.2 mils) top coat thickness.
2) Gloss per ASTM D523-89, 80% plus or minus 5%. Gloss retention after one year exceeding 50%.
3) Crosshatch adhesion per ASTM D3359-93, 4B-5B.
4) Impact resistance per ASTM D2794-93, (120-160 in. lbs).
5) Salt Spray per ASTM B117-90, 1,000+ hours.
6) Humidity per ASTM D2247-92, 1,000+ hours.
7) Water Soak per ASTM D2247-92, 1,000+ hours.

E. Where enclosure is specifically indicated on the drawings as of the **walk-in style**, or where walk-in style is otherwise provided, include the following:

1) Provide with at least two (2) entrance doors to the enclosure.
2) Provide with an integral load center panel factory wired and powering all internal generator and enclosure components requiring power. Connect generator block heater, strip heater, and battery heater to this panel.
3) Provide a minimum of three (3) linear lights, each with not less than two (2) 24" long lamps, with lenses, and controlled by three-way switches at each entrance to the enclosure. Locate lights on each of the two (2) sides and rear of the generator.
4) Provide a minimum of two (2) 20A, 120V weatherproof ground fault circuit interrupter (GFCI) type receptacles (one (1) inside the enclosure and one (1) on the exterior). Connect all receptacles to a single 20A, 120V branch circuit.
5) Provide a thermostat controlled exhaust fan to ventilate the enclosure when the generator is not operating.

6) Provide a thermostat controlled 5 kW unit heater to heat the enclosure when the generator is not operating. Interconnect (with appropriate relaying as applicable) the unit heater so the unit heater does not operate when the generator is running.

8. REMOTE GENERATOR ANNUNCIATOR

8.1 Provide a remote audio-visual generator annunciator (alarm panel), flush mounted, located directly adjacent to the building fire alarm annunciator (or fire alarm control panel where fire alarm system does not include an annunciator), unless another location is shown on the electrical drawings. Provide including the following:

A. Alarm horn with silencing switch sounding for any condition indicated by (*).

B. LED indicating lights (incandescent is not acceptable) for the following, along with a test button for indicating lights:

1) System Ready (Green)
2) Utility Line Power (Green)
3) Generator Supplying Power (Green)
4) Generator Running (Green) - Optional
5) Battery Charger Fault (Red)
6) Low Battery Voltage (Red)
7) High Battery Voltage (Red) - Optional
8) Normal Battery Voltage (Green) - Optional
9) Pre-low Oil Pressure (Yellow) *
10) Low Oil Pressure (Red) *
12) Pre-high Coolant Temperature (Yellow) *
13) High Coolant Temperature (Red) *
14) Low Coolant Temperature (Red) *
15) Low Coolant Level (Red) * - Optional
16) Over-crank (Red) *
17) Over-speed (Red) *
18) Low Fuel (Red) *
19) Pre-auxiliary Alarm (Yellow) *
20) Auxiliary Alarm (Red) *
21) Switch "Not-in-Auto" (Flashing Red) *
22) Emergency Stop (Red)

C. For high-rise structures (only), provide controls to manually start the generator and manually transfer/re-transfer each transfer switch individually to/from generator power. Provide integral to or directly adjacent to the annunciator.

9. AUTOMATIC TRANSFER SWITCH

9.1 Provide automatic transfer switches of the microprocessor logic type featuring both open-transition and delayed-programmed-transition operating modes (field-selectable), Kohler #KCP/KSP series (or approved equal).

9.2 Provide quantity, phase conductor poles, and ampacity as indicated on the drawings. Provide switch rated 600 V with control/operating voltage as applicable. Provide NEMA-1 enclosure.

9.3 Provide transfer mechanism as a specification grade double-throw switch (single "rocker" switch or two (2) switches positively interlocked by direct connection to in-line solenoid shaft) mechanically held and electrically operated by a single-coil linear solenoid. Provide transfer mechanism main contacts accessible for inspection and servicing (contacts may be located behind removable covers). Transfer mechanism utilizing two (2) mechanically interlocked or linked circuit breakers or molded case switches is not acceptable. Geared operator, motor driven operator, and transfer mechanism utilizing two (2) or more operators are not acceptable.

9.4 Provide with switched neutral pole (in addition to quantity of poles indicated on the drawings) and connect the generator system as a "separately derived system" as defined by the NEC. Provide switched neutral pole of the "overlapping" make-before-break style where available from the manufacturer. Solid neutral bus is not acceptable under any circumstance.

9.5 Provide with the following features:

A. Switch(es)/push-buttons to select from the following minimum functions:

1) AUTO: Permits normal functioning
2) TEST: Simulates normal power failure
3) OFF: Disables operation

B. LED indicating lights (incandescent is not acceptable) for the following, along with a test button for indicating lights:

1) Normal power supply (Green)
2) Generator power supply (Red)
3) Test switch not-in-auto (white or amber): Lights if switch(es)/push-buttons select any function other than "AUTO"

C. Provide voltage monitoring of both normal and generator sources, with differential voltage sensing and adjustable normal source voltage sensing (nominal 72%-100% for pickup, 70%-98% for dropout). Provide three-phase normal source sensing and three phase or single phase generator source sensing.

D. Provide the following adjustable time delay features (except engine starting time delay may be fixed or adjustable) with nominal time/range as shown:

1) Engine starting (3 seconds)
2) Normal to generator transfer (0.6-60 seconds), set not more than 10 seconds following loss of normal power (NFPA-110 Type 10 system)
3) Generator to normal retransfer (1-30 minutes)
4) Programmed transition (0-10 seconds)
5) Engine cool-down (1-30 minutes)

E. Main shaft auxiliary contacts (2 N.O. and 2 N.C.).

F. One (1) channel generator exercising time clock, with load/no-load selector switch, with digital control (electromechanical type is not acceptable), of the seven (7) day type, with an illuminated LED visible with the enclosure cover open. Provide coil and contact voltage coordinated with generator and transfer switch controls.

G. Provide with in-phase and frequency monitoring to prevent retransfer unless phase angles and frequencies of the normal and generator sources are within 20 degrees and 2 Hz, respectively.

9.6 Where specifically indicated on the drawings (only), provide automatic transfer switches of the bypass and isolation type. Provide with manually operated and fully rated bypass switch capable of operating without interrupting power to load. Provide automatic transfer mechanism of three (3) position (normal, test, and isolated) draw-out construction for isolating and servicing. Provide bypass switch, automatic transfer mechanism, and draw-out mechanism mechanically and/or electrically interlocked (without the use of key interlocks) to prevent improper operation. Provide complete operating instructions permanently and visibly labeled on the enclosure front cover.

10. INSTALLATION

10.1 Install generator set, automatic transfer switch(es), and remote annunciator at respective locations as shown on the drawings. Mount generator set and any other floor/ground mounted equipment on suitable pads as per specifications section "Housekeeping and Equipment Pads" of specifications division 16200, Electrical Work Practices. Provide pads in complete accordance with equipment manufacturer's requirements and recommendations. For the generator pad, submit shop drawings of exact pad construction, fabrication, and characteristics and include sealing (by a registered professional engineer) shop drawings where requested by local authorities having jurisdiction for review.

10.2 Coordinate exact equipment layout and locations with the architect, owner, and all other trades (including mechanical contractor) for a complete installation.

10.3 Mount the generator controller, battery rack, battery cables, battery heater, batteries, and battery charger integral to generator outdoor enclosure only. Do not mount the battery charger at transfer switches or remote from the generator.

10.4 Provide the engine exhaust silencer factory mounted within or atop the generator weatherproof enclosure utilizing flexible exhaust connection and manufacturer brackets and hardware. Provide the exhaust tailpipe/rain cap kit factory mounted atop the generator weatherproof enclosure. Provide the complete exhaust system factory installed by the manufacturer.

10.5 The mechanical contractor shall install electrical contractor furnished mechanical accessories as specified above.

10.6 **The mechanical contractor shall provide the complete fuel system serving the generator (including appropriately sized piping and suitable gas regulator serving the**

generator; fully coordinate fuel system with the mechanical engineer and mechanical contractor) The gas regulator (where applicable) must be dedicated to serving the generator only and must be located at the generator (only). Generator must be supplied directly from the natural gas utility service without any intermediate regulators.

10.7 Provide engraved laminated plastic nameplates at all generator system equipment and equipment fed from the generator system as per specifications section "Identification, Nameplates, and Tags" of specifications division 16300, Electrical Materials, except utilize red nameplates with white letters. This includes nameplates at the generator set, transfer switch, emergency branch/distribution panels, remote mounted generator accessories, switches serving generator set accessories, and related equipment.

A. Provide generator nameplate with wording similar to the following example (fill in the proper ratings):

Name (10 mm (3/8") lettering):	EMERGENCY GENERATOR
Voltage and Phase:	120/208V-3PH-4W
Ratings and circuit breaker amperes:	60KW, 75KVA, 250A
Fuel Source:	NATURAL GAS
Remarks (3.2 mm (1/8") lettering):	(list multiple ATS's) *

* Where the generator serves two (2) or more transfer switches, list locations of transfer switches in the remarks.

B. Provide nameplates for transfer switches similar to nameplates for safety switches and enclosed circuit breakers, except with remarks indicating the panel and circuit number, transformer, or generator feeding both the normal and emergency sources (provide description describing load fed from the transfer switch).

C. Provide nameplates for electrical accessories (block/coolant, generator strip, and battery heaters and battery charger) similar to nameplates for safety switches and enclosed circuit breakers.

D. Provide red engraved laminated plastic nameplates at each of the generator annunciator and the building service disconnect reading, "NATURAL GAS EMERGENCY GENERATOR LOCATED OUTDOORS AT...", and describe the generator location.

E. The electrical contractor shall provide tags (of an engineer and code approved type) at all fuel line shutoff valves and fuel supply equipment serving the generator reading, "EMERGENCY POWER SUPPLY - NOT TO BE SHUT OFF DURING AN EMERGENCY" or similar wording as directed by local authorities having jurisdiction. Coordinate locations and requirements with mechanical contractor and mechanical engineer.

10.8 Provide complete interconnection, control, and intercommunication wiring between all generator system components for a complete installation. This includes wiring between any and all of the equipment and components as follows, where applicable: generator set (including engine, generator, controller and indicating panel, and all accessories), transfer

switch(es), remote generator annunciator, elevator controls, outdoor lighting controls, fuel supply equipment, ventilation louvers, etc.. Where the system includes more than one (1) transfer switch, connect generator run contacts in each transfer switch in parallel so activation of any one (1) or more transfer switch operates the generator. Provide all control wiring in complete accordance with the NEC (including maintaining separation from other wiring and systems and fire rating of wiring [including where required for high-rise structures, places of assembly, and fire pump transfer switches], where applicable).

10.9 Completely connect, ground, and bond the generator set and complete generator power system in accordance with all applicable NEC requirements for a "separately derived system". Include the following:

A. Systems Definitions:

1) Normal Source System: The **separately derived** normal (utility) power system fed by the utility electric service and which feeds normal power to the automatic transfer switch.
2) Generator Source System: The **separately derived** generator power system originating at the generator and which feeds generator power to the automatic transfer switch.
3) Emergency Distribution System: The system originating at the load side of the automatic transfer switch, including all distribution, branch wiring, and equipment as part of the emergency power system (excluding the "Normal Source System" and the "Generator Source System" defined above).

B. Generator Neutral Bonding: Provide the generator set with provisions for bonding the neutral conductor and bond in accordance with the NEC.

C. Generator Grounding: Ground the generator as per specifications section "Grounding" of specifications division 16200, Electrical Work Practices (including using grounding materials as per specifications section "Grounding Materials" of specifications division 16300, Electrical Materials). Provide grounding electrode connections at the generator (including driven (made) grounding electrodes and other applicable connections) as per the NEC and in addition to all grounding electrode connections as part of the "Normal Source System". Connect the grounding electrode connections at the generator to the grounding electrode system for the "Normal Source System" to form a common and complete grounding electrode system throughout the building.

D. Switched Neutral at Transfer Switch: Provide the automatic transfer switch with switched neutral pole to facilitate the following:

1) Separating and isolating neutral conductors from each of the "Normal Source System" and the "Generator Source System" (except for brief intervals during transfer or re-transfer).

2) Connecting the "Emergency Distribution System" neutral conductor to either the "Normal Source System" or the "Generator Source System" (along with phase conductors) depending on the transfer switch position.

E. Install wiring of the "Normal Source System", the "Generator Source System", and the "Emergency Distribution System" so the neutral conductors of each respective system do not connect at any point to the any neutral conductor of any other system, except under the following specific conditions:

1) The switched neutral pole of the automatic transfer switch shall connect the neutral conductor of the "Emergency Distribution System" to the neutral conductor of the "Normal Source System" only when the automatic transfer switch is in the "normal" position. No other connection between any "Emergency Distribution System" neutral conductor and any "Normal Source System" neutral conductor is permitted under any circumstance.

2) The switched neutral pole of the automatic transfer switch shall connect the neutral conductor of the "Emergency Distribution System" to the neutral conductor of the "Generator Source System" only when the automatic transfer switch is in the "generator" position. No other connection between any "Emergency Distribution System" neutral conductor and any "Generator Source System" neutral conductor is permitted under any circumstance.

3) No connection between any "Normal Source System" neutral conductor and any "Generator Source System" neutral conductor is permitted under any circumstance (except that both neutral bonding points below shall connect to a common grounding electrode system). Bond the neutral conductor of the "Normal Source System" to the grounding electrode system at the point where the "Normal Source System" originates or receives its supply. Bond the neutral conductor of the "Generator Source System" to the grounding electrode system at the generator.

4) Do not bond or connect the "Emergency Distribution System" neutral conductor to any grounding conductor under any circumstance (neutral is bonded at the sources of the "Normal Source System" and the "Generator Source System" and connected via the transfer switch).

10.10 Completely fill the generator with all fluids as recommended by the manufacturer (including lubricating oil, antifreeze coolant, battery fluid, etc.).

10.11 Set all generator, transfer switch, and load control timers and relays as recommended by the manufacturer (with settings complying with all applicable codes) for a NFPA-110 Type 10 system (i.e. operating within 10 seconds maximum following loss of normal power).

10.12 Provide conduit stub-ups at the generator completely enclosed inside of the generator enclosure. Exposed conduits outside of the generator enclosure are permitted only where specifically approved in writing by the engineer before installation and where the generator base does not have any space facilitating enclosing conduit stubs.

END OF SECTION

TECHNICAL SPECIFICATIONS

for

ASBESTOS ABATEMENT

at

5 RETREAT ROAD

SOUTHAMPTON TOWNSHIP, NJ 08088

August 21, 2026

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Scope of Work

The work required of this project includes the containment of two (2) work areas to remove asbestos-containing building material (ACBM), the materials are Vinyl Tile and door caulking. They are located in the first-floor level of the building and are shown on the floor plan attached to the asbestos containing building material inspection report.

Air filtration devices are to be HEPA filtered and exhaust outside of building.

Contractor shall supply at least 3 HEPA Filtered negative air units to maintain 4 air exchanges every hour, also a negative pressure differential of at least 0.02" w.c. must be maintained during occupancy of the building. Negative pressure differential to be maintained and monitored from start of removal to acceptable final air clearance, that will be analyzed by (PCM), 24 HR TAT. The work shall be performed by certified asbestos workers. Upon completion of the work, the area shall be cleaned and HEPA vacuumed.

In addition, all door caulking shall be considered ACM. All caulking shall be removed by wet method.

This abatement is not governed by N.J.A.C. 5:23-8, commonly known as Subchapter 8.

PART I GENERAL

1.00 Access to Work Site and Hours of Work

A. All arrangements for access to the work site shall be made through the General Contractor.

B. The contractor must start work on the agreed upon start date and continue uninterrupted with a full workforce until project is complete.

1.01 Notifications

A. The contractor shall notify the following agencies in writing ten (10) days prior to the start of the asbestos removal project. The Contractor must submit a copy of notice to Environmental Resolutions, Inc., prior to the application for the asbestos abatement permit. The contractor is responsible for permit application.

1. US Environmental Protection Agency
   Asbestos NESHAPS Contracts Air &
   Hazardous Material Division
   26 Federal Plaza
   New York, New York 10007
   P/ (212) 637- 4052
   F/ (212) 637-3398 or 4035

2. New Jersey Department of Health
   Asbestos Control Project CN 360
   Trenton, New Jersey 08625
   P/ (609) 984-2193
   F/ (609) 984-2192

3. State of New Jersey Department of
   Environmental Protection
   Division of Solid Waste Management CN
   414
   Trenton, New Jersey 08625-0414
   P/ (609) 292-7081
   F/ (609) 777-0769

4. New Jersey Department of Labor
   225 East State Street
   PO Box 392
   Trenton, NJ 08625-0392
   (609) 292-2516

Notification to the agencies in Section A above shall be on the required forms (where applicable) and include the following information:

1. Name and address of owner of building.
2. Name and address of the operator of the building.
3. Name and address of contractor.
4. Address and description of the building, including size, age and prior use of the building or area, and amount of friable asbestos material present in square feet and/or linear feet, as applies. Designate room numbers and other locations information unless entire building is involved.
5. Scheduled starting and completion dates for removal.
6. Procedures and equipment (including ventilating system) that will be employed to comply with 40 CFR Part 61, National Emission Standards for Hazardous Air Pollutants.

7. The name and address of the Department of Environmental Protection (DEP) registered waste hauler and of the DEP registered landfill where the asbestos waste will be deposited. Such landfill should also comply with 40 CFR Part 61.
8. The name and address of the Monitoring Firm to perform air monitoring on behalf of the contractor's employees.
9. Contractor shall obtain all permits.

1.02 Documentation of Worker's Qualifications

A. The contractor shall post the names, signatures, and photocopies of state issued licenses for all workers to be doing asbestos removal work on the job site. In addition, contractor must display a sign in letters larger than 4 inches tall indicating, "Licensed by the State of New Jersey for Asbestos Work". N.J.S.A 34:5A-32 et seq.

B. The contractor shall comply with all applicable requirements of 40 CFR Part 61, "Accepted Engineering Practices".

1.03 Air Monitoring & Inspections

A. The contractor is responsible for all OSHA-required air monitoring for his employees.

B. Air monitoring and visual inspection in the adjacent to the work area may be conducted throughout the abatement project by the Owner's air monitoring technician and/or the Owner's representative in accordance with these specifications.

C. The Contractor shall provide the required respirators and protective clothing to all workers, and to all official representatives of the State, Federal government of other designated party who may inspect the job site.

D. The Contractor shall cooperate fully with all aspects of the air monitoring programs which are conducted by the independent air monitoring consultant.

1.04 Definitions

A. The following words, terms and abbreviations when used in this document shall have the following meanings unless the context clearly indicates otherwise.

1. **Abatement** - procedures to decrease or eliminate fiber release from precast, spray or trowel applied asbestos-containing building materials. Includes encapsulation, enclosure and removal.

2. **Airlock** - system for permitting ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least three feet (one-meter) apart.

3. **Air Monitoring** - the process of measuring the fiber content (fibers of a specified size range) of a specific volume of air in a stated period of time.

4. **Amended Water** - water to which a wetting agent is added. The wetting agent is a combination of chemicals which aids in the penetration of the material and increases the probability of individual fiber wetting.

5. **Asbestos** - a general term used to describe a group of naturally occurring hydrated mineral silicates. Including but not limited to the asbestos form varieties chrysotile (serpentine), crocidolite (riebeckite), amosite (cummingtonite-grunerite), anthophyllite, tremolite and actinolite.

6. **Asbestos Containing Material (ACM)** - any material which contains more than 1 percent asbestos by weight.

7. **Asbestos Safety Technician (AST)** - a person certified by the New Jersey Department of Community Affairs, hired by an Asbestos Safety Control Monitor who continuously monitors and inspects the asbestos abatement work pursuant to N.J.A.C. 5:23-8 and these specifications.

8. **Authorized Personnel** - The owner, the owner's representative, asbestos abatement contract personnel, asbestos safety control monitor personnel, emergency personnel, or a representative of any Federal, State, or Local regulatory agency, or other personnel under contract for, or having jurisdiction over the project.

9. **Barrier** - polyethylene sheeting that completely seals off the work area to prevent contamination of the surrounding area.

10. **Breathing Zone** - A forward hemisphere of the shoulders with a radius of approximately six to nine inches.

11. **Building Owner** - The Owner, or his authorized representative.

12. **Category 1 Non-Friable Asbestos Containing Material (ACM)** - Asbestos containing packing, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos, as determined using the method specified in Appendix A, Subpart F of 40 CFR Part 763, Section 1; Polarized Light Microscopy.

13. **Category 2 Non-Friable Asbestos Containing Material (ACM)** - Any material, excluding Category 1 Non-Friable Asbestos Containing Material as determined using the method specified in Appendix A, Subpart F of 40 CFR Part 763, Section 1; Polarized Light Microscopy. This material, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

14. **Certificate of Completion** - The certificate issued by the Asbestos Safety Control Monitor signifying that the Asbestos hazard abatement work has been completed in conformance with NJAC 5:23-8 and/or these specifications.

15. **Clean Room** - an uncontaminated area or room which is part of the worker decontamination enclosure system, with provisions for storage of workers' street clothes and protective equipment. Also referred to as Change Room.

16. **Competent Person** - in addition to the definition in 29 CFR 1926.32 {f}, one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure and who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32 {f}.

17. **Construction Permit for Asbestos Abatement** - requires official approval to commence any asbestos hazard abatement job.

18. **Contractor** - the Asbestos Removal Contractor licensed by the New Jersey Department of Labor.

19. **Critical Barrier** - two layers of 6 mil polyethylene sheeting that completely seals off the work area to prevent the distribution of fibers to the surrounding area, such as the opening between the top of non-removable lights, HVAC systems, windows, doorways, entrance ways, ducts, grilles, grates, diffusers, wall clocks, speaker grilles, floor drains, sink drains, etc.

20. **Curtained Doorway** - a device to allow ingress or egress from one room to another while minimizing air movement between the rooms. Typically constructed by placing three overlapping sheets of plastic over an existing or temporarily framed doorway and securing each along the top of the doorway, with the vertical edge of one along one vertical side of the doorway and the vertical edge of the other along the opposite vertical sides. Two curtained doorways spaced a minimum of three feet (one meter) apart from an airlock.

21. **Decontamination Enclosure System** - a series of connected rooms, with curtained doorway between any two adjacent rooms, for the decontamination of workers or of materials and equipment. A decontamination enclosure system always contains an airlock.

22. **Demolition** - The actual destruction and removal of a building, or part of a building, without the intent to renovate, repair, or replace. If it is later decided to retain the building, or part of the building, for future use, the project shall not be considered demolition and the criteria for re-occupancy shall be 0.010 fibers per cubic centimeter of air (f/cc).

23. **Disposal Bag** - Six-Mil thick leak tight plastic bags used for transporting asbestos waste from work site to disposal site. Each disposal bag will be labeled as follows:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
AVOID BREATHING AIRBORNE ASBESTOS FIBERS
AND
ASBESTOS NA 2212, RQ

Each bag shall contain the U.S. DOT Class 9 (miscellaneous) hazardous material label. Contractor shall also label all disposal bags and/or containers with the name of the waster generator (Owner) and the location from which the waster was generated; all in accordance with the EPA NESHAPS regulation, 40 CFR Part 61, Subpart M.

24. **Employee** - an asbestos abatement worker having proper training, instruction and licensing.

25. **Encapsulation** - treatment of asbestos containing materials, generally ceilings, using a liquid to bond or seal the surface to minimize the potential for fiber release.

26. **Enclosure** - the construction of an airtight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.

27. **Equipment Decontamination Enclosure System** - a decontamination enclosure system for materials and equipment, typically consisting of a designated area of the work area, a washroom and an uncontaminated area.

28. **Equipment Room** - a contaminated area or room which is part of the worker decontamination enclosure system, with provisions for storage of contaminated clothing and equipment.

29. **Flame-Resistant Polyethylene Sheeting** - a single polyethylene film in the largest sheet size possible to minimize seams, normal six mils thick, conforming to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films.

30. **Friable** - any material which when dry may be crumbled, pulverized, or reduced to a powder by hand pressure or mechanical means.

31. **Fixed Object** - a unit of equipment or furniture which cannot be removed from the work area(s).

32. **Limited Containment (Glove Bag) Technique** - a method with limited applications for removing small amounts of friable asbestos containing material from HVAC Ducts, pipe runs, pipe joints, and other non-planar surfaces in a non-contained (plasticized)

work area. The glove bag is constructed and installed in such a manner that it surrounds the object or material to be removed and contains all asbestos fibers released during the process.

All workers are permitted to use the glove bag technique, provided that they are highly trained, experienced, and skillful in the method.

33. **HEPA Filter** - a High Efficiency Particulate Air filter capable of trapping and retaining 99.97 percent of asbestos fibers greater than 0.3 microns in length.

34. **HEPA Vacuum** - a High Efficiency Particulate Air filter vacuum cleaner, capable of trapping and retaining 99.97 percent of asbestos fibers greater than 0.3 microns in length.

35. **Holding Area** - a chamber between the washroom and uncontaminated area in the equipment decontamination enclosure system. The holding area is comprised of an airlock.

36. **HVAC** - Heating, Ventilation and Air Conditioning system.

37. **Moveable Object** - a unit of equipment or furniture in the work area(s) which can be removed from the work area(s).

38. **Negative Pressure** - air pressure lower than surrounding areas, generally caused by exhausting air from a sealed space (work area).

39. **NIOSH** - National Institute for Occupational Safety and Health.

40. **Occupied Building** - A building or structure where occupancy is permitted in certain areas outside of the required containment during an asbestos hazard abatement project.

41. **Plastic Sheeting** - polyethylene sheet material, of the thickness indicated.

42. **Protection Factor** - the ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection Factor is a measure of the degree of protection provided by a respirator to the wearer.

43. **Removal** - the act of properly eliminating and disposing asbestos containing or contaminated materials from a building.

44. **Repair** - corrective action using recommended work practices to minimize the likelihood of fiber release from small, damaged areas of ACM.

45. **Respirator** - a device designed to protect the wearer from inhaling harmful atmospheres.

46. **Sealant** - a liquid or solution to be used as a binding agent, such as a diluted encapsulant or a water-based paint, on dried exposed surfaces from which asbestos-containing material has been removed. The color of the coat shall be separate and distinct from the underlying substrate.

47. **Separation Barrier** - a constructed wall with no door that separates the clean area from the work area having a fire rating, if applicable and does not interfere with the means of egress. Polyethylene sheeting (minimum 2 layers of 6 mil) shall be placed on the work site of the barrier so that it completely seals off the work area to prevent the distribution of fibers to the surrounding area.

48. **Shower Room** - a room constituting an airlock, between the clean room and the equipment room in the worker decontamination enclosure system, with hot and cold or warm running water suitable arranged for complete showering during decontamination. The shower room always comprises an airlock.

49. **Surfactant** - a chemical wetting agent added to water to improve penetration of the ACM. Surfactants are used to ensure that all Asbestos Containing Materials are thoroughly wet before removal.

50. **Wet Cleaning** - the process of reducing asbestos contamination in a building by using cloths, mops, or other cleaning tools which have been dampened with amended water to decontaminate the area and by disposing these cleaning tools as asbestos contaminated waste.

51. **Washroom** - a room between work area and the holding area in the equipment decontamination enclosure system. The washroom comprises an airlock.

52. **Work Area** - the place in a building which asbestos abatement occurs.

53. **Worker Decontamination Enclosure System** - a decontamination enclosure system for workers, typically consisting of a clean room, a shower room and an equipment room.

1.05 Personnel Requirements and Training

A. All of the Contractor's workers must have valid training, a minimum of one year's experience in asbestos abatement and a current asbestos workers permit as issued by the State of New Jersey and shall comply with all applicable requirements of N.J.S.A. 34:5A-32 et seq. and 29 CFR 1926.58(k)(3), as well as other non-training requirements of 29 CFR 1926.

B. The Contractor shall furnish proof that all of the Contractor's personnel on the job (supervisors and workers) have been given medical examinations as required by OSHA regulations, 29 CFR 1910 and 29 CFR 1926. As a minimum, the examination should

include a chest roentgenogram, a medical history with specific reference to respiratory disease and pulmonary function tests. This information should be provided to the Owner during the pre-construction meeting.

C. The Contractor shall provide a Certified, License Asbestos Supervisor to the project with a minimum of two years of successful experience in Asbestos Abatement operations similar in scope and magnitude to this project. The Contractor shall submit copy of qualifications to owner.

1.06 Asbestos Consultant/Asbestos Safety Technician

A. Final inspection shall be conducted by the Owner's Consultant as follows:

1. Upon notice by the Owner's representative or by the Contractor and at least 48 hours after the removal of the critical barriers, a final inspection shall be made to ensure the absence of any visible signs of asbestos or asbestos containing materials and that all removed asbestos and asbestos contaminated materials have been properly disposed of off-site.
2. Acceptable airborne fiber levels have been attained.
3. The Consultant shall ensure that all asbestos waste has been removed from the work site by a registered waste hauler.

B. The cost for the Consultant will be borne by the Owner.

PART II CONTRACTOR RESPONSIBILITIES & DESCRIPTION OF WORK

2.00 Scope of Work

A. This section covers the furnishing of all labor, materials, facilities, equipment, services, employee training and testing, permits and agreements necessary to perform the work required for asbestos abatement in accordance with these specifications, EPA, OSHA Regulations, NIOSH recommendations, State of New Jersey Regulations, and any other applicable federal, state, and local government regulations. Whenever there is a conflict or overlap of the above references the most stringent provisions shall apply. It shall be the contractor's responsibility to verify exact quantities and locations of all asbestos containing materials. The quantities shown are for informational purposes only.

B. Description of Work: Perform the work and provide the services as follows:

1. Contractor must provide a foreman/supervisor that can speak and write English.
2. Worker training, respiratory protection and fit-testing, and OSHA required medical examinations.
3. Work area preparation including protection of all surrounding fixtures as described herein.
4. Asbestos Abatement to include the following:
   a. Isolate the work areas from remaining areas through the use of separation barriers.
   b. Asbestos removal in the following locations:
      See attached plan.

C. Sequence of Work shall be as follows:

1. The Contractor will insure that prior to abatement preparation, that all movable objects have been removed from the abatement area.
2. The Contractor will restrict access to areas where abatement is to take place from remainder of the building. The Owner will ensure that no personnel occupy the building from the time that the Contractor mobilizes until the work is complete.
3. The Contractor shall pre-clean the abatement area by HEPA vacuuming all surfaces.
4. The Contractor will construct to operational all final barriers, seals, and decontamination chambers.
5. The Owners Testing Laboratory shall perform final air testing after a 24-hour waiting period from any wet wiping or cleaning. The final air tests will be performed by (PCM). The testing and analysis shall be done in compliance with the 40 CFR 763. If the results are higher than the allowable threshold the contractor will re-clean the abatement area and the testing firm must re-test. This sequence will continue until the test results are acceptable.
6. Once the appropriate air testing results are met, the Contractor will remove all critical barriers and separation barriers inside the abatement area. No tape, polyethylene sheet plastic or other construction debris can remain in the abatement area after this cleaning.

2.01 Standard Operating Procedures

A. The Contractor shall develop and implement a written standard procedure for abatement work to ensure maximum protection and safeguard from asbestos exposure of the workers, visitors, general public, and the environment.

The standard operating procedure shall ensure:

1. Tight security on a 24 hour basis from unauthorized entry into the workspace.
2. Remove asbestos in ways that minimize release of fibers.
3. Safe work practices in the workplace, including provisions for inter-room communications, exclusion of eating, drinking, smoking, or in any way breaking respiratory protection.
4. Proper protective clothing and respiratory protection prior to entering the workspace from the outside.
5. Packing, labeling, loading, transporting, and disposing of contaminated material in a way that minimize exposure and contamination.
6. Proper exit practices from the workspace to be the outside through the showering and decontamination facilities.
7. Emergency evacuation for medical or safety (fire and smoke) so that exposure will be minimized.
8. Safety from accidents in the workspace, especially from electrical shocks, slippery surfaces, and entanglements in loose hoses and equipment.
9. Provisions for effective supervision, air monitoring and personnel monitoring for exposure during the work.
10. Engineering systems that minimize exposure to fibers in the workspace.

2.02 Notifications, Permits, Warning Signs, Labels, and Posters

A. Erect English warning signs around the workspace and at every point of potential entry from the outside, with the words "Danger" Asbestos Hazard, Do Not Enter". The warning signs shall be a bright color so that they will be easily noticeable. The size of the sign and the size of the lettering shall be no less than OSHA requirements. Warning signs shall be posted at the entrance to the work area and around its perimeter at intervals of no more than twenty-five (25) feet.

B. Provide the OSHA required labels for all plastic bags and all drums utilized to transport contaminated material to the landfill.

C. Provide any other signs, labels, warnings, and posted instructions that are necessary to protect, inform and warn people of the hazard from asbestos exposure. Post in a prominent and convenient place for the workers a copy of the latest applicable regulations from OSHA, EPA, and NIOSH.

2.03 Emergency Precautions

A. Establish emergency and fire exits from the work area. Post these in the administrative area on the work site.

B. The Contractor shall be prepared to administer first aid to the injured personnel after decontamination. Seriously injured personnel shall be treated immediately or evacuated without delay for decontamination. When an injury occurs, precautions shall be taken to reduce airborne fiber concentrations (i.e. misting of the air with water) until the injured person has been removed from the work area.

C. Before the Contractor starts the removal of asbestos materials, the local police and fire departments shall be notified by the Contractor as to the danger of entering the work area.

2.04 Submittals

A. Submit copies of the following items to the Owner's Representative:

1. Security and safety logs showing names of persons entering workspace, date and time of entry and exit, record of any accident, emergency evacuation, and any other safety and/or health incident.
2. Disposal Certificates.
3. Required Permits, Clearances, and Licenses.
4. All Contractor's Air Monitoring and inspection Results.

B. At the completion of the project the asbestos abatement Contractor will submit the following documentation to the Construction Manager. This information will also be submitted to Environmental Resolutions, Inc.

1. A copy of all waste disposal manifests.
2. A copy of Certified Payroll for the project.

2.05 Owner/Contractor Responsibilities

A. The **Contractor** shall clean with wet cloths and/or with HEPA vacuums as appropriate all movable items that can be removed from the work area without disrupting the asbestos material. This shall include furniture, equipment, drapes, curtains. The cloths used for cleaning shall be disposed of as asbestos contaminated waste.

B. During this period, the **Contractor** shall be responsible in all areas affected by his operation for:

1. Building Security - Fire and smoke detection systems
2. Maintaining the existing building and utility systems such as plumbing or electrical installations.

3. The **Contractor** shall provide security to prevent unauthorized entry into the work area, and maintenance of decontamination chambers, isolation barriers and negative air systems.

C. Should the failure of any utility occur, the Owner will not be responsible to the **Contractor** for loss of time or any other expense incurred.

D. The **Contractor** is required to protect workers who must enter confined spaces, in accordance with 29 CFR 1910.120 (b) (1) (iv) and all applicable regulations.

E. The Owner will provide the **Contractor** with a list of items that cannot be removed or are damaged prior to abatement activities.

F. The Owner will stop all deliveries that may be scheduled to the work area while work is in progress.

G. The **Owner** will supply contractor with means of contacting the Owner's representative without unreasonable delay. Such personnel shall have access to all areas. The **Owner** shall ensure no active air handling systems are operating within the work area.

H. The **Owner** will not occupy the building in which work is being performed during the entire asbestos abatement operation, including completion of clean up, but excluding re-inspection.

2.06 Use of Building Facilities

A. The Owner will supply all required amounts of water and electric power at no charge.

B. The Contractor shall provide all electrical, water, and waste connections, tie-ins, extensions, and construction materials, supplies, etc.

C. Contractor shall provide fire protection in accordance with all State and Local fire codes.

D. When temporary services lines are no longer required, they shall be removed by the Contractor. Any parts of the permanent service lines, grounds and buildings, disturbed or damaged by the installation and/or removal of the temporary service lines, shall be restored to their original condition by the Contractor, in a manner satisfactory to the Owner.

E. Contractor shall provide shower water necessary for use in the decontamination unit.

2.07 Use of the Premises

A. The Contractor shall confine his apparatus, the storage of materials, and supplies, and the operation of his workmen to limits established by law, ordinances, and the directions of the Owner. All flammable or combustible materials shall be properly stored to obviate fire and in areas approved by the Owner.

B. The Contractor shall assure that no exits from the building are obstructed, that appropriate safety barriers are established to prevent access, and that work areas are kept neat, clean, and safe.

2.08 Protection and Damage

A. Use rubber-tired vehicles which use non-volatile fuels for conveying material inside buildings and provide temporary covering, as necessary, to protect floors.

B. No materials shall be thrown from windows or doors of buildings. Building waste system shall NOT be used to remove refuse.

C. Debris shall be removed from the site daily. Premises shall be left neat and clean after each work shift, so that work may proceed with the next regular workday without interruption.

2.10 Respiratory Systems

A. Provide all workers, foremen, superintendents, authorized visitors and inspectors personally issued and marked respiratory equipment approved by NIOSH and OSHA. When respirators with disposable filters are employed, provide sufficient filters for replacement as necessary by the worker.

B. The Contractor shall require that each person entering the Work Area wear an approved respirator and protective clothing. There shall be no exceptions to this rule.

C. Respiratory protection shall be in accordance with OSHA Regulation 1910.1001 (d), OSHA Regulation 1910.134 and ANSI z88.2-1980. Respirators chosen shall also be approved by NIOSH under the provisions of 30 CFR Part. 11.

D. Respiratory protection shall be determined by airborne fiber concentration (fibers per cubic centimeter of air).
At a minimum, respiratory protection shall be:
- 1.0 f/cc - Dual Cartridge, Air Purifying respirator with HEPA cartridge.
- 1.0 - 10.0 f/cc - Powered Air Purifying respirator with HEPA cartridge.
- 10.0 and above - Type C supplied air pressure demand respirator.

E. **NO ONE** is to be permitted into the work area without proper protection. No disposable dust masks shall be used at any time.

F. All personnel engaged in asbestos abatement procedures requiring an air purifying respirator shall have an unobstructed face/mask seal (i.e., no facial hair).

G.

2.11 Protective Clothing

A. Provide to all workers, foremen, superintendents and authorized visitors and inspectors protective disposable clothing (TYVEK) consisting of full-body coveralls, head covers, gloves and 18-inch-high boot type covers or reusable footwear.

B. Provide eye protection and hard hats as required by job conditions and safety regulations

C. Reusable footwear, hard hats and eye protection devices shall be left in the "Contaminated Equipment Room" until the end of the asbestos abatement work.

D. Disposable protective clothing shall be discarded and disposed of as asbestos waste every time the wearer exits from the workspace to the outside through the decontamination facility.

E. The Contractor shall also maintain sufficient supply of all other related items such as towels, soap, etc.

2.12 Air Monitoring - Contractors

A. The Contractor shall employ a certified laboratory and NIOSH certified air test technician to conduct air sampling and analysis in accordance with OSHA Regulations, 29 CFR, 1910.1001 (Asbestos Standard for General Industry), 1926.58 (Asbestos Standards for Construction), and 1910.134 (Respirator Standard).

B. The Testing Laboratory shall be a current proficient participant in the NIOSH PAT Program. The laboratory identification number shall be submitted and approved by the Consultant.

C. The Contractor shall require a competent person from his testing laboratory to perform the following functions:

1. Monitor the setup of the work area enclosure and ensure its integrity.
2. Ensure that employees are adequately trained in the use of proper work practices, proper personal protective equipment and in decontamination procedures.
3. Ensure that employees USE proper work practices, proper personal protective equipment and proper decontamination procedures.
4. Supervise all employee exposure monitoring. Such monitoring shall comply in all respects with OSHA Regulation 1926.58 Appendix "A".
5. Conduct air sampling as per OSHA 1926.58 and as described herein.

D. Air monitoring and inspection of the Contractor's employees shall be conducted under the supervision of the Contractor's competent person.

E. Continuous air monitoring and inspections will include work area samples, personal samples from the breathing zone of a laborer to establish 8-hour TWA's.

F. Sampling and analyses shall be performed in accordance with the NIOSH #7400 method.

G. Air sample results shall be relayed verbally to the consultant within 24 hours followed by written results posted on the job site within 48 hours after the samples have been taken. Results shall be inscribed on official letterhead.

H. All costs for required air monitoring by the contractor's competent person shall be borne by the contractor.

PART III DISPOSAL OF ASBESTOS WASTE

3.00 Disposal of Asbestos Waste

This subsection shall apply to the removal of asbestos from the job site and the disposal of asbestos waste.

All Asbestos waste is to be disposed of at a approved landfill, and a copy of the manifest is to be given to the building owner.

A. The contractor is required to give a notice 10 days prior to the disposal to the New Jersey Department of Environmental Protection, Division of Waste Management, and Bureau of Field Operations. In addition, all disposal procedures must comply with CAA 112, 42 U.S.C 7412, and 40 CFR 61.156, NJAC 7:26.

B. Disposal of asbestos waste shall be conducted as follows:
   1. All asbestos waste materials destined for disposal shall be wetted and packaged in permanently sealed, leak tight containers (such as 6 mil plastic bags, double bagged with visible labels) before it can be transported and disposed. No hauling of loose asbestos or asbestos contaminated debris is permitted.
   2. A locked, secure container shall be provided if asbestos waste is to be stored outside unattended.

C. Notify the Owner's Asbestos Consultant in writing not less than 48 hours prior to the proposed time of removing and delivery of contaminated waste to the landfill. The Owner's Asbestos Consultant may elect to observe this operation.

D. The waste hauler must possess a valid solid waste transporter registration. A licensed solid waste transporter shall be a commercial collector/hauler or shall be the removal company if they are so registered.

E. Asbestos waste can be hauled in trucks or in dumpster containers provided the load is comprised only of asbestos in bags and does not contain any other wastes which could compromise the integrity of the permanent containers.

F. If rough surfaces or other materials are present in the load which could potentially puncture the permanent containers, then those containers shall be enclosed in temporary fiber or steel drums during loading, transport and unloading operations. In addition, asbestos waste shall not be loaded into or hauled with vehicles containing collection devices.

G. Use only enclosed or covered trucks to haul impermeable containers to prevent loss or damage to containers in route to sanitary landfill.

H. Allow only sealed plastic bags or impermeable containers to be deposited in landfill. Leave damaged, broken or leaking plastic bags in the impermeable container and deposit entire container in landfill. Obtain prior approval from appropriate regulatory officials before

disposing contaminated materials from high pressure vacuum collection system in the approved landfill.

I. Ensure that there are no visible emissions to the outside air from site where materials and waste are deposited.

J. The Contractor may recycle uncontaminated impermeable containers.

PART IV PRODUCTS

4.00 Quality

A. Brand Names and Approved Equals

1. The contractor shall use Brand Named materials specified or an approved equal. (NEW JERSEY STATUTE 40A: 11-13 SPECIFICATIONS)

2. The contractor shall provide to the Owner and the Consultant, materials he/she plans to use during abatement activities. Changes in the submission of these materials shall be provided prior to abatement commencing. The Owner shall approve/disapprove these submissions.

3. No abatement activities shall occur prior to the Owner's consent and the Consultant's recommendation of the use of these products.

4. BRAND NAMES AND/OR DESCRIPTIONS USED IN THIS SPECIFICATION FOR BID PROPOSAL ARE TO ACQUAINT PROSPECTIVE BIDDERS WITH THE TYPE OF EQUIPMENT DESCRIBED (OR COMMODITY) AND WILL BE USED AS A STANDARD BY WHICH ALTERNATE OR COMPETITIVE MATERIALS OFFERED WILL BE JUDGED. COMPETITIVE ITEMS MUST BE EQUAL TO THE STANDARD DESCRIBED AND BE OF THE SAME REPUTATION FOR QUALITY AND WORKMANSHIP. VARIATIONS BETWEEN EQUIPMENT DESCRIBED AND MATERIAL OFFERED ARE TO BE FULLY EXPLAINED IN AN ACCOMPANYING LETTER. IN THE ABSENCE OF ANY CHANGES BY THE BIDDER, IT WILL BE PRESUMED AND REQUIRED THAT MATERIALS AS DESCRIBED IN THESE SPECIFICATIONS BE DELIVERED.

4.01 Materials

A. The wetting agent shall be BWE 5000 as manufactured by Better Working Environments Inc., of San Diego OR an equal.

B. Encapsulating material shall be bridging and/or penetrating in nature and must be applied in two coats.

C. Cement to be used to seal ends, tears and penetrations shall be fire-rated and asbestos-free.

D. Framing materials shall consist of 2 x 4 studs and sections of 5/8" plywood from first quality lumber, Fire Retardant.

E. The contractor shall use only polyethylene sheeting with a minimum thickness of 6 mil.

F. The use of drums is permissible as long as said drums contain lining that is leak-proof. The exterior of drums must have clear and permanent labeling and labeling specified by OSHA and EPA regulations.

G. All waste shall be discarded in properly labeled and 6 mil thick polyethylene double bags.

H. Asbestos warning signs shall be in English script and placed in areas as required by OSHA and the EPA.

I. All tape shall be of high-quality polyethylene film tape.

J. Spray adhesives may be used.

K. Disposable clothing to be used shall be of the same composition as Dupont's Tyvek or equivalent.

L. All materials utilized on the site shall be non-combustible.

4.02 Tools and Equipment

A. Asbestos filtration devices shall be equipped with HIGH EFFICIENCY PARTICULATE ABSOLUTE (HEPA) filter systems certified by the manufacturer to have an efficiency of not less than 99.97%.

B. Scaffolding is to be used when and where needed as long as its use is monitored and is safely tested and approved for such work conditions by OSHA and any other safety regulatory agency.

C. Transportation and storage equipment shall be used so that no accumulations of ACM shall occur on a daily basis. This equipment shall be constructed and registered as such to store and/or transport waste material without any threat to persons or the environment of possible contamination.

D. All vacuum equipment to be used shall use HEPA filtering systems.

PART V EXECUTION

5.00 Permits, Notifications, Licenses

A. The contractor shall present a duplicate copy of his asbestos contractor's license issued by the New Jersey Department of Labor with his bid. Only licensed contractors may perform work described and required by this specification. As required by law, the contractor shall maintain on the project site a valid Contractors license.

B. The Contractor shall apply for the necessary construction permits required for the asbestos abatement project.

C. The Contractor shall maintain the required number of qualified personnel on site to complete project on schedule.

NOTE: ALL CONTRACTOR EMPLOYEES MUST POSSESS A VALID NJ ASBESTOS REMOVER/LABORER'S PERMIT AND MAKE AVAILABLE TO THE OWNER, CONSULTANT, NJ DCA, NJ DOL, NJ DOH AND AST THESE PERMITS UPON REQUEST AT THE PROJECT SITE. ALL EMPLOYEES MUST HAVE A MINIMUM OF AT LEAST SIX (6) MONTHS' EXPERIENCE IN ASBESTOS ABATEMENT IN THE STATE OF NEW JERSEY.

D. The contractor shall also present to the Owner and Consultant prior to the commencement of abatement, proof that a NJ DEP Registered Waste Hauler Permit exists. NO PRECOMMENCEMENT INSPECTION SHALL TAKE PLACE UNTIL SUCH PROOF EXISTS AND IS SATISFACTORY TO THE NJ DCA, THE ASCM/AST, THE OWNER AND THE CONSULTANT.

5.01 Decontamination Facilities and Procedures

A. DECONTAMINATION CHAMBER

1. The decontamination facility shall be constructed of 2"x 4"x 8' wooden framing covered with two layers of 6-mil poly sheeting on all sides.
2. Airlocks shall be installed between contaminated area, equipment room, shower room, and clean room. Air locks shall consist of three layers of 6 mil. poly each and shall be alternately secured. Each airlock shall be weighed down.
3. All individual chambers shall be at least 4 feet square to allow access with a stretcher in the event of emergencies.
4. The shower shall have both hot and cold-water receptacles, liquid shampoo and liquid soap, both in plastic containers, so that workers and visitors can decontaminate prior to entering the clean room.
5. The contractor shall provide all connections for water and electrical hook-ups necessary to perform the work described in this specification.

6. The clean room shall contain an area where street clothes, towels, and cleaned respirators can be stored. The Contractor shall maintain an adequate supply of towels and soap for visitors and inspectors at all times.
7. The equipment room shall be provided by the contractor where work materials, footwear, and contaminated work clothing can be stored.
8. The decontamination chamber shall be located in the area as defined in the diagrams.
9. During abatement operations, the Contractor shall be allowed to use the decontamination chamber for waste egress.

B. DECONTAMINATION SEQUENCE - PERSONAL

1. ALL workers and visitors who will enter the work area shall remove all street clothes, put on clean overalls, and respirators while in the clean room. The person will then proceed through the showers and dirty (equipment) room and enter the work area.
2. Before leaving, the worker will remove all gross contamination with the use of HEPA vacuums. With the help of another worker, the person shall remove disposable TYVEK clothing. Contaminated clothing shall be placed in labeled poly bags and left in the work area until completion of the project.
3. The worker then proceeds to the shower room. Respiratory protection shall still be worn while showering. Such protection shall be removed after the person has completely showered to prevent inhalation of asbestos fibers.
4. After showering the person moves to the clean room and dresses in either new coveralls for re-entry, or street clothes if leaving.
5. NO EATING, DRINKING, SMOKING OR CHEWING SHALL OCCUR IN THE WORK AREA OR DECONTAMINATION CHAMBER.
6. No footwear that is not readily cleanable shall remain in the equipment room and, at the end of the project, will be discarded as contaminated waste.
7. NO EXCEPTIONS TO THESE DECONTAMINATION PROCEDURES WILL BE ALLOWED!!!

5.02 Specific Project Abatement Procedures

Floor Tile Removal

Remove and properly dispose of approximately **430 SF** of floor tile. All work in this area **must** be accomplished by a Heat Removal Method in order to ensure that the tiles do not become friable. The area must be contained with negative air pressure differential and three stage personnel decontamination units. All work shall be performed in accordance with the Recommended Work Practices for Removal of Resilient Floor Coverings, published by the Resilient Floor Covering Institute.

1. The Contractor shall install a two (2) flapped, six (6) mil polyethylene sheeted air lock at the entrance to the work areas. Entrance flaps are to be installed so that the flaps will close if air flow into the work areas is stopped for any reason.

2. The Contractor shall be responsible for the erection of critical barriers consisting of two (2) layers of six (6) mil polyethylene sheeting over all openings within the work areas. The Contractor shall provide all ladders, scaffolding and/or other necessary equipment for the installation of all engineering controls.

3. Provide a three (3) stage personnel decontamination unit. Require that the personnel decontamination unit be the only means of ingress and egress for the work areas. Require that all materials exit the work areas through the decontamination unit.

4. The Contractor shall provide and install HEPA equipped air filtration device(s) (AFDs) within the work areas to create continuous negative pressure within the work area throughout abatement operations, in addition to the prevention smoke/fumes from exiting the work areas. This may require more than one (1) AFD depending on conditions. The AFDs shall be exhausted to the exterior of the building. a. If necessary, the Contractor shall construct all exterior exhaust manifolds using a minimum of 2-inch plywood sheeting. The Contractor shall affix AFD exhaust ducts to the plywood with mechanical fasteners and/or equivalent. The Contractor shall also be responsible for establishing streamers at the outlets of the AFD exhaust, to provide quick assessment of the AFDs operation.

5. Removal activity shall not commence until a written Notice to Proceed has been issued by the Owner's representative. Approval of the work areas for removal activity shall not, in any way, relieve the Contractor of his responsibility to ensure that non-work areas and items/equipment within the work areas are protected from smoke/fumes, physical damage, or asbestos contamination from this project.

6. The Contractor shall remove floor tile by heating with an approved radiant heat machine until the heat penetrates through the tile and softens the adhesive. When the tile/adhesive is sufficiently heated, carefully lift the tile with a long-handled tile scraper from the sub-flooring. NJ Department of Transportation Technical Specification Asbestos Abatement & Disposal Lawrence Maintenance Yard Page 48 of 55 120 North Warren Street • Trenton, New Jersey 08608 • tel: 609-392-4200 5 Penn Plaza, Suite 1972 • New York, New York 10001 • tel: 212-952-7300 Ensure that all broken tile show evidence of heat application and apply amended water to the broken tile and any debris before removing from the sub-flooring and disposing of as asbestos waste.

ACM waste shall be stored in a covered, locked dumpster or approved waste transfer vehicle. Prepare waste for transport in accordance with specific requirements of the waste facility and all applicable local, state and federal regulations. 8. Transport the waste to the waste dumpster or waste vehicle in covered carts, with consideration given at all times to building occupants and/or facility personnel.

Window and Door Caulking

Remove and properly dispose of approximately **294 LF** of brown window and door caulking on all exterior windows and doors in the building. All work in this area must be accomplished by removing the asbestos-containing material using the wet method.

1. Products a. Six (6) mil polyethylene sheeting b. Spray glue c. High-quality duct tape d. Garden sprayer e. Amended water f. Asbestos warning signs g, other equipment deemed necessary by the Contractor, such as man-lifts, pulley systems, forklifts, etc.

2. Post appropriate warning signs and/or tape at the entrance to the work area(s) and around the work area boundaries.

3. The Contractor shall place one (1) layer of six (6) mil polyethylene sheeting along the side of perimeter walls where the work is occurring, stretching out a minimum of five feet (5') from the curtain wall to cover the ground.

4. The Contractor shall establish a single layer polyethylene sheeting tent enclosure on the building interior where caulks are to be wet scraped. The containment shall remain where windows are to be removed throughout this procedure until the work is completed as specified. The interior containment shall be placed at least two feet (2') from the window to allow sufficient room for the Contractors to work without impacting the barrier.

5. Mist the material with amended water; this shall be continuous when removing caulks during wet scraping. Apply a layer of duct tape between window framing and asbestos containing glazing on glass.

6. Place appropriate warning and generator labels on the packaged ACM, ensure these labels are on six (6) mil black polyethylene waste bags, where used, and place in the on-site waste container or Contractor's registered vehicle, in accordance with the requirements set forth in this Specification.

ASBESTOS-CONTAINING BUILDING MATERIALS INSPECTION

TOWNSHIP OF SOUTHAMPTON
MUNICIPAL BUILDING
5 RETREAT ROAD
SOUTHAMPTON, NJ 08088

AUGUST 21, 2026

Prepared By:

ENVIRONMENTAL RESOLUTIONS, INC.
Engineers • Planners • Scientists • Surveyors
815 East Gate Drive, Suite 103, Mount Laurel, New Jersey 08054
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Prepared By:

Harry R. Fox
EPA Asbestos Building Inspector, Management Planner & Project Designer

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MUNICIPAL BUILDING
5 RETREAT ROAD
SOUTHAMPTON, NJ 08088

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1.0 Executive Summary

Environmental Resolutions, Inc. (ERI) in Mt. Laurel, New Jersey performed environmental consulting and testing services in support of improvements to the municipal building located at 5 Retreat Road, Southampton NJ 08088. The scope of services included Asbestos-Containing Building Materials (ACBM) survey.

The building is a one-story structure and is used as a Township Municipal Building, containing municipal offices, and a municipal meeting room. The Township of Southampton owns and maintains the property. The inspection addressed all accessible interior building materials and the exterior of the structure.

Section 3.0 discusses the Asbestos-Containing Building Materials (ACBM) survey, which involved locating, quantifying, and assessing the condition of all accessible suspect ACBM, using bulk sampling and visual inspection techniques to develop a report which identifies the extent of the asbestos-containing materials present within the site. The asbestos inspection was performed by EPA-accredited asbestos inspector Harry R. Fox on July 29, 2026. A total of eleven (11) samples of suspect ACBM were collected and analyzed for asbestos contents via Polarized Light Microscopy (PLM) through EMSL Analytical, Inc. The laboratory would create separate samples if the submitted sample material contained multiple materials. For example, sample FT-1 was submitted as floor tile. EMSL analyzed the sample as the tile itself, and the mastic used to place it on the floor. In doing so, the total number of samples analyzed increases to fourteen (14). ERI's inspector performed both the visual inspection and bulk sampling in accordance with methods outlined in the U.S. Environmental Protection Agency (EPA) guidance document titled, "Guidance for Controlling Asbestos-Containing Materials in Buildings" (Document No. 560/5-85/024). The findings of this report are based upon observations of accessible areas and the number of representative bulk samples that were collected and analyzed. Please refer to **Appendix A** for building floor plans and **Appendix C** for all laboratory analytical results.

- ***Table IA*** – *Bulk Sampling Results*, found in **Section 3.2**, contain the bulk sample results of suspect ACBM sampled and analyzed from the buildings. These tables include material descriptions, approximate sample locations and laboratory analytical results. ERI identified two (2) building materials suspected of containing asbestos, which were floor tiling and door caulking.
- ***Table IIA*** – *Summary of Asbestos-Containing Building Materials,* found in **Section 3.2** contain a summary of identified ACBM including the material description, location, friability, NESHAP Category, estimated quantity of the material, and general material condition.

General recommendations, based on the visual inspection and bulk sample analytical results, are discussed in **Section 3.2**. All suspect asbestos-containing materials uncovered during demolition activities and not identified within this report should be assumed to be asbestos-containing, unless future bulk sampling determines otherwise.

2.0 Limitations/Certification of Results

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with customary principles and practices in the field of environmental science and engineering. This statement is in lieu of other statements either expressed or implied. This report does not warrant against future operations or conditions, nor does it warrant against operations or conditions present of a type or at a location not investigated.

Environmental evaluations are limited in the sense that conclusions and recommendations are developed from personal interviews and information obtained from limited research and secondary sources. Except as set forth in this report, Environmental Resolutions has made no independent investigations as to the accuracy or completeness of the information derived from the secondary sources and personal interviews and has assumed that such information was accurate and complete.

Additionally, the passage of time may result in a change in the environmental characteristics at this site. This report does not warrant against future operations or conditions that could affect the recommendations made. The results, findings, conclusions, and recommendations expressed in this report are based only on conditions that were observed during Environmental Resolution's inspection of the site. This report is intended for the sole use of Environmental Resolutions, Inc. and Southampton Township. The scope of services performed in execution of this evaluation may not be appropriate to satisfy the needs of other users and use or re-use of this document or the findings, conclusions, or recommendations, is at risk of said user.

Harry R. Fox, Asbestos Management Planner & EPA Accredited Building Inspector
Partner/Project Manager
Environmental Resolutions, Inc.
Direct Line 856-840-4462
Email: hfox@erinj.com

3.0 Limited Asbestos-Containing Building Materials Survey

3.1 Sampling Methodology

The limited survey was conducted by an experienced asbestos building inspector, who conducted a thorough inspection of representative accessible areas throughout the building. Bulk samples, representing individual homogenous areas of suspect materials were collected in a randomly distributed manner.

ERI conducted a limited asbestos survey to identify asbestos-containing building materials (ACBM) in order to provide an order of magnitude estimate for the remediation of asbestos-containing materials identified at the building structure prior to its demolition. Suspect building materials exist in the form of floor tiling, and window/door caulk.

For the purpose of this report, ERI has classified the asbestos-containing materials as being in either Good, Fair or Poor condition. The following are the general definitions of each category:

Good Condition	Any material which is intact with no noticeable damage.
Fair Condition	Any material with a small amount of overall or localized damage (generally, less than 10% of the entire area).
Poor Condition	Any material with a large amount of damage (generally greater than 10% of the entire surface area).

3.2 Asbestos-Containing Building Materials

TABLE IA – BULK SAMPLING RESULTS contains a listing of all suspect ACBM identified and sampled by ERI. This table includes the sample number, material description, sample location and analytical result of each bulk sample.

TABLE IA – BULK SAMPLING RESULTS

Sample Number	Material Description	Sample Location	Analytical Results
PLM Samples:			
L-1	Linoleum Floor Tile: Tan/Yellow, Fibrous, Heterogeneous	Hallway Floor	ND
L-2	Linoleum Floor Tile: Gray/ Tan/ Yellow Fibrous, Heterogeneous	Hallway Floor	ND
CT-1	Ceiling Tile: Brown/White Fibrous, Homogeneous	Clerk Ceiling	ND
CT-2	Ceiling Tile: Brown/White Fibrous, Homogeneous	Clerk Ceiling	ND
FT-1	Floor Tile: Tan/White Fibrous, Homogeneous	Clerk Storage	3%
FT-1-M	Mastic: White/Yellow, Non-Fibrous, Heterogeneous	Clerk Storage	ND
FT-2	Floor Tile: Tan/White Fibrous, Homogeneous	Copy Room Floor	3%
FT-2-M	Mastic: White/Yellow, Non-Fibrous, Homogeneous	Copy Room Floor	ND
FT-3	Floor Tile: Tan/White Fibrous, Homogeneous	Utility/Computer Room	4%
FT-3-M	Mastic: White/Yellow, Non-Fibrous, Heterogeneous	Utility/Computer Room	ND
TP-1	Window Tar Paper: Black Fibrous, Homogeneous	Exterior Under Windows	ND
WC-1	Door Caulk: White Non-Fibrous, Heterogeneous	Outside Woman's Lav	4%
WC-2	Door Caulk: White Non-Fibrous, Heterogeneous	Outside Meeting Room	3%
WC-3	Window Door Caulk: Brown Non-Fibrous, Heterogeneous	Outside Men's Room	ND
SBWC-1	Brown Window Caulk: Brown Non-Fibrous Homogeneous	Exterior Window Caulk	ND
SBWC-2	Brown Window Caulk: Brown Fibrous Homogeneous	Exterior Window Caulk	ND
SGWC-1	Gray Window Caulk: Gray Non-Fibrous Homogeneous	Exterior Window Caulk	ND
SGWC-2	Gray Window Caulk: Gray Non-Fibrous Homogeneous	Exterior Window Caulk	ND
SBDC-1	Door Caulk: Brown, Non-Fibrous, Homogeneous	Exterior Aluminum Door	2.7%

D = Not Detected

TABLE IIA – SUMMARY OF ASBESTOS-CONTAINING BUILDING MATERIALS contains a summary of identified or assumed ACBM within the spaces. This table includes the material description, location, friability, NESHAP Category, estimated quantity of the material, and general material condition.

TABLE IIA – SUMMARY OF ASBESTOS-CONTAINING BUILDING MATERIAL

Sample Number	Material Description	Sample Location	Friable	NESHAP Category	Condition	Estimated Quantity
FT-1-Floor Tile	Floor Tile: Tan/White Fibrous, Homogeneous	Clerk Storage	No	Cat I	Good	430 SF
FT-2-Floor Tile	Floor Tile: Tan/White Fibrous, Homogeneous	Copy Room	No	Cat I	Good	
FT-3-Floor Tile	Floor Tile: Tan/White Fibrous, Homogeneous	Utility/Computer Room	No	Cat I	Good	
WC-1-Door Caulk	White Non-Fibrous, Heterogeneous	Outside Woman's Lav	No	Cat I	Good	294 LF
WC-2-Door Caulk	White Non-Fibrous, Heterogeneous	Outside Meeting Room	No	Cat I	Good	

CAT I – Category I non-friable asbestos-containing material
CAT II – Category II non-friable asbestos-containing material
SF – Square Feet

ERI offers the following observation with regards to the asbestos survey:

Environmental Resolutions identified two (2) building materials suspected to contain asbestos, which included floor tile and door caulk.

Any other suspect asbestos-containing materials uncovered during construction activities, not identified within this report, should be assumed to be asbestos-containing, unless future bulk sampling determines otherwise.

Fourteen (14) bulk samples of suspect materials were analyzed by EMSL Analytical, Inc.'s Cinnaminson, New Jersey Laboratory. All of the samples were analyzed using the approved Polarized Light Microscopy with Dispersion Staining (PLM/DS) method. By using the PLM method, a trained microscopist is able to identify and distinguish between asbestos group minerals and other fibrous materials such as cellulose (paper), mineral (rock), wood, or glass fiber. The quantity of each of these substances is estimated on a weight basis and recorded as a percentage. The TEM method is used to detect smaller fibers asbestos, such as the very small fibers as found in the case of floor tiles. Only the asbestos content, if any, is recorded in the bulk sample 'Report of Analysis' (**Appendix B**). If a material contains greater than 1% asbestos, it is considered to be asbestos-containing material.

EMSL's Laboratory is accredited by the EPA for "Interim Asbestos Bulk Sample Analysis Quality Assurance Program" and is also accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). The PLM/DS analytical method is modeled after 40 CFR Part 763, Subpart F, Appendix A: "Interim Method for the Determination of Asbestos in Bulk Insulation Samples".

4.0 Asbestos Abatement

Description of Work

Perform all work in accordance with all applicable Federal, State and Local Regulations including, but not limited to, N.J.D.O.L. Chapter 120, EPA and NESHAP, and OSHA Regulations regarding asbestos removal in a public unoccupied building. Provided all work is completed in accordance with these Specifications; this is not a Subchapter 8 regulated project.

4.1 Non-Friable ACBM Abatement

A. Floor Tile

Remove and properly dispose of approximately **430 SF** of floor tile. All work in this area **must** be accomplished by a Heat Removal Method in order to ensure that the tiles do not become friable. The area must be contained with negative air pressure differential and three stage personnel decontamination units. All work shall be performed in accordance with the Recommended Work Practices for Removal of Resilient Floor Coverings, published by the Resilient Floor Covering Institute.

B. Door Caulking

Remove and properly dispose of approximately **294 LF** of door caulking on all exterior doors in the building. All work in this area must be accomplished by removing the asbestos-containing material using the wet method in order to ensure that the caulk does not become friable.

5.0 Safety Control Monitor

A Safety Control Monitor will not be required for this project. ERI will perform final clearance air testing.

Should any final air testing results indicate that the areas exceed acceptable standards, the Contractor shall re-clean as required and any costs for additional testing will be charged to the Contractor.

The Contractor shall perform, at its own expense, all OSHA-required testing.

6.0 General Conditions

The above quantities of ACM are provided for use as general guidance and may not be all inclusive of actual conditions. The Contractor is required to visit locations to determine the exact locations, quantities and conditions of materials in order to ensure complete removal of all ACM and/or Asbestos Containing Materials within the project site.

APPENDIX A

FLOOR PLAN


SOUTHAMPTON MUNICIPAL
EXISTING-6,435 S.F.
NORTH
SBDC-1
FT-3
FT-1
FT-2
WC-1
WC-2
BUSINESS ADMINISTRATOR 235 SF
ATR. ADMIN.
BREAK ROOM 185 SF
VESTIBULE 40 SF
TAX OFFICE 144 SF
VESTIBULE 44 SF
STAIR 55 SF
MUNICIPAL CLERK 255 SF
STORAGE 50 SF
MAIL ROOM 165 SF
VESTIBULE 25 SF
UTILITY 150 SF
COPY ROOM 55 SF
TAX COLLECTOR 130 SF
MEN'S 155 SF
WOMEN'S 157 SF
OMFO 230 SF
HALLWAY 920 SF
VESTIBULE 40 SF
CONFERENCE 235 SF
MEETING ROOM 1255 SF
VESTIBULE 55 SF
OFFICE 202 SF
CONSTRUCTION VESTIBULE 60 SF
STORAGE 34 SF
STORAGE 85 SF
CODE OFFICIAL 102 SF
CONSTRUCTION OFFICE 260 SF
FILE ROOM 160 SF
Asbestos Containing Floor Tile
Asbestos Containing Window/Door Caulk
Sample Number

APPENDIX B

PLM BULK SAMPLE RESULTS

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Tel/Fax: (800) 220-3675 / (856) 786-5974
http://www.EMSL.com / cinnasblab@EMSL.com

EMSL Order:	042618373
Customer ID:	ERI50
Customer PO:	
Project ID:	

Attention: Harry Fox
Environmental Resolutions, Inc.
815 East Gate Drive, Suite 103
Mount Laurel, NJ 08054

Project: Southampton Town Hall

Phone:	(856) 235-7170
Fax:	(856) 273-9239
Received Date:	08/31/2026 5:50 PM
Analysis Date:	09/01/2026
Collected Date:	08/31/2026

Test Report: Asbestos Analysis of Non-Friable Organic Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

Sample ID	Description	Appearance	% Matrix Material	% Non-Asbestos Fibers	Asbestos Types
sbwc-1 *042618373-0001* HA: 1	Exterior Window - Brown Window Caulk	Brown Non-Fibrous Homogeneous	100 Other	None	<0.25% Chrysotile
sbwc-2 *042618373-0002* HA: 1	Exterior Window - Brown Window Caulk	Brown Fibrous Homogeneous	100 Other	None	<0.25% Chrysotile
sgwc-1 *042618373-0003* HA: 2	Exterior Window - Gray Window Caulk	Gray Non-Fibrous Homogeneous	100 Other	None	No Asbestos Detected
sgwc-2 *042618373-0004* HA: 2	Exterior Window - Gray Window Caulk	Gray Non-Fibrous Homogeneous	100 Other	None	No Asbestos Detected
sbdc-1 *042618373-0005* HA: 3	Exterior Aluminum Door - Brown Door Caulk	Brown Non-Fibrous Homogeneous	97.3 Other	None	2.7% Chrysotile
sbdc-2 *042618373-0006* HA: 3 Positive Stop (Not Analyzed)	Exterior Aluminum Door - Brown Door Caulk				
sbdc-3 *042618373-0007* HA: 3 Positive Stop (Not Analyzed)	Exterior Aluminum Door - Brown Door Caulk				

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Some samples may contain asbestos fibers present in dimensions below PLM resolution limits. EMSL suggests that samples reported as < 1% or none detected undergo additional analysis via TEM. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ PA ID# 68-00367, NVLAP Lab Code 101048-0

Initial report from: 09/01/2026 16:25:57

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Tel/Fax: (800) 220-3675 / (856) 786-5974
http://www.EMSL.com / cinnasblab@EMSL.com

EMSL Order:	042618373
Customer ID:	ERI50
Customer PO:	
Project ID:	

Attention:	Harry Fox Environmental Resolutions, Inc. 815 East Gate Drive, Suite 103 Mount Laurel, NJ 08054	**Phone:**	(856) 235-7170
		Fax:	(856) 273-9239
		Received Date:	08/31/2026 5:50 PM
		Analysis Date:	09/01/2026
		Collected Date:	08/31/2026
Project:	Southampton Town Hall		

Test Report: Asbestos Analysis of Non-Friable Organic Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

Sample ID	Description	Appearance	% Matrix Material	% Non-Asbestos Fibers	Asbestos Types

Analyst(s)

Brett Teixeira (3)
Jannat Fareen (2)

Samantha Sweeney

Samantha Sweeney, Laboratory Manager
or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Some samples may contain asbestos fibers present in dimensions below PLM resolution limits. EMSL suggests that samples reported as < 1% or none detected undergo additional analysis via TEM. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ PA ID# 68-00367, NVLAP Lab Code 101048-0

Initial report from: 09/01/2026 16:25:57

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Tel/Fax: (800) 220-3675 / (856) 786-5974
http://www.EMSL.com / cinnasblab@EMSL.com

EMSL Order:	042617383
Customer ID:	ERI50
Customer PO:	
Project ID:	

Attention:	Harry R. Fox	**Phone:**	(856) 235-7170
	Environmental Resolutions, Inc.	**Fax:**	(856) 273-9239
	815 East Gate Drive, Suite 103	**Received Date:**	08/19/2026 5:00 PM
	Mount Laurel, NJ 08054	**Analysis Date:**	08/19/2026
		Collected Date:	
Project:	Southampton Town Hall		

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
TP-1 *042617383-0001*	Tar Paper under Windows	Black Fibrous Homogeneous	65% Cellulose	35% Non-fibrous (Other)	None Detected
WC-1 *042617383-0002*	Caulk - Windows	White Non-Fibrous Homogeneous		96% Non-fibrous (Other)	**4% Chrysotile**
WC-2 *042617383-0003*	Caulk - Windows	White Non-Fibrous Homogeneous		97% Non-fibrous (Other)	**3% Chrysotile**
WC-3 *042617383-0004*	Caulk - Windows	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Analyst(s)
Alex Francois (2)
Cassandra Carey (2)

Samantha Sweeney

Samantha Sweeney, Laboratory Manager
or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NVLAP Lab Code 101048-0, AIHA LAP, LLC-IHLAP Lab 100194, PA ID# 68-00367, LA #04127

Initial report from: 08/19/2026 22:06:37

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
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http://www.EMSL.com / cinnasblab@EMSL.com

EMSL Order:	042615727
Customer ID:	ERI50
Customer PO:	
Project ID:	

Attention:	Harry Fox	**Phone:**	(856) 235-7170
	Environmental Resolutions, Inc.	**Fax:**	(856) 273-9239
	815 East Gate Drive, Suite 103	**Received Date:**	07/29/2026 3:10 PM
	Mount Laurel, NJ 08054	**Analysis Date:**	07/29/2026 - 07/30/2026
		Collected Date:	
Project:	Southampton Town Hall		

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
L-1	Hall Floor - Linoleum	Tan/Yellow Fibrous Heterogeneous	15% Cellulose 7% Synthetic	78% Non-fibrous (Other)	None Detected
042615727-0001					
Result includes inseparable attached mastic.					
L-2	Hall Floor - Linoleum	Gray/Tan/Yellow Fibrous Heterogeneous	25% Cellulose 10% Synthetic	10% Ca Carbonate 55% Non-fibrous (Other)	None Detected
042615727-0002					
Result includes a small amount of inseparable attached material					
CT-1	Ceiling Tile	Brown/White Fibrous Homogeneous	80% Cellulose	10% Perlite 10% Non-fibrous (Other)	None Detected
042615727-0003					
CT-2	Ceiling Tile	Brown/White Fibrous Homogeneous	85% Cellulose	5% Perlite 10% Non-fibrous (Other)	None Detected
042615727-0004					
FT-1-Floor Tile	Floor Tile	Tan/White Fibrous Homogeneous		25% Quartz 72% Non-fibrous (Other)	**3% Chrysotile**
042615727-0005					
FT-1-Mastic	Mastic	White/Yellow Non-Fibrous Heterogeneous		10% Ca Carbonate 90% Non-fibrous (Other)	None Detected
042615727-0005A					
Result includes a small amount of inseparable attached material					
FT-2-Floor Tile	Floor Tile	Tan/White Non-Fibrous Homogeneous		25% Quartz 72% Non-fibrous (Other)	**3% Chrysotile**
042615727-0006					
FT-2-Mastic	Mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
042615727-0006A					
FT-2-Floor Tile 2	Floor Tile	White Non-Fibrous Homogeneous		25% Quartz 75% Non-fibrous (Other)	None Detected
042615727-0006B					
FT-3-Floor Tile	Floor Tile	Tan/White Non-Fibrous Homogeneous		10% Quartz 86% Non-fibrous (Other)	**4% Chrysotile**
042615727-0007					
FT-3-Mastic	Mastic	White/Yellow Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
042615727-0007A					
Result includes a small amount of inseparable attached material					

Initial report from: 07/30/2026 09:52:22

EMSL Analytical, Inc.
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Customer ID:	ERI50
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Project ID:	

Analyst(s)
Alex Francois (7)
Brian Napper II (4)

Samantha Sweeney

Samantha Sweeney, Laboratory Manager
or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NVLAP Lab Code 101048-0, AIHA LAP, LLC-IHLAP Lab 100194, PA ID# 68-00367, LA #04127

Initial report from: 07/30/2026 09:52:22

APPENDIX C

CERTIFICATIONS

ASBESTOS CONTAINING BUILDING MATERIALS INSPECTION

Certificate of Completion

awarded to

Harry Fox

for successfully completing the prescribed course of study in

Pennsylvania Asbestos Building Inspector Refresher Course

under TSCA Title II, Virtual Teleconference

presented by

ACCESS TRAINING SERVICES, INC.
7921 River Road, Pennsauken, NJ 08110
(856) 665-3449

1/2/25	N/A	1/2/26
Course Date	*Exam Date*	*Expiration Date*
Not Provided	ACC-0125-6-023	*Mark K. Schläger*
Social Security Number	*Certificate Number*	*Training Director*

17005-18

ASBESTOS CONTAINING BUILDING MATERIALS INSPECTION

Certificate of Completion

awarded to

Harry Fox

for successfully completing the prescribed course of study in

Pennsylvania Asbestos Management Planner Refresher Course

under TSCA Title II, Virtual Teleconference

presented by

ACCESS TRAINING SERVICES, INC.
7921 River Road,Pennsauken New Jersey 08110
(856) 665-3449

1/2/25	N/A	1/2/26
Course Date	*Exam Date*	*Expiration Date*
Not Provided	ACC-0125-8-012	*Mark K. Schläger*
Social Security Number	*Certificate Number*	*Training Director*

17005-19