ADDITIONS AND RENOVATIONS
TO COMMUNITY MIDDLE SCHOOL

WEST WINDSOR-PLAINSBORO REGIONAL SCHOOL DISTRICT
WEST WINDSOR TOWNSHIP - MERCER COUNTY - NEW JERSEY
BID: 2019-05

FVHD PROJECT #5063N / NJDOE# 5715-140-18-2000

Van Cleef Engineering Associates
Consulting Civil Engineers

Harrison - Hamnett, P.C.
Consulting Structural Engineers

French & Parrello Associates, P.A.
Consulting MEP Engineers

September 6, 2019

VOLUME 2 OF 3
SPECIFICATIONS

for
ADDITIONS AND RENOVATIONS TO COMMUNITY MIDDLE SCHOOL
95 Grovers Mill Road, Plainsboro, NJ 08536

for the
WEST WINDSOR-PLAINSBORO REGIONAL SCHOOL DISTRICT
WEST WINDSOR TOWNSHIP, MERCER COUNTY, NEW JERSEY
BID: 2019-05

FVHD PROJECT #5063N / NJDOE# 5715-140-18-2000

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PART 2 - GENERAL CONSTRUCTION WORK
SECTION 02070 - SELECTIVE DEMOLITION

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 DESCRIPTION OF WORK

A. Extent of selective demolition work is indicated on the drawings.

B. Type(s) of Selective Demolition Work: Demolition requires the selective removal and subsequent offsite disposal of the following:

   1. Portion(s) of building structure, as indicated on the drawings and as required, to accommodate the new construction.

   2. Removal and protection of existing fixtures and equipment items indicated as "salvage".

C. Removal Work Specified Elsewhere:

   1. Mechanical and Electrical Work - Cutting non-structural concrete floors and masonry walls for underground piping, conduit, and for above grade piping, conduit, is included with the work of the respective mechanical and electrical.

D. Related Work Specified Elsewhere:

   1. Remodeling construction work and patching is included within the respective sections of specifications, including removal of materials for re-use and incorporated into remodeling or new construction.

1.3 SUBMITTALS

A. Proposed Demolition Activities: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's Representative for review prior to commencement of work. Provide starting and ending dates for each activity as appropriate.

   1. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.

   2. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

   3. Sequence construction so as to minimize obstruction of exits and provide temporary alternate exits, as required by authorities having jurisdiction.

   4. Coordinate with Owner's continuing occupation of portions of existing building, and with Owner's reduced usage during summer months.
B. Photographs: Photograph existing conditions of structure, surfaces, equipment or surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Owner's Representative prior to starting work.

C. Project Record Documents:
   1. Indicate unanticipated structural, electrical, or mechanical conditions.

1.4 JOB CONDITIONS

A. Occupancy: Owner will be continuously occupying areas 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 advance notice to Owner of demolition activities which will severely impact Owner's normal operations.

B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.
   1. Conditions existing at time of commencement of contract 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 selective demolition work.

C. Protections: Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.
   1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to and from occupied portions of building.
   2. Protect existing finish work, from being damaged during the project, which is to remain in place and becomes exposed during demolition operations.
   3. Protect floors with suitable coverings so as to leave the flooring in same condition at end of job.
   4. Construct temporary insulated solid dustproof partitions, where required, to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors, if required.
   5. Remove protections at completion of work.

D. Damages: Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner, including but not limited to concealed interior and exterior utility lines not properly investigated by the contractor, prior to commencement of demolition work.

E. Traffic: Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
1. Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

F. Explosives: Use of explosives will not be permitted.

G. Utility Services: Maintain existing interior and exterior utilities indicated to remain, keep in service, and protect against damage during 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.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.1 INSPECTION

A. Prior to commencement of selective demolition work, inspect areas in which work will be performed.

1. **Photograph existing conditions of structure, surfaces, equipment or surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Owner's Representative prior to starting work.**

2. Commencement of work shall constitute acceptance of conditions. Any necessary remedial work required to correct any unsatisfactory conditions, found after the start of installation, will be provided at no cost to the Owner.

3. Prior to the commencement of work review the demolition activities with the Owner’s representative to identify additional salvage items requested by the Owner.

3.2 PREPARATION

A. Cover and protect furniture, equipment and fixtures to remain from soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed.

B. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.

1. Provide weatherproof closures for exterior openings resulting from demolition work.

C. Locate, identify, stub off and disconnect utility services that are not indicated to remain.

1. Provide by-pass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shut-down of service is necessary during change-over.
3.3 DEMOLITION

A. 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. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
   a. The Contractor shall use caution when cutting into existing masonry construction (e.g.: concrete slabs, single wythe and cavity wall construction) as there may be undocumented utilities within the cavity or built into the cores of cmu wall construction or under the floor slab. The contractor shall perform all necessary investigation prior to demolition work to determine the presence of existing utilities within construction to be demolished, including but not limited to radar, thermal, impact echo, etc. The Contractor shall pay for restoring / repairing the existing construction if utilities are cut and proper selective demolition investigation work was not performed. Refer to Section 01050.

2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors or framing.

3. Provide services for effective air and water pollution controls as required by authorities having jurisdiction.

4. For interior slabs on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.

B. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative, Construction Manager, and Architect in written, accurate detail. Pending receipt of directive from Owner's Representative, Construction Manager, Architect rearrange selective demolition schedule as necessary to continue overall job progress without delay.

3.4 SALVAGE MATERIALS

A. Salvage Items: Where indicated on Drawings as "Salvage-Deliver to Owner", carefully remove indicated items, clean, store and turn over to Owner and obtain receipt.

1. Unless otherwise indicated all materials, items, equipment, etc. resulting from demolition work shall be removed from the site at the Contractor’s expense.

B. Historic artifacts, including cornerstones and their contents, commemorative plaques and tablets, antiques, and other articles of historic significance remain the property of the Owner. Notify Owner's Representative if such items are encountered and obtain acceptance regarding method of removal and salvage for Owner.
3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site.

B. If hazardous materials are encountered during demolition operations, notify the Owner’s Representative / Construction Manager immediately, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.

C. Burning of removed materials is not permitted on project site.

3.6 CLEAN-UP AND REPAIR

A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.

B. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION 02070
SECTION 02071 - SELECTIVE SITE DEMOLITION

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 WORK INCLUDED

A. Remove, except as specifically excluded by provisions of this section:

1. Existing work obstructing new work.
2. Existing work indicated on drawings to be removed.
3. Existing work below grade obstructing new construction.

B. Remove from the project site, and dispose of, materials and equipment removed as selective demolition work, except:

1. Materials and equipment to be incorporated into new work.
2. Materials and equipment to be delivered to Owner.

C. Phasing: Perform selective demolition in phases as required by Owner's use of portions of the site.

D. Install 8 foot high temporary construction security fencing around the perimeter of all construction areas to protect the general public. No exact amount of fencing is shown on the drawings and the Owner and/or Architect reserve the right to require as much fencing as needed to maintain construction site safety.

E. Private underground utility location mark out and survey to verify the location and alignment of all underground utilities within the scope of work. Conduct test pits as needed to verify the depth and finite location/alignment of underground utilities where subsurface excavations will occur.

1.3 RELATED SECTION(S)

A. Section 02110 - Site Clearing

1.4 SUBMITTALS

A. Schedule of Operations: Include coordination to ensure uninterrupted progress of Owner's on site operations.

B. Details: Proposed modifications to removal work as required by the Contract Documents.

C. Proof of obtaining PRIVATE underground utility mark-out and survey prior to any land disturbance that results into the excavation of subgrade soils, per NJ State regulations governing subsurface excavations.
1.5 QUALITY ASSURANCE

A. Qualifications:

1. Supervision: Perform selective demolition under the direct supervision of a qualified construction superintendent, experienced in type of construction involved.

2. Skills: Where selective demolition terminates at existing work to remain, perform work using craftsmen skilled in materials and systems involved.

B. Pre-demolition Work:

1. Engage the services of a private underground utility location company to mark the location of all underground utilities present within construction areas and at least 50 feet beyond, where subgrade earthwork is proposed.

   Note: The NJ One Call Utility Mark out service will not provide on-site utility mark out inside a property, in most instances, which is why the Contractor must engage its own mark out service.

2. Compare the utility locations shown on the Existing Conditions plan with those locations marked in the field. Using a licensed professional land surveyor, survey the location of any utility found to be in a significantly different location, a location not identified on the plan, or in a location that will conflict with future construction. Provide a drawing (to scale) to the Architect illustrating the utility locations found in the field, versus those represented on the Existing Conditions Plan at least 1 week prior to demolition or earthwork.

3. Test Pits: Perform open excavation test pits in areas where the mark out shows underground utilities conflict with or pass within 25 feet of proposed construction, to verify the depth, size, and alignment of underground utilities that may be in conflict with future construction or are found to be located significantly different than the Existing Conditions plan depicts. Survey the size, depth, and alignment of the affected utility and report this information to the Engineer (overlay this information on a copy of the Existing Conditions plan). Include all costs associated with at least 8 test pits in base bid. No separate payment will be made for test pits.

4. All utilities shall be field verified by the Contractor prior to the ordering of materials, or the procurement of equipment related to the installation of underground utilities.

C. Compaction of Demolition Areas.

1. The Contractor's Geotechnical Engineer shall verify the compaction of all backfill, fill, and other earthwork relative to disturbance caused by demolition work. See Section 02200 for soil compaction, testing and Geotechnical Engineering oversight.

2. If demolition work occurs in areas slated for lawn construction, do not over compact the subgrade soils or fill. Use only light duty earthwork equipment in lawn areas.

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1.6 PROJECT CONDITIONS

A. Coordinate this work with the work of other sections to avoid any delay or interference with other work.

B. Condition of Structure(s): By submitting its bid, the Contractor represents that it has fully examined the conditions of the building(s), grounds, and other existing site improvements surrounding all work areas. The Owner assumes no responsibility for actual condition of items or structure(s) to be selectively demolished.

1. Conditions existing at time of inspection for bidding will be maintained by Owner insofar as practicable. However, variations within the site and surrounding structures may occur by Owner’s and/or adjacent property owner’s daily use of the premises prior to start of selective demolition work. No claims for additional cost due to such variations shall be considered.

2. The Contractor shall continually assess the structural adequacy of nearby structures as demolition proceeds and conditions are uncovered. If previously unseen or unknown structural elements are encountered, promptly advise the Architect and wait for instructions before proceeding further.

3. The Contractor shall photograph and catalog the structural condition of each adjacent structure, paying particular attention to the condition of existing foundations, evidence of cracks, poor condition of masonry, cracking in plaster or walls, or other poor site conditions that exist before demolition and construction begins. The purpose of this exercise is to obtain a record of adjacent site conditions before work begins, in order to evaluate potential future claims for property damage caused by vibrations, noise, seismic disturbances, or direct impact.

NOTE: The Contractor is encouraged to video record the condition of each work area in addition to obtaining a photographic record.

4. The Contractor shall periodically assess the structural condition of adjoining areas throughout demolition and construction, in order to insure that the condition of the neighboring area is not being compromised. The Contractor shall repair any damage to neighboring areas, to the satisfaction of the Owner and the local Building Department, at no additional cost to the Owner.

5. If the Contractor fails to photographically document the condition of existing structures as noted above, then, by default, it assumes all responsibility for mitigating claims of property damage. Photographically documenting the condition of neighboring areas does not relieve the Contractor from any responsibility for repairing subsequent damage to the property. The Contractor will be held responsible for repairing any property damage that can be justifiably linked to the contractor’s demolition or construction activities.

C. Protection:

1. Provide protective measures as required to provide free and safe passage of persons to and from occupied portions of the site and around areas of demolition.
a. Ensure that adequate illumination, exit signs and warning signs, included as Temporary Facilities work, are in place whenever such passage is required.

b. Ensure that all areas are kept in a clean and safe condition at all times. Install temporary construction fencing as needed, and as directed by the Owner's representative to insure the safety of the public.

c. If pavements or other hard surfaces are to be removed in public areas, and not immediately restored, install temporary bituminous pavement patch, and maintain said patch until permanent hard surfaces are installed.

2. Provide necessary shoring, bracing, and support to prevent movement, settlement, or collapse of structures or elements adjacent to areas being demolished, and adjacent facilities and neighboring structure to remain.

3. Protect existing finished work to remain in place that becomes exposed during demolition operations from damage.

4. Protect existing curbing, fencing and walls that are designated to remain. Terminate demolition at clean control joints or if joints or seams are not present, carefully trim or sawcut materials to provide a mendable edge that can be re-secured or otherwise treated for assimilation into future work or work to remain.

5. Provide temporary weather protection during interval between demolition, removal of existing construction on exterior surfaces and installation of new construction, to ensure that no water leakage or weather related damage occurs to subgrades or subbases.

D. Traffic: Conduct demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Comply with requirements of authorities having jurisdiction.

E. Utility Services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations. Do not interrupt existing utilities serving occupied or facilities in use, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

1. If utility systems, including mechanical or electrical systems, are encountered, that are not indicated to remain but give evidence of being in use, promptly advise the Architect for instructions before proceeding.

F. Advise the Owner’s Representative / Construction Manager, in writing, of encounter with materials suspected to be of a hazardous nature. These materials are not to be handled or removed under this Contract.

PART 2 - PRODUCTS [NOT USED]
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas in which work is to be performed. Report to the Owner’s Representative / Construction Manager all prevailing conditions that will adversely affect satisfactory execution of work. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Starting work constitutes acceptance of the existing conditions and the Contractor shall then be responsible for correcting all unsatisfactory and defective work encountered at his/her expense.

C. The following is repeated from another section in these specifications to insure that the contractor recognizes this provision of the contract:

1. The Contractor shall photograph and catalog the structural condition of each adjacent structure, paying particular attention to the condition of existing foundations, evidence of cracks, poor condition of masonry, cracking in plaster or gypsum wall board, or other poor site conditions that exist before demolition and construction begins. The purpose of this exercise is to obtain a record of adjacent site conditions before work begins, in order to evaluate potential future claims of property damage caused by vibrations, noise, seismic disturbances, or direct impact.

   NOTE: The Contractor is encouraged to video record the condition of each area in addition to obtaining a photographic record.

2. The Contractor shall periodically assess the structural condition of neighboring areas throughout demolition and construction, in order to insure that the condition of the neighboring areas is not being compromised. The Contractor shall repair any damage to neighboring areas, to the satisfaction of the Owner’s Representative / Construction Manager and the local Building Department, at no additional cost to the Owner.

3. If the Contractor fails to photographically document the condition of existing structures as noted above, then, by default, it assumes all responsibility for mitigating claims for property damage. Photographically documenting the condition of neighboring areas does not relieve the Contractor from any responsibility for repairing subsequent damage to the property. The Contractor will be held responsible for repairing any property damage that can be justifiably linked to the contractor’s demolition or construction activities.

3.2 PREPARATION

A. Prior to commencement of work, the Contractor, Owner’s Representative / Construction Manager shall inspect respective demolition areas and:

1. Tabulate and, if appropriate, photograph (and video record or digitally record if feasible) existing conditions which could be misconstrued as damage resulting from selective demolition work and,

2. File record photographs with Owner’s Representative / Construction Manager prior to starting work and,
3. Confirm that items to be removed by the Owner have been removed.

4. Contact NJ One Call service and appropriate utility companies to schedule utility location mark-outs. If the service refuses to provide utility mark-out on-site, then the Contractor shall engage the services of an independent utility location service to identify and mark the location of all utilities within the scope of construction where excavation will occur. All costs associated with the location of utilities shall be borne by the Contractor. The Contractor may not excavate down below pavement courses and into soil without having obtained an underground utility mark out in said area. The demolition of pavements and walkways does not require underground utility mark out, unless said demolition extends into stone subbase or soils below.

3.3 SITE DEMOLITION

A. General: Perform work using methods which comply with governing regulations, and which produce proper surfaces to receive new work.

1. Demolish to limits not less than what is depicted on the demolition plan or to the nearest seam or joint if within 5 feet thereof. If no seam or joint exists within 5 feet of the depicted demolition limit then saw cut (uniformly) along the designated line. The Contractor may elect to increase the limits of demolition work to extend to a nearby control joint to avoid saw-cutting work, however, all additional areas that are demolished must be restored in-kind to a "like new" condition at no additional project cost.

B. Concrete and Masonry: Demolish in small sections. Cut at junctures near construction to remain by using power driven saws or hand tools; do not use power driven impact tools.

C. Locate equipment and promptly remove debris to avoid imposing excessive loads on structures.

D. Demolish foundations, footings, and slabs, in their entirety, in all areas where the new construction will occur or where underground utilities will be constructed to provide required clearances for new work.

E. Do not open and expose pavement subbase and subgrades when inclement weather is forecast and areas cannot be reasonably restored and protected from damage. Make necessary provisions to ensure continuous watertight integrity of work to remain.

F. Explosives: Use of explosives is not permitted.

3.4 DUST CONTROL

A. Comply with governing regulations pertaining to prevention of raising excessive dust and dirt.

B. Use water sprinkling, temporary enclosures, and other suitable methods to minimize amounts of dust and dirt rising and scattering in the air.

1. Do not use water sprinkling when it may create hazardous or objectionable conditions such as ice, flooding, polluted runoff, or damage.
3.5 SALVAGE MATERIALS

A. Verify that the Owner has salvaged all materials from the site that they want to retain.

B. Carefully dismantle (retain hardware and fasteners in re-sealable containers) all features that the Owner asks to retain including but not limited to signs, fencing, equipment, etc. Store salvaged materials off site and/or deliver salvaged materials to a location specified by the Owner.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove debris, rubbish and other materials resulting from demolition operations from project site. Do not bury demolished materials on the project site. Transport and legally dispose of materials off site.

B. On site burning of removed materials is not permitted.

C. Storage or sale of removed materials shall not be permitted on the site, except storage of materials to be reused or furnished to Owner.

3.7 CLEAN UP AND REPAIR

A. Return structure(s) and surfaces to remain to their condition existing prior to start of demolition work. Repair adjacent construction and surfaces soiled or damaged by excessive demolition work to original or better condition.

B. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave work areas broom clean.

END OF SECTION 02071
SECTION 02200 - EARTHWORK

1. 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 DESCRIPTION OF WORK

A. Extent of earthwork is indicated on drawings.
   1. Rough grading.
   2. Unclassified Excavation

   2. Preparation of subgrade for building slabs, pads, pavements, and lawns is included as part of this work.


1.3 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction, and in accordance with all recommendations of Section 02200


C. Testing and Inspection Service:

   1. Owner will engage a qualified testing agency to perform the Special Inspections – Material Testing services.

1.4 SUBMITTALS

A. Test Reports: Testing service will submit following reports directly to Architect with copy to Contractor:

   1. Test reports on borrow material as outlined herein.

   2. Field density test reports.
3. One optimum moisture-maximum density curve for each type of soil encountered, including borrow soils.

4. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

1.5 JOB CONDITIONS

A. Test pits and other common exploratory operations may be required by the Architect/Engineer to be made by Contractor at no cost to Owner.

B. Existing Utilities

1. Locate existing underground utilities in areas of work. Contact utility companies mark-out service, Garden State Underground Plant Location Service, Inc. at 1-800-272-1000, as required by law, to locate all utilities prior to start of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

3. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by Architect/Engineer and then only after acceptable temporary utility services have been provided.

C. Use of Explosives

1. Do not bring explosives onto site, or use in work, without prior written permission from authorities having jurisdiction and from the Owner.

2. Contractor is solely responsible for handling, storage, and use of explosive materials if and when their use is permitted. Comply with applicable requirements of NFPA 495, “Explosive Material Code”.

D. Protection of Persons and Property

1. Install barricades and operate warning lights as recommended by authorities and agencies having jurisdiction.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
1.6 **PAYMENT**

A. The lump sum price bid shall include the costs of all labor, equipment and materials necessary to perform earthwork.

1.7 **RELATED SECTIONS**

A. Section 02232 – Site Clearing
B. Section 02600 – Soil Erosion and Sediment Control
C. Section 02248 – Shoring and Bracing
D. Section 02485 – Finished Grading
E. AIA A232 & Section 00800 – Submittals
F. Geotechnical Engineering Report Community Middle School Proposed Additions & Improvements June 1, 2019

2. **PART 2 - PRODUCTS**

2.1 **SOIL MATERIALS**

A. Allowable Gradational Envelope, Type "S" Fill (Structural Fill):

<table>
<thead>
<tr>
<th>U.S. Standard Sieve Size</th>
<th>Percent Finer by Weight</th>
</tr>
</thead>
<tbody>
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<td>100</td>
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<tr>
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<td>65-100</td>
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<tr>
<td>No. 10</td>
<td>40-85</td>
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<tr>
<td>No. 60</td>
<td>10-45</td>
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<tr>
<td>No. 200</td>
<td>5-12</td>
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</tbody>
</table>

B. Allowable Gradational Envelope, Type "G" Fill (Granular Fill):

<table>
<thead>
<tr>
<th>U.S. Standard Sieve Size</th>
<th>Percent Finer by Weight</th>
</tr>
</thead>
<tbody>
<tr>
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<td>15-65</td>
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<td>No. 200</td>
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</table>

C. **NJDOT Paving and Subgrade Materials:** All materials shall meet or exceed the NJDOT Standard Specifications for Road and Bridge Construction, as amended or supplemented.

D. **Porous Fill:** Coarse Aggregate, crushed stone or gravel, poorly graded with 100% passing a 1-1/2" sieve and not more than 10 percent of material that passes
through No. 4 sieve.

E. Impervious Fill: All materials shall be fine grained inorganic silts and clays, meeting class ML/CL specification of the Unified Classification System.

F. Prior to importation activities, all soil materials proposed to be imported to the site shall be certified by an independent testing agency to be free from contamination, in accordance with the standards of the N.J.D.E.P., and the U.S. Environmental Protection Agency. Written certification to be received prior to any importation activity. See also subsection 3.3E.3 below.

3. PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavation is Unclassified, and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

1. Earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and to be removed, material of any classification indicated in data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.

B. Excavation Classifications: The following classifications of excavation will be made when rock excavation is encountered in work:

1. Rock Excavation

   a. Footing Rock Excavation: All boulders or rock above the bottom of the footing elevations which can be removed by a 1 cubic yard power shovel or backhoe using a prime mover equal in size to a Bucyrus Erie 30B Series 3, or a pneumatic hammer using a pavement breaker shall be classified as earth excavation.

   b. General Rock Excavation: Removal of boulders or rock encountered in the excavation by a 1 cubic yard power shovel or backhoe using a prime mover equal in size to a Caterpillar 325, or a hydraulic hammer using a pavement breaker, or a D-8N bulldozer, or equivalent, equipped with ripper teeth, shall be classified as earth excavation. All boulders and rock which cannot be removed by the foregoing equipment and require blasting for their removal, shall be classified as general rock excavation.

   c. All three of the aforementioned methods of excavation must be tried and proven unsatisfactory in the presence of the Engineer, before removal by blasting will be authorized.
d. Intermittent drilling or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.

C. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect/Engineer. Unauthorized excavation, as well as remedial work directed by Architect/Engineer, shall be at Contractor's expense.

1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Architect/Engineer.

2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Architect/Engineer.

D. Additional Excavation: When excavation has reached required sub-grade elevations, notify Architect/Engineer who will make an inspection of conditions.

1. If unsuitable bearing materials are encountered at required sub-grade elevations, Contractor must notify the Architect/Soil Engineer.
   a. In pavement areas, proof roll prepared sub-grade surface to check for unstable areas and areas requiring additional compaction. Proof rolling shall be accomplished by the application of a three (3) wheel, ten (10) ton roller over the subgrade. Proof rolling shall be performed in the presence of the Engineer, or his representative, to locate unstable areas and to achieve uniform compaction immediately prior to placement of base paving materials. Proof rolling will not be used as a substitute for field moisture and density tests, if required. Finish grade sub-grade to required slope at proper distance below finish surface. Unsuitable soils shall be over excavated to a depth required by the Soils Engineer and replaced with borrow excavation as specified by NJDOT. In certain instances, replacement material may require larger stone aggregate per NJDOT specifications, at the discretion of the Soils Engineer.

2. Contractor shall carry excavations deeper to elevations as directed by the Soil Engineer, replace excavated material with Type "S" structural fill as described herein.

3. Additional fill shall be provided, placed and compacted to required elevations.
4. Additional excavation and compacted fill work, when authorized by the Architect/Engineer, shall be in the form of change order(s) using Unit Prices, when accepted, adjusted or established by the Contract.

E. Excavation for Structures:

1. Prior to foundation construction, all superficial materials including asphalt and topsoil shall be stripped from the limits of construction.

2. All excavations within the building area shall be backfilled with a clean bankrun sand and gravel conforming to the gradational requirements for Structural (Type S) Fill, unless Soils Report indicates on site materials may be used as structural fill. The Type S fill shall also be used for filling within the building limits to attain proposed porous fill subgrade elevation. All imported fill materials and on-site material shall be placed in a controlled manner, utilizing maximum lift thickness of twelve (12) inches and be compacted with vibratory compaction equipment. All Type S fill shall be compacted to a minimum of 95% of their Modified Proctor Density. On-site materials placed as backfill outside the building limits shall be compacted to 90% of its Modified Proctor Density. The compaction levels shall be confirmed in the field in accordance with ASTM Designation D-1557. Moisture-density relationships shall be established in accordance with ASTM Designation D-1556 and be observed in the field during placement procedures.

F. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

1. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

G. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

1. It will be the Contractor's responsibility to provide sheet piling and other shoring as required to protect existing facilities from damage during excavation. Such work shall be designed by a professional engineer licensed in New Jersey, and shop drawings submitted to Architect for information purposes. Damage to existing structures or pavement caused by earthwork operations shall be repaired to Architect's satisfaction.

2. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

3. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation
progresses.

H. All existing construction debris, old foundations, floors and any other old construction encountered shall be removed entirely from the building and paved areas; replaced with Type S structural fill.

I. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area. Contractor to provide all necessary material and labor to dewater construction excavations.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

3. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

   a. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

J. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown. Also see paragraph D.1.a. above.

K. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room and per typical trench detail where shown.

L. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees.

M. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

   1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by diskng, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.2 COMPACTION

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.

B. Percentage of Maximum Dry Density Requirements: Compact soil to not less than the following percentages of maximum dry density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D 1557.

1. Structures, Building Slabs and Steps, Pavements: Compact top 12" of subgrade and each layer of backfill or fill material at 95% Modified Proctor in accordance with ASTM D-1557.

2. Foundation, Utility trenches: Compact top 6" of subgrade and each layer of backfill or fill material at 95% Modified Proctor in accordance with ASTM D-1557.

3. Infiltration Basin / Bioretention Basin / Rain garden / Porous Pavement: No compaction of native subgrade soils is permitted.

4. Lawn and Grass Recreation Area: Compact top 12" of subgrade and each layer of backfill or fill material at 85% Modified Proctor in accordance with ASTM D-1557.

5. Landscape Planting Areas: Compact top 12" of subgrade and each layer of backfill or fill material at 70% Modified Proctor in accordance with ASTM D-1557.

6. Walkways: Compact top 6" of subgrade and each layer of backfill or fill material at 95% Modified Proctor in accordance with specification section ASTM D-1557.

7. In Detention Basin Embankments: Compact top 6" of subgrade and each layer of backfill or fill material at 95% Modified Proctor in accordance with ASTM D-1557.

C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or
subsequent to compaction operations.

1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.3 BACKFILL AND FILL

A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

1. Under grassed areas, use satisfactory excavated or select borrow material.

2. Under steps and building slabs, use compacted structural fill or on site materials permitted for use as structural fill as recommended in Geotechnical Report.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

2. Inspection, testing, approval, and recording locations of underground utilities.


4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

5. Removal of trash and debris.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

7. Maintain carefully all bench marks, monuments and other reference points; if disturbed or destroyed, replace as directed.

C. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil
materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

1. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

D. Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers and/or in confined areas.

1. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density per ASTM D-1557 test procedure or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.

3. Proof rolling of soils within 10 feet of existing building shall be performed with vibrator disengaged.

E. Additional material required for filling, backfilling and grading:

1. The on-site soils removed during excavation are suitable for reuse as fill outside the building and other pavement areas when placed in a controlled manner.

2. Material which may be required in addition to that obtained from excavations, shall be provided by the contractor. Such material shall be as specified hereinbefore. Such material shall be provided at no additional cost to the Owner, in sufficient quantity to compensate for the "fluff factor", to provide compacted grade at the elevations shown.

3. Imported fill material must include a written certification from the supplier stating that the fill is virgin material, and if it is from an agricultural, commercial or non-commercial source. The material shall also be tested and be certified free of contamination or hazardous materials. Testing shall be based on the source of the material. The Architect/Engineer may require
supplemental testing by Contractor prior to importation at no cost to the Owner.

3.4 GRADING

A. Areas which will receive the floor slabs or pavement shall be graded and proof-rolled with vibratory compaction equipment to densify the soil surface and delineate potential soft areas.

1. Any soft areas encountered during the proof-rolling operations shall be removed and replaced with structural fill in a controlled manner, compacted as specified by the Soils Engineer.

B. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.

C. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding.

1. Finish surfaces free from irregular surface changes, and as follows:

   a. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10' above or below required subgrade elevations. Plan grades and spot elevations are to final surface.

   b. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10' above or below required subgrade elevation.

   c. In addition to the above tolerances, slope between any two points shall not vary more than 1.5 inches in 100 feet from the slope indicated.

D. Grading Surface of Fill under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2" when tested with a 10' straightedge.

E. The cutting, filling and grading within the building area, together with sufficient area outside of the filled areas of the building to provide a slope of 1 vertically to 4 horizontally beyond the building walls, shall be done before excavations are made for footings and foundation walls.

3.5 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. All work within the above section shall be performed as approved by the Soils Engineer. The Contractor shall cooperate in every way with the Soils Engineer as
required for the performance of this work and shall give not less than 48 hours notice to schedule operations requiring sampling, inspection certification and testing.

B. The Soils Engineer shall provide direction and all equipment and apparatus necessary for laboratory and field testing, sampling, inspection and reports on soil inspection. He will identify and document the removal of unsuitable material which may remain within the bottom of excavation after limits of the excavated area have been reached.

1. Field density testing and soil analysis at the rate of one compaction test per 2,500 square feet minimum for each lift of compacted fill within building areas.

2. Laboratory compaction tests for each type of on-site soil and/or borrow material to be used throughout the site.

3. Field C.B.R. testing in pavement areas at the rate of one per 500 square yard of pavement.

4. Field inspection control and certification of bottom of footings, trenches, subgrades or under slabs, parking area, athletic areas and landscaped areas, as applicable.

5. When required, soil materials and rock-definition testing to be performed in accordance with ASTM E 329 and documented according to ASTM D 3740 and ASTM E 548.

6. The moisture content of the fill materials should be controlled to within 3% of the optimum by wetting, aeration or blending to facilitate compaction.

7. Quality control testing of in-place fill densities should be conducted throughout the entire earthwork operation.

C. The Soils Engineer shall provide a signed and certified written report at the completion of each phase of construction, verifying that all soils operations have been completed within the design parameters as noted in the contract documents and in accordance with accepted engineering practices.

D. The Soil Engineering Firm must show adequate credentials as approved by the Owner, but as a minimum, shall be as follows:

1. Must have as a principal a Professional Engineer registered in New Jersey, with 10 years responsible experience in Soils Engineering.
2. Provide certificates of professional liability insurance of $750,000.00 minimum.

3. All technical staff personnel performing services on the project are to be under the direct supervision of the Soils Engineer.

3.6 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

1. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

2. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.7 DISPOSAL OF WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials, including excess excavated material, trash and debris, and dispose of it off Owner's property in a legal manner.

B. The Contractor shall not remove any excess excavated material off Owner's property without written permission from the Owner. All excess excavated material shall be disposed of onsite.

3.8 RECORD DRAWING

A. As the work progresses, record on one set of grading drawings all changes and deviations from the Contract Drawings in line and finished grade.

B. All record drawing verifications must be executed by a NJ licensed professional land surveyor.

C. Record Drawings shall be submitted to Architect when all parking lots, sidewalks
and rough grading are complete. Contractor shall not spread topsoil until written notice to proceed is issued by Architect.

D. At the completion of the work, transfer accurately all such records in waterproof ink on mylar reproducibles of the grading drawings, have them certified by the NJ licensed Professional Land Surveyor and deliver same to Architect.

END OF SECTION 02200
SECTION 02231 - MOBILIZATION

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 DESCRIPTION OF WORK

A. Mobilization shall consist of any preparatory work and operations, necessary for the movement of personnel, equipment, supplies and incidentals to, from and within the project site, maintenance and protection of traffic and pedestrians, and other work performed or costs incurred prior to beginning the work.

1.3 JOB CONDITIONS

A. The Contractor shall notify the property owner, a minimum of seventy-two (72) hours prior to the start of construction.

B. Subsequent notifications shall be given to property owners a minimum of twenty four (24) hours prior to the start of work affecting direct access to their property.

C. The contactor shall provide for the protection of traffic and pedestrians during all work.

D. Administrative Requirements: Verification of existing conditions before starting work.

E. Verify all utility markouts are completed. Call 1-800-272-1000 for markouts.

F. Verify all soil erosion measures are complete.

1.4 PAYMENT

A. The lump sum price bid shall include the costs of all labor, equipment and materials mobilization, demobilization, removal, disposal, and/or relocation as specified.

PART 3 – EXECUTION

A. Pavement, concrete and structures shall be removed and disposed of by the Contractor in accordance with local, state and federal requirements.
B. The Contractor shall obey all traffic laws and highway load size/weight restrictions.

C. Traffic control and pedestrian control devices shall be installed and maintained in accordance with the Manual of Uniform Traffic control devices at times during construction.

END OF SECTION 02231
SECTION 02232 – SITE CLEARING

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 DESCRIPTION OF WORK

A. This work shall consist of clearing the site within the project limits as shown on the plans or the herein specified limits. Site clearing shall include but not be limited to surface debris, trees, topsoil stripping, topsoil stockpiling, shrubs, sidewalk, curb, curb and gutter, pavement, fences, driveways, landscaping, mailboxes, signs, drainage structures, pipes, structures and all other appurtenances related thereto.

1.3 PAYMENT

A. The lump sum price bid shall include the costs of all labor, equipment and materials mobilization, demobilization, removal, disposal, and/or relocation as specified.

1.4 RELATED SECTIONS

A. Section 02600 – Soil Erosion and Sediment Control
B. Section 02248 – Shoring and Bracing
C. Section 02071 – Selective Site Demolition

PART 2 - PRODUCTS

A. All items designated to be relocated shall be relocated using in-kind materials approved by the engineer. All items designated for relocation or reuse shall be stockpiled safely and protected until time of use. If any material is damaged it shall be replaced in-kind by the contractor.

PART 3 - EXECUTION

A. All areas designated for site clearing shall be cleared of all vegetation including roots and stumps. All removed vegetation shall become the property of the contractor and shall be disposed of.

B. All construction areas shall be stripped of topsoil prior to construction. All topsoil shall be stockpiled as shown on the plans, if required.
C. Pavement, concrete and structures shall be removed and disposed of by the contractor in accordance with local, state and federal requirements.

D. Before hedges, shrubs, and privately owned fences, mailboxes and signs are removed, the Engineer shall determine whether or not said items are to be reset. If so, the Contractor shall use reasonable care in removing and storing the item so as not to damage same. Privately owned fences, signs, shrubs, etc., scheduled to be reset, and damaged beyond repair during removal or storage, shall be replaced in kind and quality acceptable to the Engineer and without additional compensation.

E. Call Local Utility Line Information service at 800-272-1000 not less than three working days before performing Work.

F. Protect trees, plant growth, and features designated to remain, as final landscaping.

END OF SECTION 02232
SECTION 02234 – SIGN INSTALLATION

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 DESCRIPTION OF WORK
   A. This work shall consist of the installation and maintenance until final acceptance of traffic signs.

1.3 SUBMITTALS
   A. Not applicable this section unless substitutions in specified materials or methods are proposed. The degree of applicability of this item shall be determined by the Engineer upon receipt of the specified alternate or substitution proposed by the Contractor.

1.4 PAYMENT
   A. The lump sum price bid shall include the costs of all labor, equipment and materials necessary to install signs.

1.5 RELATED SECTIONS
   A. Section 01550 – Traffic Control

PART 2 - PRODUCTS

A. All signs, posts and incidentals thereto shall be in conformance with the drawings and the Manual on Uniform Traffic Control Devices. All materials shall be of good quality, shall be legible, reflective, self-supporting and properly placed. The dimensions of all signs shall be in accordance with the Manual on Uniform Traffic Control Devices.

B. Sign blanks shall be aluminum and shall be in accordance with NJDOT Standard Specifications for Road and Bridge Construction as amended or supplemented.

C. Sign material for ADA signs shall be engineering grade and shall be in accordance with NJDOT Standard Specifications for Road and Bridge Construction as amended or supplemented.
D. Posts for all regulatory, warning and barrier free signs shall be 3"X3" dark bronze #313 anodized aluminum square. Rear of all signs shall be painted the color match the color of the post (dark bronze #313).

E. Sign material for all other signs shall be diamond grade material and shall be in accordance with NJDOT Standard Specifications for Road and Bridge Construction as amended or supplemented.

PART 3 - EXECUTION

A. All signs shall be installed and located as shown and detailed on the drawings.

B. The contractor shall inspect and replace any damaged sign until final acceptance of the same.

C. All signs shall be installed with breakaway hardware in accordance with NJDOT Standard Specifications for Road and Bridge Construction as amended or supplemented.

END OF SECTION 02234
SECTION 02241 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Dewatering system.
   2. Surface water control system.
   3. Monitoring wells.
   4. System operation and maintenance.
   5. Water disposal.

1.2 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 PERFORMANCE REQUIREMENTS
A. Temporarily lower water table within areas of excavation to below bottom of excavation.

1.4 SUBMITTALS
A. Submit shop drawing of proposed dewatering system to the Engineer.

1.5 RELATED SECTIONS
A. Section 02236 – Soil Erosion and Sediment Control
B. AIA A232 & Section 00800 - Submittals

1.6 PAYMENT
A. The lump sum price bid shall include all material, equipment and labor necessary to provide and maintain temporary dewatering during construction.
PART 2 - PRODUCTS

2.1 DEWATERING EQUIPMENT

A. Dewatering Pumps: Portable or Skid mounted centrifugal type, diesel engine driven shall be used during daytime operations.

B. Dewatering Pumps: Submersible type, electric pumps shall be used during night time operations.

C. Surface Water Pumps: Self priming, centrifugal semi-open clog resistant impeller; engine driven type.

D. Riser Pipe: Shall be PVC.

E. Discharge Header Pipe: Shall be PVC.

F. Discharge Pipe: Shall be PVC or other flexible hose.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Conduct additional borings/test pits and investigations to complete dewatering system design.

3.2 DEWATERING SYSTEM

A. Install dewatering system in accordance with shop drawings.

3.3 SURFACE WATER CONTROL SYSTEM

A. Divert surface water and seepage water into sumps and pump water into drainage channels, storm drains or settling basins.

3.4 SYSTEM OPERATION AND MAINTENANCE

A. Operate dewatering system continuously until backfill is minimum of 2 feet above normal ground water table elevation.

B. Diesel or gas powered pumps shall only be used between the hours of 8:00 am and 9:00 pm. Electric pumps shall be used between 9:00 pm and 8:00 am to minimize noise.
3.5 WATER DISPOSAL
   A. Discharge water into existing storm sewer or settling basin.

3.6 SYSTEM REMOVAL
   A. Remove dewatering and surface water control systems after dewatering operations are discontinued.

3.7 FIELD QUALITY CONTROL
   A. Monitor and record the following:
      1. Ground water elevation.
   B. Monitor ground water discharge for contamination and sediment load.

END OF SECTION 02241
SECTION 02248 - SHORING AND BRACING

1. 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. Extent of shoring and bracing work includes, but is not limited to, the following:

1. Shoring and bracing necessary to protect existing buildings, streets, walkways, utilities, and other improvements and excavation against loss of ground or caving embankments.


3. Removal of shoring and bracing, as required.

B. Types of shoring and bracing system includes, but is not limited to, the following:

1. Soldier piles.

2. Lagging.

1.3 SUBMITTALS

A. Layout Drawings: Provide layout drawings for shoring and bracing system and other data prepared and sealed by a registered Professional Engineer licensed in the State of New Jersey. System design and calculations must be acceptable to local authorities having jurisdiction.

1.4 QUALITY ASSURANCE

A.. Regulations: Comply with local codes and ordinances of governing authorities having jurisdiction.

1.5 JOB CONDITIONS

A. Before starting work, check and verify governing dimensions and elevations. Survey condition of adjoining properties. Take photographs to record any prior settlement or cracking of structures, pavements, and other improvements.
Prepare a list of such damages, verified by dated photographs, and signed by Contractor and others conducting investigation.

B. Survey adjacent structures and improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations. Locate datum level used to establish benchmark elevations sufficiently distant so as not to be affected by movement resulting from excavation operations.

C. During excavation, resurvey benchmarks weekly, employing a licensed Land Surveyor or registered Professional Engineer, licensed in the State of New Jersey. Maintain accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags or other damage is evident.

1.6 EXISTING UTILITIES

A. Protect existing active sewer, water, gas, electricity and other utility services and structures.

B. Notify municipal agencies and service utility companies having jurisdiction. Comply with requirements of governing authorities and agencies for protection, relocation, removal and discontinuing of services, as affected by this work.

1.7 PAYMENT

A. The lump sum price bid shall include all material, equipment and labor necessary to install and maintain shoring and bracing during construction.

1.6 RELATED SECTIONS

A. Section 02232 – Site Clearing
B. Section 02236 – Soil Erosion and Sediment Control
C. Section 02241 – Dewatering
D. Section 02200 – Earthwork
E. Section 02071 – Selective Site Demolition
F. AIA A232 & Section 00800 - Submittals

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide suitable shoring and bracing materials which will support loads imposed. Materials need not be new, but should be in serviceable condition.
B. If wood is part of shoring system near existing structures, use pressure preservative treated materials or remove before placement of backfill.

3. PART 3 - EXECUTION

3.1 SHORING

A. Wherever shoring is required, locate the system to clear permanent construction and to permit forming and finishing of concrete surfaces. Provide shoring system adequately anchored and braced to resist earth and hydrostatic pressures.

B. Shoring systems retaining earth on which the support or stability of existing structures is dependent must be left in place at completion of work.

3.2 BRACING

A. Locate bracing to clear permanent work. If necessary to move a brace, install new bracing prior to removal of original brace.

B. Do not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to Architect.

C. Install internal bracing, if required, to prevent spreading or distortion to braced frames.

D. Maintain bracing until structural elements are rebraced by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

E. Remove sheeting, shoring and bracing in stages to avoid disturbance to underlying soils and damage to structures, pavements, facilities, and utilities.

F. Repair or replace, as acceptable to Architect, adjacent work damaged or displaced through installation or removal of shoring and bracing work.

END OF SECTION 02248
SECTION 02480 - LANDSCAPE WORK

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Extent of landscape development work is shown on drawings and in schedules.

B. Subgrade Elevations: Excavation, filling and grading required to establish elevations shown on drawings are not specified in this section. Refer to Earthwork Section 02200.

C. Work Included:

1. The work of this Section includes providing and installing or performing all work and equipment, complete as indicated on the Drawings or specified herein, or both, necessary for completion of planting. Any and all work related to tree transplantation must be performed under the supervision of a New Jersey Certified Tree Expert.

2. The Contractor shall provide all topsoil, and it shall be tested, and if necessary, shall be made to conform to the pH and acidity range and percentage of organic matter as specified herein.

D. The Contractor shall be liable for any damages to property caused by planting operations and shall, at his own expense, restore all disturbed or damaged areas to their original condition.

E. Plant materials shall be free of damage as the result of handling and transportation.

F. Balls of trees shall be in one solid piece properly shaped and shall be at least as large as the ball size recommended by the American Association of Nurserymen.

1.2 QUALITY ASSURANCE

A. Standards


2. Plant material shall have a habit of growth that is normal for the species and that equals or exceeds the measurements specified in the plant list, which are the minimum acceptable sizes. Provide trees, shrubs and plants of quantity, size, genus, species and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock". Provide healthy,
vigorous stock, grown in recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae and defects such as knots, sun-scald, injuries, abrasions or disfigurement. They shall be measured before pruning with branches in normal position. Any necessary pruning shall be done at the time of planting under direction of the Landscape Architect. Requirements for measurements, branching, grading, quality, balling and burlapping of plants in the plant list shall follow the code of standard currently recommended by the American Association of Nurserymen, Inc., the American Standard for Nursery Stock. Plants that meet the requirements specified, but do not have the normal balance of height and spread typical for the respective plant, shall not be accepted.

B. Inspection and Selection of Plant Material

1. The plant material shall be located by the Contractor from sources within the local area. At the direction of the Architect, the Contractor shall proceed as follows:

   a. When all plant material has been selected by the Contractor, the Landscape Architect will make his inspection upon 72 hours notice during normal business hours. The Contractor shall have located sufficient alternative choices to prevent loss of time in the event that some plant fails to meet with the approval of the Landscape Architect. The Contractor or a member of his firm shall be present when the Landscape Architect inspects the plant material at the nursery.

   b. Trees selected should be well matched as to height, spread and general conformation. All trees must be approved and tagged by the Landscape Architect in the field before digging. Trees delivered without tags will be rejected.

   c. Label each tree and shrub with securely attached waterproof tag bearing legible designation of botanical and common name.

2. Substitution: Substitution will be permitted only upon submission of proof that any plant is not obtainable and written authorization by the Landscape Architect for the use of the nearest equivalent obtainable; size and variety of the plant having the same essential characteristics with an equitable adjustment of contract price. Should the Landscape Architect deem it appropriate and substitute plant material other than that specified, it shall be accomplished as long as the price of the substituted item does not exceed the bid item being replaced.

3. Plant material is to be delivered to the site in quantities and at dates established in consultation with the Landscape Architect in order that the Landscape Architect shall have a minimum of a full day's work in supervising placement of specimen material.
C. Delivery, Storage and Handling

1. Balled and Burlapped Plants: Plants designated "B & B" in the plant list shall be balled and burlapped. They shall be dug with firm natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Balls shall be firmly wrapped with burlap of similar materials and bound with twine, cord, or wire mesh. All collected plants shall be balled and burlapped. Do not bend or bind-tie trees or shrubs in such a manner as to damage bark, break branches or destroy the natural shape. Provide protective covering during delivery.

2. Container Grown Plants: Plants grown in containers will be accepted as "B & B" providing that the plant has been growing in the container for one full growing season prior to delivery. Do not remove container grown stock from containers until planting time.

3. Protection After Delivery: Plants which cannot be planted immediately on delivery to the site shall be covered with moist soil, mulch, or other protection from the drying of wind and sun. All plants shall be watered as necessary until planted. Trees moved by winch or crane shall be thoroughly protected from chain marks, girdling, or bark slippage by means of burlap wood battens or other approved method.

1.3 SUBMITTALS

A. Certified analysis of a recognized laboratory shall be submitted for topsoil; analysis shall be made to determine compliance with requirements for topsoil as hereinbefore specified under Section 02485 Finish Grading and Seeding sections. The costs of the tests shall be borne by the Contractor. Reports of the tests shall be submitted to the Engineer in writing.

B. Furnish, in duplicate, copies of manufacturer's specifications as well as invoices for all soil amendments, including fertilizer, used on the project. Quantities of each material shall be clearly indicated on supplier's invoicing.

C. Planting Schedule: Submit proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

1.4 MAINTENANCE INSTRUCTIONS:

A. Submit typewritten instructions recommending procedures to be established by Owner for maintenance of landscape work for one full year. Submit prior to expiration of required maintenance period(s).
PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil as specified under Section 02485, Finish Grading and Seeding.

1. The topsoil mixture materials shall be thoroughly mixed by hand or rotary mixer to the satisfaction of the Landscape Architect.

2. Deciduous Plants: Topsoil mixture for backfilling planted areas shall consist of two parts each by volume of topsoil and native soil thoroughly mixed with 1 part of composted cow manure, or stable manure, and 5 pounds of bone meal per cubic yard.

3. Evergreen Plants: Topsoil mixture for backfilling planted areas shall consist of two parts each by volume of topsoil and native soil thoroughly mixed with 1 part of peat moss or humus.

2.2 SOIL AMENDMENTS

A. Peat Humus: FS Q-P-166 decomposed peat with no identifiable fibers and with pH range suitable for intended use.

B. Wood Mulch: Twice Ground Hardwood, Ground or Shredded Bark, Wood Chips: Shall have no leaves, young green growth, wood shavings, sawdust, or foreign materials of any nature mixed with the bark. Size shall be 1-1/2" maximum and 3/4" minimum in greatest dimension. Samples shall be submitted to the Engineer for approval before purchase or delivery.

C. Commercial Fertilizer: Time released packets shall be a complete fertilizer, part of the elements of which are derived from organic sources. It shall be delivered to the site in the original unopened packages each bearing the manufacturer's guaranteed analysis and installation instructions. For trees and shrubs, provide fertilizer with not less than 5% total nitrogen, 10% available phosphoric acid and 5% soluble potash.

D. For lawns, provide fertilizer with percentage of nitrogen required to provide not less than 1 lb. of actual nitrogen per 1000 sq. ft. of lawn area and not less than 4% phosphoric acid and 2% potassium. Provide nitrogen in a form that will be available to lawn during initial period of growth; at least 50% of nitrogen to be organic form.

E. Anti-Desiccant Spray: Shall be an emulsion which provides a protective film over plant surfaces, permeable enough to permit transpiration. The Anti-desiccant shall be delivered in manufacturer's containers and shall be mixed according to manufacturer's directions.

F. Water: Shall be furnished by the Contractor until the maintenance phase and will
be suitable for irrigation and free from ingredients harmful to plant life. Hose and other watering equipment shall be furnished by the Contractor. Self-watering system, where required, shall be Tree Gator 20-gallon capacity refillable watering system, by Spectrum Products, Raleigh, NC, 919-878-8911 or approved equal.

G. Guying, Staking and Wrapping Materials

1. Wire for tree guys shall be 3/16" - 1 x 7 stainless black steel leftlay strand Type 304 cable as manufactured by U.S. Steel or approved equal.

2. Turnbuckles shall be stainless steel and 4-1/2" lengthwise openings, threaded ends, 5/16" diameter, filled with screw eyes.

3. Hose shall be new black two-ply, reinforced, fiber-bearing garden hose not less than 1/2 inch inside diameter.

4. Stakes for vertical staking shall be white cedar milled 3 inches diameter, as manufactured by L. J. Taylor and Sons, Vincentown, NJ or approved equal.

5. Stakes for guying trees 3 inch caliber or less, shall be of 2" x 4" x 40", one end pointed, wolmanized wood.

2.3 PLANT MATERIALS

A. Quality: Provide trees, shrubs, and other plants of quantity, size, genus, species and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock".

B. All plants shall be freshly dug and neither heeled-in plants nor plants from cold storage will be accepted. Balled and burlapped plants shall come from soil which will hold a firm ball.

C. Deciduous Trees: Provide trees of height and caliper scheduled or shown and with branching configuration recommended by ANSI Z60.1 for type and species required. Provide single stem trees except where special forms are shown or listed.

D. Deciduous Shrubs: Provide shrubs of the height shown or listed and with not less than minimum number of canes required by ANSI Z60.1 for type and height of shrub required.

E. Coniferous and Broadleafed Evergreens: Provide evergreens of sizes shown or listed. Dimensions indicate minimum spread for spreading and semi-spreading type evergreens and height for other types, such as globe, dwarf, cone, pyramidal, broad upright, and columnar. Provide normal quality evergreens with well-balanced form complying with requirements for other size relationships to the
primary dimension shown.

F. Ground Cover: Provide plants established and well rooted in removable containers or integral peat pots with not less than minimum number and length of runners required by ANSI Z60.1 for the pot size shown or listed.

G. Container Grown Plants: Container grown plants may be supplied in lieu of balled and burlapped plants if all other specified requirements are met. These plants shall have been grown in the container for a minimum of one full growing season and a maximum of two years and when delivered, shall have sufficient root growth to hold earth intact when removed from container. They shall not be root bound. Remove container in a way to prevent damage to plant or root system.

2.4 GROUND COVER

A. Provide plants established and well-rooted in removable containers or integral peat pots and with not less than minimum number and length of runners required by ANSI Z60.1 for the pot size shown or listed.

2.5 MISCELLANEOUS LANDSCAPE MATERIALS

A. Wood Headers and Edging: Of sizes shown and following wood species.
   1. Southern Pine, pressure treated with water borne preservatives for ground contact use complying with AWPB LP-22.
   2. Provide wood stakes of the same species, 2" x 2" x 24" long and galvanized nails for anchoring headers and edging.

B. Steel Edging: Commercial steel edging of size shown on drawings fabricated in sections at 2'-6" o.c. to receive stakes. Provide tapered steel stakes 16" long. Finish edging sections and stakes with manufacturers standard green-black paint.

C. Tree grates: Campbell pattern 9188 1484 or approved equal, measuring 48" by 48" square. To be ADA compliant, constructed of grey cast iron and free from holes, cracks, cold shuts, etc. and coated with coal tar varnish. Work includes furnishing and placing of grates, and all labor incidental to placement.

PART 3 - EXECUTION

3.1 PREPARATION

A. Planting Operations
   1. The Engineer / Landscape Architect shall be notified 72 hours in advance of the delivery of any plant material to the site. Delivery slips covering all plant
material transported to the site shall be furnished to the Engineer / Landscape Architect.

2. Following the signing of the Contract and prior to the commencement of planting, the Contractor shall contact the Engineer / Landscape Architect to work out a schedule for plant material inspection and for planting dates.

3. Upon delivery of plant material to the site, and prior to planting, the Engineer / Landscape Architect shall inspect the delivered plant material in the presence of the Contractor or his designated representative. Any and all plant materials which fail to comply with the Contract drawings and/or American Association of Nurserymen Standards due to health, form or damage shall be rejected and replaced with conforming materials.

4. Plant pits shall not be pre-dug. The location of plants, as shown on the drawings is intended only as a guide. Plants shall be delivered to the site and set on the ground in the location shown. The Engineer / Landscape Architect shall then determine the specific location of each plant in the field prior to planting.

B. Prior to any digging, the Contractor shall ascertain the location of all utilities in the areas including tanks or other subsurface encumbrances within the contract limit line. Precaution must be taken not to disturb or damage these items. In the event of a conflict with planting, the Contractor shall notify the Engineer / Landscape Architect.

C. Preparation of Planting Soils

1. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.

2. Contractor shall prepare soil mixture as outlined under Section 2.1.

3. For nursery plantings, use timed release fertilizer packets for all trees and shrubs as per planting details, making sure the packets do not come in direct contact with root ball. Apply as per manufacturer's instructions.

D. Preparation of Planting Beds:

1. Loosen subgrade of planting bed areas to a minimum depth of 6" using a cultimulcher or similar equipment. Remove stones over 1-1/2" in any dimension, and sticks, stones, rubbish and other extraneous matter.

2. Spread planting soil mixture to minimum depth required to meet lines, grades and elevations shown, after light rolling and natural settlement. Place approximately 1/2 of total amount of planting soil required. Work into top of loosened subgrade to create a transition layer, then place remainder of the planting soil.
3. Planters: Place not less than 4" layer of gravel in bottom of planters, install filtration/separation fabric and fill with planting soil mixture consisting of 1 part topsoil, 1 part course sand, 1 part peat humus, and 3 lbs. dolomitic limestone per cubic yard of mix. Place soil in lightly compacted layers to an elevation 1-1/2" below top of planter allowing for natural settlement.

E. Excavation for Trees and Shrubs:

1. Excavate pits, beds and trenches with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. Loosen hard or compacted subsoil in bottom of excavation. This is particularly important in pits excavated by machine due to compaction and smearing of soils which can occur, which prevents proper development of root systems.

2. For bare root trees and shrubs, make excavations at least 1'-0" wider than root spread and deep enough to allow for setting of roots on a layer of compacted backfill and with collar set at same grade as in nursery, but 1" below finished grade at site.

3. For balled and burlapped (B&B) trees and shrubs, make excavations at least half again as wide as the ball diameter and equal to the ball depth, plus following allowance for setting of ball on a layer of compacted backfill:

4. For container grown stock, excavate as specified for balled and burlapped stock, adjusted to size of container width and depth.

5. Fill excavations for trees and shrubs with water and allow to percolate out before planting.

3.2 PLANTING

A. Planting Trees and Shrubs:

1. Set balled and burlapped (B&B) stock on layer of compacted planting soil mixture, plumb and in center of pit or trench with top of ball at same elevation as adjacent finished landscape grades. Remove burlap from sides of balls; retain on bottoms. If wire baskets have been used, cut wire baskets at top half and fold down so as to be a minimum of 3" below final grade, prior to any mulching. When set, place additional backfill around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 2/3-full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill.

2. Set transplanted trees plumb and in center of pit with top of root ball flush with adjacent finish grades. Orient each tree in the pit so that marked north side of tree aligns with north direction of pit. Backfill around base and sides of ball with planting soil as specified, and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately
2/3rds full, water thoroughly before placing remaining backfill. Amend top 8-10 inches of planting pit soil as specified in Section 2.2. Repeat watering until no more water is absorbed. Dish top to allow for mulching. Install according to manufacturers specification two (2) 20-gallon Tree Gators, zipped together, for trees 4-12" in caliper. Fill bags with potable water.

3. Set bare root stock on cushion of planting soil mixture. Spread roots and carefully work backfill around roots by hand and puddle with water until backfill layers are completely saturated. Plumb before backfilling and maintain plumb while working backfill around roots and placing layers of soil mixture above roots. Set collar 1" below adjacent finish landscape grades. Spread out roots without tangling or turning up to surface. Cut injured roots clean; do not break.

4. Set container grown stock as specified for balled burlapped stock, except cut cans on 2 sides with an approved can cutter; remove bottoms of wooden boxes after partial backfilling so as not to damage root balls. Backfill soil shall comply with the Topsoil specified in Section 2.1.

B. Dish top of backfill to allow for mulching.

C. Mulch pits, trenches and planted areas. Provide not less than following thickness of mulch and work into top of backfill and finish level with adjacent finish grades.

1. Provide 3" thickness of shredded hardwood mulch at trees.

2. Provide 2" thickness of shredded hardwood mulch at shrubs and ground covers.

D. For ground cover planting, space plants as shown on schedule; dig holes large enough to allow for spreading of roots, apply fertilizer at a rate of one (1) pound per twenty (20) square feet, backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plant to hold water. Water after planting and mulch as specified.

E. Tree and Shrub Pruning

1. Prune, thin, and shape trees and shrubs as directed by Engineer / Landscape Architect.

2. Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain height and spread. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Shrub sizes indicated are sizes after pruning.

F. All trees and shrubs shall be sprayed with anti-desiccant material immediately
after pruning. After pruning, all trees and shrubs shall also be sprayed with insecticide and fungicide. Transplanted trees to be sprayed only upon approval of Landscape Architect.

G. As indicated in the Drawings, trees shall be guyed, immediately after planting. Pieces of rubber hose or tree tie shall be used under the wires where they are attached to the trees. This work shall be performed only when necessary to stake or guy in areas subject to high winds or on slopes.

H. Miscellaneous Landscape Work:

1. Install wood headers and edgings where shown. Anchor with wood stakes spaced not more than 3’ o.c., and driven at least 1” below top elevation of header or edging. Use 2 galvanized nails per stake to fasten headers and edging, and clinch point of each nail.

2. Install steel edging where shown. Anchor with steel stakes spaced not more than 3’ o.c., and driven at least 1” below top elevation of edging.

3.3 MAINTENANCE

A. Begin maintenance immediately after planting. Maintain trees, shrubs and other plants until final acceptance but in no case less than one (1) year after substantial completion of planting.

B. Maintain trees, shrubs and other plants by pruning, cultivating and weeding as required for healthy growth. Restore planting saucers. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required. Spray as required to keep trees and shrubs free of insects and disease. All tree stakes and guys must be removed within 2 growing seasons of the initial planting.

C. Maintenance to be performed by the Contractor shall include the following:

1. Watering of plant material as required for each plant type and current weather conditions, but in no case less than once a week for the period between June 15th to September 15th.

2. Also cultivation, weeding, seasonal spraying, pruning of plant material, and adjusting of stakes, guys, and wrapping, repairs of minor washouts and gullies, and other horticultural operations necessary for the proper growth of all plants.

END OF SECTION 02480
SECTION 02485 - FINISH GRADING, SEEDING AND AMENITIES

1. 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 DESCRIPTION OF WORK

A. Extent of work is shown on drawings and in schedules.

B. The work includes, but is not limited to, the following.

1. Soil erosion and sediment control.

2. Fine grading of topsoil.

3. Application of lime and fertilizer.

4. Seeding.

5. The task items specified above must be applied to all disturbed areas, whether or not indicated on the drawings. Include adjacent property wherever grass is disturbed in execution of this contract.

C. See notes on drawings for additional requirements relating to work of this section, including the Soil Erosion and Sediment Control Plan and Notes and Details.

D. Subgrade Elevations: Excavation, filling and grading required to establish the elevations shown on drawings are not specified in this section. Refer to Earthwork, Section 02200.

E. Refer to Earthwork Section 02200 for as-built drawings required prior to finish grading and seeding work.

F. Refer to Section 02514 – Sitework Concrete for concrete work.

1.3 QUALITY ASSURANCE

A. Conform to the requirements of "Standards for Soil Erosion and Sediment Control in New Jersey", current edition, promulgated by the NJ State Soil Conservation Committee, hereinafter referred to as "standards". Compliance with the certified Soil Erosion and Sediment Control Plans and Details is mandatory.
B. Analysis and Standards: Package standard products 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.

1.4 SUBMITTALS

A. Certification: Submit certificates of inspection as required by governmental authorities, and manufacturer’s or vendors certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.

B. Submit certified analysis from a recognized laboratory shall be submitted for site topsoil stockpile for re-use as required in this specification. Certified analysis shall be made to determine compliance with requirements for topsoil stockpiled on-site as hereinafter specified under "Materials". Additional topsoil may be required to be imported from off-site in order to comply with these specifications. Certified analysis for an imported topsoil material shall also be provided to verify compliance with these Specifications. See also subsection C below. The costs of the tests shall be borne by the Contractor. Reports of the tests shall be submitted to the Architect in writing.

C. Imported materials must include a written certification from the supplier stating that the fill is virgin material, and if it is from an agricultural, commercial or non-commercial source. The material shall also be tested and be certified free of contamination or hazardous materials. Testing parameters shall be based on the source of the material, which shall be declared to Architect/Engineer in writing. The Architect/Engineer may require supplemental testing by Contractor prior to importation at no cost to the Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Materials imported for use as topsoil, and for detention basin infiltration sand, shall be segregated and protected from contamination prior to use. Topsoil shall be stockpiled and temporarily stabilized in accordance with the Erosion Control Standards.

B. Lawn Seed: Furnish in duplicate, signed copies of a statement from the vendor, certifying that each container of seed delivered is fully labeled in accordance with the Federal Seed Act. This certification shall appear on or with all copies of invoices for seed.

C. Furnish in duplicate copies of invoices for all fertilizer used on the project.

1.6 JOB CONDITIONS

A. Utilities: Determine location of underground utilities and perform work in a
manner that will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until parties concerned mutually agree upon removal.

B. Obtain copies of and abide by all conditions of the approvals and permits issued by the local Soil Conservation District.

1.7 PAYMENT

A. The lump sum price bid shall include all material, equipment and labor necessary to perform final grading and stabilization and maintain the same until final acceptance.

1.8 RELATED SECTIONS

A. Section 02200 – Earthwork
B. Section 02485 – Finished Grading
C. AIA A232 & Section 00800 - Submittals

2. PART 2 - PRODUCTS

2.1 TOPSOIL

A. The existing topsoil shall be tested and, if necessary, shall be made to conform to the pH acidity range and percentage of organic matter, and other requirements as listed below. Additional topsoil may be required; it shall be furnished by the Contractor at no additional expense, and shall be tested and made to meet the requirements listed below. Tests shall be made by the Contractor at his expense.

B. All topsoil (new and existing) shall be of uniform quality, free from hard clods, roots, sods, stiff clay, hard pan, stones larger than 1 inch, lime cement, ashes, slag, concrete, tar residues, tarred paper, boards, chips, sticks, or any undesirable material.

C. Topsoil shall contain a minimum of 2.75% organic matter in accordance with the current method of the Local Soil Conservation District. The acidity range shall be Ph 5.0 to Ph 7.0, inclusive. Soluble salts, as determined by electrical conductivity testing, shall not exceed 0.5 milliohms per centimeter.

D. The mechanical analysis of the soil shall be:

<table>
<thead>
<tr>
<th>Quantity Percent oven dry weight</th>
<th>Size Fraction</th>
<th>Range of Particle Diameter in Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 2%</td>
<td>Gravel</td>
<td>Larger than 1</td>
</tr>
<tr>
<td>Less than 3%</td>
<td>Gravel</td>
<td>1/4 to 1</td>
</tr>
<tr>
<td>Less than 10%</td>
<td>Gravel</td>
<td>2/25 to 1/4</td>
</tr>
</tbody>
</table>
40% to 65%  Sand     1/500 to 2/25
25% to 40%  Silt      1/12,500 to 1/500
Less than 12% Clay       Smaller than 1/12,500

<table>
<thead>
<tr>
<th>Passing</th>
<th>Retained On</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot; Screen</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>1&quot; Screen  ½&quot; Screen (gravel not more than)</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>1/4&quot; Screen #100USS Sieve (coarse, medium &amp; fine sand)</td>
<td>40-60%</td>
<td></td>
</tr>
<tr>
<td>#100USS Sieve (Very fine sand, silt &amp; clay)</td>
<td>12-40%</td>
<td></td>
</tr>
</tbody>
</table>

E. Sufficient native topsoil is to be retained and stockpiled on-site to adequately restore the site in accordance with these specifications. If topsoil is required to be imported to the project, obtain topsoil from local sources or from areas having similar soil characteristics to that found at project site. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 5 inches; do not obtain from bogs or marshes. The source of imported topsoil is to be inspected and approved by the Architect prior to approval of its use and importation.

F. All soil materials proposed to be imported to the site shall be certified by an independent testing agency to be free from contamination, in accordance with the standards of the N.J.D.E.P., and the U.S. Environmental Protection Agency. Written certification to be received, and approval by Owner issued prior to any importation activity.

2.2 SOIL AMENDMENTS

A. Provide the following as recommended by the Local Soil Conservation District or, if not required by the District, provide as indicated below. In the case of conflicting standards, the standards of the Soil Conservation District govern.

B. Lime: Natural limestone containing not less than 85% of total carbonates, ground so that not less than 90% passes a 10-mesh sieve and not less than 50% passes a 100-mesh sieve.

1. Agriculture Pulverized Limestone: 50% calcium availability.

2. Commercial Fertilizer: Complete fertilizer of neutral character with some elements derived from organic sources and containing following percentages of available plant nutrients.

3. Provide fertilizer with not less than 4% phosphoric acid and not less than 2% potassium, and percentage of nitrogen required to provide not less than 1 pound of actual nitrogen per 1000 square feet of lawn area. Provide
nitrogen in a form that will be available to lawn during initial period of growth.

a. Refer to permanent Seeding Requirements shown on drawings for fertilizer specifications.

C. Weed Killer: Type selected by the Seeding Subcontractor and approved by the local authorities having jurisdiction. Apply to planting and ground cover areas, in strict accordance with the manufacturer's recommendations.

D. Grass seed shall be fresh, re-cleaned seed of the latest crop mixed in the following proportions by weight and meeting the following standards of pure live seed content. The tolerance for P.L.S. (purity x germination) shall be those called official and tabulated on page 5, Department of Agriculture Bulletin No. 480.

1. Lawn Materials: Refer to "Seed Mix" on turf seeding and application specifications on Soil Erosion and Sediment Control drawings.

2. All seed shall be fresh and clean and shall be "new crop" seed. All seed shall be delivered in the original packages, unopened, which shall bear the manufacturer's guaranteed analysis. No packages shall be opened or seed labels removed until inspected by the Architect.

E. Water: Water used in the work will be suitable for irrigation and free from ingredients harmful to plant life. Hoses, sprinklers and other water equipment required for the work shall be furnished by the Contractor at no additional cost or expense.

2.3 EROSION CONTROL

A. Silt Fence: Material to conform with the requirements of the Standards for Soil Erosion and Sediment Control in New Jersey, as amended, and New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, as amended.

B. Erosion Control Fabric: Where required, is to conform with the requirements of a Flexible Channel Liner as outlined in the Standards for Soil Erosion and Sediment Control in New Jersey, as amended and New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, as amended. Shall be a minimum of Type E as defined therein, as manufactured by American Excelsior, BonTerra, North American Green, or approved equal.

3. PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Perform all work to reasonably control soil erosion resulting from construction
operations, including the work of other contractors on the project, and to prevent excessive flow of sediment from the construction site.

B. The Contractor shall adhere to the requirements of the Soil Erosion and Sediment Control Plan. When no work will be performed on critical areas for more than 30 days, they shall be protected by temporary seeding, and mulching in accordance with drawings. Earth berms or diversions shall be constructed to intercept and divert runoff water away from critical areas.

1. Diversion outlets shall be stable or shall be stabilized by paving or other means acceptable to Architects.

C. Permanent restoration of vegetative cover on all areas shall be accomplished within 10 days after final grading operations have been completed. Time extensions beyond the 10 days requirement may be requested in writing and are subject to written approval by the Architect.

D. Excavated soil materials shall not be placed adjacent to wetlands streams and bodies of water.

E. Pollutants such as chemicals, fuels, lubricants and other harmful waste shall not be discharged into or alongside of streams, wetlands, impoundments or into natural or man-made channels leading thereto.

3.2 PROTECTION FOR CRITICAL AREAS

A. Except as otherwise directed by the local Soil Conservation District, or as outlined and details on the Plans, the type of protection for critical areas shall be optional with the Contractor.

B. Protection shall be by means of straw mulch, hydro seeding or matting, applied in conformance with referenced standards.

C. Critical areas shall be those areas subject to excessive erosion due to highly erodible soils, slope length and steepness or water concentrations, including overflow spillways.

3.3 PREPARATION OF SUBGRADE AND SPREADING OF TOPSOIL

A. The subgrade soil shall be loosened to a depth of 6 inches and graded to remove all ridges and depressions so that it will be everywhere parallel to proposed finished grade. All stones over 2 inches in any dimension, sticks, rubbish and other extraneous matter shall be removed during this operation. No heavy equipment shall be moved over lawn areas after the subgrade soil has been prepared before topsoil is spread. This scarification must be done and approved before topsoil is spread.
B. After the subgrade soil has been prepared, topsoil shall be spread evenly thereon and the area then rolled with a 200 lb. roller so as to produce a minimum compact depth of five (5) inches of topsoil. No topsoil shall be spread in frozen or muddy conditions. In all lawn areas, the finished surface of the topsoil shall conform and shall be free from hollows or other inequalities, stones over 1 inch every dimension, sticks, and other extraneous matter.

3.4 SEEDBED PREPARATION, FERTILIZING AND SEEDING (LAWN AREAS)

A. Before any seed is sown, the topsoil shall be cultivated (raked) to a depth of 3”-4” to produce an even, friable surface or moderately coarse particles. Do not work soil into dusty powder. No fertilizer shall be applied or seed sown on any area which has not been so prepared.

B. Fertilizer and limestone shall be applied to lawn areas at the rate as indicated on drawings. Fertilizer and limestone shall be spread evenly on the newly prepared soil prior to seeding and incorporated into the topsoil as stated in the Permanent Seeding Requirements shown on drawings.

C. Ground limestone shall be evenly distributed in an amount related to the pH and worked into the top three (3) inches of soil at least 5 days before applying commercial fertilizer. Commercial fertilizer shall be worked lightly into the top 3 inches of the soil of new areas.

D. Lawn shall be seeded with the seed mixes and rates as specified in the Permanent Seeding Requirements shown on drawings. The seed shall be sown in a uniform application by the use of an accurate spreader, properly calibrated, in the opposite direction of fertilization. The spreader shall be set at the specified rate. After the seed has been applied lightly, mix into surface by pulling a short section of chain link fence (or an alternate method if approved by the Architect) over the seeded area. Do not roll seed bed unless specifically ordered by the Architect. If rolling is deemed to be necessary by the Architect, it shall be done with 100 lb. roller or less and under his direction.

3.5 MULCHING

A. Mulching is required on all seeding. Mulch will insure against erosion before grass is established and will promote faster and earlier establishment. (The existence of vegetation sufficient to control soil erosion shall be deemed compliance with this mulching requirement.)

1. Mulch materials should be unrotted small grain straw, hay free of seeds, or salt hay to be applied at the rate of 1-1/2 to 2 tons per acre (70 to 90 pounds per 1,000 square feet), except that where a crimper is used instead of a liquid mulch-binder (tacking or adhesive agent), the rate of application must be double the lower rate. Mulch chopper-blowers must not grind the material.
2. Spread uniformly by hand or mechanically so that approximately 85% of the soil surface will be covered. For uniform distribution of hand-spread mulch, divide area into approximately 1,000 square feet sections and distribute 70 to 90 pounds within each section.

3. Mulch anchoring should be accomplished immediately after placement to minimize loss by wind or water. This may be done by one of the following methods, depending upon the size of the area, steepness of slopes, and costs.

   a. Peg and Twine - Drive 8 to 10 inch wooden pegs to within 2 to 3 inches of the soil surface every 4 feet in all directions. Stakes may be driven before or after applying mulch. Secure mulch to soil surface by stretching twine between pegs in a criss-cross and a square pattern. Secure twine around each peg with two or more round turns.

   b. Mulch Nettings - Staple paper, jute, cotton, or plastic nettings to the soil surface. Use a degradable netting in areas to be mowed.

   c. Crimper (mulch anchoring tool) - A tractor-drawn implement, somewhat like a disc harrow, especially designed to push or cut some of the broadcast long fiber mulch 3 to 4 inches into the soil so as to anchor it and leave part standing upright. This technique is limited to areas traversable by a tractor, which must operate on the contour of slopes. Straw mulch rate must be 3 tons per acre. No tacking or adhesive agent is required.

4. Liquid Mulch-Binders - May be used to anchor salt hay or straw mulches.

   a. Applications should be heavier at edges where wind catches the mulch, in valleys, and at crests of banks. Remainder of area should be uniform in appearance.

   b. Use of the following:
      Synthetic or Organic binders - binders such as Curasol, DCA-70, Petro-set, and Terra-Tack may be used at rates recommended by the manufacturer to anchor mulch materials.

      NOTE: All names given above are registered trade names. This does not constitute a recommendation of these products to the exclusion of other products.

5. Wood-fiber or paper-fiber mulch at the rate of 1,500 pounds per acre may be applied by a hydro seeder. Use is limited to flatter slopes and during optimum seeding periods in spring and fall.
3.6 SEEDING PERIOD

A. Permanent seeding shall be executed according to the following schedule: From 1 March to 15 May or 15 August to 1 October. This period may be extended or reduced according to prevailing weather conditions at the time, as directed by the Architect.

3.7 LAWN PROTECTION

A. Adequate protection shall be provided at all times for lawn areas against trespassing by any individuals and damage of any kind during planting or other operations. Such protection shall be maintained from the completion of seeding to the completion of the Contract Work.

3.8 MAINTENANCE OF LAWNS

A. The Contractor shall be responsible for all areas during the period when the grass is becoming established and until all work under this Contract is completed and accepted.

B. Maintenance shall include but not be limited to reseeding, watering, mowing and reworking as follows:

1. Reseeding of any bare areas.

2. Proper and adequate watering.
   a. The lawn area shall be watered daily and as may additionally be required until germination.
   b. Upon germination, the lawn area shall be watered twice a week with an accumulation of ½ inch of water at each watering.
   c. The above watering schedule is a minimum and shall be changed at the discretion of the Architect according to climatic conditions, etc.

3. If any portion of the surface becomes eroded, washed out, gullied or otherwise damaged following seeding, the affected portion shall be repaired to re-establish the conditions and grade of the soil prior to seeding and shall then be reseeded as specified herein.

C. Mowing: The grass shall be properly mowed to a height of 2 inches when the grass attains a height of 3 inches. It is essential that at all times the mower blades are kept sharp.

D. Reworking and reseeding of any areas which fail to show a uniform stand of grass shall be done at the Contractor’s expense with the same seed mixture.
applied at the rate originally used and repeated until all areas are covered with a satisfactory stand of grass.

E. It is the Contractor's responsibility to carry out the above operations on a continuing basis until a uniform, thick stand of specified grasses is established and until acceptance by the Architect.

3.9 INSPECTION AND ACCEPTANCE

A. Inspection of the seeding and related work to determine completion of Contract work will be made by the Architect upon notice requesting such an inspection by the Contractor several days prior to the anticipated date. The conditions of the planting and lawns will be noted and determination made by the Architect whether maintenance shall be continued in any part.

B. After inspection, the Contractor will be notified in writing by the Architect of acceptance of the work or, if there are any deficiencies, the requirements for completion of the work. Remaining work to be done shall be subject to inspection before acceptance. Maintenance shall become the responsibility of the Owner immediately upon acceptance.

3.10 CLEAN UP

A. The Contractor shall dispose of excess materials and debris including but not limited to branches, paper, and rubbish resulting from this work off-site and in a legal manner.

B. All areas shall be left neat and clean; and, upon completion of the work, the site shall be left in an orderly condition satisfactory to the Architect.

END OF SECTION 02485
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 SCOPE

A. Provide new porous asphalt bituminous paving on approved compacted subbase for parking lots, driveways and asphalt walkways as specified on the Contract Drawings. All porous bituminous paving sections shall be in accordance with the details provided on the Contract Drawings.

1.3 STANDARDS

A. The paving subcontractor shall demonstrate proven capability in the installation of bituminous paving and shall be NJDOT prequalified and submit satisfactory evidence of same. The Contractor shall be engaged in the installation of bituminous pavement, as a primary business enterprise.

B. All materials, methods and workmanship is based on New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, as amended.

C. All paving under this section shall be "Porous Bituminous Concrete Paving", as shown on plans, details, and as specified herein.

D. Do all rolling with a power roller. Weight of roller shall be at least one ton for constructing bituminous walkways and at least ten tons for the parking areas. Use thorough hand or power tamping to obtain proper compaction on any areas not accessible to roller.

E. Bituminous Pavers: Use self-contained, power-propelled units, with activated screeds or strike-off assemblies, that produce a finished surface of required evenness and texture. Provide a unit that does not tear, shove, or gouge the mixture. Use a unit that is heated, if necessary, and capable of spreading and finishing bituminous plant mix material to widths and depths indicated. Use pavers capable of being operated at forward speeds consistent with satisfactory laying of the mixture, equipped with receiving hoppers having sufficient capacity for uniform spreading, and with distribution systems that place the mixture uniformly in front of the screeds. Equipment shall utilize automatic slope and grade controls.
1.4 SITE CONDITIONS

A. Weather Limitations: Apply prime and tack coats only when ambient temperature is above 50 degrees Fahrenheit (hereinafter “F.”), and when temperature has not been below 35 degrees F. for 12 hours immediately prior to application. Apply only when base is dry. When any moisture is visible on the surface of any base, the operations will be suspended.

1. Construct porous asphalt concrete course only when atmospheric temperature is above 40 degrees F. and when base is dry.

B. Protect adjacent work from splashing of paving materials.

C. Protect paving against traffic until surface has properly cured. Provide temporary barriers, warning lights and other protection as necessary. Remove when no longer required.

1.5 SUBMITTALS

A. Provide specifications and certifications from asphalt and aggregate suppliers demonstrating that materials conform to NJDOT requirements. Provide six (6) copies of each certification:

2. Submit a list of materials proposed for work under this Section including the name and address of the materials producer and the location from which the materials are to be obtained.

3. Submit certificates, signed by the materials producer and the paving subcontractor, stating that materials meet or exceed the specified requirements.

4. Submit samples of coarse aggregates, non-woven geotextile, and porous bituminous asphalt for review and approval by the Engineer.

5. The asphalt mixing plant shall certify the aggregate mix, abrasion loss factor, polymer additive, binder draindown, tensile strength ratio, resistance to stripping by water and asphalt content in the mix.

1.6 PAYMENT

A. The lump sum price bid shall include the costs of all labor, equipment and materials necessary to install and maintain porous pavement.

1.7 RELATED SECTIONS

A. Section 02200 – Earthwork
B. Section 01550 – Traffic Control
C. AIA A201 & Section 00800 - Submittals
PART 2 - PRODUCTS

2.1 MATERIALS FOR BITUMINOUS MIXTURES

A. Materials shall conform to the applicable sections of NJ DOT specifications for:

1. Coarse Aggregates
2. Filler
3. Asphaltic Cement
4. Prime Coat
5. Tack Coat
6. Geotextile

2.2 BITUMINOUS MATERIALS

A. Porous Pavement shall be Modified Open-Graded Friction Course-2 (MOGFC-2) as specified in the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction as amended and supplemented.

The following general criteria shall apply unless otherwise amended or supplemented herein:

1. Pavement thickness shall be as indicated on the Contract Drawings with a bituminous mix of 5.5% to 6% by weight dry aggregate. Drain-down of the binder shall be no greater than 0.3% in accordance with ASTM D6390. If more absorptive aggregates, such as limestone, are used in the mix then the amount of bitumen is to be based on the testing procedures outlines in the National Asphalt Pavement Association's Information Series 131 – “Porous Asphalt Pavements” (2003).

2. Use asphalt modified with an elastomeric polymer to produce an asphalt binder meeting the requirements of PG-76-22. The elastomeric polymer shall be styrene-butadiene-styrene (SBS), or approved equal, applied at a rate of 3% by total weight of the asphalt binder. The composite materials shall be thoroughly blended by the supplier prior to being loaded into the transport vehicle. The polymer modified asphalt binder shall be heat and storage stable.

The Contractor shall submit a certification from the material supplier to the Engineer prior to placing the asphalt that includes the following information:
1. Type of elastomer used to modify the asphalt.
2. Quality control sampling and testing procedures used to certify the polymer modified asphalt.
3. Information on the storage and stability of the polymer modified asphalt.
4. Recommended mixing and compaction temperatures.
5. A statement indicating the polymer modified asphalt complies with these specifications.

3. Hydrated lime shall be added at a dosage rate of 1.0% by weight of the total dry weight of the aggregate to mixes containing granite. Hydrated lime shall meet the requirements of ASTM C 977. The additive must be able to prevent separation of the asphalt binder from the aggregate and must achieve the required tensile strength ration (TSR) of at least 80% on the asphalt mix.

4. The asphalt mix shall be tested for its resistance to stripping by water in accordance with ASTM D-3625. If the estimated coating area is not above 95%, anti-stripping agents shall be added to the asphalt.

5. The following changes are hereby made to Section 403 of the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction:

   403.01 Description.

   This work includes the construction of Dense Graded Friction Course (DGFC), Open Graded Friction Course (OGFC), and Modified Open Graded Friction Course (MOGFC).

   3. Aggregate for OGFC and MOGFC shall conform to Subsection 901.10; except that coarse aggregate shall be broken stone of gneiss, granite, quartzite, or trap rock. Reclaimed asphalt pavement or crushed recycled container glass will not be allowed.

   4. Asphalt binder for MOGFC shall be storage stable, pre-blended, homogenous, SB (Styrene-Butadiene) or SBS (Styrene-Butadiene-Styrene) polymer modified asphalt binder, grade PG76-22, conforming to the requirements of AASHTO Provisional Standard MP1. In addition, the residue from the Rolling Thin Film Oven Test (AASHTO T-240) shall be tested in accordance with ASTM-6084 (Standard Method for Elastic
Recovery of Bituminous Materials by Ductilometer) and have a minimum elastic recovery of 50 percent. A written certification of compliance in accordance with Subsection 106.04 shall be submitted for the polymer modified asphalt binder.

5. Anti-Stripping agent, if needed, shall be heat stable and conform to AASHTO R15.

Modified Open Graded Friction Course (MOGFC)
The mix design for MOGFC shall conform to Table 403-1.

Table 403-1

<table>
<thead>
<tr>
<th>Production Control Tolerances</th>
<th>Mixture Designations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MOGFC-1</td>
</tr>
<tr>
<td>Sieve Sizes</td>
<td>Job Mix Formula Master Range</td>
</tr>
<tr>
<td>% Passing by weight of total aggregate</td>
<td>% Passing by weight of total aggregate</td>
</tr>
<tr>
<td>0.0 (⅜&quot;) 19 mm</td>
<td>100</td>
</tr>
<tr>
<td>± 6.0 (½&quot;) 12.5 mm</td>
<td>85-100</td>
</tr>
<tr>
<td>± 5.5 (3/8&quot;) 9.5 mm</td>
<td>35-60</td>
</tr>
<tr>
<td>± 5.5 (#4) 4.75 mm</td>
<td>10-25</td>
</tr>
<tr>
<td>± 4.5 (#8) 2.36 mm</td>
<td>5-10</td>
</tr>
<tr>
<td>± 2.0 (#200) 0.075 mm</td>
<td>2-5</td>
</tr>
<tr>
<td>(± 0.15 Bin Anal.) (± 0.2 Ignition Oven)</td>
<td>Minimum asphalt binder, percent by weight of total mixture, design</td>
</tr>
<tr>
<td>- 1.0 Min % Air Voids, design</td>
<td>20%</td>
</tr>
<tr>
<td>- 0.0 Min lift Thickness, design</td>
<td>30 mm</td>
</tr>
</tbody>
</table>
Note 1: The target asphalt percentage for the job mix formulas shall be determined according to NJDOT method B-11.

Note 2: Gradations chosen for the JMF must exhibit stone-on-stone contact according to NJDOT Method B-11.

The Contractor shall prepare at least ten compacted test specimens for submittal to the Owner at least four weeks prior to the initial production date. These specimens shall be prepared from material mixed according to the final job mix formula, using the same compaction effort used during the design process.

At least two of the ten test specimens will be tested for abrasion and impact resistance using a modified L.A. Abrasion Test as per NJDOT Method B-11, Section 6. The maximum loss as calculated by this method shall not be more than 30 percent.

The final job mix formula shall produce a mixture that has a minimum void content as specified in table 403-1 when compacted using the same compactive effort used to obtain the optimum asphalt content.

During production, one random acceptance sample will be taken from each lot of 300 megagrams to verify composition. Voids and draindown tests shall be conducted as directed by the Engineer.

If the composition testing results are out of the production control tolerances specified in Table 403-1 for an acceptance sample, the Contractor shall determine if a plant adjustment is needed and immediately run a quality control sample. If the quality control sample is also out of the control tolerances in Table 403-1, corrective action shall be taken immediately. Additional quality control samples shall be taken after the corrective action to ensure that the mix is under control. If two consecutive acceptance samples are outside the tolerances specified in Table 403-1, production shall stop immediately. A plant correction shall be made prior to resuming production. Upon restarting production, no mixture shall be transported to the project before the results of a QC sample from the mixture indicate that the mixture meets JMF tolerances. Any mixture produced at initial restarting that does not meet tolerances will be rejected. After restarting, acceptance sampling begins on a new lot.
Sampling and testing for compaction, voids, and draindown will be performed according to NJDOT B-3 or ASTM D-3665 (sampling), NJDOT B-4 or NJDOT B-6 or AASHTO T-308 (asphalt content), NJDOT B-10 (aggregate surface area), and NJDOT B-11 (air voids and optimum asphalt determination).

Porous Pavement shall be Modified Open-Graded Friction Course as specified in the New Jersey Department of Transportation Standard Specification For Road and Bridge Construction as amended and supplemented. All placement methods and procedures shall be in accordance with the New Jersey Department of Transportation Standard Specification For Road and Bridge Construction as amended and supplemented and as may be supplemented herein.

All material shall be transported to the site directly from the plant in vehicles with smooth, clean dump bodies that have been sprayed with a non-petroleum release agent. The mix shall be covered during transporting to prevent cooling. Materials shall not be permitted to be stored in excess of 90 minutes prior to placement.

403.5 Construction Requirements

The construction requirements shall be as specified in Section 404 except as follows for OGFC and MOGFC:

2. Laying temperature for OGFC mix shall not be less than 225°F (107°C); laying temperature for MOGFC shall be as per binder manufacturers recommendations.

5. Temperature at discharge from the plant shall be maintained from 240°F (116°C) to 270°F (132°C) for OGFC; temperature at discharge from the plant for MOGFC shall be within the binder manufacturer’s recommended mixing range.

PART 3 - EXECUTION

3.1 EXCAVATION

All excavation shall be performed as per Section 02200 Earthwork. All excavated materials shall be either used to construct the embankments or shall be removed and disposed of by the contractor. The contactor is specifically advised that the
use of any machinery on the excavated subgrade shall not be permitted. The subgrade must remain un-compacted. The contractor shall provide the proper equipment for excavation from the perimeter of the project only.

3.2 GEOTEXTILE FABRIC

Geotextile fabric shall be placed in accordance with manufacturer’s standards and recommendations. Geotextile fabric shall be placed on the uncompacted subgrade. All longitudinal and transverse joints shall be overlapped by a minimum of sixteen inches (16”). All filter fabric installed shall be kept clean and free of silt. Any fabric and bedding stone subjected to siltation shall be removed and replaced prior to the placement of stone at no additional cost to the owner.

3.3 CLEAN WASHED CRUSHED STONE

All subgrade shall be inspected and approved for placement of stone by the Engineer. Subgrade shall be protected from debris and sediment accumulation prior to the Engineer’s approval and prior to the installation of the Geotextile fabric and clean washed stone.

Place Geotextile fabric in a manner to prevent accumulation of debris and sediment and without compacting the subgrade. Place clean washed crushed stone atop clean Geotextile fabric as shown on the construction details. Place 1 ½” stone in 6” lifts and lightly compact each lift with equipment, keeping equipment movement over the subgrade to a minimum. The use of drum rollers is strictly prohibited unless otherwise approved by the engineer. Once completely installed and compacted, the stone shall be protected from construction traffic until installation of porous pavement. Any stone contaminated with silt shall be removed and replaced at the contractor’s expense.

3.4 CHOKE STONE

Install a one-inch (1”) lift of choke stone atop the clean crushed stone in 3.3 above. The thickness of the choke stone shall be as shown on the construction details. Stone shall evenly cover the surface of the bedding stone, sufficient to allow placement of pavement. The use of drum rollers is strictly prohibited unless otherwise approve by the engineer. Once completely installed and compacted the choke stone shall be protected from construction traffic until paving. The stone shall also be protected from siltation. Any choke stone contaminated with silt shall be removed and replaced at the contractor’s expense.
3.5 TEMPORARY PROTECTION

The contractor shall be responsible for protecting all stone from any contamination by silt, dirty stormwater runoff, deleterious liquids, and any debris or any other materials or liquids that might damage the permeability of the stone bed or chocker stone until the time of paving. There shall be no payment made for temporary filter fabric. The temporary filter fabric should be secured in place with weights to prevent it from blowing. Temporary filter fabric shall be removed immediately prior to paving. The contractor shall dispose of all temporary filter fabric in accordance with all applicable laws.

3.6 POROUS PAVEMENT

Porous Pavement shall be Modified Open-Graded Friction Course - 2 as specified in the New Jersey Department of Transportation Standard Specification For Road and Bridge Construction as amended and supplemented. All placement methods and procedures shall be in accordance with the New Jersey Department of Transportation Standard Specification For Road and Bridge Construction as amended and supplemented and as may be supplemented herein.

All material shall be transported to the site directly from the plant in vehicles with smooth, clean dump bodies that have been sprayed with a non-petroleum release agent. The mix shall be covered during transporting to prevent cooling. Materials shall not be permitted to be stored in excess of 90 minutes prior to placement.

The porous bituminous surface course shall be laid in one lift directly over the stone base course to a 3-inch finished thickness. The laying temperature of the bituminous mix shall be between 300 degrees Fahrenheit and 250 degrees Fahrenheit (based on recommendations of the asphalt supplier). Installation shall take place when ambient temperatures are 55 degrees Fahrenheit or above, when measured in the shade away from artificial heat. Do not place bituminous paving mixtures between November 15 and March 15 unless otherwise permitted in writing by the Engineer. Do not place porous bituminous paving mixtures when surfaces are wet or when the ambient temperature is 55 degrees Fahrenheit or lower. The use of a remixing material transfer device between the trucks and the paver is highly recommended to eliminate cold lumps in the mix. The polymer-modified asphalt is very difficult to rake. A well-heated screed should be used to minimize the need for raking. Compaction of the surface course shall take place when the surface is cool enough to resist a 10-ton roller. One or two passes is all that is required for proper compaction. More rolling could cause a reduction in the surface porosity, which is unacceptable.
3.7 QUALITY CONTROL

A. General: In addition to other specified conditions, where so directed by the Engineer, comply with any or all of the following requirements:

B. Testing:

1. Test in-place porous asphalt concrete for compliance with requirements for density, thickness and surface smoothness.

2. Take not less than required type and number of pavement specimens outlined in Section 2, from locations as directed.

3. Repair holes from test specimens to conform with adjoining surfaces.

C. Density:

1. Compare density of in-place material against laboratory specimen of same asphalt concrete mixture, when subjected to 50 blows of standard Marshall hammer on each side of specimen.

D. Thickness:

1. In-place compacted thicknesses will not be acceptable if exceeding following allowable variation from thicknesses shown on drawings.

   1. All asphalt courses: 1/4" plus or minus.

   2. Crushed aggregate base course, 1/2" plus or minus.

E. Surface Smoothness:

1. Test finished surface of each bituminous concrete course for smoothness, using a 10 foot straightedge applied parallel to and at right angles to centerline of paved areas.

2. Check surfaced areas at intervals directed.

3. Surfaces will not be acceptable if exceeding the following:

   a. Finished Surface Course: 1/8" in 10 feet in any direction.

   b. Base Course: 3/8" in 10 feet

   c. Aggregate Course: 1/2" in 10 feet.
F. Permeability:

1. The final pavement shall be tested to insure its permeability. Testing shall be accomplished by application of clean water at a rate of at least 5 gallons per minute over the surface using a hose or other distribution device. Water used shall be clean and free of suspended solids and deleterious liquids of any kind. All applied water shall infiltrate directly into the pavement without puddle formation or surface runoff and shall be observed and approved by the Engineer.

END OF SECTION 02505
SECTION 02514 - SITEWORK CONCRETE

1. 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 DESCRIPTION OF WORK

A. Extent of concrete work is shown on drawings.

1. Curbs, concrete walks, and slabs where shown.

1.3 RELATED SECTIONS

A. Section 02232 – Site Clearing
B. Section 02248 – Shoring and Bracing
C. Section 02200 - Earthwork
D. Section 02485 – Finished Grading
E. Section 02071 – Selective Site Demolition
F. Section 01550 – Traffic Control
G. Section 07900 – Joint Sealer Assemblies
H. AIA A232 & Section 00800 - Submittals

1.4 QUALITY ASSURANCE

A. Codes and Standards

1. Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.

ACI 301 "Specifications for Structural Concrete for Buildings."
ACI 311 "Recommended Practice for Concrete Inspection."
ACI 318 "Building Code Requirements for Reinforced Concrete."
ACI 347 "Recommended Practice for Concrete Formwork."
ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete."
Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
Non-Slip Finish for Walkways: Provide finish in accordance with BOCA Building Code, CABO/ANSI A117.1, for non-slip finish.

B. Owner will engage a qualified testing agency to perform the Special Inspections - Material Testing services

C. Comply with the requirements of Section 03300 and structural drawings for concrete work, where applicable, as determined by Architect.

1.5 SUBMITTALS

A. Submit all test reports to Architect with copy to Engineer. Submit copies of all receipt tickets to Engineer.
B. Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems and others as requested by the Architect.

C. Submit samples of materials as specified and as otherwise may be requested by the Architect, including names, sources and descriptions as required.

1.6 JOB CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities, for facility operation and for public use. All traffic control measures to comply with the Manual on Uniform Traffic Control Devices, as amended.

1. Utilize flagmen, barricades, warning signs and warning lights as required.

B. Mark Out: Contractor shall be responsible to do the necessary survey work required for the mark out of all proposed features and elevations.

1.7 PAYMENT

A. The lump sum price bid shall include all survey mark outs, material, equipment and labor necessary to construction site concrete work and maintain the same.

2. PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Construct formwork for exposed concrete surfaces with plywood, metal, or other acceptable materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.

B. Provide commercial formulation form-coating compounds that will not bond with, stain or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces to be cured with water or curing compound. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

2.2 REINFORCING MATERIALS


2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type 1, unless otherwise acceptable to the Architect.

B. Normal Weight Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source for all exposed concrete.

1. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.

2. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud,
loam, or foreign matter as follows:

a. Maximum Aggregate Size: Not larger than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs.

C. Water: Clean, fresh, drinkable.


E. Water-Reducing Admixture: ASTM C 494, Type A.

F. Set-Control Admixtures: ASTM C 494.

G. Anti-Spalling Compound: 50 percent (by volume) boiled linseed oil and 50 percent (by volume) commercial grade kerosene or mineral spirits.

H. Calcium Chloride will not be permitted in concrete, unless specifically authorized in writing by the Architect.

2.4 RELATED MATERIALS

A. Preformed Expansion Joint Fillers: Specified in Section 07900.

B. Curing Compounds: Exterior slabs shall be cured with a compound that shall conform to Federal Specification TT-C-800A, with 30 percent solids, minimum, such as "Masterseal" as manufactured by Master Builders, or approved equal.

C. Detectable Warning Strips for handicap ramps: Preformed polyurethane mats with raised bumps of truncated domes, of a high visibility color, including required installation materials, meeting State and local code regulations for handicap accessibility, such as those manufactured by Detectable Warning Systems of Orange, California, 714-974-3566, or approved equal.

2.5 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes in accordance with applicable provisions of ASTM C 94. Use an independent testing facility acceptable to the Architect for preparing and reporting proposed mix designs.

B. Submit written reports to the Architect of proposed mix at least fifteen (15) days prior to the start of the work. Do not begin concrete production until mixes have been reviewed by the Architect.

C. Design mix to provide normal weight concrete with the following properties.

1. 4500 psi 28-day compressive strength.
2. 3500 psi 28-day compressive strength
3. 2500 psi 28-day compressive strength

D. Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant at no additional cost to the Owner and as accepted by the Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by the Architect before using in the work.
E. Admixtures

1. Use air-entraining admixture in exterior exposed concrete. Add air-entraining admixture at the manufacturer’s prescribed rate to result in concrete at the point of placement having air content within the following limits.

   a. Concrete exposed to freezing and thawing or subjected to hydraulic pressure:

      5 percent for maximum 2-inch aggregate.
      6 percent for maximum ¾-inch aggregate.

   b. Maximum water cement ratio: 0.40.

2. Use admixtures for water-reducing and set-control in strict compliance with the manufacturer’s directions.

F. Slump Limits including Ready-Mix Concrete

1. Ramps and Sloping Surfaces: Not more than 3 inches.

2. All Other Concrete: Not less than 1 inch and not more than 4 inches.

G. Ready-Mix Concrete: Comply with the requirements of ASTM C 94 and as herein specified.

3. PART 3 - EXECUTION

3.1 FORMS

A. Construct forms complying with ACI 347, to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work.

B. Form Ties: Factory-fabricated, adjustable length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete surfaces upon removal. Provide form ties that will not leave holes larger than 1 inch in diameter in concrete surface.

C. Check completed formwork for grade and alignment to the following tolerances:

   1. Top of forms not more than 1/8 inch in 10 feet.

   2. Vertical face on longitudinal axis or radius, not more than 1/4 inch in 10 feet.

D. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

E. Depressed curb shall be installed one and one-half (1-1/2) inch above the adjacent existing or proposed pavement grade. Fully depressed curb at handicapped ramps and other noted locations shall be flush with the existing or proposed finished pavement grade. Excavation for depressed curb shall be full depth in accordance with the plan details.

3.2 REINFORCEMENT

A. Reinforce walks with welded wire mesh, as indicated.
B. Comply with the specified codes and standards, and Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

C. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one (1) full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.3 JOINTS AND SCREEDS

A. Provide expansion joints between new and existing curbs and concrete paving, between new curbs or concrete paving and vertical surfaces, and where required by the plan notes and details, but not exceeding 20 feet o.c. in all directions. Extend joint fillers full width and depth of joint, and not less than ½ inch or more than 1 inch below finished surface. Fill flush with sealer, as specified in Section 07900. Concrete shall be allowed to expand in not less than 2 directions.

B. Weakened-Plane (Contraction) Joints: Provide weakened-plane joints, sectioning concrete into areas as shown on drawings. Construct weakened-plane joints for a depth equal to at least 1/4 concrete thickness, as follows:

1. Tooled Joints: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.

2. Provide tooled joints on 5 foot centers each way for paving and walks or as shown on the drawings.

C. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain the required elevations and contours in the finished slab surface. Provide and secure units sufficiently strong to support the types of screed strips by the use of strike-off templates or accepted compacting type screeds.

3.4 PREPARATION OF FORM SURFACE

A. Coat the contact surfaces of forms with a form coating compound before reinforcement is placed.

B. Do not allow excess form coating material to accumulate in the forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with the manufacturer's instructions.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete the formwork installation and reinforcing steel.

B. Comply with ACI 304, and as herein specified.

C. Deposit concrete paving in a continuous operation, as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.

D. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping, and use equipment and procedures for consolidation of
concrete in accordance with the recommended practices of ACI 309, to suit the type of concrete and project conditions.

E. Bring slab surfaces to the correct level with a straightedge and strikeoff. Use bull floats or darbies to smooth the surface, leaving it free of humps or hollows. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces prior to beginning finishing operations.

F. Maintain reinforcing in the proper position during concrete placement operations.

G. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306.

H. When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305.

3.6 FINISH

A. Smooth Form Finish: For formed concrete surfaces exposed to view. This is the as-cast concrete surface as obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with all fins or other projections completely removed and smoothed.

B. Float Finish: Apply float finish to monolithic slab surfaces that are to receive other finishes as hereinafter specified. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance not exceeding 1/8 inch in 10 feet when tested with a 10-foot straightedge. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, re-float surface to a uniform, smooth, granular texture.

C. After smooth form finishing or floating and when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:

1. Walks
   a. Broom finish by drawing a fine hair broom across concrete surfaces, perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to Architect and meet indicated code for non-slip finish. Provide a smooth border at all joints and edges.
   
   b. On inclined slab surfaces, provide a coarse, non-slip finish by scoring surface with a stiff bristled broom, perpendicular to line of traffic.

2. Curbs and other exposed formed surfaces: Smooth rubbed finish; grout cleaned finish will not be permitted. Match sample of finish approved by Architect for entire project.

D. ADA detectable warning surface where required and shown on the plans and details shall be installed during the finishing of concrete. Detectible warning surfaces shall be flush with the surface to prevent trip hazards. Detectible warning surfaces shall be the color safety red. Surface applied detectable warning systems are prohibited. All detectable warning surfaces shall be cast into the fresh concrete.
3.7 CURING

A. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 72 hours.

B. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures.

C. Cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods as approved by Architect.

3.8 ANTI-SPALLING TREATMENT

A. Apply compound to concrete surfaces no sooner than 28 days after placement. Apply to clean, dry concrete free of oil, dirt, and other foreign materials, in 2-sprayed applications. First application at rate of 40 square yards per gallon; second application, 60 square yards per gallon. Allow complete drying between applications. Do not apply to areas of concrete is to receive paint or other surface treatment.

3.9 REMOVAL OF FORMS

A. Formwork may be removed after cumulatively curing at not less than 50 degrees F. for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

3.10 DETECTABLE WARNING STRIP

A. Install detectable warning strips to handicap ramps as required by the plans during finishing. Strips are to be installed in strict accordance with manufacturer's specifications and materials.

3.11 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. Sampling Fresh Concrete: ASTM C 172, except modified or slump to comply with ASTM C 94.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

2. Slump: ASTM C 143; one test for each concrete load at point of discharge; and one test for each set of compressive strength test specimens.

3. Compression Test Specimens: ASTM C 31; provide tests as specified in Section 03300 - Concrete Work.

END OF SECTION 02514
SECTION 02516 – STORM SEWER

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 DESCRIPTION OF WORK

A. The contractor shall furnish all necessary labor, equipment, tools, implements and materials required to construct storm sewer or other storm water drainage facilities and structures herein.

1.3 SUBMITTALS

A. Upon delivery of materials, the Contractor shall require the Manufacturer or Supplier to furnish to the Engineer a Certification of Compliance that the delivered materials, components and manufactured items are acceptable. Certificates of Compliance shall contain the following information:

(1) Project to which material is consigned.
(2) Name of the Contractor to which the material is supplied.
(3) Kind of material supplied.
(4) Quantity of material represented by the Certificate.
(5) Means of identifying and consignment.
(6) Date and method of shipment.
(7) That the material has been tested and found in conformity with the pertinent specification(s) stated in the Certificate.
(8) Signature of person having legal authority to bind the supplier.
(9) Signature attested to by a notary public.

B. An NJDOT mix design shall be submitted and approved by the engineer prior to the placing of any Portland Cement Concrete.

C. Shop drawings of all pre-cast manholes, inlets, bases and trench drains shall be submitted to and approved by the Engineer prior to installation.

1.4 PAYMENT

A. The lump sum price bid shall include the costs of all labor, equipment and materials necessary to install storm sewers infrastructure.

1.5 RELATED SECTIONS
A. Section 02232 – Site Clearing
B. Section 02236 – Soil Erosion and Sediment Control
C. Section 02241 – Dewatering
D. Section 02248 – Shoring and Bracing
E. Section 02200 – Earthwork
F. Section 02485 – Finished Grading
G. Section 02550 – Traffic Control
H. Section 02514 – Site Work Concrete
I. Section 03300 – Cast In Place Concrete
J. AIA A232 & Section 00800 - Submittals

PART 2 – MATERIALS

2.1 PORTLAND CEMENT

A. Cement shall be either Standard of High Early Strength Portland Cement, conforming to the requirements of Serial Designation: C150, Type I and Type III, respectively, of the Standards of the American Society for Testing Materials; unless otherwise specified, all cement shall be Type I.
B. Only one brand of cement shall be used on the project, except when written permission is obtained from the Engineer for the use of more than one brand.
C. Cement shall be in either cloth or paper bags containing ninety-four (94) pounds.
D. At the site of the project, the cement shall be stored in a suitable weatherproof building, or other acceptable enclosure, with the floor raised above the ground.
E. Bags of cement which for any reason have become partially set on the outside or which contain lumps or partly set cement, shall be rejected.

2.2 CRUSHED STONE

A. Crushed stone shall be either trap rock or dolomite. Only one type of stone shall be used, unless otherwise approved by the Engineer.
B. When a coating of bitumen is to be applied to the stone or when the stone is to be used in concrete, it shall be free from pieces coated with clay, caked store dust, and other foreign materials.
C. Stone shall contain not more than five percent (5%) of weathered or decomposed rock, not more than three percent (3%) of flat pieces and pieces with a length less than half the width, not more than five percent (5%) of other types of stone, and the total of the above shall not be more than ten percent (10%).
D. Crushed stone shall be graded in accordance with the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, Section 901 as amended or supplemented.
E. When two (2) or more sizes of stone are mixed to secure any particular size, the mixing must be so executed that the resulting product shall be uniform throughout.

2.3 FOUNDATION MATERIAL
A. Foundation material shall be clean 3/4" stone. It shall be free of all dirt, dust, vegetation and other foreign matter. The stone shall be leveled and compacted to the required depth and graded by approved means.

B. All ASSHTO No. 2 stone shall be washed clean and uniformly graded in accordance with ASSHTO specifications.

2.4 FINE AGGREGATE FOR CONCRETE AND MORTAR

A. Sand for concrete and mortar shall be particles of quartz or other hard, durable rock, moderately sharp and free from soft particles, clay, loam, cemented particles, mica, salt and organic and other foreign matter. The surfaces of the particles shall be clean, and the sand shall contain not more than four percent (4%) of elutriable materials. The sand shall further conform to the requirements of the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, as amended or supplemented.

B. When the sand is mixed with cement and water, the resulting mortar shall have compressive and tensile strengths at the age of seven (7) and twenty-eight (28) days, which are not less than those of mortar similarly prepared with standard Otowa sand.

2.5 WATER

A. Water shall be subject to the approval of the Engineer and shall be clean, fresh and free from oil, acid, injurious alkali and vegetable matter. It may be tested in accordance with Method T-26 of the American Association of State Highway and Transportation Officials. If the test indicates that mortar made with the water being tested in unsound or slow setting, or of less strength than mortar made with water of satisfactory quality, the water shall not be used for concrete mixtures.

2.6 BRICK

A. Brick, for use in construction of manholes and catch basins, shall be new, whole, first-quality concrete brick, of a standard brand or make. The brick shall comply with the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, as amended or supplemented.

2.7 CONCRETE BLOCK

A. Concrete block, for use in construction of manholes, inlets and catch basins, shall comply with the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, as amended or supplemented.
2.8 PIPE

A. Reinforced Concrete Pipe - Reinforced concrete pipe shall conform to the requirements of current A.A.S.H.T.O. Designation M170, as amended by the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction.

B. PVC Pipe - All polyvinyl chloride (PVC) pipe shall be schedule 40 unless otherwise noted on the plans with rubber gasket joints except 3", 4", 6" and 8" diameters which shall have solvent welded joints. Pipes shall be labeled by the manufacturer on the pipe to indicate size and schedule.

C. Ductile Iron Pipe - Ductile Iron Pipe shall be centrifugally cast in conformance with ANSI/AWWA C151/A21.51 (Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids). Ductile Iron Pipe, shall, as a minimum, be of the thickness required for laying condition Type 1 (Flat-bottom trench, loose backfill) in accordance with ANSI/AWWA C150/A21.50). In no case shall Ductile Iron Pipe be installed with a thickness class less than Class 52, regardless of laying condition, depth of cover, or surcharge loading. Push-on joints or mechanical joints shall be used for all buried piping. Gaskets for ductile iron push-on and mechanical joints shall be in conformance with ANSI/AWWA C111/A21.11 (Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings), and shall be vulcanized natural rubber or vulcanized synthetic rubber.

D. Corrugated High Density Polyethylene Pipe (HDPE): Corrugated Polyethylene Pipe: ASTM F405-97, high density corrugated polyethylene pipe, complete with all accessories and couplings for silt tight joints. Pipe shall be smooth wall unless otherwise noted.

2.9 CASTINGS

A. All castings shall be made of clean, even grain, tough gray cast iron. The castings shall be smooth, conform in all respects to the plans and be free from sand holes, projections, blow holes, cold shuts, cracks, warp and other defects which would interfere with the use of, or impair the serviceability of the castings.

B. Castings shall not be repaired, plugged or welded without permission from the Engineer, and such permission will be given only for small defects.

C. All manhole castings shall be machined, as required by the plans. After machining, it shall not be possible to rock any cover after it has been seated in any position in its associated frame.
2.10 SELECT FILL

A. The select fill under this item shall consist of bank run sand and gravel or other permitted materials. The fill shall contain no stone larger than two inches (2") in its largest diameter and shall meet the specifications for Borrow Excavation Embankment of the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, as amended or supplemented.

2.11 DENSE GRADED AGGREGATE

A. All dense graded aggregate shall conform to the NJDOT Standard Specifications for Road and Bridge Construction as amended or supplemented except that recycled concrete shall not be substituted for quarry grade dense graded aggregate.

2.12 ASSHTO No. 2

A. All ASSHTO No. 2 stone shall be washed clean and uniformly graded in accordance with ASSHTO specifications.

2.13 MANHOLE BOOT

A. A manufacturer's product data for Link-Seal or equivalent.

2.14 PORTLAND CEMENT CONCRETE

A. All Portland Cement Concrete shall conform to the NJDOT Standard Specifications for Road and Bridge Construction as amended or supplemented.

2.15 FILTER FABRIC

A. Filter fabric shall be Mirafi 140N or equivalent as shown on the plans and details.

2.16 COURTYARD INLETS

A. Courtyard inlet shall be Promenade deck drain #1409 or equivalent as shown on the plans and details.

2.17 ROOF DRAIN CONNECTION WITH CLEANOUT

A. Roof drain connection with clean out shall be Neenah foundry cast iron downspout shoe model No. R-4929-S1C or equivalent as shown on the plans and details.

2.18 DRYWELL
A. Drywell shall be constructed of shall be perforated PVC Schedule 40 pipe, 1-1/2” clean crushed clean stone as shown on plans and details. The drywell shall be wrapped in filter fabric on all sides as shown on plans and details. All drywells shall conform to design standards in the New Jersey Stormwater Best Management Practices Manual Chapter 9.3 Drywells.

PART 3 – EXECUTION

3.1 GENERAL

A. All drainage structures and facilities shall be constructed by capable, skilled workman, according to the Construction Details in the locations shown on the Construction Plans. All grubbing, stripping and stockpiling of topsoil, unclassified excavation, stripping and stockpiling of topsoil, unclassified excavation, furnishing of all materials, labor and equipment, pumping and/or bailing, compaction and backfill of excavation and all other items incidental to completion, shall be included in the lump sum price bid for the structure, except those items specifically set forth as pay item.

B. All backfilling operations shall be conducted, at the direction of the Engineer, in such a manner that uniform ground pressures will result. Compaction of backfill in areas adjacent to drainage structures shall be by hand tamping.

3.2 INLETS

A. Wherever inlets are mentioned in these specifications, they shall be construed to also mean catch basins.

B. All concrete block and brick shall be laid with broken joints, and all vertical and horizontal joints shall be filled with 1:2 cement-sand mortar. Joints shall not be more than 3/8” wide. The masonry shall be carried to such a height that a mortar joint not more than one-half inch (1/2”) thick is needed for setting the head casting, without using split blocks or bricks. The outside wall shall be plastered with a one-half inch (1/2”) thick coat of 1:2 cement-sand mortar, troweled to a smooth finish. The portions of inlets below a depth of eight feet (8’) from the top of the inlet grate, shall be constructed with double walls.

C. The concrete base shall be poured on a firm and level bearing. If excavation is carried too deep, it shall be brought to grade, using three-quarter inch (3/4”) compacted crushed stone. The concrete for inlet bases shall be 2500 psi concrete.

D. Steps shall be installed as the masonry work progresses. The steps shall be an aluminum ladder rung, extruded from 6061-T6 Aluminum.
E. Channels shall be installed in all inlets in accordance with the Construction Details, using 2500 psi, concrete. The channels shall be smooth and semi-circular in shape and shall conform to the size of the adjacent storm drainage pipe. Changes in direction shall be made with as large a radius as possible. The base of the inlet shall fall to the invert channel. No drainage pipe shall extend further into the manhole than is required for proper bond.

3.3 CONNECTION TO EXISTING INLETS

A. The connection to an existing inlet must be made by means of coring machine. The Contractor must have experience in the operation of this equipment or subcontract to a company who has experience in the operation of a coring machine.

B. The new connection in the inlet must be sealed by means of a manhole boot. Contractor shall follow manufacturer’s instructions when installing the manhole boot.

3.4 HEADWALLS

A. All headwalls shall be constructed in accordance with size and dimensions shown on the Construction Details; 3500 psi concrete, shall be used for headwalls. Concrete may be prepared with or without air entrainment. All reinforcing steel shall be Grade 40. All reinforcing steel shall be placed in accordance with the dimensions shown on the Construction Details. All exposed concrete edges shall be finished with a 1 inch 45 degree chamfer. All exposed concrete surfaces shall be smoothly finished by workmen skilled in this work.

B. Headwalls will not be accepted or paid for, if the following conditions exist:

(1) Improper placement of concrete, resulting in honeycombing or voids in the concrete.

(2) Exposed concrete edges and surface are not finished, as specified.

(3) The face of the headwall is not plumb.

(4) Backfill and clean-up operations are incomplete.

(5) Base of headwall is not carried to depth specified.

(6) Concrete apron or rip-rap, if required by the Engineer, is not in place.

(7) Drainage runoff is improper, due to improper grade and/or alignment of the headwall.

(8) Improper placement of reinforcing steel.
3.5 MANHOLES

A. Concrete and Brick Masonry - Concrete block manholes shall conform to the requirements of these specifications, except:

(1) The top foot of masonry shall have alternate vertical joints open.

(2) The words "Storm Sewer" shall be cast into all manhole covers.

B. Base

(1) If precast manhole bases are allowed by the Engineer, a solid, stabilized and level sub-foundation will be furnished. The manhole shall have a minimum of six inches (6") between the low invert of the manhole and the inside base to allow ample room for the construction of the channel. All riser sections and the top cone will be placed before grouting the pipe in place.

C. Steps shall be as specified heretofore.

D. Invert channels shall be as specified heretofore.

E. Frame and cover shall be as specified heretofore.

3.6 FLARED END SECTIONS

A. Flared end sections shall be installed in accordance with the size, dimensions, grades, and cutoffs as shown on the construction details. The Contractor shall furnish all materials, labor, equipment, excavation and grading to assure drainage to or from the flared end section at the lump sum price bid for the same.

3.7 STORM DRAINAGE PIPE

A. All excavations shall be made in such a manner and to such width as will give ample room for building the required structures or laying and jointing the pipe and for such sheeting, pumping and drainage incidental thereto. Trenches of excessive width, greater than pipe I.D. + 2' measured 1 foot above the pipe crown, may require pipe of increased strength class, special bedding, or other corrective measure directed by the Engineer and such corrective work is to be completed without extra compensation.

B. All excavation shall be unclassified and shall include the removal of all materials, including, but not limited to pavements, curbs, earth, loam, shale, clay and rock of any kind, including boulders and abandoned foundations.

C. Stripping and Stockpiling of Topsoil - Topsoil shall be stripped from the construction area before excavating the trench and shall be stockpiled. Soil erosion protection and temporary vegetative cover shall be provided in

D. The trench in which storm sewers and appurtenances are to be constructed shall be opened in accordance with the grades designed by the Engineer. All excavation shall be by open cut from the surface, except where otherwise directed, and shall be excavated to a width not less than twelve inches (12") or more than twenty-four inches (24") greater than the outside diameter of the pipe as will give suitable room for laying and properly joining the pipes, sheeting and bracing, pumping and bailing. When rock is encountered, the trench depth shall be carried to at least four inches (4") lower than the invert of the pipe to provide a suitable bedding for the pipe. The trench width at the ground surface may vary with and depend upon its depth and the nature of the ground encountered. The maximum clear width of unsheeted or sheeted trench, measured at the top of the pipe, shall be not more than the outside of the barrel, plus two feet (2'). Greater widths may be allowed, with the written permission of the Engineer.

E. The extent of excavation opened or the area unrestored at any one time will be controlled by existing conditions, but shall always be confined to the limits prescribed by the Engineer, with regard to expeditious construction and to the safety and convenience of the public. Without the written permission of the Engineer, not more than two hundred feet (200') of trench shall be opened in advance of the completed storm sewer. In rock, the completed excavation must be at least fifty feet (50') in advance of the pipe laying. Without the written permission of the Engineer, all excavations and trenches shall not remain open when construction activity is suspended for any reason, including but not limited to cessation of operations over weekends, nights and holidays.

F. If the Contractor excavates below the grade given by the Engineer, the bottom of the trench shall be filled and compacted to the required grade with a material satisfactory to the Engineer at the expense of the Contractor.

G. If, in the opinion of the Engineer, the material at or below the grade for which excavation would normally be carried is unsuitable for pipe foundation, it shall be removed to such depths and widths as he may direct and be replaced with the type of foundation material as ordered.

H. The Contractor shall furnish sufficient pumping equipment and shall provide at his own expense satisfactory methods for pumping or bailing whenever needed in the trench and other excavations during the progress of the work and at its completion for final inspection. The use of foundation material to provide drainage will not be an allowable pay item. No structure of sewers shall be laid in water and water shall not be allowed to flow over or rise upon any concrete, masonry, or pipe until the work has been inspected and the mortar or concrete has properly set. All water pumped or bailed from the trench or other excavation shall be conveyed in a proper manner to a suitable point of discharge by the Contractor at his own expense.
I. The Contractor shall be responsible for properly supporting the sides of all excavations with timber, metal, or other supports.

J. Prior to any excavation the Contractor shall locate and mark all services, mains, conduits and drains, etc., in the vicinity of, or crossing over, the storm sewers included in the project. All costs for crossing subsurface utilities, whether shown on the plans or not, shall be included under the prices bid for storm sewers.

K. Prior to any excavation, the Contractor shall cut all pavement to a neat line, by using pneumatic hammers or mechanical pavement cutters, saws or other approved methods or devices.

L. Drainage pipe to be abandoned shall be sealed by mortaring (bricking) the end of the pipe for a distance of 18 inches minimum, or one-half the diameter of the pipe, whichever is larger. The pipe shall be sealed with solid concrete block or brick and acceptable cement grout to form a solid waterproof plug completely bonded to the pipe, unless otherwise specified.

3.8 HDPE MANIFOLD SYSTEM

A. HDPE manifold system shall be installed in accordance with the manufacturer's recommendations and include all material, and labor including but not limited to cleanouts, cleanout covers, couplers, and fittings necessary to construct the underground basin as shown in the construction plans. The manufacturer of the manifold components shall be identical to the pipe manufacturer.

3.9 2.12 ASSHTO No. 2

A. All subgrade shall be inspected and approved for placement of stone by the Engineer. Subgrade shall be protected from debris and sediment accumulation prior to the Engineer's approval and prior to the installation of the Geotextile fabric and clean washed stone.

B. Place Geotextile fabric in a manner to prevent accumulation of debris and sediment and without compacting the subgrade. Place clean washed crushed stone atop clean Geotextile fabric as shown on the construction details. Place ASSHTO No. 2 stone in 6" lifts and lightly compact each lift with equipment, keeping equipment movement over the subgrade to a minimum. The use of drum rollers is strictly prohibited unless otherwise approved by the engineer. Once completely installed and compacted, the stone shall be protected from construction traffic until installation of subbase. Any stone contaminated with silt shall be removed and replaced at the contractor's expense.

3.10 ALIGNMENT AND GRADE

A. The Contractor shall lay the pipe lines in the location and exactly to the lines and grades established and as staked by the Engineer. No deviation shall be made.
from the required line or grade without the written consent of the Engineer. The Engineer shall have the power to order the removal or relaying of any pipe laid contrary to his instructions.

B. Where the grade or alignment of the pipe is obstructed by existing utility structures, such as conduits, ducts, pipes, service connections to water mains, or sanitary sewers, the obstruction shall be permanently supported, relocated, removed, or reconstructed by the Contractor in cooperation with the Owners of such utility structures. Temporary support, adequate protection and maintenance of all underground and surface utility structures, drains, water mains and other obstructions encountered in the progress of the work, shall be furnished by the Contractor at his own expense under the direction of the Engineer.

C. Except in rock, water bearing earth, or where excavated material is not suitable for proper foundation, mechanical excavation of trenches shall be stopped above the final invert grade elevation so that the pipe may be laid on a solid, dry foundation free from any rocks, wood block, etc., along its entire length except at joints. This part of the work shall be done manually by men skilled in this type of work. Depressions for joints shall be made after the trench bottom has been aligned and properly graded.

3.11 HANDLING MATERIALS

A. All pipe shall be carefully examined for dents, cracks and other defects, and no pipe known to be defective shall be laid. Those pipes not meeting the specifications shall be rejected and either destroyed or removed from the work within twenty-four (24) hours. If any pipe is found to be broken or defective after being laid, it shall be removed and replaced by sound pipe without any further payment. Pipe shall be thoroughly cleaned and ample precautions shall be taken to prevent entrance of dirt and debris into the pipe after laying.

B. Equipment - Proper implements, tools and facilities satisfactory to the Engineer shall be provided for the safe and efficient execution of the work. All pipes, fittings and accessories shall be carefully lowered into the trench by means of crane, ropes, or other suitable equipment in such manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

3.12 PIPE JOINTING

A. All pipe ends shall be thoroughly cleaned prior to and kept clean during the jointing operations. Joints for rigid pipe shall be made with mortar, grout, 2 step solvent weld, or gaskets. Other types of joints recommended by the pipe manufacturer may be permitted. Corrugated pipe shall be joined by coupling bands. For mortar joints, the pipe ends shall be cleaned and wetted with water before the joint is made. Stiff mortar shall be placed in the lower half of the bell or groove of the pipe section already laid and on the upper half of the spigot or tongue of the section to be laid. The two pipe sections shall then be tightly joined with their inner surfaces flush and even. Any voids occurring in the outside of the
joint shall be filled. Lifting holes shall be filled with stiff mortar. For pipes 36 inches and larger, the inside of the joint shall be finished smooth. For pipes smaller than 36 inches, the joint shall be cleared of protruding mortar. The completed mortar joints shall be protected against rapid drying if not immediately backfilled with earth. Gaskets, where required, shall be installed to form a flexible watertight seal. Rubber and flexible plastic gaskets shall be installed in accordance with recommendations of the manufacturer. All lift holes shall be fully mortared with a 1:2 cement sand mortar.

3.11 BACKFILLING

A. The backfilling of trenches or other excavations shall not begin until the storm sewer or structure has been inspected and approved, except as otherwise provided in these specifications.

3.12 BACKFILL AROUND STRUCTURES

A. As soon as practicable after the masonry has been placed and concrete has acquired a suitable degree of hardness and all installations have been made, backfilling shall begin. Select fill or dense graded aggregates as shown on the plans shall be used in backfilling within two feet (2') of the structure. Unequal distribution of soil pressures shall be avoided by carrying the fill up evenly. The Contractor shall be responsible for proper compaction to prevent settlement. If the backfill is compacted by tamping, rolling or ramming, the fill shall be deposited in suitable layers to give optimum compaction.

3.13 BACKFILLING OPEN TRENCHES

A. One-half (1/2) the diameter of the pipe above the invert shall be placed by hand. The materials shall be free from large lumps and stones having any dimension greater than two inches (2”). If the material excavated from the trench is not suitable for backfill, select material will be ordered by the Engineer. The backfill shall be deposited in layers not to exceed six inches (6”) and shall be thoroughly compacted by hand tamping or other vibratory soil compacting equipment approved by the Engineer. Tamping will proceed to a point two feet (2’) above the crown of the pipe. Backfilling shall proceed evenly on both sides of the pipe and be compacted to two feet (2’) above the crown of the pipe. Care will be taken not to displace the pipe from its correct grade and alignment.

B. When the sewer is in a street or driveway area which is to be replaced as part of the work under the contract, the trench shall be compacted to grade by approved method of compaction. The backfill material shall be Dense Graded Aggregate only.

3.14 BACKFILL PROCEDURE
A. Compaction--The backfill shall be deposited and spread in horizontal layers not exceeding thickness allowed by the Engineer. Each layer shall be thoroughly compacted before additional layers are placed.

B. Puddling--The excavated material or select fill shall be deposited in water when this method of backfilling is employed.

C. Water Jetting--When water jetting is employed, the Contractor shall provide a suitable length of pipe not less than 1¼" in diameter fitted with a quick-acting valve and sufficient hose to connect to a hydrant or pump having adequate pressure and capacity. The full depth of the backfill material shall then be thoroughly saturated by thrusting the pipe into the soil with the valve open at frequent intervals along the trench until all slumping ceases.

D. All methods of compacting the backfill shall avoid stones and lumps that become nested and result in voids. No large masses of backfill or stones weighing over fifty pounds (50 lbs.) shall be dropped into the trench.

3.15 RIP-RAP OUTLET PROTECTION

A. The Contractor shall furnish, handle, excavate for, grade and place rip-rap as shown on the plans and details.

3.16 SOIL EROSION AND SEDIMENTATION CONTROL

A. Soil erosion and sedimentation control shall be provided and maintained in accordance with the details delineated on the construction plans and the "Standards for Soil Erosion and Sedimentation Control in New Jersey".

END OF SECTION 02516
SECTION 02517 - CONCRETE CURB

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 DESCRIPTION OF WORK

A. This work shall consist of the construction or reconstruction of Portland Cement Concrete Curb parking lots and roadways.

1.3 SUBMITTALS

A. An approved NJDOT concrete mix design shall be submitted for all Portland Cement Concrete used for curb and/or curb and gutter. The design shall be submitted to the engineer and approved prior to the placing of any concrete.

B. Concrete delivery receipts shall be provided for all Portland Cement Concrete delivered and used on the project.

1.4 PAYMENT

A. Payment shall be a lump sum for concrete curb and shall include all equipment, labor and materials necessary to install and/or remove and install concrete curb.

PART 2 - PRODUCTS

A. Portland Cement Concrete shall conform to the NJDOT Standard Specification for Road and Bridge Construction as amended or supplemented. All Portland Cement Concrete shall have a minimum strength of 4,500 PSI at 28 days. All other materials including but not limited to curing materials, preformed expansion joint filler, and foundation material shall conform to NJDOT Standard Specifications for Road and Bridge Construction as amended or supplemented. Cure and seal compound shall be Lumiseal Plus as manufactured by L&M Construction Chemicals, Inc. or equivalent.

PART 3 - EXECUTION

3.1 TESTS AND INSPECTIONs

A. Concrete curb and curb and gutter shall be rejected and ordered replaced by the Engineer, if any or all of the following should occur or exist:

(1) Staining or discoloration of curb;
(2) Curb is out of alignment;
(3) Curb is out of grade;
(4) Expansion joints are not perpendicular;
(5) Joints and surface are improperly finished;
(6) Expansion joints protrude from curb;
(7) Cracks, chips or other damage occur in construction or maintenance period;
(8) Settlement of curb;
(9) Inspection not asked for prior to pouring of curb.

3.2 CONSTRUCTION

A. The contractor shall excavate for all concrete curb and shall properly compact all subgrade beneath the curb or curb and gutter. If unsuitable subgrade material is encountered, the contractor shall excavate said material until suitable material is reached and shall backfill with ¾" clean crushed stone to the proper subgrade elevation. If existing curb is present, the same shall be removed entirely and shall be disposed of by the Contractor. All excavation of curb shall be unclassified. Where curb is proposed adjacent to existing pavement, the pavement shall be cut and removed as shown on the construction details to allow for proper forming of new curb. Cure and seal compound shall be applied to all concrete curb, except those painted, prior to backfilling in accordance with manufacturers recommendations.

B. Concrete Curb shall conform with the Construction Details.

C. Forms used shall be metal forms or wood forms. Wood forms shall be used on curves or monolithically constructed curb. Form-lubricating materials and methods shall be such that they will not discolor or stain the concrete. Forms shall be removed when sufficient hardness of the concrete has been attained for the curb to be self-supporting, yet in ample time for finishing.

D. Expansion joints shall be located a maximum of twenty feet (20') on centers and in all areas where designated by the Engineer. Expansion joint material shall be one-half inch (½") premolded asphalt. All expansion joints shall not be closer than one-quarter inch (¼") to the exposed area of the curb.

E. Lawn restoration adjacent to curb shall be in accordance with the site restoration section.

END OF SECTION 02517
SECTION 02518 - CONCRETE SIDEWALK

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 DESCRIPTION OF WORK

A. This work shall consist of the construction or reconstruction of Portland Cement Concrete Sidewalk.

1.3 SUBMITTALS

A. An approved NJDOT concrete mix design shall be submitted for all Portland Cement Concrete used for sidewalk. The design shall be submitted to the engineer and approved prior to the placing of any concrete.

B. Concrete delivery receipts shall be provided for all Portland Cement Concrete delivered and used on the project.

1.4 JOB CONDITIONS (Not Applicable).

1.5 PAYMENT

A. Payment shall be a lump sum for concrete sidewalk and shall include all equipment, labor and materials necessary to install and/or remove and install concrete sidewalk.

PART 2 - PRODUCTS

A. Portland Cement Concrete shall conform to the NJDOT Standard Specification for Road and Bridge Construction as amended or supplemented. All Portland Cement Concrete shall have a minimum strength of 4,500 PSI at 28 days. All other materials including but not limited to curing materials, reinforcing steel, preformed expansion joint filler, and foundation material shall conform to NJDOT Standard Specifications for Road and Bridge Construction as amended or supplemented. Cure and seal compound shall be Lumiseal Plus as manufactured by L&M Construction Chemicals, Inc. or equivalent.

PART 3 - EXECUTION

3.1 INSPECTION
A. Concrete sidewalk shall be rejected and ordered replaced by the Engineer, if any or all of the following should occur or exist:

(1) Staining or discoloration of sidewalk;
(2) Sidewalk is out of alignment;
(3) Sidewalk is out of grade;
(4) Expansion joints are not perpendicular to sidewalk;
(5) Joints and surface are improperly finished;
(6) Expansion joints protrude from sidewalk;
(7) Cracks, chips or other damage occur in construction or maintenance period;
(8) Settlement of sidewalk;
(9) Inspection not asked for prior to pouring of sidewalk.

3.2 CONSTRUCTION

A. The contractor shall excavate for all concrete sidewalk and shall properly compact all subgrade beneath the sidewalk. If unsuitable subgrade material is encountered, the contractor shall excavate said material until suitable material is reached and shall backfill with ¾" clean crushed stone to the proper subgrade elevation. If existing sidewalk is present, the same shall be removed entirely and shall be disposed of by the Contractor. All excavation for sidewalk shall be unclassified.

B. Concrete Sidewalk shall conform with the Construction Details.

C. Forms used shall be metal forms or wood forms. Wood forms shall be used on curves or monolithically constructed sidewalk. Form-lubricating materials and methods shall be such that they will not discolor or stain the concrete. Forms shall be removed when sufficient hardness of the concrete has been attained to be self-supporting, yet in ample time for finishing.

D. Expansion joints shall be located a maximum of twenty feet (20') on centers and/or every eighty square feet (80 S.F.) and in all areas where designated by the Engineer, including, but not limited to areas where the slab meets curb, existing pavement, or existing sidewalk. Expansion joint material shall be one-half inch (½") premolded asphalt.

E. Dowels where required shall be installed per the construction detail.
F. Restoration adjacent to sidewalk shall be in accordance with the site restoration section of this specification.

END OF SECTION 02518
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 DESCRIPTION OF WORK

A. The Contractor shall furnish and install the StormFilter from Contech Engineered Solution, LLC or equivalent, complete and operable as shown and as specified herein, in accordance with the requirements of the plans and contract documents. The water quality treatment flow shall be as determined and approved by the Engineer of Record.

B. The StormFilter from Contech Engineered Solution, LLC or equivalent shall consist of an aboveground or underground precast concrete, steel or plastic structure that houses passive, radial flow, siphon-actuated, and rechargeable media filled filtration cartridge(s). The rechargeable media-filled filter cartridges shall incorporate a protective hood over the media cartridge and a siphon-actuated surface self-cleaning mechanism to increase the effective life of the filter media and to reduce the accumulation of material on the cartridge/media interface. Each radial-flow filter cartridge shall operate at a predetermined flow rate through the use of an integrated flow control orifice located within each filter cartridge outlet manifold. The media-filled cartridges shall trap particulates (TSS) and have the capability to adsorb pollutants such as dissolved metals, nutrients and hydrocarbons. The media cartridge filtration system shall consist of no less than 0.12 cubic feet of filter media for each 1-gallon per minute of water quality treatment flow.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) Reference Specifications:

2. ASTM C858: Standard Specification of Underground Precast Concrete Utility Structures
3. ASTM C478: Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
4. ASTM C497: Standard Test Methods for Concrete Pipe, Manhole Sections or Tile
6. ASTM A615/A615M: Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
7. ASTM D698: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

B. American Association of State Highway and Transportation Officials (AASHTO) Reference Specifications:
   1. AASHTO M199: Standard Specification for Precast Reinforced Concrete Manhole Sections

1.4 SUBMITTALS

A. Manufacturer or supplier shall submit to the Contractor shop drawings for the StormFilter from Contech Engineered Solution, LLC or equivalent structure, filter cartridges and accessory equipment. Drawings shall include principal dimensions, filter placement, location of piping and unit foundation.

B. Manufacturer or supplier shall submit Installation Instructions to the Contractor.

C. Manufacturer or supplier shall submit an Operation and Maintenance Manual to the Contractor.

D. Substitution: Any proposed equivalent alternative product substitution to this specification must be submitted for review and approved by the Engineer of Record prior to installation. Review package should include third party reviewed performance data for both flow rate and pollutant removal.

0.5 RELATED SECTIONS

A. Section 02241 – Dewatering
PART 2 - PRODUCTS

2.1 INTERNAL COMPONENTS

A. All internal components including ABS and PVC manifold piping, filter cartridge(s), filter media (as specified on the plans in the StormFilter from Contech Engineered Solution, LLC or equivalent data block or by the Engineer of Record) shall be provided by Contech Engineered Solutions LLC or equivalent. This includes sump covers, flow spreaders, energy dissipaters and outlet risers with scum baffles where appropriate.

B. ABS manifold pipe shall meet ASTM F628. PVC manifold pipe shall meet ASTM D1785 and PVC fittings shall meet ASTM D2466.

C. Filter cartridge bottom pan, inner ring, and hood shall be constructed from linear low-density polyethylene (LLDPE) or ABS. Filter cartridge screen shall consist of 1" x ½" welded wire fabric (16 gauge minimum) with a bonded PVC coating. Internal parts shall consist of ABS or PVC material. Siphon-priming float shall be constructed from high-density polyethylene (HDPE). All miscellaneous nuts, bolts, screws, and other fasteners shall be stainless steel or aluminum.

D. An orifice plate shall be supplied with each cartridge to restrict flow rate to a maximum of 22.5 gpm at system design head or as specified on drawings.

E. If a sump cover/overflow, baffle/inlet, sump/outlet, sump/inlet, tower/outlet overflow is provided, they shall be constructed of ABS and sealed to the interior vault walls and floor with a polyurethane construction sealant rated for use below the waterline, SikaFlex 1a or equal. Contractor to provide sealant material and installation unless completed prior to shipment.

F. Where an Underdrain Design is provided, the size of the underdrain will provide a minimum of 0.067 in² of underdrain cross sectional area per 1 gpm of design flow rate. (example: 105 gpm maximum design flow rate will require an underdrain with 7.035 in² of cross sectional area, which is equal to one 3" diameter pipe).

G. Filter media shall be provided by Contech or an approved alternate source. Filter media shall consist of one or more of the following, as
specified in the StormFilter from Contech Engineered Solution, LLC or equivalent data block, or by the Engineer:

1. Perlite Media: Perlite media shall be made of natural siliceous volcanic rock free of any debris or foreign matter. The perlite media shall have a bulk density ranging from 6.5 to 8.5 lb/ft³ and particle sizes ranging from that passing through a 0.50 inch screen and retained on a U.S. Standard #8 sieve.

2. CSF Media: CSF media shall be made exclusively of composted fallen deciduous leaves. Filter media shall be granular. Media shall be dry at the time of installation. The CSF leaf media shall have a bulk density ranging from 40 to 50 lb/ft³ and particle sizes ranging from that passing through a 0.50 inch screen to that retained on a U.S. Standard #8 sieve.

3. Metal Rx Media: Metal Rx media shall be made exclusively of composted fallen deciduous leaves. Filter media shall be granular. Media shall be dry at the time of installation. The Metal Rx media shall have a bulk density ranging from 40 to 50 lb/ft³ and particle sizes ranging from that passing through a U.S. Standard #8 sieve to that retained on a U.S. Standard #14 sieve.

4. Zeolite Media: Zeolite media shall be made of naturally occurring clinoptilolite, which has a geological structure of potassium-calcium-sodium aluminosilicate. The zeolite media shall have a bulk density ranging from 44 to 48 lb/ft³, particle sizes ranging from that passing through a U.S. Standard #4 sieve to that retained on a U.S. Standard #6 sieve, and a cation exchange capacity ranging from 1.0 to 2.2 meq/g.

5. Granular Activated Carbon: Granular activated carbon (GAC) shall be made of lignite coal that has been steam activated. The GAC media shall have a bulk density ranging from 28 to 31 lb/ft³ and particle sizes ranging from that passing through a U.S. Standard #4 sieve to that retained on a U.S. Standard #8 sieve.

Zeolite-Perlite-Granular Activated Carbon (ZPG): ZPG is a mixed media that shall be composed of a 1.3 ft³ outer layer of 100% Perlite (see above) and a 1.3 ft³ inner layer consisting of a mixture of 90% Zeolite (see above) and 10% Granular Activated Carbon (see above).

6. Zeolite-Perlite (Zeo/Perl): Zeo/Perl is a mixed media that shall be composed of a 1.3 ft³ outer layer of 100% Perlite (see above) and a 1.3 ft³ inner layer consisting of 100% Zeolite.

7. CSF Leaf Media – Granular Activated Carbon (CSF/GAC): CSF/GAC is a mixed media that shall be composed of a 1.3 ft³
outer layer of 100% CSF media (see above) and a 1.3 ft³ inner layer consisting of 100% Granular Activated Carbon (see above).

8. Perlite – Metal Rx: Perlite/Metal Rx is a mixed media that shall be composed of a 1.3 ft³ outer layer of 100% Perlite (see above) and a 1.3 ft³ inner layer consisting of 100% Metal Rx (see above).

9. PhosphoSorb: PhosphoSorb media shall be made from Perlite pellets with activated alumina bound to the surface. The PhosphoSorb media pellets shall be granular and have a bulk density from 18 to 25 lb/ft³. The pellet size should range from that passing through a U.S. Standard ¼ inch sieve and retained on a #8 sieve.

H. Overflow Assembly (Where Provided):

1. Flow spreader shall be constructed of Linear Low-Density Polyethylene (LLDPE). Contractor to provide sealant material and installation unless completed prior to shipment.

2. Energy dissipater shall be constructed of polyolefins. Contractor to provide sealant material and installation unless completed prior to shipment.

3. Outlet riser with scum baffle shall be constructed of HDPE. Outlet riser shall have an outlet stub outside dimension (O.D.) of 12-inch diameter PVC, SDR 26 and a secondary outlet stub O.D. of 8-inch diameter PVC, SDR 26.

I. Steel Catch Basin & Roof Drain Components:

1. Basin shall be all welded steel construction, fabricated from ASTM A36 ¼-inch steel and shall be designed to withstand AASHTO H-20 wheel loads when placed below ground in a location that could receive direct loading.

2. Basin Grate: Grating shall be ductile iron construction and shall meet AASHTO H-20 loading requirements, and shall be provided according to ASTM A48.

3. Basin Solid Lid (below ground system design): Solid lid shall be gray cast iron, treated with non-slip surfacing, and shall meet AASHTO H-20 loading requirements, and shall be provided according to ASTM A48.

4. Basin Solid Lid (above ground system design): Solid lids shall be PVC plate with pick holes. Covers to be cut as required for top inlet roof drain pipes.

J. Precast Concrete Structure Components:
1. Precast concrete vault shall be provided according to ASTM C857 and C858. Precast concrete manhole shall be provided according to ASTM C478.
2. Vault and manhole joint sealant shall be Conseal CS-101 or approved equal.
3. If interior concrete baffle walls are provided, baffle walls shall be sealed to the interior vault walls and floor with a polyurethane construction sealant rated for use below the waterline, SikaFlex 1a or equal. Contractor to provide sealant material and installation unless completed prior to shipment.
4. Frames and covers shall be gray cast iron and shall meet AASHTO H-20 loading requirements, and shall be provided according to ASTM A48.
5. Doors shall have hot-dipped galvanized frame and covers. Covers shall have diamond plate finish. Each door to be equipped with a recessed lift handle. Doors shall meet H-20 loading requirements for incidental traffic, at a minimum, or per project specific traffic loading requirements.
6. Steps shall be constructed of copolymer polypropylene conforming to ASTM D4101. Steps shall be driven into preformed or drilled holes once concrete is cured. Steps shall meet the requirements of ASTM C478 and AASHTO M199. The ½” Grade 60 deformed reinforcing bar shall meet ASTM A615, where required.
7. Ladders shall be constructed of aluminum and steel reinforced copolymer polypropylene conforming to ASTM D4101. Ladder shall bolt in place. Ladder shall meet all ASTM C497 load requirements. Ladders provided upon request or where required, and shall not conflict with the operation and accessibility to perform maintenance of the StormFilter from Contech Engineered Solution, LLC or equivalent.

K. Contractor Provided Components (below ground installation):
1. All contractor-provided components shall meet the requirements of this section, the plans specifications and contract documents. In the case of conflict, the more stringent specification shall apply.
2. Sub-base: Crushed rock base material shall be six-inch minimum layer of ¾-inch minus rock. Compact undisturbed sub-grade materials to 95% of maximum density at +/-2% of optimum moisture content. Unsuitable material below sub-grade shall be replaced to engineer’s approval.
3. In-situ concrete, if required, shall have an unconfined compressive strength at 28 days of at least 3000 psi, with ¾-inch round rock, a 4-inch slump maximum, and shall be placed within 90 minutes of initial mixing.
4. Silicone Sealant shall be pure RTV silicone conforming to Federal Specification Number TT S001543A or TT S00230C or Engineer approved.

5. Grout shall be non-shrink grout meeting the requirements of Corps of Engineers CRD-C588. Specimens molded, cured and tested in accordance with ASTM C109 shall have minimum compressive strength of 6,200 psi. Grout shall not exhibit visible bleeding.

6. For manhole systems, Contractor shall connect to 12-inch or 8-inch diameter outlet riser with Fernco flexible coupling, or approved equal.

7. Rebar used on applicable Catch Basin & Roof Drain systems shall meet ASTM A615M Grade 420 (60 ksi) or as otherwise specified in the general technical specifications.

8. Backfill material shall be ¾-inch minus crushed rock, or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. The system shall be installed in accordance with the manufacturer’s recommendations and related sections of the contract documents.

B. The contractor shall follow Occupational Safety and Health Association (OSHA) guidelines for safe practices in executing the installation process in accordance with the manufacturer/supplier installation recommendations.

C. Supplier will conduct an on-site preconstruction meeting with the contractor prior to the scheduled delivery date of the system.

3.2 PERFORMANCE

A. Cartridge Operation: Each StormFilter from Contech Engineered Solution, LLC or equivalent shall contain one or more siphon actuated media filter cartridges that maintain a uniform pressure profile across the face of the filter during operation. At the design flow rate the maximum filter hydraulic loading rate is not to exceed 2.1 gallons per minute per square foot of filter surface area. Stormwater shall enter the filter cartridges through sides and shall flow through the filter media radially from the outer perimeter to the inner cartridge lumen and shall have an average contact time no less than 35 seconds. These media filter
cartridges will incorporate a self-cleaning mechanism to remove accumulated material from the cartridge media surface that is activated when the siphon breaks.

B. Documentation of Sediment Removal: The StormFilter system from Contech Engineered Solution, LLC or equivalent shall have a current approval status from the New Jersey Department of Environmental Protection (NJDEP).

C. Cartridge Sediment Loading: Filter cartridges shall be of a design that has demonstrated a minimum sediment retention capacity of 22 pounds of silty loam per cartridge in laboratory tests without a reduction in hydraulic capacity. Laboratory data shall be corroborated with field observations/data demonstrating equivalent or improved longevity without impacting normal hydraulic performance of the StormFilter. All laboratory and field tests submitted in support of this specification must have undergone peer review by outside entity other than manufacturer.

D. Overflow:
1. Vault Configuration: Structure shall have a baffled, non-siphoning internal overflow with a minimum capacity of 1.8 cfs.
2. Manhole Configuration: The filter system will have a baffled, non-siphoning internal overflow with a minimum of 1.0 cfs capacity.
3. Peak Diversion Configuration: Each structure shall include an internal, offline overflow bypass. Water first enters an inlet bay that is separate from the cartridge bay and separate from the outlet bay. Low flows travel from the inlet bay, through a transfer opening and into the cartridge bay. High flows enter the outlet bay by topping a weir separating the inlet and outlet bay. Flow rates beyond the treatment design flow shall bypass, and not enter the cartridge bay.
4. Catch Basin Configuration: Each structure shall include an internal, offline overflow bypass. Water enters through the grate into the inlet bay that is separate from the cartridge bay and separate from the outlet bay. Low flows travel from the inlet bay, through a transfer opening and into the cartridge bay. High flows enter the outlet bay by topping the baffled weir separating the inlet and outlet bay. Flow rates beyond the design flow (overflow) will not enter the cartridge bay. Minimum of 0.5 cfs overflow capacity.
5. Roof Drain Configuration: Minimum of 1 cfs overflow capacity.
6. Infiltration Manhole Configuration: The filter system will have a baffled, non-siphoning internal overflow with a minimum of 1.0 cfs capacity.
E. Linear Grate Configuration Vault Access: All portions of the vault, inlet bay, outlet bay and filtration bay shall be directly accessible from the surface through removable grated openings or solid covers.

3.3 EXECUTION

A. Precast Concrete Structure:
1. Set precast structure on crushed rock base material that has been placed in maximum 6-inch lifts, loose thickness, and compacted to at least 95-percent of the maximum dry density as determined by the standard Proctor compaction test, ASTM D698, at moisture content of +/-2% of optimum water content.
2. Structure floor shall slope 1/4 inch maximum across the width and slope downstream 1 inch per 12 foot of length. For manholes “Length” is defined by a line running from the invert of the outlet through the center of the manhole and “width” is the perpendicular to the “length”. Structure top finish grade shall be even with surrounding finish grade surface unless otherwise noted on plans.
3. Inlet and outlet pipes shall be stubbed in and connected to precast concrete structure according to Engineer’s requirements and specifications. All connections to be water tight. If grout is used, Contractor to grout all inlet and outlet pipes flush with or protruding up to 2 inches into interior of structure.
4. When required, ballast shall be placed to the dimensions specified by the engineer and noted on the data block. Ballast shall not encase the inlet and/or outlet piping. Provide 12” clearance from outside diameter of pipes.

B. Steel Catch Basin:
1. Catch basin floor shall slope 1/4 inch maximum across the width and slope downstream 1 inch per 12 foot of length. Catch basin top finish grade shall be even with surrounding finish grade surface unless otherwise noted on plans.
2. Contractor shall prevent sediment and debris from entering the filter unit during construction.
3. If necessary, the inlet chamber may be filled with clean water to assist in preventing flotation during construction until the structure is backfilled and the concrete collar is poured. 4.2.4 Catch basin outlet shall be connected to downstream (and upstream, if applicable) piping using a flexible-type coupling.
4. Concrete perimeter slab shall be constructed 1 foot wide and 6 inches thick. Slab shall include two #4 rebar hoops with minimum 6-inch overlap at closure. Allow 2-inch vertical spacing between hoops and minimum 2-inch clearance from concrete surfaces, or as directed by the engineer.
C. Clean Up
1. Remove all excess materials, rocks, roots, or foreign material, leaving the site in a clean, complete condition approved by the engineer. The project site shall be clean and free of dirt and debris and the inlet/outlet chamber(s) and filter chamber(s) shall be free of construction debris and sediment before the allowing runoff to enter and place the system in operation. All filter components shall be free of any foreign materials including concrete and excess sealant.
2. Where applicable, Contractor shall remove the temporary filter fabric around the inlet grate to place the system in operation.
3. Where required, the 4-inch cleanout plug in the overflow weir wall shall remain in place for proper operation of the system.

D. Filter Cartridges:
1. Filter cartridges shall be delivered installed in the structure, unless otherwise agreed upon with Manufacturer. Contractor shall take appropriate action to protect the cartridges from sediment and other debris during construction. The method ultimately selected shall be at Contractor’s discretion and Contractor’s risk. Some methods for protecting the cartridges include, but are not limited to:
   a. Remove cartridges from the structure and store appropriately. Cartridges shall be reinstalled to operate according to 3.4 B (see below).
   b. If structure is equipped with underdrain bypass piping, Contractor may leave cartridges in the vault and allow stormwater entering collection system to bypass filter bay through underdrain bypass piping.
   c. Leave cartridges in the structure and plug inlet and outlet pipe to prevent stormwater from entering the vault, and provide means for stormwater to bypass the StormFilter from Contech Engineered Solution, LLC or equivalent.
2. Filter cartridges shall not be placed in operation until the structure is clean and the project site is clean and stabilized (construction erosion control measures no longer required). The project site includes any surface that contributes storm drainage to the StormFilter from Contech Engineered Solution, LLC or equivalent. All impermeable surfaces shall be clean and free of dirt and debris. All catch basins, manholes and pipes shall be free of dirt and sediments.

E. Contractor to install filter cartridges. Specifications for alternate cartridge installation methods available by contacting Manufacturer directly. 4.5.1. Filter Cartridges with ¼-Turn Connector Fittings: Tape shall
be cleanly and completely removed from manifold fitting openings. \( \frac{1}{4} \)-turn connects shall be glued and inserted into all manifold fittings to be equipped with a filter cartridge. Filter cartridges shall be turned onto the connector until they reach the hard stop on the connector – approximately \( \frac{1}{4} \) revolution, with care to not “over turn” the cartridge, or turn with such force to damage the hard stop mechanism. Plugs shall be inserted without glue in all manifold fittings not equipped with a filter cartridge.

### 3.4 INSPECTION AND MAINTENANCE

A. Maintenance and Inspection shall be in performed in accordance with Manufacturer’s recommendations for maintenance and inspection.

B. Maintenance and inspection intervals shall be per manufacturer’s recommendations, or per the approving/local jurisdiction/agency requirements; whichever is more frequent.

C. Surface access for personnel and equipment for inspection and maintenance activities shall be provided.

### 3.5 PROTECTION OF FINISHED WORK

A. Contractor shall maintain and protect the treatment device until final acceptance.

END OF SECTION 02519
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 DESCRIPTION OF WORK

A. This work shall consist of the removal and installation of pavement markings.

1.3 SUBMITTALS

A. Not applicable this section unless substitutions in specified materials or methods are proposed. The degree of applicability of this item shall be determined by the Engineer upon receipt of the specified alternate or substitution proposed by the Contractor.

1.4 JOB CONDITIONS

A. All new pavement markings shall be installed and located as shown and detailed on the drawings. All existing pavement markings shall be restored in-kind. All temporary striping shall be in latex paint. Paint for on-site parking stalls, and parking stall numbering used on this project shall be epoxy resin. All stop bars, crosswalks, large lettering, arrows and symbols shall be constructed of thermoplastic material. All striping and symbols for ADA parking spaces shall be constructed of epoxy resin. Long lines shall be constructed of epoxy resin. All striping shall have glass beads for reflectivity in accordance with the Manual on Uniform Traffic Control Devices.

1.5 PAYMENT

A. The lump sum price bid shall include all material, equipment and labor necessary to install and maintain traffic markings.

1.6 RELATED SECTIONS

A. Section 01550 – Traffic Control

PART 2 - PRODUCTS

A. All materials for pavement markings shall be latex paint, epoxy resin or thermoplastic material in conformance with the NJDOT Standard Specifications for Road and Bridge Construction as amended or supplemented.
B. All striping to be reflective in accordance with MUTCD requirements

PART 3 - EXECUTION

A. All new pavement markings shall be installed and located as shown and detailed on the drawings. Any existing pavement markings show to remain shall be restored in-kind if disturbed.

B. The contractor shall remove any markings that require removal with a grinder. The grinding process shall not remove more than 1/8" of the bituminous pavement.

C. New striping shall be installed with hand or truck mounted equipment. All striping shall have crisp edges with no overspray. The dimensions of striping shall be as shown on the plans and details.

END OF SECTION 02520
SECTION 02521 – PRECAST CONCRETE WHEEL STOPS

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 DESCRIPTION OF WORK

A. This work consists of furnishing and installing precast concrete wheel stops in locations shown on the plans or as designated by the Engineer.

1.3 PAYMENT

A. The lump sum price bid shall include the costs of all labor, equipment and materials necessary to install concrete wheel stops.

0.4 RELATED SECTIONS

A. Section 02514 – Site Work Concrete
B. Section 03300 – Cast In Place Concrete

PART 2 - PRODUCTS

A. Requirements for material and fabrication of the precast wheel stop shall be the same as specified in 02517 Concrete Curb.

PART 3 - EXECUTION

A. Anchoring dowels shall be Grade 60 reinforcing bars, conforming to ASTM designation A615. Minimum bar size shall be #4 x 1.0 foot long. The dowel hole diameter shall not exceed the dowel diameter by more than ¼ inch.

B. The precast wheel stop shall be set in place on top of the pavement with both ends bearing evenly. Steel dowels shall be driven into the underlying pavement through the holes at each end of the wheel stop. The dowels shall be driven so that they are flush with the top surface of the wheel stop. If necessary, holes shall be pre-drilled in the pavement.

C. The precast wheel stop shall be painted yellow with epoxy paint prior to installation.

END OF SECTION 02521
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 DESCRIPTION OF WORK

A. The contractor shall furnish all necessary labor, equipment, tools, implements and materials required to install bollards where directed. The work shall include but not be limited to, excavation, compaction, concrete, pipe, and bumper post sleeve as required and all other incidentals appurtenant thereto in a neat, competent, and skilled manner. The contractor shall be able to perform all work in accordance with the project specifications.

B. The work performed under this Contract shall comply with the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction as amended and supplemented which specifications are made a part of these specifications except as amended, modified or supplemented herein.

1.3 SUBMITTALS

A. An approved NJDOT concrete mix design shall be submitted for all Portland Cement Concrete used. The design shall be submitted to the Owner and approved prior to the placing of any concrete.

B. Concrete delivery receipts shall be provided for all Portland Cement Concrete delivered and used on the project.

C. Heavy duty steel pipe specifying diameter.

D. Bumper Post Sleeve specifying post manufacturer, color and size.

1.4 PAYMENT

A. The lump sum price bid for this item shall include all excavation, concrete materials, pipe, bumper post sleeves, labor, equipment, and incidental items necessary for construction.

1.5 JOB CONDITIONS

A. A bollard shall be rejected and ordered repairs or replaced, if any or all of the following should occur or exist:
(1) Staining or discoloration of the bumper sleeve;

(2) Bollard is not plumb;

(3) Bollard’s construction was not consistent with contract documents;

PART 2 - PRODUCTS

A. Portland Cement Concrete used for the installation of the bollard shall conform to Section 914 of the 2007 NJDOT Standard Specification for Road and Bridge Construction as amended or supplemented. All Portland Cement Concrete shall have a minimum strength of 4,500 PSI at 28 days. All other materials including but not limited to curing materials, reinforcing steel, preformed expansion joint filler, and foundation material shall conform to the NJDOT Standard Specifications for Road and Bridge Construction as amended or supplemented.

PART 3 – EXECUTION

A. The contractor shall excavate for bollards and shall properly compact beneath the all posts. All excavation for bollards shall be unclassified.

B. Length and diameter shall be as specified within the contract documents. All bollards shall be set plumb. Engineer shall approve final bollard location prior to pouring of concrete. Pipe shall be painted as specified on the plans prior installation of bumper sleeve. Bumper sleeve shall be secured to pipe.

END OF SECTION 02522
SECTION 02523 – BIKE RACK

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 DESCRIPTION OF WORK

A. This work consists of furnishing and installing bicycle rack in the location shown on the plans or as designated by the Engineer.

PART 2 - PRODUCTS

A. Requirements for material and fabrication of the Original Ribbon Rack (RB-11-I-S) or equivalent
B. Bike rack shall be comprised of heavy-duty stainless steel pipe to provide security and durability.
C. Bike rack shall not be coated.

PART 3 - EXECUTION

A. Contractor shall install bike rack prior to installation of concrete sidewalk.
B. Contractor shall embed bike rack at least 6 inches into concrete footing.
C. The concrete footing shall extend 1 foot beyond the frost line and have a diameter of 6 inches.
D. The footing shall be comprised of 4500 psi concrete and meet the qualifications found in specification 02514.

END OF SECTION 02523
SECTION 02524 – CONCRETE PAVERS

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 DESCRIPTION OF WORK

A. This work consists of furnishing and installing concrete pavers in locations shown on the plans or as designated by the Engineer.

PART 2 - PRODUCTS

A. Requirements for material and fabrication of the precast wheel stop shall be the same as specified in 02517 Concrete Curb.

B. Contractor shall provide a hanover prest paver (23-1/2" x 23-1/2") manufactured by Hanover Architectural Product Pavers or equivalent

PART 3 - EXECUTION

A. The contractor shall excavate for all concrete pavers

B. and shall properly compact all subgrade beneath the sidewalk. If unsuitable subgrade material is encountered, the contractor shall excavate said material until suitable material is reached and shall backfill with ¾" clean crushed stone to the proper subgrade elevation. All excavation for concrete pavers shall be unclassified.

C. Concrete Sidewalk shall conform with the Construction Details.

D. The subgrade the for the pavers shall be compacted to 95% proctor

E. 6 inch thick of clean crushed ¾” stone to be compacted to 95% proctor on the subgrade.

F. 4 inch thick 4000 psi concrete shall be installed on top of the crushed stone. The concrete shall have 2” holes placed on center throughout the concrete to allow for stormwater runoff to drain. The 2” holes shall be filled with the crushed stone.

G. The 2” holes in the concrete shall be covered with 6 oz. geotextile fabric

H. The pavers shall be set in sharp masonry sand with a maximum depth of 1 inch deep.

END OF SECTION 02522
SECTION 02550 – TRAFFIC CONTROL

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 DESCRIPTION OF WORK

A. This work shall consist of the installation, maintenance and removal of traffic control devices, flagmen and pedestrian control devices to assure the safety of all public traffic and pedestrians on and about the construction site.

1.3 SUBMITTALS

A. Shop drawings: Layout of temporary fences and gates with dimensions, details, accessories, and post stands and sandbags.

B. Product data: Manufacturer’s catalog cuts indicating material compliance and specified options.

1.4 PAYMENT

A. The lump sum price bid shall include all labor, material and equipment necessary to erect and maintain traffic and pedestrian control (including temporary fencing) in accordance with the drawings and as may be required to safely complete the project.

PART 2 - PRODUCTS

A. All signs, barricades, lights, cones, drums and incidentals there to shall be in conformance with the drawings, the Manual on Uniform Traffic Control Devices and the NJDOT Standard Specifications for Road and Bridge Construction as amended or supplemented. All materials shall be of good quality, shall be legible, reflective, self-supporting and functional for the duration of the project.

2.1 MANUFACTURER

A. Products from qualified manufacturers having a minimum of five years’ experience manufacturing thermally fused PVC coated chain link fencing will be acceptable and if they meet the following specifications for design, size gauge of metal parts and fabrication.

B. Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.
2.2 MATERIAL

A. Size: Helically wound and woven to height of 6 feet as indicated on drawings with 2" diamond mesh, 6 gauge, with a core wire diameter of 0.192" and a minimum breaking strength of 2170 lbf.

B. Fencing material shall be ASTM A392-06 Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric compliant

C. 36" Base Stands

D. Fence shall be 6 feet tall

E. Fence shall swing gates

F. Fence panels shall be provided with standard privacy screening

PART 3 – EXECUTION

A. All signs, barricades, drums, cones and lights shall be installed and located as shown on the drawings and accordance with the Manual on Uniform Traffic Control Devices.

B. The contractor shall inspect all traffic control devices as needed and shall maintain all devices for the duration of the project.

END OF SECTION 02550
SECTION 02600 – SOIL EROSION AND SEDIMENT CONTROL

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 DESCRIPTION OF WORK

A. Soil Erosion and Sediment Control measures shall be constructed and installed in accordance with the Soil Erosion and Sediment Control notes, details and plans. The contractor shall be responsible for excavating for, placing and maintaining Soil Erosion and Sediment Control measures until final acceptance of the project. Soil Erosion and Sediment Control measures include but are not limited to, silt fence installation, tracking pad installation, tree protection, inlet protection, hay bale sediment barrier construction, pavement sweeping, dust control, topsoil stockpiling and temporary seeding and mulching.

1.3 SUBMITTALS

A. Not applicable this section unless substitutions in specified materials or methods are proposed. The degree of applicability of this item shall be determined by the Engineer upon receipt of the specified alternate or substitution proposed by the Contractor.

1.4 PAYMENT

A. The lump sum price bid shall include the costs of all labor, equipment and materials necessary to install and maintain soil erosion and sediment control devices.

1.5 RELATED SECTIONS

A. Section 02485 – Finished Grading

PART 2 – PRODUCTS

A. All materials used for soil erosion control measures shall conform to the standards for Soil Erosion and Sediment Control in New Jersey latest revision. Temporary seed shall conform to the seed mixture shown on the drawings.
PART 3 - EXECUTION

A. Notify local NJSCD of tentative start date for qualifying projects in accordance with their requirements

3.1 STABILIZED CONSTRUCTION ENTRANCE

A. Install Work in accordance with Contract Drawings and Certified Plan when applicable.
B. Maintain construction driveway entrance for duration of project or until base course paving work has been completed. Regrade or add stone to construction entrance as necessary and as required by NJSCD. Any material tracked onto a public roadway shall be removed immediately.

3.2 SEDIMENT BARRIERS

A. Install Work in accordance with the Contract Drawings and Certified Plan when applicable.
B. The silt fence material shall be new and undamaged. Install at locations indicated on Contract Drawings or Certified Plan, top of installed fence to be 2 feet above ground, bury bottom 12 inches of fence in soil as per Certified Plan, overlap ends of adjacent fence a minimum 1-1/2 feet.
C. The silt fence shall be maintained for the duration of the project, replace damaged fence and remove accumulated sediment as necessary and as required by the NJSCD.
D. Remove silt fence when all disturbed areas have been permanently stabilized, restore remaining disturbed area.

3.3 INLET PROTECTION

A. Install Work in accordance with the Contract Drawings or Certified Plan.
B. Install proper protection for inlet type and site conditions.
C. Inspect and clean protection after each rain event and as required by the NJSCD.
D. Maintain protection until all disturbed areas have been properly stabilized or just prior to top course paving. Replace protection if disturbed areas not stabilized.
E. SEDIMENT TRAP
   a. The Contractor shall take appropriate measures to prevent erosion and discharge of silt when dewatering excavations or trenches. Devices to trap silt and mitigate erosion shall be utilized for all dewatering operations, as indicated by the certified plan or approved by the Engineer. Sediment laden water may not be discharged into storm sewers or existing waterways without proper protection.
   b. The type and size of device will be dictated by the nature and volume of water being discharged, as approved by the Engineer.

3.4 PAVEMENT CLEANING
A. The Contractor shall be responsible for maintaining roadways, sidewalks and driveways within the project limits free of dirt, debris or other material resulting from his work operations.

B. The project areas are to be inspected on a regular basis and cleaned as necessary. At no time shall any material be washed or swept into a storm drain inlet or natural waterway. The cleaning operation shall be conducted so as to minimize creating dust.

C. The Contractor shall employ the services of a street sweeper service on a routine basis as required to meet the intent of this section.

3.5 DUST CONTROL

A. The Contractor shall conduct his work operations to minimize the creation and dispersion of dust. If dust becomes a problem within the project or adjacent areas the Contractor shall provide for the application of water to those areas, or other approved measures as outlined on the Certified Plan, as necessary during and after the work hours to control the problem. The use of calcium chloride or other chemicals will not be permitted.

3.6 SITE STABILIZATION

A. Incorporate erosion control devices indicated on the Contact Drawings into the Project at the earliest practicable time.

B. Construct, stabilize and activate erosion controls before site disturbance within the tributary (“drainage”) areas of those controls.

C. Stockpile heights for topsoil shall be reasonable and subject to approval of Engineer. Slope stockpile sides at 3:1 or flatter. Provide erosion control at lower end and sides of pile, stabilize surface as necessary with temporary vegetative cover.

D. Stabilize any disturbed area on which activity has ceased and which will remain with soils exposed for more than fourteen (14) days which are not being graded, or under active construction.

E. During non-germinating periods, apply mulch at recommended rates.

F. Temporary Stabilization: Stabilize disturbed areas which are not at finished grade and which will be disturbed within one year in accordance with Contract Drawings, use proper temporary seed mixture with no topsoil.

G. Stabilize disturbed areas which are not at finished grade and will not be disturbed within one year in accordance with Contract Drawings permanent seeding specifications.

H. Stabilize disturbed lawn and turf areas at finished grade in accordance with Section 02485 Finish Grade.

I. Stabilize diversion channels, sediment traps and sediment basins, and stockpiles immediately.

J. Stabilize steep slopes where required by the Contract Drawings, and where greater than 3:1, with an erosion control blanket. Use “Curlex 111” or equivalent. Installation shall include all required trenching, overlap, staples or pins as required by manufacturer’s specifications.
3.7 FIELD QUALITY CONTROL

A. Quality Requirements, Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing in accordance with Contract Documents.
B. Inspect erosion control devices on a weekly basis and after each runoff event. Make necessary repairs to ensure erosion and sediment controls are in good working order.

3.8 SOIL COMPACTION TESTING AND COMPLIANCE

A. Contractor shall be responsibility for a compaction testing required by the local soil erosion sediment control district.
B. Contractor is required to satisfy the requirements for subsoil compaction found in New Jersey Soil Erosion and Sediment Control Act, N.J.S.A. found in chapters 8 and 19.
C. Contractor shall be responsible for completing the NJDA soil compaction mitigation Verification form.
D. Any Mitigation work required to meet the soil compaction standards shall be included the lump sum price of the work and will be considered extra work.

3.8 CLEANING

A. Requirements for cleaning in accordance with the Contract Documents as directed by the Engineer.
B. When sediment accumulation in sedimentation structures or devices has reached a point one-third depth of sediment structure or device, remove and dispose of sediment.
C. Do not damage structure or device during cleaning operations.
D. Do not permit sediment to erode into construction or site areas or natural waterways.
E. Clean channels when depth of sediment reaches approximately one half channel depth.
F. Properly dispose of sediment bags after use.

3.9 PROTECTION

A. Execution and Closeout Requirements: Requirements for protecting finished Work in accordance with the Contract Documents.

END OF SECTION 02600
SECTION 02730 - SANITARY SEWERS

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 DESCRIPTION OF WORK

A. Sanitary sewer piping, fittings and accessories.
B. Sanitary sewer manholes and cleanouts.

1.3 REFERENCES

A. ANSI/ASTM D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
B. ANSI/ASTM D2729 - Poly Vinyl Chloride (PVC) sewer pipe and fittings.
C. ASTM A377 - Cement lined ductile iron pipe.
D. ASTM C479 - Precast reinforced concrete manhole sections.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable codes for the work of this section.

1.5 SUBMITTALS

A. Submit shop drawings for precast reinforced concrete manholes.
B. Submit product data for pipe and pipe accessories.
C. Submit product data for manhole frames and covers.

1.6 PROJECT RECORD DRAWINGS

A. Accurately record location of pipe runs, connections, manholes, cleanouts and rim and invert elevations.
B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.7 PAYMENT
A. The lump sum price bid shall include the costs of all labor, equipment and materials necessary to install gravity sanitary sewer systems.

1.8 RELATED SECTIONS

A. Section 02232 – Site Clearing
B. Section 02236 – Soil Erosion and Sediment Control
C. Section 02241 – Dewatering
D. Section 02248 – Shoring and Bracing
E. Section 02100 – Traffic Control
F. Section 02514 – Site Work Concrete
G. AIA A232 & Section 00800 – Submittals

PART 2 - PRODUCTS

2.1 PVC GRAVITY SEWER PIPE

A. PVC gravity sewer pipe shall conform to A.S.T.M. D-3034 (SDR35) A.S.T.M D2241 (SDR26), Type P.S.M. Polyvinyl Chloride (PVC) sewer pipe and fittings. The maximum laying length of twenty feet (20 ft.) shall be permitted.

B. All pipe and fittings shall be made from PVC compounds as defined and described in A.S.T.M. D-1784 for rigid polyvinyl chloride compounds (chlorinated polyvinyl chloride compounds).

C. Joints shall be rubber gasketed of the bell and spigot type. Gaskets shall meet the requirements of A.S.T.M. F-477. All joints shall comply to A.S.T.M. D-3212.

D. Pipe and fittings shall be installed in accordance with A.S.T.M. D-2321. Pipe performance is directly related to the haunching material and its placement. The material should be placed and consolidated under the pipe, haunch to provide adequate side support to the pipe, while avoiding both vertical and lateral movement of the pipe from proper alignment. Haunching is placed up to the pipe spring line.

2.2 DUCTILE IRON SEWER MAIN PIPE

A. Pipe

Ductile Iron Pipe shall be centrifugally cast in conformance with ANSI/AWWA C151/A21.51 (Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids). Ductile Iron Pipe, shall, as a minimum, be of the thickness required for laying condition Type 1 (Flat-bottom trench, loose
backfill) in accordance with ANSI/AWWA C150/A21.50). In no case shall Ductile Iron Pipe be installed with a thickness class less than Class 52, regardless of laying condition, depth of cover, or surcharge loading.

B. Joints

Push-on joints or mechanical joints shall be used for all buried piping. Gaskets for ductile iron push-on and mechanical joints shall be in conformance with ANSI/AWWA C111/A21.11 (Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings), and shall be vulcanized natural rubber or vulcanized synthetic rubber. Natural rubber gaskets shall be considered unsuitable for wastewater pipelines.

C. Fittings

Push-on and mechanical joint fittings shall be in conformance with ANSI/AWWA C110/A21.10 (Ductile-Iron and Gray-Iron Fittings, 3 In. through 48 In. for Water and Other Liquids). All joints shall be assembled in accordance with the manufacturer’s recommendations. Pressure rating of fittings shall be as follows: 4" - 12" fittings - 350 psi; 14" - 24" fittings - 350 psi; 30" - 36" fittings - 250 psi.

D. Linings and Coatings


The outside of all buried Ductile Iron Pipe and Fittings shall be coated with a bituminous coating approximately one (1) mil thick, in conformance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/A21.10 for fittings.

2.3 PRECAST MANHOLES

A. General

Precast reinforced concrete manhole sections shall be manufactured in accordance with A.S.T.M. Specification C-478-68, or the latest revision thereof. The minimum compressive strength of the concrete for all sections shall be 4,000 psi. The circumferential steel reinforcement for riser pipe, cone sections and base walls shall be a minimum of 0.12 square inches per linear foot in forty-eight (48) inch diameter sections and 0.17 square inches per linear foot for sixty (60) inch diameter sections. The reinforcing in both layers of steel in the flat slat top sections shall be 0.12 square inches per linear foot in both directions.
Joints of the manhole sections shall be formed entirely of concrete employing a round rubber gasket and when assembled, shall be self-centering and make a uniform watertight joint. Except for those surfaces within the gasket groove, all inside surfaces of the bell or outside surfaces of the spigot, or both, on which the rubber gasket may bear during the closure of the joint at any degree of partial closure shall be parallel within 1 degree and have an angle of not more than 2 degrees with the longitudinal axis of the pipe. In joints formed entirely of concrete, the distance from either side of the gasket to the end of the bell or spigot shall be not less than ¾ inch. The gasket spaces between the bell and spigot shall be so shaped as to provide grooves that will prevent the gasket from disengaging from its compression surface or being blown out by hydrostatic pressures.

The manhole shall be designed for an H-20 loading. A minimum period of ten (10) days shall have elapsed from manufacture of the manhole to shipping. The precast sections shall be steam cured for at least thirty-six (36) hours. The date of manufacture shall be stamped upon each manhole section when removed from the forms.

B. Base

Precast manhole bases will be furnished with a solid stabilized, and level subfoundation. A minimum of six (6) inches of foundation material is to be placed under the base of each manhole. If The Engineer deems it necessary, six (6") inches of concrete shall be placed to insure adequate bearing. The manhole shall have a minimum of five (5) inches between the low invert of the manhole and the inside base to allow ample room for the construction of the channel. All riser sections and cone top will be placed before grouting the pipe in place.

C. Manhole Steps

Shall be of the design known as safety step as shown on the plans. They shall be 16" wide and the legs at least 12" long. Steps to be of extruded aluminum Alcoa 6061-16 drop front design, steel reinforced polypropylene step #PS4B by MA Industries, or approved equal.

D. Invert Channel

1. The channels shall be smooth and semicircular in shape and form to the size of the adjacent sewer section as shown on the detail sheet of the plans.
Changes in directions shall be made with as large a radius as possible. The height of the channel will be three-fourths (¾) the size of the adjacent pipe. The base of the manhole shall slope toward the invert channel. Adjacent sewer pipes will extend to the manhole only as far as necessary to make a proper watertight bond between the pipe and the manhole. The pipe shall be cut evenly in a workmanlike manner and mortared smoothly.

2. The vitrified brick for the channel and invert construction shall be Red Brick Paver, nominal size 2”x 4”x 8”, as manufactured by Anchor Concrete or approved equal.

3. The mortar used in the channel and benching construction shall be Type 3 cement, with a 1:2 cement/sand ratio and no lime is to be used in this application.

E. Joints

Joints shall be mortared on the exterior and interior surface of the manhole. Lifting holes shall be plugged with rubber stoppers or mortar after installation. Prior to parging, the area to be parged shall be coated with a latex binder (blue) or approved equal.

F. Coatings

1. Exterior Coating

All precast sections shall receive two (2) coats of bituminous waterproofing material, Koppers 300M Epoxy, Pennsbyry 32-B-4 Epoxy, or approved equal. The first coat of waterproofing material may be pre-applied leaving three (3) inches uncovered adjacent to each joint. Upon the completion of grouting the joints and lifting holes and allowing a proper drying time, the second coat of waterproofing shall be applied. The second coat must cover all sections of the manhole prior to backfilling.

2. Interior Coating

The interior of the manhole shall receive two coats of a factory applied 2 part epoxy coating 10 mil. DFT each coat.

G. Rubber Gasket
Pipe to manhole seal shall be an A-Lok Gasket or approved equal - A.S.T.M. C923 and shall be cast integrally in manhole wall and located as required.

H. Manholes shall be manufactured by Atlantic Precast Concrete, Inc. or approved equal.

I. Frames and Covers

The frame and cover shall be as manufactured by Campbell Foundry, Pattern as indicated on the plan and detail, or approved equal, and the covers permanently cast with the words "Sanitary Sewer". Covers shall be of grey cast iron and shall be free from holes, cracks, cold shuts, etc. All castings shall be coated with coal tar varnish. All manhole covers shall have the plan manhole number painted on the underside. The work shall include furnishing and placing, and all other labor incidental to placement.

2.4 FOUNDATION MATERIAL

A. The foundation material shall be ¾" clean crushed stone or gravel. It shall be free of all dirt, dust, vegetation and other foreign matter. The stone shall be leveled and compacted to the required depth and graded by approved means.

PART 3 - EXECUTION

3.1 EXAMINATION AND COORDINATION

A. Verify that trench cut is ready to receive work, and excavations, dimensions and elevations are as indicated on the Contract Drawings.

B. Beginning of installation means acceptance of existing conditions. Any necessary remedial work required to correct any unsatisfactory conditions, found after the start of installation, will be provided at no cost to the owner.

C. All work related to connection into the existing system shall be coordinated with utility owner. Do not proceed with work until utility owner has been contacted and connection work has been coordinated.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fill material.

B. Remove large stones or other hard matter which could damage drainage pipe or
impede consistent backfilling or compaction.

C. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area. Contractor to provide all necessary material and labor to dewater construction excavations.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations. Where necessary, the Contractor shall employ the services of an independent Soils Engineer to design and implement an effective dewatering system, at no additional cost to the Owner, should the Contractor’s standard dewatering practices prove ineffective.

2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

D. Contractor to maintain flow of sewage at all times. Bypass pumps may be used, providing that they shall be operable prior to temporary disconnection of gravity flow system. Contractor to provide pump capacity data and test same prior to start of work.

3.3 INSTALLATION - PIPE

A. Install pipe, fittings and accessories in accordance with ANSI/ASTM D2321 and manufacturer's instructions. Seal joints watertight.

B. Place pipe on minimum 6 inch deep bed of quarry pressed stone.

C. Lay pipe to slope gradient noted on Contract Drawings.

D. Install quarry processed stone next to the top of pipe as specified in Section 02200 - Earthwork.

E. Place approved backfill material in maximum 8 inch lifts, compacting each lift.

F. Increase compaction of each successive lift. Refer to Section 02200 for compaction requirements. Do not displace or damage pipe when compacting.

G. Connect to existing building sewer outlet as necessary to maintain adequate flow conditions. Provide new connections as required by the Engineer.
3.4 INSTALLATION - MANHOLES AND CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Place precast concrete base pad on depth and type of stone as indicated in the details with provision for sanitary sewer pipe and sections.

C. Establish elevations and pipe inverts for inlets and outlets as indicated on the Contract Drawings.

D. Mount lid and frame level in grout, secure to top cone section to elevation indicated on the Contract Drawings. Contractor shall install frame risers prior to final surface paving as shown on plans.

3.5 FIELD QUALITY CONTROL

A. Testing: Perform testing of completed piping in accordance with local authorities having jurisdiction. The entire sewer system, including piping and appurtenances shall be tested for leakage. System may be tested by the use of either water or low pressure air.

B. General Test Requirements

1. Piping shall be adequately restrained against movement before testing.

2. Piping system shall be flushed clean and sediment, scale, dirt and debris removed before piping is tested.

3. Adequate provisions shall be made for carrying off flushing water without causing erosion or other damage.

4. Structures and piping shall be tested before joints are concealed or made inaccessible.

5. Tests shall be made in the presence of an inspector of the authority having jurisdiction and the design engineer.

C. Notice of tests shall be made in writing to the Architect and Owner and received by them not less than five days before the date of the test.

D. Gravity Flow System Test

1. When the groundwater is more than one foot above the crown of the pipe at the upper end of the section to be tested, an infiltration test shall be made.
The upper end of the section to be tested shall be plugged, and a V-notch weir of appropriate size shall be fitted into the lower end. There shall be no leakage around the weir plate. Commercially manufactured weirs made and calibrated for the purpose may be used.

2. When the groundwater is less than one foot above the crown of the pipe at the upper end of the section to be tested, an exfiltration test shall be made. The sewer shall be plugged at the inlet pipes of both upper and lower structures. The line shall then be filled with water to a level two feet above the crown of the pipe in the upper manhole. Before any measurements are made, a period of two hours shall be permitted to allow for absorption and escape of trapped air. Following this period, a test period of at least four hours shall begin. At the end of the test period, loss of water shall be measured and leakage computed.

3. Air testing shall be performed in accordance with the procedures described in ASTM C828, except as otherwise noted. For making the low pressure air test, the Contractor shall use equipment specifically designed and manufactured for the purpose of testing sewer pipelines using low pressure air. The equipment shall be provided with an air regulator valve or air safety valve set so that the internal air pressure in the pipe cannot exceed 8 psi.

   a. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be tested. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.

   b. All air used for testing shall pass through a single control panel.

   c. Low pressure air shall be introduced in the sealed line until the internal air pressure reaches a valve 4 psig greater than the maximum pressure exerted by groundwater that may be above the invert of the pipe at the time of the test. However, the internal air pressure in the sealed line shall not be allowed to exceed 8 psig. When the maximum pressure exerted by the groundwater is greater than 4 psig, the Contractor shall conduct only an infiltration test.

   d. At least two minutes shall be allowed for the air pressure to stabilize in the section under test. After the stabilization period, the low pressure air supply hose shall be quickly disconnected from the control panel. The time required in minutes for the pressure in the section under test to decrease from 3.5 to 2.5 psig (greater than the maximum pressure exerted by groundwater that may be above the invert of the pipe) shall not be less than that shown in the following table:
MINIMUM HOLDING TIME REQUIRED FOR PRESSURE TO DROP FROM 3½ TO 2½ PSI

<table>
<thead>
<tr>
<th>Pipe Diameter (inches)</th>
<th>Minimum Time for Minimum Length (min:sec)</th>
<th>Minimum Time for Length Shown (min:sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>100 ft.</td>
</tr>
<tr>
<td>4</td>
<td>3:46</td>
<td>3:46</td>
</tr>
<tr>
<td>6</td>
<td>5:40</td>
<td>5:40</td>
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<tr>
<td>8</td>
<td>7:34</td>
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<tr>
<td>10</td>
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<td>9:26</td>
</tr>
<tr>
<td>12</td>
<td>11:20</td>
<td>11:20</td>
</tr>
</tbody>
</table>

4. Rate of infiltration and exfiltration shall not exceed 100 gallons/inch of pipe diameter per mile of pipe per 24 hours. Each section of pipe tested shall meet the above criteria.

E. Following completion of the backfill over the PVC pipe installation, the pipe shall be tested for deflection using a "go-no-go" deflection mandrel. The mandrel shall be passed through all sections of the pipe. The test may not be performed prior to 7 days after installation, and in the presence of the Township Engineer.

   1. Pipe deflections shall be measured and converted to a percent deflection. Deflections shall be recorded with a copy of the results submitted to the Engineer. Test results shall be mailed or delivered to the Engineer not later than the day following the day on which the test was made.

   2. Sections of pipe deflection greater than 7.5% shall be replaced.

F. Video Record

A closed circuit television inspection shall be made of the newly installed line. A permanent video tape record, and one copy, of a color VHS format shall be supplied to the Engineer upon completion of the TV inspection.

   1. The TV camera shall be specifically designed for sewer inspection, with its own light source suitable to provide a clear picture of the entire periphery of the pipe. The camera shall not be pulled by means of a water jetting nozzle.

   2. Copies of video recordings shall be submitted to the Engineer in duplicate at no cost, and shall be accompanied by a typewritten log. The videotapes and case shall be labeled clearly, indicating the project name, date and sewers inspected. The label shall correspond to the log sheet.
3. The audio log and written log shall contain the following information (as a minimum): Firm and crew chief's name; date; manhole to manhole designations or station or station; direction of camera; type of pipe; type of joints; joint spacing; cleanliness; manhole conditions; pipe conditions; section length; pipe size; depth of pipe; clarity of flow; continuous distance measurement; and location of all connections to the sewer main.

4. All TV inspection work shall be witnessed by a representative of the Engineer. Photographs of the television picture shall be provided, at no expense, of any portion of the inspection where requested by the Engineer.

5. TV inspection work shall follow sewer cleaning operations, such that the highest quality inspection can be made.

G. Manholes

Manholes shall be tested in accordance with methods approved by the Engineer for both exfiltration and infiltration.

END OF SECTION 02730
SECTION 02830 – FENCE

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 DESCRIPTION OF WORK

A. This work shall consist of the construction of a 4-foot high PVC coated fence as directed in the project documents.

1.3 SUBMITTALS

A. Changes in specifications may not be made after the bid date.

B. Shop drawings: Layout of fences and gates with dimensions, details, and finishes of components, accessories, and post foundations.

C. Product data: Manufacturer’s catalog cuts indicating material compliance and specified options.

D. Samples: Color selection for PVC finishes.

1.4 PAYMENT

A. The lump sum price bid shall include the costs of all labor, equipment and materials necessary to install fence, gates and all appurtenances.

0.5 RELATED SECTIONS

A. AIA A201 & Section 00800 - Submittals

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Products from qualified manufacturers having a minimum of five years’ experience manufacturing thermally fused PVC coated chain link fencing will be acceptable and if they meet the following specifications for design, size gauge of metal parts and fabrication.

B. Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.
2.2 MATERIAL

A. Size: Helically wound and woven to height of 6 feet as indicated on drawings with 2" diamond mesh, 6 gauge, with a core wire diameter of 0.192" and a minimum breaking strength of 2170 lbf.

B. Fencing material shall be ASTM A392 - 06 Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric compliant

C. 36" Base Stands

D. Fence shall be 6 feet tall

E. Fence shall swing gates

F. Fence panels shall be provided with standard privacy screening

C. Products from qualified manufacturers having a minimum of five years' experience manufacturing thermally fused PVC coated chain link fencing will be acceptable and if they meet the following specifications for design, size gauge of metal parts and fabrication.

D. Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.

2.2 MATERIAL

G. Size: Helically wound and woven to height of 6 feet as indicated on drawings with 2" diamond mesh, 6 gauge, with a core wire diameter of 0.192" and a minimum breaking strength of 2170 lbf.

H. Fencing material shall be ASTM A392 - 06 Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric compliant

I. 36" Base Stands

J. Fence shall be 6 feet tall

K. Fence shall swing gates

L. Fence panels shall be provided with standard privacy screening

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify areas to receive fencing are completed to final grades and elevations.
B. Ensure property lines and legal boundaries of work are clearly established.

3.2 CHAIN LINK FENCE FRAMING INSTALLATION

A. Install chain link fence in accordance with ASTM F 567 and manufacturer’s instructions.

B. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30° or more.

C. Space line posts uniformly at 10’ on center.

D. Concrete set terminal and gate posts: Drill holes in firm, undisturbed or compacted soil. Holes shall have diameter 4 times greater than outside dimension of post, and depths approximately 6”(152 mm) deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36” (914 mm) below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post. Slope to direct water away from posts.

E. Drive Anchor [line] posts: With protective cap, drive post 36” (914 mm) into ground. Slightly below ground level install drive anchor shoe fitting. Install 2 diagonal drive anchors and tighten in the shoe.

F. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.

G. Bracing: Install horizontal pipe brace at mid-height for fences 6’ (1829 mm) and over, on each side of terminal posts. Firmly attach with fittings. Install diagonal truss rods at these points. Adjust truss rod, ensuring posts remain plumb.

H. Tension wire: Provide tension wire at bottom of fabric [and at top, if top rail is not specified]. Install tension wire before stretching fabric and attach to each post with ties. Secure tension wire to fabric with 12-1/2 gauge [0.0985” (2.502 mm)] hog rings 24” (610 mm) oc.

I. Top rail: Install lengths, 21’ (6400 mm). Connect joints with sleeves for rigid connections for expansion/contraction.

J. Center Rails (for fabric height 12’ (3658 mm) and over). Install mid rails between posts with fittings and accessories.

K. Bottom Rails: Install bottom rails between posts with fittings and accessories.

3.3 CHAIN LINK FABRIC INSTALLATION
A. Fabric: Install fabric on security side and attach so that fabric remains in tension after pulling force is released. Leave approximately 2\" (50 mm) between finish grade and bottom selvage. Attach fabric with wire ties to line posts at 15\" (381 mm) on center and to rails, braces, and tension wire at 24\" (600 mm) on center.

B. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips spaced maximum of 15\" (381 mm) on center.

3.4 ACCESSORIES

A. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.

B. Fasteners: Install nuts on side of fence opposite fabric side for added security.

3.5 CLEANING

A. Clean up debris and unused material, and remove from the site.

END OF SECTION 02830
SECTION 03300 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 SUMMARY

A. Extent of concrete work is shown on drawings.

B. Concrete paving and walks are specified in Division 2.

1.03 SUBMITTALS

A. Product Data: Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds and others as required by Architect.

B. Samples: Submit samples of materials as requested by Architect, including names, sources and descriptions.

C. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test.

D. Materials Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Architect. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.


1.04 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:

1. ACI 301 "Specifications for Structural Concrete for Buildings".
2. ACI 318 "Building Code Requirements for Reinforced Concrete".
3. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice".

B. Concrete Testing Service: Engage a testing laboratory acceptable to Architect to perform material evaluation tests and to design concrete mixes.

C. Materials and installed work may require testing and retesting at anytime during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.
PART 2 - PRODUCTS

2.01 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Steel Wire: ASTM A 82, plain, cold-drawn steel.


E. Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications.

2.03 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II.

1. Use one brand of cement throughout project, unless otherwise acceptable to Architect.

B. Normal Weight Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.

C. Light Weight Aggregates: ASTM C330 and as herein specified, coarse shale, slate or slag aggregate, free from expanded clay

D. Water: Drinkable.

E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
b. "Sika Aer"; Sika Corp.
c. "MB-VR or MB-AE"; Master Builders.
d. "Darex AEA" or "Daravair"; W.R. Grace.

F. Water-Reducing Admixture: ASTM C 494, Type A, and containing not more than 0.05 percent chloride ions.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
   b. "Eucon WR-75" or "Eucon WR-89"; Euclid Chemical Co.
   c. "Pozzolith 322N"; Master Builders.

G. High-Range Water-Reducing Admixture (Super Plasticizer) ASTM C 494, Type F or Type G and containing not more than 0.05 percent chloride ions.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
   a. "Daracem 100" or "WRDA-19"; W.R. Grace.
   b. "Eucon 37"; Euclid Chemical Co.
   c. "Rheobuild 1000"; Master Builders.
   d. "Sika 86"; Sika Corporation.

H. Water-Reducing, Non-Chloride Accelerator Admixture: ASTM C 494, Type E, and containing not more than 0.024 percent chloride ions.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
   a. "Accelguard 80"; Euclid Chemical Co.
   b. "Daraset"; W.R. Grace
   c. "Plastocrete 161FL" or "SikeSet NC"; Sika Corporation

I. Water-Reducing, Retarding Admixture: ASTM C 494, Type D and containing not more than 0.05 percent chloride ions.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
   b. "Eucon Retarder 75"; Euclid Chemical Co.
   d. "Plastocrete 161R"; Sika Corporation.

J. Prohibited Admixtures: Calcium chloride thyocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.
2.04 RELATED MATERIALS

A. Extruded Polystyrene Board Insulation: Rigid closed-cell extruded, expanded polystyrene insulation board with integral high-density skin, complying with ASTM C-578 Type IV: min. 25 psi compressive strength ASTM D 1621: k value of 0.20 ASTM C 518: 0.30% maximum water absorption ASTM C272: 1.1 perm/inch max water vapor transmission: manufacturer's standard length and widths.

1. Manufacturer: Subject to compliance with requirements, provide products of one of the following, or an approved equal:
   a. Dow Chemical Co: Midland MI
   b. VC Industries/V.5 Gypsum: Chicago, IL
   c. GreenGuard XPS: Pactive LLC: Austin, TX

B. Non-Shrink Grout: CRD-C 621, factory pre-mixed grout.

1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements provide one of the following, or approved equal:
3. Non-metallic
   a. "Euco-NS"; Euclid Chemical Co.
   b. "Duragrout"; L&M Construction Chemicals, Inc.
   c. "Masterflow 713"; Master Builders

C. Absorptive Cover: Burlap cloth made from jute or kenaf weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

D. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

1. Waterproof paper.
2. Polyethylene film.
3. Polyethylene-coated burlap.

E. Clear curing and sealing compound (VOC Compliant): The compound shall have 30% solids content minimum, and will not yellow under ultraviolet light after 500 hours of test in accordance with ASTM C-1315 and will have test data from an independent testing laboratory indicating a maximum moisture loss of 0.039 grams per sq. cm. when applied at a rate of 300 sq. ft. per gallon. Sodium silicate compounds are not permitted.

3. Product: “Kure-n-Seal 30 VOC” by Sonneborne
4. Or approved equal.

F. Vapor Barrier: Provide vapor barrier which conforms to ASTM E1745, Class A. The membrane shall have a water-vapor transmission rate no greater than 0.01
The vapor barrier shall be placed over prepared base material where indicated below slabs on grade. Vapor barrier shall be no less than 15 mil thick. Installation of vapor barrier to comply with ASTM E1643.

1. Product: Stego Wrap (15 mil) Vapor Barrier by Stego Industries LLC
2. Product: VaporBlock (15 mil) by Raven Industries
3. Product: Zero Perm by Alumiseal
5. Or approved equal:

2.05 **PROPORTIONING AND DESIGN OF MIXES**

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.

B. Submit written reports to Architect and Structural Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Architect.

C. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:

D. For normal weight aggregate mixes: 3000 psi 28-day compressive strength; W/C ratio, 0.51 maximum, 3500 psi 28-day compressive strength W/C ratio, 0.47 maximum.

E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be admitted to and accepted by Architect before using in work.

F. Admixtures:

1. Use water-reducing admixture or high range water-reducing admixture (super plasticizer) in concrete as required for placement and workability.
2. Use high-range water-reducing admixture in pumped concrete, concrete for industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight and concrete with water/cement ratios below 0.50.
3. Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.
4. Use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content within following limits.
   a. 5% for maximum 2" aggregate
   b. 6% for maximum 3/4" aggregate
c. 7% for maximum 1/2" aggregate

G. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Ramps, slabs and sloping surfaces: Not more than 3".
2. Reinforced foundation systems: Not less than 1" and not more than 3".
3. Concrete containing HRWR admixture (super-plasticizer): Not more than 8" after addition of HRWR to site-verified 2"-3" slump concrete.
4. Other concrete: Not less than 1" nor more than 4"

2.06 CONCRETE MIXING

A. Ready-Mix Concrete: Comply with requirements of ASTM C94, and as herein specified.

B. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.

PART 3 - EXECUTION

3.01 FORMS

A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structure are of correct size, shape, alignment, elevations and position.

B. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keywarp, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features, required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

3.02 PLACING REINFORCEMENT

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

1. Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations.

B. Clean reinforcement of loose rust and mill scale, earth, ice and other materials which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.

D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in
position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.03 JOINTS

A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate at a maximum spacing of 90 feet, so as not to impair strength and appearance of the structure, as acceptable to Architect.

B. Control Joints: Locate and install control joints as indicated or at a maximum spacing of 30 feet. Locate at a spacing which does not impair appearance of the structure as acceptable to Architect. Use “SOFFCUT” saw to cut joints in slab. Joint to be cut the same day as the pour.

C. Joint filler and sealant materials are specified in Division-7 sections of these specifications.

3.04 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto.

B. Edge Forms and Screed Strips for Slabs: Set edge forms, or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

3.05 CONCRETE PLACEMENT

A. Preplacement inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

1. Apply temporary protective covering to lower 2' of finished walls adjacent to poured floor slabs and similar conditions, and guard against spattering during placement.

B. General: Comply with ACI 304R "Guide for Measuring, Mixing, Transporting and Placing Concrete", and as herein specified.

C. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

E. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

F. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

G. Maintain reinforcing in proper position during concrete placement operations.

H. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which would be caused by frost, freezing actions or low temperatures, in compliance with ACI 306R.

I. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

J. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305R.

3.06 MONOLITHIC SLAB FINISHES

A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.

B. After screeding, consolidating and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of Ff18 - Ff15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.

D. After floating, begin first trowel finish operation using a power driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of Ff20 - Ff17. Grind smooth surface defects which would telegraph through supplied floor covering system.
E. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps and elsewhere as indicated.

3.07 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

C. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

D. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing and by combinations thereof, as herein specified.

E. Provide moisture curing by following methods.
   1. Keep concrete surface continuously wet by covering with water.
   2. Continuous water-fog spray.
   3. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

F. Provide moisture-cover curing as follows:
   1. Cover concrete surfaces with moisture-retaining cover for curing concrete, place in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

G. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting and other coatings and finish materials, unless otherwise acceptable to Architect.

H. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.

I. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture retaining cover, unless otherwise directed.

3.08 MISCELLANEOUS CONCRETE ITEMS

A. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment
to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

B. Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.

3.09 CONCRETE SURFACE REPAIRS

A. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.

B. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets and other objectionable conditions.

C. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.

D. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.

E. Underlayment Application: Leveling of floors for subsequent finishes may be achieved by use of specified underlayment material.

3.10 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. The owner will employ a testing laboratory to perform the following tests, inspect formwork and reinforcement placement and to submit test reports.

B. Sampling and testing for quality control during placement of concrete may include the following, as directed by Architect.

C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

1. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.

D. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
E. Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

F. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.

G. Test results will be reported in writing to Architect, Structural Engineer and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

H. Nondestructive Testing: Impact hammer, sonoscope or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

I. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.

END OF SECTION 03300
SECTION 03450 - SELF-DRYING FINISHING UNDERLAYMENT

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. Section Includes:

1. Extent of Self Drying Cement - Based Finishing Underlayment for flooring work as indicated on drawings.

B. Related Sections:

1. Section 09300 - Tile
2. Section 09650 - Resilient Flooring
3. Section 09685 - Carpet Tile

1.3 DEFINITIONS

A. Self-Drying Finishing Underlayment for flooring includes systems which consist of materials specially formulated, portland cement self-smoothing, rapid hardening compound to level and repair existing interior concrete slabs.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, installation instructions, and general recommendations for each major product required. Include data substantiating that products to be furnished comply with requirements of the contract documents.

B. Test Reports: Submit results of testing specified.

1. Certificates: Submit manufacturer's test data certifying compliance with specified performance requirements.

2. Test reports: Submit test data for moisture content and hydrostatic pressure of existing concrete slab.

C. Certificates: Submit manufacturer's certification that products comply with requirements of the contract documents.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain required products from a single manufacturer.

B. Manufacturer Experience: Provide products of this section by companies which have successfully specialized in production of this type of work for a recommended 5 years.
C. Installer's Qualifications: All work of this section shall be performed by an experienced applicators, licensed by the manufacturer of the system and successfully completed this type of work for a recommended 2 years.

D. Codes and Standards: Comply with requirements of the contract documents or of governing codes and authorities having jurisdiction.

E. Mock-up: Prior to installation of work of this section, erect sample at location directed by or acceptable to the Architect, using specified materials and workmanship to be expected in the completed work. Once mock-up has been approved by the Architect, retain until the work has been completed and accepted.

1. Configuration: Approximately 4 feet by 4 feet.
2. Mock-up may not be incorporated into the final work; demolish and remove from site when directed by the Architect.

F. Pre-installation Conference: Prior to installation of work of this section, conduct a meeting at the project site to discuss quality assurance requirements. In addition to the contractor and the installer, arrange for attendance of the following:

1. Other installers affected by the work of this section.
2. The Owner's Representative.
3. Construction Manager.
5. Manufacturer's Representative.
6. Supplier.

G. Allowable Tolerances: Variation from Level: Do not exceed 1/4 inch in any bay or 10 feet in distance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Keep materials dry at all times. Protect against exposure to weather and against contact with damp or wet surfaces.

B. Store materials on one site to maintain proper separation and grading integrity. Cover materials to prevent excessive accumulation of moisture.

C. Protect materials from excessive moisture in shipment, storage, and handling. Deliver materials in manufacturer's unopened packages, and store in dry place with adequate air circulation.

D. Storage: Stack products of this section carefully to provide air circulation within stacks.

1.7 PROJECT CONDITIONS

A. Environmental Requirements: Do not proceed with installation when air temperatures are below 40°F, or above 95°F, unless protective measures acceptable to the manufacturer are taken.
B. Do not proceed with installation until temperature and relative humidity have been stabilized and will be maintained within values established by the manufacturer for optimum quality control.

C. Provide adequate ventilation to prevent accumulation of hazardous fumes during application of components in enclosed spaces, and maintain ventilation until materials have thoroughly cured.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate work of this section with other trades and installation of special construction and equipment.

1.9 WARRANTY

A. Special Project Warranty: Submit a written warranty signed by the manufacturer, the contractor, and the installer, guaranteeing to correct failures in materials and workmanship which occur within the warranty period, including those attributable to abnormal aging, without reducing or otherwise limiting any other rights to correction which the Owner may have under the contract documents.

1. The warranty shall include responsibility for removing and replacing other work as necessary to accomplish repairs or replacement of materials covered by the warranty.

   a. Warranty period: Minimum two (2) years after date of substantial completion.

PART 2 - PRODUCTS

2.1 MIXES

A. Basis of Design: “Ardex Feather Finish” Self-Drying, Cement-Based Finishing Underlayment, as manufactured by ARDEX Engineered Cements, Aliquippa, PA, Tel. # 888.512.7339, www.ardex.com; or approved equal.

B. Subject to compliance with requirements of the Contract Documents, manufacturers offering products which may be incorporated in work include the following:

   1. Mapei, South River, NJ, Tel. # 732.254.8001.
   2. CMP Specialty Products, Horsham, PA, Tel. # 215.672.6384.
   3. Or approved equal.

C. Follow the manufacturer's printed instructions, procedures and recommended equipment for mixing the components.

   1. Mixing Ratio: 2½ quarts of water per 10 lbs. bag at 70°F.

      a. For smaller batches, use 2 parts powder to 1 part water by volume.

D. Compressive Strength: ASTM C 109, 4200 psi, minimum.

E. VOC: 0
PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect substrates and conditions under which the work of this section will be performed, and verify that installation properly may commence. Do not proceed with the work until unsatisfactory conditions have been resolved fully.

1. Commencement of work shall constitute acceptance of conditions. Any necessary remedial work required to correct any unsatisfactory conditions, found after the start of installation, will be provided at no cost to the Owner.

2. If asbestos abatement of flooring products was performed (by others), review product information on the product(s) used (by others) to remove the adhesive(s) to ensure compatibility.

B. Testing: Perform required testing of existing concrete slab, for hydrostatic pressure and moisture content. Follow manufacturer’s recommended procedures for testing slab. Do not proceed with the work until unsatisfactory conditions have been resolved fully.

3.2 PREPARATION

A. Clean substrate, removing projections, all loose material and substances detrimental to the work; comply with recommendations of manufacturer of products to be installed for proper preparation procedures.

B. Prepare substrate in accordance with recommendations of manufacturer for optimum installed performance.

C. Mask off or otherwise protect adjacent surfaces not scheduled to receive products of this section.

D. Coordinate installation with other trades, report conditions in writing to the Owner/Architect. Do not proceed with application work until any unsatisfactory conditions have been corrected.

3.3 APPLICATION

A. General: Comply with manufacturer's instructions, except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.

1. Apply materials to the substrate with flat side of a steel trowel to obtain a solid mechanical bond. Apply sufficient pressure to fill all defects and to feather the product into the subfloor surface and to suit existing substrate conditions.

3.4 CLEANING

A. Upon completion, clean all surfaces which have become soiled or coated as a result of work of this section, using proper methods which will not scratch or otherwise damage finished surfaces.
B. For cleaning, use only products and techniques acceptable to manufacturer of products being cleaned.

### 3.5 PROTECTION

A. General: Institute protective procedures and install protective materials as required to ensure that work of this section will be without damage or deterioration.

**END OF SECTION 03450**
SECTION 04200 - UNIT MASONRY

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 DESCRIPTION OF WORK

A. Extent of each type of masonry work is indicated on drawings and schedule.

B. Types of masonry work required includes:

1. Concrete unit masonry.
2. Brick masonry.
4. Calcium silicate masonry units.
5. Dolomitic masonry units
7. Split face architectural CMU.
8. Ground face architectural CMU.
11. Slate Bench Seat.
12. Concrete masonry lintels and bond beams.
15. Concealed Flashing

C. Related Work:

1. Section 05120 - Structural Steel.
2. Section 05400 - Miscellaneous Structural Steel.
3. Section 05500 - Metal Fabrications.
4. Section 07200 - Building Insulation.
5. Section 07270 - Fluid Applied (Impermeable )Air/Vapor Barriers.
6. Section 07600 - Flashing.
7. Section 07900 - Joint Sealer Assemblies.
8. Section 08110 - Hollow Metalwork.
10. Section 08415 - Aluminum Storefront.
11. Section 08520 - Aluminum Windows.
12. Section 08900 - Glazed Curtain Wall.
13. Section 09900 - Painting of exposed to view CMU surfaces.
1.3 QUALITY ASSURANCE

A. Fire Performance Characteristics: Where indicated, provide materials and construction which are identical to those of assemblies whose fire endurance has been determined by testing in compliance with ASTM E 119 by a recognized testing and inspecting organization or by another means, as acceptable to authority having jurisdiction.

B. Single Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

C. Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

D. Field Constructed Mock-Ups: Prior to installation of masonry work, erect sample wall panels to further verify selections made for color and textural characteristics, under sample submittals of masonry units and mortar, and to represent completed masonry work for qualities of appearance, materials and construction.

E. Build mock-ups for the following types of masonry in sizes of approximately 4 feet long by 6 feet high by full thickness, including provisions for 16” wide by 24” high opening with appropriate steel or masonry lintels, face and back-up wythes, cavity, insulation, horizontal reinforcement, ties, through wall flashing, weep holes, air/vapor barrier, mortar net and spandrel steel beam / lintel flashing as well as any other wall components and accessories in accordance with attached sketch and as directed by the Architect in Field. See sketch of sample Mock-Up Panel at the end of this Section.

1. Each type of exposed unit masonry work.
2. Typical exterior face brick wall.
3. Typical interior brick wall.
4. Where masonry is to match existing, erect panels parallel to existing surface.

F. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

G. Masonry Pre-Installation Meeting: Prior to installation of any above-grade masonry work, there shall be a Masonry Pre-Installation Meeting between the General Construction Work Contractor, all masonry Subcontractors (if any), Construction Manager and the Architect. At this meeting, all masonry construction products and procedures shall be reviewed.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s product data for each type of masonry unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements.
B. Samples for Verification Purposes: Submit the following samples:

1. Unit masonry samples for each type of exposed masonry unit required; include in each set the full range of exposed color and texture to be expected in completed work.

2. For selection of brick, submit products of all local manufacturers that the manufacturers consider to be their closest match. Resubmit until match meets approval of Architect.

3. Cast Stone samples not less than 12 inch square showing full range of exposed color and texture to be expected in finish work.

4. Colored masonry mortar samples for each color required showing the full range of color which can be expected in the finished work. Label samples to indicate type and amount of colorant used.

C. Shop Drawings: Submit shop drawings for the following:

1. All locations of Vertical Control Joints for interior concrete masonry unit walls including control joints shown.


3. Datestone.

D. Cast Stone Standards:

1. Cast stone mix and certification of compliance with standard ASTM C 1364 testing requirements. Include testing for freezing and thawing resistance.


1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry materials to project in undamaged condition.

B. Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes.

C. Limit moisture absorption of concrete masonry units during delivery and until time of installation to the maximum percentage specified for Type I units for the average annual relative humidity as reported by the U.S. Weather Bureau Station nearest project site.

D. Store cementitious materials off the ground, under cover and in dry location.

E. Store aggregates where grading and other required characteristics can be maintained.

F. Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.
G. Coordinate delivery and application of air/vapor barrier with the delivery and application of the cavity insulation to ensure the installation of these products are completed within the same construction phase.

H. Deliver air/vapor barrier membranes, adhesives and primers to the jobsite in undamaged and original packaging indicating the name of the manufacturer and product. Store roll materials on end in original packaging. Protect rolls from direct sunlight until ready for use. Store air/vapor barrier membranes, adhesives and primers at temperature of 40°F and rising. Keep solvent away from open flame and excessive heat.

1.6 REFERENCE STANDARDS

A. Comply with the current applicable provisions of all codes, regulations, industry standards and specifications referenced in this section, unless otherwise modified by the requirements of the Contract Documents, including but not limited to the following:

1. ACI 531 Building Code Requirements for Masonry Structures.
2. ACI 531 Commentary on Building Code Requirements for Masonry Structures.
3. ACI 530.1 Specification for Masonry Construction.
4. ASTM C-90 Load Bearing Masonry Units.
5. ASTM C-129 Non-Load Bearing Masonry Units.
6. ASTM C 140 Testing Concrete Masonry Units.
7. ASTM C 216 Testing Facing Brick (Solid Masonry Units Made from Clay or Shale).
8. ASTM C 270 Standard Specification for Mortar for Unit Masonry
12. BIA Technical Notes on Brick Construction.
14. NCMA TEK Bulletins.
15. ASTM 1364 Cast Stone Masonry

1.7 PROJECT CONDITIONS

A. Protection of Work: During erection, cover top of walls with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

B. Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls or columns.
C. Do not apply concentrated loads for at least 3 days after building masonry walls or columns.

D. Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Remove immediately grout or mortar in contact with such masonry.

E. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

F. Protect sills, ledges and projections from droppings of mortar.

G. Cold Weather Protection:
   1. Do not lay masonry units which are wet or frozen.
   2. Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.
   3. Remove masonry damaged by freezing conditions.
   4. For clay masonry units with initial rates of absorption (suction) which require them to be wetted before laying, comply with the following requirements:
      a. For units with surface temperatures above 32°F (0°C), wet with water heated to above 70°F.
      b. For units with surface temperature below 32°F (0°C), wet with water heated to above 130°F.

H. Perform the following construction procedures while masonry work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation except for grout.

I. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10°F.
   1. 40 degrees F to 32 degrees F:
      a. Mortar: Heat mixing water to produce mortar temperature between 40°F and 120°F. Setting time will be limited to 60 minutes from initial mixing.
      b. Grout: Follow normal masonry procedures.
   2. 32 degrees F to 25 degrees F:
      a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F and 120°F; maintain temperature of mortar on boards above freezing.
      b. Grout: Heat grout materials to 90°F to produce in-place grout temperature of 70°F at end of work day.
3. 25 degrees F to 20 degrees F:
   a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F and 120°F; maintain temperature of mortar on boards above freezing.
   b. Grout: Heat grout materials to 90°F to produce in-place grout temperature of 70°F at end of work day.
   c. Heat both sides of walls under construction using salamanders or other heat sources.
   d. Use windbreaks or enclosures when wind is in excess of 15 mph.

4. 20 degrees F and below:
   a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F and 120°F.
   b. Grout: Heat grout materials to 90°F to produce in-place grout temperature of 70°F at end of work day.
   c. Masonry Units: Heat masonry units so that they are above 20°F at time of laying.
   d. Provide enclosure and auxiliary heat to maintain an air temperature of at least 40°F for 24 hours after laying units.
   e. Do not heat water for mortar and grout to above 160°F.

J. Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry, temperature ranges apply to anticipated minimum night temperatures.

1. 40 degrees F to 32 degrees F:
   a. Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.

2. 32 degrees F to 25 degrees F:
   a. Completely cover masonry with weather-resistant membrane for at least 24 hours.

3. 25 degrees F to 20 degrees F:
   a. Completely cover masonry with weather-resistant insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.

4. 20 degrees F and below:
   a. Except as otherwise indicated, maintain masonry temperature above 32°F (0°C) for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps or other methods proven to be satisfactory. For grouted masonry maintain heated enclosure to 40°F (4°C) for 48 hours.
1.8 WARRANTY

A. The Contractor shall warrant the exterior walls to be free from leakage due to any natural cause for a period of five (5) years from date of final acceptance of the building and he shall, within such period at his own expense, upon written notification from the Owner, pursue such remedial measures as may be necessary to correct any condition of leakage and damage incidental thereto that may develop. The Contractor in signing this Contract accepts the above conditions. In so doing, he also agrees either that the materials and methods specified herein are such as to insure the results required or that he will, at no additional expense, furnish such additional or alternative items of labor and materials (or both) as may be necessary to accomplish the stated intent of the Contract.

B. Calcium Silicate Masonry Units: Warranty of product against deterioration for the life of the building, provided the products have been installed and used according to accepted masonry standards within the guidelines of local building codes and as recommended by the manufacturer.

C. Adair Masonry Units: Warranty of product against deterioration for the life of the building, provided the products have been installed and used according to accepted masonry standards within the guidelines of local building codes and as recommended by the manufacturer.

D. Flexible Copper Flashing:

1. Special warranty:
   a. Manufacturer shall warrant flexible flashing material for life of the wall.
   b. Begin warranty from the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL

A. Manufacturer: Obtain masonry units from one manufacturer, of uniform texture and color for each kind required, for each continuous area and visually related areas.

1. Brick: Subject to compliance with requirements, manufacturers of brick units which may be incorporated in the work include, but are not limited to, the following:

   a. Church Brick Company.
   b. Consolidated Brick.
   c. Diener Brick Company.
   d. Tri-State Brick & Building Materials, Inc.
   e. The Belden Brick Company.
   f. Or approved equal.

2. Concrete and Architectural Masonry Units: Subject to compliance with requirements, manufacturers of concrete masonry units which may be incorporated in the work include, but are not limited to, the following:
2.2 BRICK MADE FROM CLAY OR SHALE

A. General: Comply with referenced standards and other requirements indicated below applicable to each form of brick required.

B. Size: Provide bricks manufactured to the following actual dimensions:

1. Economo: 3-5/8 inch x 3-5/8 inch x 7-5/8 inch.
2. 7-5/8" Modular: 3-5/8 inch x 7-5/8 inch x 7-5/8 inch.

C. Provide special molded shapes where indicated and for application requiring brick of form, size and finish on exposed surfaces which cannot be produced from standard brick sizes by sawing.

D. For sills, caps and similar applications resulting in exposure of brick surfaces which otherwise would be concealed from view, provide uncored or unfrogged units with all exposed surfaces finished.
E. Facing Brick: ASTM C 216, and as follows.

1. Grade SW.
2. Type: FBS.
3. Compressive Strength: 8,000 psi, average, per ASTM C 67.
4. Application: Use where brick is exposed, unless otherwise indicated.
5. Texture and Color: As selected by the Architect.

F. Efflorescence: Provide brick tested and rated in compliance with ASTM C67.

2.3 CALCIUM SILICATE MASONRY UNITS (CSMU)

A. Basis of Design: “Renaissance” masonry units as manufactured by Arriscraft International; or approved equal. Provide calcium silicate masonry units, ASTM C73, Grade SW; solid units that have been pressure formed and autoclaved; special shapes in sizes indicated; or approved equal.

1. Modular sizes as indicated on the drawings.
2. Texture: Smooth.
3. Color: As selected by Architect

B. Mortar: 1:1:6 Portland cement-hydrated lime-sand mix, as specified in this Section.

C. Grout: Maximum 6,500 psi at 28 days, as specified in this Section.

D. Wall Ties and Anchorages: As specified in this Section.

E. Joint Sealants and Backer Rods: Non-staining type, as specified in Section 07900.

F. Flashing, Vents and Masonry Accessories: as specified in this Section.

G. Fabrication Tolerances: Fabricate calcium silicate masonry units to the following tolerances:

1. Unit Length: Plus or minus 1/16”.
2. Unit Height: Plus or minus 1/16”.
3. Deviation from Square: Plus or minus 1/16”, with measurement taken using longest edge as the base.
4. Bed Depth: Plus or minus 1/8”.

2.4 DOLOMITIC MASONRY UNITS

A. Basis of Design: “Adair Limestone Marble” units as quarried by Arriscraft International; or approved equal. Provide dimension limestone, ASTM C568, Category III - High Density, dolomitic limestone; special shapes as indicated; having the following typical average properties when tested to the identified standard; or approved equal:

2. Absorption: 0.75 percent, to ASTM C97.
5. Flexural Strength: 1,600 psi, to ASTM C880.
7. Finish: Medium-Dressed.

B. Mortar: 1:1:6 Portland cement-hydrated lime-sand mix, as specified in this Section.

C. Grout: Maximum 6,500 psi at 28 days, as specified in this Section.

D. Wall Ties and Anchorages: As specified in this Section.

E. Joint Sealants and Backer Rods: Non-staining type, as specified in Section 07900.

F. Flashing, Vents and masonry accessories: as specified in this Section.

2.5 CONCRETE MASONRY UNITS

A. General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.

B. Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

1. Provide bullnose units for outside corners unless otherwise indicated.

C. Concrete Block: Provide units complying with characteristics indicated below for face size, exposed face and under each form of block included, for weight classification.

D. Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8" high (15-5/8" x 7-5/8" actual) x thicknesses indicated.

E. Where special patterns are indicated, provide units with exposed faces matching color, texture and pattern of Architect's sample.

F. Hollow Loadbearing Block: ASTM C 90 and as follows:

1. Weight Classification: Lightweight.

G. Solid Loadbearing Block: ASTM C 90 and as follows: (Below grade and wherever else solid CMU is indicated.

1. Weight Classification: Lightweight.

H. Solid 4" and 6" CMU (2 and 3 Hour Fire Resistance Rated) Loadbearing Block: Standard Method for Determining Fire Resistance of Concrete and Masonry Assemblies - ANSI/ACI 216.1-97, TMS-0216-97 and as follows:

1. Construction and material requirements of concrete masonry including units, mortar, grout, control joint materials and reinforcement shall comply with ACI 530/ASCE 5/TMS 402.
2. Concrete masonry units shall comply with ASTM C 55, C 73, C 90 or C 129.

3. Weight Classification: Lightweight.

4. Aggregate Type: Expanded clay, expanded shale or expanded slate with a minimum required equivalent thickness of 3.6 inches for 4" CMU.

2.6 SPLIT FACE BLOCK

A. Provide split face block, ASTM C-90, in sizes indicated as manufactured by E.P. Henry Company; or approved equal.

B. Provide units with integral liquid polymeric water repellant admixture, mixed with concrete during production of masonry units

1. Basis of Design: "Dry-Block Integral Water Repellant System" as manufactured by GCP Applied Technologies Inc., Cambridge, MA, Tel.# 877.423.6491 / 617.876.1400; or approved equal.

2. Units shall be capable of attaining Class E Rating under ASTM E 514-74, and no decrease in flexural strength or compressive strength of prisms when compared to “control”, under ASTM E 72-74.

3. Special shapes: Provide special block types where required for corners, control joints, headers, lintels, and other special conditions, whether or not specifically indicated on the drawings as special.

a. Provide ends of exposed architectural cmu with matched texture to unit face unless otherwise noted.

b. Provide sand blasted surfaces at exposed head, jamb and sill at window, door, louver, vent and all other similar conditions.

4. Provide indicated number of colors, to be selected from manufacturer’s available full range of colors.

2.7 GROUND FACE BLOCK

A. Provide smooth textured concrete masonry units, ASTM C-90, in sizes indicated as manufactured by E.P. Henry Company; or approved equal.

B. Provide units with integral liquid polymeric water repellant admixture, mixed with concrete during production of masonry units

1. Basis of Design: "Dry-Block Integral Water Repellant System" as manufactured by GCP Applied Technologies Inc., Cambridge, MA, Tel.# 877.423.6491 / 617.876.1400; or approved equal.

2. Units shall be capable of attaining Class E Rating under ASTM E 514-74, and no decrease in flexural strength or compressive strength of prisms when compared to “control”, under ASTM E 72-74.
3. Special shapes: Provide special block types where required for corners, control joints, headers, lintels, and other special conditions, whether or not specifically indicated on the drawings as special.

4. Provide indicated number of colors, to be selected from manufacturer’s available full range of colors.

2.8 CAST STONE BANDS AND DATESTONE

A. Basis of Design: Provide cast stone as manufactured by Reading Rock®, Inc.; or approved equal.

1. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to the following:

   a. Custom Cast Stone, Inc.
   b. American Artstone
   c. Or approved equal

2. Other acceptable manufacturers shall have a recommended minimum of ten (10) years of continuous operation and adequate facilities for producing and curing machine-made Cast Stone units as described herein.

3. Manufacturer shall be a member of the Cast Stone Institute.

B. Provide cast stone of size, shape and thickness indicated.

C. Provide datestone as shown, with incised inscription and complete with copper document box.

1. Include in the cost the labor costs for sealing the document box and setting the cornerstone at a public ceremony to be scheduled by the Owner.

D. Physical Properties:

3. Linear Shrinkage: ASTM C 1364.
5. Cast Stone Materials:
   a. Portland Cement: ASTM C 150, Type I, white/or gray as required to match specified color,
   b. Coarse Aggregate: ASTM C 1364, Granite, quartz, or limestone,
   c. Fine Aggregate: ASTM C 1364, Natural or manufactured sands,
   d. Coloring Pigments: ASTM C 1364, Inorganic iron oxides,
   e. Chemical Admixtures: ASTM C 1364.

E. Color and finish: To be selected by the Architect from manufacturer’s available full range of standard colors and finishes.
1. Exposed surfaces shall exhibit a fine grained texture similar to natural stone. No bugholes or air voids will be permitted.

2. Variation:
   a. Must match color and finish of approved sample when viewed in direct light at a 10 foot distance.
   b. Permissible Variation in Color:
      1) Hue Difference - ASTM C 1364, 2 units.
      2) Total Color Difference - ASTM C 1364, 6 units.

F. Anchors: Non-corrosive type, sized for conditions:
   1. Provide Stainless steel type 304 anchors, pins, dowels and clip angles as indicated or if not indicated as required for each cast stone units and panels.
   2. Shelf angles and other similar structural items shall be galvanized steel.

G. Reinforcement: Where required by ASTM C 1364, Epoxy coated or galvanized.

H. Fiber Reinforcement: ASTM C 1116, fibrous nylon


J. Curing, Finishing and Cleaning: Provide methods and products which had been approved or recommended by manufacturer of the cast stone units.

K. Cleaner:
   1. Manufacturer’s standard-strength, general-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces.
   2. Approved for intended use by cast stone manufacturer and approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.9 GLAZED BRICK

A. Provide units indicated below with manufacturer's standard smooth resinous tile facing complying with ASTM C 126, Grade S for glazed brick:
   1. For units on which prefaced surfaces are molded, comply with the following requirements:
      a. Hollow Loadbearing Brick: ASTM C216, Grade SW, Type FBX.

B. Size: Manufacturer's standard with nominal face dimensions of 8 inch long x 8 inch high (7-5/8 inch x 7-5/8 inch actual) x thicknesses indicated for units on which prefaced surfaces are molded.

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C. Color and Pattern: Provide color and pattern selected by Architect from manufacturer's full range of standard colors and patterns.

D. Available Products: Subject to compliance with requirements, prefaced units which may be incorporated in the work include, but are not limited to, the following:

1. Glen Gerry Glazed Brick.
2. Stark Ceramics Millennium Collection.
3. Or approved equal.

2.10 SOUND CONTROL BLOCK

A. Basis of Design: “Soundblox, Type RSC”, thickness as shown, and as manufactured by the Proudfoot Company; or approved equal, with slots and wedges, and filler material of specially fabricated incombustible fibrous material.

1. NRC: 0.80, minimum for 4" thick units.

2.11 MASONRY LINTELS

A. General, provide the following:

1. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.12 MORTAR AND GROUT MATERIALS

A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

B. Limit cementitious materials in mortar to portland cement-lime.

C. Portland Cement: ASTM C 150, Type 1, except Type III may be used for cold weather construction. Provide natural color or white cement as required to produce required mortar color.

D. For colored aggregate mortars use masonry cement, ASTM C 91, of natural color or white as required to produce mortar colors required.

E. Hydrated Lime: ASTM C 207, Type S.

F. Aggregate for Mortar: ASTM C 144, except for joints less than 1/4 inch use aggregate graded with 100% passing the No. 16 sieve.

1. White Mortar Aggregates: Natural white sand or ground white stone.
2. Colored Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.

G. Mortar: ASTM C387, Type N. Provide mortar for face brick and accessories to match original mortar in color, texture, strength and hardness (density and porosity). Determine existing mortar mix constituents and ratios by analysis. Review laboratory evaluations with Architect before proceeding with the work. Match color of existing mortar by use of aggregates matching original aggregate color where possible. Use inorganic coloring pigments if satisfactory color match cannot be attained with natural materials.

1. Use Type M mortar for masonry below grade and in contact with earth, and where indicated.

2. Use Type S mortar for exterior, above-grade loadbearing and non-loadbearing CMU walls; for interior loadbearing CMU walls; and for other applications where another type is not indicated.

H. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar required, unless otherwise indicated.

I. Grout for Unit Masonry: Comply with ASTM C 476.

1. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

J. The proper use of ASTM C 270 and Test Method ASTM C 780 for evaluating masonry mortars produced in the laboratory and the construction site is in accordance with ASTM C 1586.


L. Water: Clean and potable.

M. Colored Aggregate Mortar: Produce mortar of color required by use of colored aggregates in combination with selected cementitious materials.

1. Colors as selected by the Architect from manufacturer’s available full range of colors.

N. Refractory Mortar Mix: Complying with ASTM C 199, medium duty, J. A. France "Francet" or approved equal.

O. Water Repellant Admixture:

1. Basis of Design: "Dry-Block Integral Water Repellant System" as manufactured by GCP Applied Technologies Inc., Cambridge, MA, Tel.# 877.423.6491 / 617.876.1400; or approved equal.

2. Provide water repellant mortar admixture to be added to mortar and grout during mixing, and capable of attaining Class E Rating under ASTM E 514-74. Tested walls, containing integral water repellant admixture and with mortar containing water...
repellant admixture, shall exhibit no decrease in flexural strength or compressive strength of prisms when compared to “control”, under ASTM E 72-74.

3. Provide water repellant mortar admixture for use with Architectural Concrete Masonry Units, (Ground face, Rock face, etc.) and where concrete masonry units used in areas with high exposure to water, (Basements, exposed painted exterior application, etc.).

2.13 JOINT REINFORCEMENT, TIES AND ANCHORING DEVICES

A. Materials: Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie and anchor for size and other characteristics:

1. Hot-Dip Galvanized Steel Wire: ASTM A 82 for uncoated wire and with ASTM A 153, Class B-2 (1.5 oz. per sq. ft. of wire surface) for zinc coating applied after prefabrication into units.

B. Joint Reinforcement: Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units, and complying with requirements indicated below:

1. Width: Fabricate joint reinforcement in units with widths of approximately 2 inch less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8 inch on joint faces exposed to exterior and ½ inch elsewhere.

   b. Wire Size for Cross Rods: 9 gauge.

2. Truss design with continuous diagonal cross rods spaced not more than 16 inch o.c.

3. Number of Side Rods: One side rod for each face shell of concrete masonry back-up and one rod for brick wythe.

4. Configuration:

   a. Applications of Single Wythe Wall width: Truss design, diagonal cross rods at not more than 16 inches on center.

      1) Basis of Design: Provide Hohmann & Barnard, Inc., No.# 120, Truss-Mesh; or approved equal.

   b. Applications of more than one unit width (Composite Wall): Truss design, diagonal cross rods at not more than 16 inches on center:

      1) Basis of Design: Provide Hohmann & Barnard, Inc., No.# 140, Truss-Twin-Mesh; or approved equal.

   c. Applications of more than one unit width, exterior cavity walls (Masonry back-up), Seismic design:
1) Basis of Design: Provide Hohmann & Barnard, Inc., No. #170-ML (Mighty-LOK®); or approved equal.

d. Applications for exterior cavity walls (Metal stud back-up), Seismic design (where applicable):

1) Basis of Design: Provide Hohmann & Barnard, Inc., No. # Thermal 2-Seal Wing Nut Anchor, stainless steel. Single screw veneer tie for metal stud construction; or approved equal.
   a) Dual-diameter barrel with factory-installed WEPDM washers to seal both the face of the installation and the air/vapor barrier.
   b) Projecting thermal wings are steel reinforced and coated with highly flame resistant plastic to create a thermal break, decreasing thermal transfer through rigid insulation.
   c) Wings accept a standard or seismic hook, spin to easily orient pintles/hooks to masonry joints, and provide up to ½" of adjustability to account for variations in the wall thickness.

C. Flexible Anchors: Where flexible anchors are indicated for connecting masonry to structural framework, provide 2-piece anchors as described below which permit vertical or horizontal differential movement between wall and framework parallel to, but resist tension and compression forces perpendicular to, plane of wall.

1. For anchorage to steel framework provide manufacturer's standard anchors with triangular-shaped wire tie section sized to extend within 1 inch of masonry face. Coordinate with Steel Contractor for type and size required. Provide 3/16 inch diameter, hot-dip galvanized steel.

D. Unit Type Masonry Inserts in Concrete: Furnish cast iron or malleable iron inserts of type and size indicated.

E. Dovetail Slots: Furnish dovetail slots, with filler strips, of slot size indicated, fabricated from 0.0336 inch (22 gage) sheet metal.

F. Anchor Bolts: Provide steel bolts with hex nuts and flat washers complying with ASTM A 307, Grade A, hot-dip galvanized to comply with ASTM C 153, Class C, in sizes and configurations indicated.

G. Pencil rods at construction joints as shown: Dowels dipped in tar for ½ of length.

H. Reinforcing Bars: Deformed steel, ASTM A 615, Grade 60 for bars No. 3 to No. 18.

2.14 CONCEALED FLASHING MATERIALS

A. Type 1: Through Wall Mechanically Keyed Flashing; (At ledges and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior and/or where indicated). Provide end dams where shown or required.

1. Basis of Design: Provide 0.018" (26 gauge) thick 302/304 dead soft stainless steel, as manufactured by Keystone Flashing Co., Philadelphia, PA, Tel. # 215.329.8500; or approved equal.
a. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to the following:

1) Cheney Flashing Co., Trenton, NJ, Tel.# 609.394.8175 or 800.322.2873.
2) Or approved equal.

2. Type: Provide three way bond interlocking type, factory formed, 3/16” high undercut sawtooth ribs at 3” intervals to provide a three way mechanical bond in the mortar bed.

3. Extend bottom horizontal leg of flashing out from the outer face of the masonry wall ½" at 30 degree from horizontal, and hem.

4. Provide specially fabricated units and exterior and interior corner conditions. Lap flashing a minimum of 4-inches and seal laps with mastic or as recommended by manufacturer.

B. **Type 2**: Thru-Wall Copper Fabric Flashing (Asphalt-Free): (At the head of window, door and unit ventilator masonry openings, existing columns in masonry cavity wall or where indicated). Provide end dams where shown, or as required.


   a. Subject to compliance with requirements of the Contract Documents, manufacturers offering products which may be incorporated in work include the following:

   1) “Copper Sealtite 2000®”, as manufactured by Advanced Building Products Inc., Tel.# 800.252.2306.
   2) “Copper-Fabric™ NA Copper Fabric Flashing”, as manufactured by Sandell Manufacturing Company, Inc., (a Hohmann & Barnard, Inc. Co.) , Tel.# 800.283.3888 or 518.357.9757.
   3) “Gorilla Flash GF-500, as manufactured by STS Coatings, Inc., Tel.# 830.995.5177.
   4) “Copper Seal”, as manufactured by Wire-Bond, Inc., Tel.# 800.849.6722.
   5) Or approved equal.

2. Type: Copper sheet bonded with rubber based adhesive, between two layers of fiberglass fabric weighing not less than 0.3 oz/layer with a minimum of 10 x 20 threads per inch.

   a. Copper Type: CDA Alloy 110, 060 temper in accordance with ASTM B370.
   b. Copper Weight: 5 oz. per square foot.

3. Fabric: Fiberglass fabric; laminated to each face of copper core with core weight manufacturer identified on product with color coded laminate.


5. Size: Manufacturer’s standard roll width and length.
   a. Type: One part 100% solids, solvent-free formulated silyl-terminated polyester (STPE), ASTM C920-11, Type S, Grade NS, Class 50.

   a. Provide factory fabricated stainless-steel drip plate from ASTM A240, Type 304, 26 gauge continuous, Type FTS with 1/8" thick compressible filler adhered to bottom of drip plate.
      1) Extend horizontal leg flashing not less than 3-inches into masonry wall and bend down from outer edge of wall or steel lintel for ½" at 30 degree from horizontal, and hem.
      2) Fabricate in 8 to 12 feet lengths and provide stainless-steel splice plates at joints between lengths.
      3) Provide factory fabricated outside and inside corner pieces.

8. Termination Bar: Where indicated, or required, provide manufacturer’s standard 1" wide, minimum by 1/8" thick, minimum by continuous length pre-punched stainless-steel bar or composite material bar complete with stainless-steel fasteners.
   a. Subject to compliance with requirements of the Contract Documents, manufacturers offering products which may be incorporated in work include the following:
      1) Heckmann Building Products, Inc., Melrose Park, IL, Tel.# 800.621.4140 / www.heckmannbuildingprods.com
      2) Hohmann & Barnard, Inc., Hauppauge, NY, Tel.# 800.645.0616 or 631.234.0600 / www.h-b.com
      3) Or approved equal.

9. Provide specially fabricated units and interior corner conditions. Lap flashing a minimum of 6-inches and seal laps with mastic, or as recommended by manufacturer.

C. **Type 3**: Thru-Wall Spandrel Steel Beam / Lintel Flashing: (At spandrel steel beams, steel lintels above doors and windows, at steel columns and/or where indicated).

      a. 40 mil (1 mm) total thickness self-adhesive, cold applied tape consisting of 32 mils (0.8 MM) of rubberized asphalt integrally bonded to a 8 mil (0.2 mm) high density, cross laminated polyethylene film. Rolls are interwound with disposable silicone-coated release sheet.
b. Provide specially premolded units at exterior and interior corner conditions. Lap
flashing a minimum of 4-inches and seal laps with Bituthene mastic or as
recommended by manufacturer.

c. Conditioning and Priming: Use “Perma-A-Barrier WB Primer” to enhance adhesion
on dusty cementitious substrates.

1) Use “Bituthene Primer B2” to prime green concrete or damp substrates.

2. Subject to compliance with requirements of the Contract Documents, manufacturers
offering products which may be incorporated in work include the following:


b. Hohmann & Barnard, Inc., Hauppauge, NY, Tel.# 800.645.0616 / 631.234.0600,

c. Or approved equal.

3. Provide “FTSA” stainless steel drip plate as manufactured by Hohmann & Barnard, Inc.,
Polyguard Products Inc., Masonpro Inc., Mortar Net USA Ltd., or approved equal,
adhered to the Perm-A-Barrier Wall Flashing, between the steel lintel and the exterior
finish masonry.

a. Provide factory fabricated stainless-steel drip plate from ASTM A240, Type 304,
26 gauge continuous, Type FTS with 1/8" thick compressible filler adhered to
top of drip plate.

1) Extend horizontal leg flashing not less than 3-inches into masonry wall and
bend down from outer edge of wall or steel lintel for ½" at 30 degree from
horizontal, and hem.

2) Fabricate in 8 to 12 feet lengths and provide stainless-steel splice plates at
joints between lengths.

3) Provide factory fabricated outside and inside corner pieces.

D. **Type 4**: Thru-Wall Two Piece Mechanically Keyed Cap Flashing; (At rising walls above roofs
and/or where indicated).

1. Basis of Design: Provide 0.018" (26 gauge) thick 302/304 dead soft stainless steel, as
manufactured by Keystone Flashing Co., Philadelphia, PA, Tel.# 215.329.8500; or
approved equal.

a. Subject to compliance with requirements, manufacturers offering products which
may be incorporated in the work include but are not limited to the following:

1) Cheney Flashing Co., Trenton, NJ, Tel.# 609.394.8175 / 800.322.2873.

2) Or approved equal.

2. Type: Provide three way bond interlocking type, factory formed thru-wall flashing, 3/16"
high undercut sawtooth ribs at 3" intervals to provide a three way mechanical bond in
the mortar bed, with counterflashing where roof abuts rising wall.
3. Provide specially fabricated units and exterior and interior corner conditions. Lap flashing a minimum of 4-inches and seal laps with mastic or as recommended by manufacturer.

2.15 MISCELLANEOUS MASONRY ACCESSORIES

A. Non-Metallic Expansion Joint Strips: Premolded, flexible cellular neoprene rubber filler strips complying with ASTM D 1056, Grade 2A1, capable of compression up to 35%, of width and thickness indicated.

B. Compressible Insulation at Top of Walls: A high-density mineral fiber insulation rated non-combustible as tested per ASTM E136.


2. Insulation shall sustain temperature above 2,000°F in accordance with ASTM E119 and comply with ASTM E84 for the following:
   a. Flame Spread: 0
   b. Smoke Developed: 0

3. Provide size and shape to suit indicated conditions.

C. Fire Rated Control and Expansion Joints, Joint Filler and Sealant:

1. Provide fire-rated sealant in accordance with UL. Listed design for fire-rated joint assemblies.

2. For expansion and control joint filler and sealant as specified in Section 07900.

D. Weepholes: Provide the following for weepholes:

1. Plastic, Rectangular with screen: Item # 342 W/S; Hohmann & Barnard, Inc.; or approved equal
   a. Medium density polyethylene 3/8 inch x 1-1/2 inch x 3-1/2 inch clear color plastic with stainless steel screens and cotton wicks.

E. Mortar Net: Basis of Design: Provide Mortar Net as manufactured by Mortar Net USA, Ltd., Tel. # 800 664-6638; or approved equal.

1. Size: 10 inches high x 1 inch thick x 5 feet long.

2. Provide mortar net inside masonry cavity walls to keep weepholes open. Install in accordance with manufacturer’s printed instructions.

F. Waterstops: Provide 16 oz. copper waterstops at indicated expansion joints; Catalog # 94-V with Type “A” flange as manufactured by Heckmann Building Products Inc.; or approved equal.
G. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D226, Type I (No. 15 asphalt felt).

2.16 SLATE BENCH SEAT

A. Pennsylvania Slate: Clear stock, honed finish, as produced by the Williams and Sons Slate and Tile Inc. Wind Gap Pa., The Structural Slate Co., Penn Argyl, PA; or approved equal.

1. Submit 2 samples, cutting and setting drawings.

B. All stone shall be cut accurately to shape and dimensions and full to the square, with jointing as shown on approved drawings. All exposed faces shall be dressed true.

2.17 CAVITY INSULATION: Refer to Section 07200.

2.18 AIR/ VAPOR BARRIER: Refer to Section 07270.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Wetting Clay Brick: Wet brick made from clay or shale which have ASTM C 67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods which ensure each clay masonry unit being nearly saturated but surface dry when laid.

B. Do not wet concrete masonry units.

C. Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.

D. Thickness: Build cavity and composite walls, floors and other masonry construction to the full thickness shown. Build single-wythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness indicated.

E. Build chases and recesses as shown or required for the work of other trades. Provide not less than 8 inch of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.

F. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.

G. Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining work. Use full-size units without cutting where possible. No discoloration of units caused by cutting will be acceptable.

H. Pattern Bond:

1. Brick: Running bond, unless otherwise shown.
2. Concrete masonry units: Running bond, unless otherwise shown.

3. Lay concealed masonry with all units in a wythe bonded by lapping not less than 2 inches.

I. All concrete masonry units and courses below grade shall be filled solid with grout.

3.2 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4 inch in 10 feet, or 3/8 inch in a story height not to exceed 20 feet, nor ½ inch in 40 feet or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4 inch in any story or 20 feet maximum, nor ½ inch in 40 feet or more. For vertical alignment of head joints do not exceed plus or minus 1/4 inch in 10 feet, ½ inch maximum.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4 inch in any bay or 20 feet maximum, nor ½ inch in 40 feet or more. For top surface of bearing walls do not exceed 1/8 inch between adjacent floor elements in 10 feet or 1/16 inch within width of a single unit.

C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed ½ inch in any bay or 20 feet maximum, nor 3/4 inch in 40 feet or more.

D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch nor plus ½ inch.

E. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to ½ inch. Do not exceed head joint thickness indicated by more than plus or minus 1/8 inch.

3.3 LAYING MASONRY WALLS

A. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units at corners, jambs and wherever possible at other locations.

B. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.

C. Stopping and Resuming Work: Rack back ½-unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.

D. Built-in Work: As the work progresses, build-in items specified under this and other sections of these specifications. Fill in solidly with masonry around built-in items.

1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

3. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts and similar items, unless otherwise indicated.

E. Extend all interior walls full height to underside of structure of deck, unless otherwise indicated. Include compressible insulation at top to completely close space between wall and structure above.

F. Support and protect masonry, indicated to remain, which surrounds removal area.

1. Refer to BIA, Technical Note #46: “Maintenance of Brick Masonry”, [www.gobrick.com/Portals/25/docs/Technical%20Notes/TN46.pdf](http://www.gobrick.com/Portals/25/docs/Technical%20Notes/TN46.pdf), for two recommended methods to properly support existing brickwork when installing new mechanically keyed through wall flashing, and as indicated below:

   a. **Method 1**: Remove alternate sections of masonry in 2'-0" to 5'-0" (610 mm to 1.52m) lengths.

   b. **Method 2**: Temporary braces can be installed to permit the removal of longer sections of masonry.

   **Note**: The replaced masonry should be properly cured (5 to 7 days) before the intermediate masonry sections or supports are removed.

3.4 **INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY**:

A. Do not wet concrete masonry units (CMU).

B. Lay CMU units with full-face shell mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Solidly bed cross-webs of starting courses in mortar. Maintain head and bed joint widths shown, or if not shown, provide 3/8 inch joints.

C. Where solid CMU units are shown, lay with full mortar head and bed joints.

D. Walls:

1. For running bond lay CMU wall units in ½-running bond with vertical joints in each course centered on units in courses above and below, unless otherwise indicated. Bond and interlock each course at corners and intersections. Use special-shaped units where shown, and as required for corners, jambs, sash, control joints, lintels, bond beams and other special conditions.

   a. For walls intersecting and/or abutting firewalls, provide control joints with fire-rated sealant as indicated in Section 07900.
2. Maintain vertical continuity of core or cell cavities, which are to be reinforced and
grouted, to provide minimum clear dimension indicated and to provide minimum
clearance and grout coverage for vertical reinforcement bars. Keep cavities free of
mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.

3. Where horizontal reinforced beams (bond beams) are shown, use special units or
modify regular units to allow for placement of continuous horizontal reinforcement
bars. Place small mesh expanded metal lath or wire screening in mortar joints under
bond beam courses over cores or cells of non-reinforced vertical cells, or provide units
with solid bottoms.

4. Option: Where all vertical cores are not shown to be grouted, Contractor may elect
to fill all vertical cores with grout. In which case, requirements for mortar bedding of
cross-webs and closing of core spaces below bond beams do not apply.

E. Grouting:

1. Use "Fine Grout" per ASTM C 476 for filling spaces less than 4" in one or both
horizontal directions.

2. Use "Coarse Grout" per ASTM C 476 for filling 4 inch spaces or larger in both
horizontal directions.

3. Grouting Technique: At the Contractor's option, use either low-lift or high-lift grouting
techniques subject to requirements which follow.

F. Low-Lift Grouting:

1. Provide minimum clear dimension of 2inch and clear area of 8 sq. in. in vertical cores
to be grouted.

2. Place vertical reinforcement prior to laying of CMU. Extend above elevation of
maximum pour height as required for splicing. Support in position at vertical intervals
not exceeding 192 bar diameters nor 10 ft.

3. Lay CMU to maximum pour height. Do not exceed 5' height, or if bond beam occurs
below 5' height stop pour at course below bond beam.

4. Pour grout using chute or container with spout. Rod or vibrate grout during placing.
Place grout continuously; do not interrupt pouring of grout for more than one hour.
Terminate grout pours 1-1/2 inch below top course of pour.

5. Bond Beams: Stop grout in vertical cells 1-1/2 inch below bond beam course. Place
horizontal reinforcement in bond beams; lap at corners and intersections as shown.
Place grout in bond beam course before filling vertical cores above bond beam.

G. High-Lift Grouting:

1. Do not use high-lift grouting technique for grouting of CMU unless minimum cavity
dimension and area is 3 inch and 10 sq. inch, respectively.
2. Provide cleanout holes in first course at all vertical cells which are to be filled with grout.

3. Use units with one face shell removed and provide temporary supports for units above, or use header units with concrete brick supports, or cut openings in one face shell.

4. Construct masonry to full height of maximum grout pour specified, prior to placing grout.

5. Limit grout lifts to a maximum height of 5 feet and grout pour to a maximum height of 24 feet, for single wythe hollow concrete masonry walls, unless otherwise indicated.

6. Place vertical reinforcement before grouting. Place before or after laying masonry units, as required by job conditions. Tie vertical reinforcement to dowels at base of masonry where shown and thread CMU over or around reinforcement. Support vertical reinforcement at intervals not exceeding 192 bar diameters nor 10 feet.

7. Where individual bars are placed after laying masonry, place wire loops extending into cells as masonry is laid and loosen before mortar sets. After insertion of reinforcement bar, pull loops and bar to proper position and tie free ends.

8. Where reinforcement is prefabricated into cage units before placing, fabricate units with vertical reinforcement bars and lateral ties of the size and spacing indicated.

9. Place horizontal beam reinforcement as the masonry units are laid.

10. Embed lateral tie reinforcement in mortar joints where indicated. Place as masonry units are laid, at vertical spacing shown.

11. Where lateral ties are shown in contact with vertical reinforcement bars, embed additional lateral tie reinforcement in mortar joints. Place as shown, or if not shown, provide as required to prevent grout blowout or rupture of CMU face shells, but provide not less than No. 2 bars or 8-gage wire ties spaced 16 inches o.c. for members with 20 inches or less side dimensions, and 8 inches o.c. for members with side dimensions exceeding 20 inches.

12. Preparation of Grout Spaces: Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcement and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond. After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.

13. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond. Install shores and bracing, if required, before starting grouting operations.

14. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Architect.
15. Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 5 feet. Allow not less than 30 minutes, nor more than one hour between lifts of a given pour. Rod or vibrate each grout lift during pouring operation.

16. Place grout in lintels or beams over openings in one continuous pour.

17. Where bond beam occurs more than one course below top of pour, fill bond beam course to within 1 inch of vertically reinforced cavities, during construction of masonry.

18. When more than one pour is required to complete a given section of masonry, extend reinforcement beyond masonry as required for splicing. Pour grout to within 1-1/2 inch of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour section before grouting. Repeat sequence if more pours are required.

3.5 MORTAR BEDDING AND JOINTING

A. Lay solid brick size masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

B. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

C. Set stone units in full bed of mortar with all vertical joints slushed full. Fill dowel, anchor and similar holes solid. Wet stone joint surface thoroughly before setting; for stone surfaces which are soiled, clean bedding and exposed surfaces with fiber brush and soap powder followed by thorough rinsing with clear water.

D. Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8 inch joints.

E. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, unless otherwise indicated.

F. Tool exposed joints slightly concave using a jointer larger than joint thickness, unless otherwise indicated.

G. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

3.6 CAVITY WALLS

A. Keep cavity clean of mortar droppings and other materials during construction. Strike joints facing cavity flush.
B. Tie exterior wythe to back-up with continuous horizontal joint reinforcing, installed in mortar joints at not more than 16" o.c. vertically.

C. Provide weep holes in exterior wythe of cavity wall located immediately above ledges and flashing, spaced 2'-0" o.c., unless otherwise indicated.

D. Provide concealed flashing in cavity walls at all required locations and as indicated herein after.

E. On units of plastic insulation, install small pads of mastic spaced approximately 1'-0" o.c. both ways on inside face, as recommended by manufacturer. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

3.7 AIR/ VAPOR BARRIER: Refer to Section 07270.

3.8 HORIZONTAL JOINT REINFORCEMENT

A. Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch on exterior side of walls, ½ inch elsewhere. Lap reinforcing a minimum of 6 inches.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

1. Space continuous horizontal reinforcement as follows:

   a. For multi-wythe walls (solid or cavity) where continuous horizontal reinforcement acts as structural bond or tie between wythes, space reinforcement as required by code but not more than 16 inches o.c. vertically.

   b. For single-wythe walls, space reinforcement at 16" o.c. vertically, unless otherwise indicated.

2. Cut reinforcement units at walls intersecting and/or abutting firewalls. Provide control joints with fire-rated sealant as indicated in Section 07900.

D. Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcement placed in 2 horizontal joints approximately 8" apart, immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2'-0" beyond jambs of the opening except at control joints.

3.9 ANCHORING MASONRY WORK

A. Provide anchoring devices of the type indicated. If not indicated, provide standard type for facing and back-up involved.
1. Strap anchors for masonry at existing walls.
2. Do not anchor fire walls to Structural Steel, intersecting and/or abutting walls.

3.10 CONTROL AND EXPANSION JOINTS

A. General: Provide vertical and horizontal expansion, control and isolation joints in masonry maximum 30 feet on center. Build-in related items as the masonry work progresses.
   1. Coordinate location of all control and expansion joints in the field with Architect prior to commencement of work.

B. Build in joint fillers where shown: See Section 07900, Joint Sealers. Joint width for sealants: 3/8 inch unless otherwise indicated. Include straight joints at vertical recessed brick detail.

3.11 LINTELS

A. Install loose lintels weighing 200 lbs. or less of steel and other materials where shown. Steel lintels weighing more than 200 lbs. will be installed by Structural Steel Contractor.

B. Provide masonry lintels where shown and wherever openings of more than 1'-0" are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Precast lintels shall be scored to simulate adjacent blockwork. Cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.12 FLASHING OF MASONRY WORK

A. **NOTE:** When Contractor must remove a portion of the existing masonry wall veneer in order to install through wall flashing or other work, the Contractor MUST follow the Brick Industry Association (Technical Note #46) and the Concrete Masonry Industry methodology to support and protect the existing adjacent masonry, indicated to remain, which surrounds removal area. The Contractor shall remove the proper length of masonry and leave adjacent masonry in place to support existing masonry above the work in lengths indicated below.

   1. Refer to BIA, Technical Note #46: “Maintenance of Brick Masonry”, www.gobrick.com/Portals/25/docs/Technical%20Notes/TN46.pdf, for two recommended methods to properly support existing brickwork when installing new mechanically keyed through wall flashing, and as indicated below:

      a. **Method 1:** Remove alternate sections of masonry in 2'-0" to 5'-0" (610 mm to 1.52m) lengths.

      b. **Method 2:** Temporary braces can be installed to permit the removal of longer sections of masonry.

   Note: The replaced masonry should be properly cured (5 to 7 days) before the intermediate masonry sections or supports are removed.
B. General: Provide concealed flashing in masonry work at, or above, shelf angles, lintels, ledges and the base of perimeter cavity walls and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Place through-wall flashing in wall and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar. Extend flashings through exterior face of masonry and turn down to form drip.

1. Contractor shall provide concealed flashing in masonry at all required conditions, whether shown or not, and shall be typical and/or similar for all building conditions when details and notes are shown on drawings.

2. Contractor shall provide spandrel beam membrane flashings for all steel beams exposed to cavity, whether shown or not, and shall be typical and/or similar for all building conditions when details and notes are shown on drawings.

3. Contractor shall provide mechanically keyed through wall flashings above roofs conditions or where indicated in cavity wall construction, whether shown or not. Flashings shall be typical and/or similar for all building conditions when details and notes are shown on drawings.

   a. Set mechanically keyed through wall flashing in thin layer of mortar. Set masonry course above flashing in light layer of mortar.

C. Extend flashing the full length of ledges. Lap all flashing a minimum of 4 inches and seal laps with mastic or as recommended by manufacturer. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 8 inches, and through the inner wythe to within third of width of the inner wythe as indicated on drawings.

D. Extend flashing the full length of lintels and shelf angles and minimum of 4 inches into masonry each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 8 inches, and through the inner wythe to within ½" of the interior face of the wall in exposed work. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches.

   1. At heads and sills flashing shall extend 6 inches beyond each side of the opening and to be turned up at the sides/ends not less than 2 inches to form a pan, (end dam). All corners shall be folded, not cut.

E. Lap all flashing a minimum of 4 inches and seal laps with mastic or as recommended by manufacturer.

F. Provide weep holes in the head joints of the same course of masonry bedder in the flashing mortar. Space 24 inches o.c., unless otherwise indicated.

G. Install reglets and nailers for flashing and other related work where shown to be built into masonry work.
3.13 SOUND BLOCK

A. Anchor to concrete with dovetail anchors. Provide slots to concrete installer with instructions for installation.

B. Soundblox units shall be laid in stackbond with the open ends of the cavities facing downward, and shall be seated in a full horizontal bed of mortar. The slots shall be exposed to the area where the sound absorption is desired as indicated on the plans. Care shall be taken to insure that the slots are kept free of mortar or debris above the mortar joints. Lines shall be straight and true and the Soundblox workmanship shall otherwise conform to all requirements of the general specifications for masonry work.

3.14 SLATE BENCH SEAT

A. Clean stone before setting by thoroughly scrubbing with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh fillers or abrasives. If not thoroughly wet at time of setting, drench or sponge stone, Do not wet expansion or control joint surfaces.

B. Execute stonework by skilled mechanics, and employ skilled stone fitters at the site to do necessary field cutting as stone is set.

C. Set stone in accordance with drawings and final shop drawings for stonework. Provide anchors, supports, fasteners and other attachments shown or necessary to secure stonework in place. Shim and adjust accessories for proper setting of stone. Completely fill holes, slots and other sinkages for anchors, dowels, fasteners and supports with mortar during setting of stones.

D. Set stone before initial set of cement bed occurs. Do not set stone on dry bed. Apply a thin layer of neat cement paste 1/32-inch to 1/16-inch thick by brushing or troweling over setting bed, or apply 1/32 inch thick to bottom of stone. Tamp and beat stone for complete contact between stone and setting bed. Set and level each unit immediately.

E. Grout joints as soon as possible after initial set of setting bed. Force grout into joints, strike flush and tool slightly concave. Wet joint surfaces, if dry, prior to grouting.

1. Use Portland cement grout mixed in the proportion of one bag of Portland cement to 2 cubic feet of sand (measured in a damp, loose condition) mixed with water to the consistency of heavy cream.

2. Cure grout by maintaining in a moist condition for 7 days.

3. Remove grout spillage from face of stone as work progresses.

3.15 CAST STONE BANDS, CAPS AND DATESTONE

A. EXAMINATION
1. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of cast stone.

2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. INSTALLATION

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

2. Drench units with clear water just before setting.

3. Set units in full bed of mortar with full head joints, unless otherwise indicated. Build anchors and ties into mortar joints as units are set.

4. Fill dowel holes and anchor slots with mortar.

5. Fill collar joint solid as units are set.

6. Leave head joints open in coping and other units with exposed horizontal surfaces. Keep joints clear of mortar, and rake out to receive sealant.

7. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.

8. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.

9. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

10. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated, or as recommended by units manufacturer.

11. Sealing joints is specified in Division 7 Section "Joint Sealants."

12. Keep joints free of mortar and other rigid materials.

C. INSTALLATION TOLERANCES

1. Variation from Plumb: Do not exceed 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.

2. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet.
3. Variation in Plane between Adjacent Surfaces (Lipping): Do not exceed 1/16-inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

D. ADJUSTING AND CLEANING

1. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.

2. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

3. In-Progress Cleaning: Clean cast stone as work progresses. Remove mortar fins and smears before tooling joints.

4. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:

   a. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

   b. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

3.16 QUALITY CONTROL TESTING

A. Engage an independent testing and inspection agency to inspect engineered masonry and to perform tests and prepare test reports.

   1. Perform tests for condition, size, location and spacing of reinforcement and anchorage of engineered masonry assemblies.

B. Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with design requirements and indicated standards, and specifically state any deviations therefrom.

   1. Provide access for testing agency to places where structural steel reinforcement and anchorage work is being fabricated or produced so that required inspection and testing can be accomplished.

   2. Testing agency may inspect structural steel reinforcement and anchorage work at plant before shipment; however, Architect reserves right, at any time before final acceptance, to reject material not complying with specified requirements.

C. Correct deficiencies in structural steel reinforcement and anchorage work which inspections and laboratory test reports have indicated to be not in compliance with requirements.
1. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.

3.17 REPAIR, POINTING AND CLEANING

A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings and adjacent work to provide a neat, uniform appearance, prepared for application of sealants.

C. Clean exposed brick masonry surfaces by the bucket and brush hand cleaning method or by high pressure water method. Comply with requirements of BIA Technical Notes No. 20 "Cleaning Brick Masonry".

1. Use commercial cleaning agents in accordance with manufacturer's instructions.

D. Clean exposed CMU masonry by dry brushing at the end of each day's work and after final pointing to remove mortar spots and droppings. Comply with recommendations in NCMA TEK Bulletin No. 28.

1. Prepare exposed to view CMU surfaces to receive paint coatings in accordance with Section 09900.
SECTION 05450 - COLD-FORMED METAL FRAMING

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 exterior non load-bearing steel-stud walls.

1.3 PERFORMANCE REQUIREMENTS

A. AISI "Specifications": Calculate structural characteristics of cold-formed metal framing according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members" and the following:

1. Allowable stress design, AISI CFSD-ASD
2. AISI Load and Resistance Factor, AISI CFSD-LRFD
3. Seismic requirements AISI CFSC-LRFD and ASCE 8-SSD-LRFD, for the design based on the load resistance factor design method, and the AISI CFSD-ASD and ASCE 8-SSD-ASD, for the design based on the allowable stress design method which shall meet the design modifications indicated in the International Building Code.

B. Structural Performance: Engineer, fabricate, and erect cold-formed metal framing to withstand design loads within limits and under conditions required.

1. Design framing systems to withstand design loads without deflections greater than the following:
2. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120°F (67°C).
3. Design framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

C. Delegated Design:

1. Engineering Responsibility: Engage a fabricator who assumes undivided responsibility for engineering cold-formed metal framing and anchors / fasteners by employing a qualified structural engineer licensed in the State of New Jersey, to prepare design calculations, signed and sealed shop drawings, and all other structural data.
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 cold-formed metal framing, accessory, and product specified.

C. Shop drawings showing layout, spacings, sizes, thicknesses, and types of cold-formed metal framing, fabrication, fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachments to other units of Work.

1. For cold-formed metal framing indicated to comply with certain design loadings, include structural analysis data sealed and signed by the a structural engineer licensed in the State of New Jersey. Provide shop drawings prepared by cold-formed metal framing manufacturer.

D. LEED - Sustainable Design Submittals:

1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, provide documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Data for Credit MR 2.1 and Credit MR 2.2: For products diverted from disposal in landfills and incinerators, and where recycled resources are directed back to the manufacturing process, include a statement indicating percentage of materials diverted and recycled and the costs associated with each.

3. Product Data for Credit MR 5: For products where product manufacturing is within a 500 mile radius of the jobsite and the point of extraction of the raw materials, include a statement indicating percentage of materials diverted and recycled and the costs associated with each.

E. Mill certificates by manufacturers of cold-formed metal framing or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, and galvanized-coating thickness.

F. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

G. 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.

H. Product test reports from a qualified independent testing agency evidencing compliance with requirements of the following based on comprehensive testing:
1. Expansion anchors.
3. Mechanical fasteners.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

1. ASTM E329 can be used for on-site construction projects.

C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone re-certification.

D. Structural Engineer Qualifications: A professional engineer legally authorized to practice in the State of New Jersey and experienced in providing engineering services of the kind indicated that have resulted in the installation of cold-formed metal framing similar to this Project in material, design, and extent and that have a record of successful in-service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling, as required in AISI's "Code of Standard Practice".

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation, as required in AISI's "Code of Standard Practice".

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:

1. Clark Dietrich Building Systems
2. Marino\WARE; a Div. of WARE Industries, Inc.
4. Or approved equal.
2.2 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
   1. Coating Designation: G60 (Z180).
   2. Grade: As required by structural performance.

B. Steel Sheet for [Vertical Deflection] [Drift] Clips: ASTM A 1003/A 1003M, ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
   1. Grade: As required by structural performance.
   2. Coating: G90 (Z275).

2.3 WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs of web depths indicated, with lipped flanges, and complying with the following:
   1. Design Uncoated-Steel Thickness: To meet structural performance requirements.

B. Slotted Deflection Track: Manufacturer’s single, deep-leg, U-shaped steel track; punched with vertical slots in both legs. Studs should be positively attached to deep-leg track using vertical slots while allowing free vertical movement. Legs designed to support horizontal and lateral loads and transfer them to the primary structure, as follows:
   1. Product: ClarkDietrich Building Systems; MaxTrak Slotted Deflection Track, or a comparable product.

C. Vertical Deflection Clips: Manufacturer's standard [bypass] [head] clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web and capable of resisting forces imposed by the wall system.
   1. Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; [FCSC] [FCEC] [FTSC] [FTC3] [FTC5] [FS12] [FS15] [FS24] [QC], or a comparable product by one of the members of the SFIA.
   2. Minimum Uncoated-Steel Thickness: [Fast Clip Slide Clip; 0.0677 inch (1.72 mm)] [Extended FastClip Slide Clip; 0.0677 inch (1.72 mm)] [Flat Tail Slide Clip; 0.1180 inch (3 mm)] [Fast Top Clip; 0.0677 inch (1.72 mm)] [Fast Strut Clip; 0.0677 inch (1.72 mm)] [Quick Clip; 0.1180 inch (3 mm)].

D. Headers and Jambs - Heavy-Duty Stud: Manufacturer's proprietary shape used to form header beams and jambs, columns or posts, of web depths indicated, unpunched, with stiffened flanges and as follows:
   1. Product: ClarkDietrich Building Systems; [Heavy Duty Stud (HDS)] [and] [Header Bracket (HDSC)], or approved equal.
E. U-Channel Assembly: Manufacturer's standard length U-Channel for lateral bracing for exterior curtain wall framing, loadbearing walls, or high interior partitions constructed of structural studs.

1. Product: ClarkDietrich Building Systems; U-Channel and FastBridge Clip [FB43] | [FB68]; or approved equal.
2. U-Channel Size: 1-1/2 inches (38.1 mm).
3. U-Channel Minimum Uncoated-Steel Thickness: 0.0538 inch (1.37 mm).

F. Bridging and Spacer Bar:

1. Product: ClarkDietrich Building Systems; TradeReady Spazzer 5400 (SPZS) | Spazzer Bar Guard (SPBG)]; or approved equal.
2. Minimum Uncoated-Steel Thickness: 0.0538 inch (1.37 mm).
3. Size: 1-1/4 by 1-1/4 by 50 inches (32 by 32 by 1270 mm) long, pre-notched at 12, 16 and 24 inches (305, 406, and 610 mm) centers.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi (230 MPa).

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
5. Deflection track and vertical slide clips.
7. Joist hangers and end closures.
8. Reinforcement plates.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36 (ASTM A 36M), zinc coated by the hot-dip process according to ASTM A 123.

B. Cast-in-Place Anchor Bolts and Studs: ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); carbon-steel hex-head bolts and studs; carbon-steel nuts; and flat, unhardened-steel washers. Zinc coated by the hot-dip process according to ASTM A 153.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Powder-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
E. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

B. Nonmetallic, Nonshrink 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, with fluid consistency and a 30-minute working time.

2.7 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.
   1. Fabricate framing assemblies in jig templates.
   2. Cut framing members by sawing or shearing; do not torch cut.
   3. Fasten cold-formed metal framing members by welding. Wire tying of framing members is not permitted.
   4. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
      a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to cold-framed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
   5. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to manufacturer's recommendations.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or distortion.

C. Fabrication Tolerances: Fabricate assemblies to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:
   1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements, including installation tolerances and other conditions affecting performance of cold-formed metal framing. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to ASTM C1007, AISI S200 "North American Standard for Cold-Formed Steel Framing - General Provisions", and to manufacturer's recommendations and the requirements of this Section.

1. Cut framing members by sawing or shearing; do not torch cut.

2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
   a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   b. Locate mechanical fasteners and install according to cold-framed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

C. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.

D. Provide temporary bracing and leave in place until framing is permanently stabilized.

E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

F. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and double studs, inaccessible upon completion of framing work.
G. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

H. Erection Tolerances: Install cold-formed metal framing to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 NONLOAD-BEARING INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as indicated or if not indicated to meet structural performance requirements.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate steel framing from building structure at locations indicated to prevent transfer of vertical loads while providing lateral support.

1. Install deflection track and anchor to building structure.

2. Connect studs with vertical slide clips to continuous angles or supplementary framing anchored to building structure.

E. Install horizontal bridging in curtainwall studs, spaced in rows not more than 48 inches (1219 mm) apart. Fasten at each stud intersection.

1. Install additional row of horizontal bridging in curtainwall stud beneath deflection track when curtainwall studs are not fastened to an additional top track.

2. Bridging: Combination of flat, steel-sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtainwall-framing system.

3.5 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated or as recommended by the manufacturer.
B. Install joists bearing on supporting framing, level, straight, and plumb, adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1. Install joists over supporting framing with a minimum end bearing of 1-1/2 inches (38 mm).

2. Reinforce ends of joists with web stiffeners, end clips, joist hangers, steel clip angles, steel-stud sections, or as otherwise recommended by manufacturer.

C. Space joists not more than 2 inches (51 mm) from abutting walls, as indicated, or if not indicated to meet structural performance requirements.

D. Install bridging at each end of joists and at intervals indicated. Fasten bridging at each joist intersection as follows:

1. Bridging: Combination of flat, steel-sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

E. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

F. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

### 3.6 FIELD QUALITY CONTROL

A. Testing Agency: A qualified independent testing agency employed and paid by the Contractor will perform field quality-control testing.

B. Field and shop welds will be subject to inspection and testing.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace Work that does not comply with specified requirements.

E. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

### 3.7 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanizing repair paint according to ASTM A 780 and the manufacturer's instructions.

B. Touchup Painting: Wire brush, clean, and paint scarred areas, welds, and rust spots on fabricated and installed prime-painted, cold-formed metal framing.

1. Touchup painted surfaces with same type of shop paint used on adjacent surfaces.
C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer to ensure that cold-formed metal framing is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 05450
SECTION 05500 - METAL FABRICATIONS

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 DESCRIPTION OF WORK

A. Definition: Metal fabrications include items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere and non-ferrous items listed herein.

B. Type of work in this section includes metal fabrications for assemblies which include but are not limited to the following:

1. Rough hardware.
2. Expansion joint covers.
3. Ladders.
4. Exterior roof ladder.
5. Access ladder roof supports.
7. Portable, free-standing guardrail system for roof railings.
8. Pipe Trench Cover.
9. Wall Brackets.

C. Related Work:

1. Structural Steel, including loose lintels, specified in Sections 05120 and 05400 (Part 3).
2. Steel Joists are specified in Section 05210 (Part 3).
3. Metal Decking is specified in Section 05300 (Part 3).
4. Miscellaneous Structural Steel is specified in Section 05400 (Part 3).
5. Concrete work: Section 03300.
6. Masonry work: Section 04200.
7. Painting: Section 09900.

1.3 QUALITY ASSURANCE

A. Codes and Standards:

B. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrications might delay work.

C. Shop Assembly: Preassemble items in 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.

D. Regulatory Requirements: Products and finished installations to be used by persons with disabilities must comply with requirements of the Uniform Construction Code, American National Standard, Accessible and Usable Buildings and Facilities, ICC / ANSI A117.1.

E. Furnish joint cover assemblies and accessories manufactured by one firm for each type of joint cover required.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.

B. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous metal fabrications. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.
1. Portable, free-standing guardrail system for Roof Railings: Complete details of entire railing layout, showing member sizes and part identification, fasteners, anchors, fittings and evidence of compliance with structural performance requirements.

C. Where materials or fabrications are indicated to comply with certain requirements for design loadings, include structural computations, material properties and other information needed for structural analysis.

D. Samples: Submit 2 sets of representative samples of materials and finished products as may be requested by Architect.

E. Mill test reports: Reports indicating metals to be furnished comply with project requirements.

1.5 WARRANTY

A. Portable, free-standing guardrail system for roof railings: Manufacturer’s two (2) year warranty against defective materials and workmanship.

1. Warranty does not cover integrity / performance of the paint finish.

2. During the warranty period, if parts are found to be defective they will be replaced or repaired at the manufacturer’s discretion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

B. Aluminum: Comply with the following standards for the forms and types of aluminum for the required items of work.

1. Alloy and Temper: Provide alloy and temper as recommended by the aluminum producer or finisher, with not less than the strength and durability properties specified in ASTM B 632/B 632 M, alloy 6061-T6.

2. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of the metal to be welded, and as required for color match, strength and compatibility in the fabricated items.

3. Fasteners: Finish of basic metal and alloy, matching finished color and texture as the metal being fastened, unless otherwise indicated. Unless otherwise shown, provide Phillips flat-head screws for exposed fasteners.

5. Protective Lacquer: Clear non-yellowing, of type recommended by metal producer for protection of the finished metal surfaces.


10. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

C. Steel

1. Steel Plates, Shapes and Bars: ASTM A 36/A 36M.

2. Steel Tubing: Cold-formed, ASTM A 500; or hot-rolled, ASTM A 501.

3. Structural Steel Sheet: Hot-rolled, ASTM A 570; or cold-rolled ASTM A 611, Class 1; of grade required for design loading.

4. Galvanized Structural Steel Sheet: ASTM A 446, of grade required for design loading. Coating designation as indicated, or if not indicated, G90.

5. Steel Pipe: ASTM A 53; Type and grade (if applicable) as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (schedule 40), unless otherwise indicated.


E. Malleable Iron Castings: ASTM A 47, grade as selected by fabricator.

F. Stainless Steel Sheet, Strip, Plate and Flat Bars: ASTM A 666, Type 304, unless otherwise indicated.

1. Stainless Bars and Shapes: ASTM A 276, Type 304.

G. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

H. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A 153.

I. Grout:

1. Non-Shrink, Metallic Grout: Pre-mixed, factory-packaged, ferrous-aggregate grout complying with CE CRD-C588, Type M, and ASTM C 1107, specifically recommended
by manufacturer for heavy-duty loading applications and not to be used in wet areas or on exterior applications.

2. Non-Shrink, Non-Metallic Grout: Pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with CE CRD-C621, and ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

J. Fasteners:

1. General: Provide zinc-plated fasteners complying with ASTM B 633, Class Fe/Zn 5, for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.

2. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A, with hex nuts, ASTM A 563; and where needed, flat washers.

3. Weathering Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3, with hex nuts, ASTM A 563, Grade C3; and where needed, flat washers.

4. Lag Screws: Square head type, ASME B18.2.1.


10. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as needed.


12. Anchor Bolts: ASTM F 1554, Grade 36, of dimension indicated; with nuts, ASTM A 563; and where indicated, flat washers.

K. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

L. Cast-in-Place in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
M. Post-Installed Anchors:

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5, unless otherwise indicated.


N. Paint:

1. Metal Primer Paint: Red lead mixed pigment, alkyd varnish, linseed oil paint, FS TT-P-86l, Type II; or red lead iron oxide, raw linseed oil, alkyd paint, Steel Structures Painting Council (SSPC) Paint 2-64; or basic lead silico chromate base iron oxide, linseed oil, alkyd paint, FS TT-P-615, Type II.

2. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Section 09900.

3. Galvanizing Repair Paint: High-zinc-dust content paint for regalvanizing welds in galvanized steel, complying with the Military Specifications MIL-P-21035 (Ships) or SSPC-Paint-20 and compatible with paints specified to be used over it.

2.2 FABRICATION, GENERAL

A. Workmanship

1. Use materials of size and thickness indicated, or if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of work.

2. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

3. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.

4. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts.

5. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

6. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
B. Galvanizing:

1. Provide a zinc coating for exterior steel items and those items indicated or specified to be galvanized, as follows:
   
a. ASTM A 153 for galvanizing iron and steel hardware.
   
b. ASTM A 123 for galvanized rolled, pressed and forged steel angles, corner guards, other indicated shapes, plates, bars, bollards and strip 1/8" thick and heavier.
   
c. ASTM A 386 for galvanizing assembled steel products.

C. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

D. Shop Painting

1. Shop paint miscellaneous metal work, except members of portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise indicated.

2. Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-2 "Hand Tool Cleaning", or SSPC SP-3 "Power Tool Cleaning", or SSPC SP-7 "Brush-Off Blast Cleaning".

3. Remove oil, grease and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning".

4. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions, and at a rate to provide uniform dry film thickness of 2.0 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.

5. Apply one shop coat to fabricated metal items, except apply two (2) coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

2.3 MISCELLANEOUS METAL FABRICATIONS

A. Rough Hardware

1. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items as specified in Division-6 sections.

2. Fabricate items to sizes, shapes and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.
B. Expansion Joint Covers and Control Joint Covers:

1. Basis of Design: Provide extruded aluminum expansion and control joint covers as manufactured by Balco Inc., Wichita, Kansas, Tel. # 800.767.0082 / 316.945.9328; www.balcousa.com; or approved equal.

   a. Other acceptable manufacturers:

      1) CS Construction Specialties, Muncy, PA, Tel.# 800.233.8493, www.c-sgroup.com
      2) MM Systems, Pendergrass, GA, Tel.# 800.241.3460, www.mmsystemscorp.com
      3) Gordon Interior Specialties Division, Bossier, LA, Tel. # 800.747.8954, www.gordon-inc.com
      4) Or approved equal.

   b. Aluminum Finish: Provide clear anodized finish or as selected by the Architect to suit adjacent construction conditions, finishes and colors.

2. Provide type and size where shown on drawings, or as required at all building areas to receive expansion joint and column covers. Where used in rated construction, provide fire rated units.

   a. Submit to the Architect a complete layout drawing indicating all locations of expansion joint and column covers, type, size and detailed construction conditions.

3. Do not proceed with fabrication and/or installation until you receive Architect’s approval.

4. Provide assemblies including manufacturer’s available anchors, hardware and accessories.

C. Steel Ladder(s):

1. Fabricate ladders from galvanized steel for the locations shown, with dimensions, spacings, details and anchorages as indicated. Comply with requirements of ANSI A14.3, unless otherwise indicated.

2. Unless otherwise indicated, provide ½" x 2-1/2" continuous structural steel flat bar side rails with eased edges, spaced 18" apart.

3. Provide 3/4" diameter solid structural steel bar rungs, spaced 12" o.c.

4. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.

5. Support each ladder at top and bottom as shown.
6. Provide non-slip surface on top of each rung, by coating the rung with abrasive material metallically bonded to rung by a proprietary process.

   a. Basis of Design: Subject to compliance with requirements, provide one of the following:
      1) IKG Industries, a Division of Harsco Corp.: Mebac;
      2) SlipNOT Metal Safety Flooring, a W.S. Molnar Company.
      3) or approved equal.

D. Exterior Roof Access Ladder:

   1. Fixed Wall Ladder(s): Galvanized steel; serrated rungs 3/4" inches in diameter, connected to 2½-inch continuous galvanized structural steel flat bar side rails with eased edges, each secured to rails by means of four (min.) solid aircraft rivets.

      a. Provide 3/4" diameter solid galvanized structural steel bar rungs, spaced 12" o.c.
      b. Provide roof ladder support for ladder as per paragraph E below.

E. Access Ladder Roof Support:

   1. Basis of Design: Provide “ARS-500" access ladder roof support as manufactured by Thaler Metal Industries - Tel. # 800.576.1200 / www.thalermetal.com; SBC Industries; or approved equal.

      a. Product consists of a urethane insulated, epoxy primed, hollow steel support and mounting plate, adjustable height steel cap and rail post base.
      b. Provide stainless steel stack jack flashing with urethane insulation and EPDM Base seal.
      c. Provide units complete with manufacturer’s standard and optional hardware, accessories, adhesive, etc. to suit indicated application.
      d. Provide manufacturer’s standard twenty (20) year warranty against leaks, condensation and defects in materials and other manufacture when installed in accordance with the manufacturer’s instructions.
      e. Comply with manufacturer’s instructions and recommendations for installation methods.

F. Miscellaneous Structural Shapes, Framing and Supports, Etc.

   1. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.

   2. Fabricate miscellaneous units to sizes, shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise indicated, fabricated from structural steel shapes, plates and steel bars of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.
3. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

4. Galvanize exterior miscellaneous frames and supports.

G. Portable, Free-standing Guardrail System for Roof Railings:

1. Basis of Design: Provide “RailGuard 200 Roof Safety Railing”, as manufactured by Garlock Safety Systems, 2601 Niagara Ln., Plymouth, MN 55447; Tel. # 877-791-4446 or 763-694-2614; Web: www.railguard.net; or approved equal.

   a. Subject to compliance with requirements, an acceptable alternate product from one of the following:

      1) “Safety Rail 2000” as manufactured by BlueWater Mfg., Inc., distributed by Dakota Safety - located in St. Paul, MN; Tel# 866.503.7245.
      2) Or approved equal.

   b. Design Requirements:

      1) Structural Performance: Comply with requirements of applicable local, state, and federal and OSHA codes.

      2) Structural performance of rails and supports:
         a) Meets OSHA requirements: 1910.29(b) and 1926.502 (b).
         b) Capable of withstanding a concentrated load of 200 pounds (90.6 kg), applied to the top rail at any point and in any direction.
         c) Capable of withstanding a uniform load of 50 pounds per linear foot (74.3 kg/m) applied to the top rail horizontally with a simultaneous load of 100 pounds per linear foot (148.6 kg/m) applied vertically downward.
         d) Design need not provide for both concentrated and uniform loads to be applied concurrently.

      3) Structural performance of railing infill:
         a) Capable of withstanding a horizontal concentrated load of 200 pounds (90.6 kg), applied to one foot (30.5mm) square area at any point on the infill.
         b) Infill includes panels, intermediate rails, posts and other elements.
         c) Design need not provide for infill loads to be applied concurrently with top rail loading.
         d) Horizontal members not to exceed 12 inch (305 mm) spacing over lens area of skylight.

      4) Finish: Provide hot dipped galvanized steel with powder coated paint finish to be selected from manufacturer’s standard colors.

H. Pipe Trench Cover: (At Science Rooms)

1. Basis of Design: Model # TSP-375, as manufactured by Balco Inc., Wichita, Kansas, Tel. # 800.767.0082 / 316.945.9328; www.balcousa.com; or approved equal.
a. Trench covers shall be aluminum, ASTM B 209, alloy 6061-T651 in clear anodized finish.
   1) Aluminum surfaces in contact with concrete shall be prime painted.

b. Frames shall be aluminum, ASTM B 221, alloy 6063-T5 in clear anodized finish.

c. Provide aluminum frame with anchor bolts at 20" o.c., unless otherwise shown.

2. Subject to compliance with requirements of the Contract Documents, manufacturers offering products which may be incorporated in work include the following:

I. Wall Brackets for Shelves:
   1. Basis of Design: Concealed Support Bracket for wall shelving, Model #C(1.0)12, as manufactured by A&M Hardware Inc., Mount Joy, PA, Tel.# 888-647-0200; or approved equal.
      a. Steel brackets for the appearance of a floating shelf.
      b. Pre-drilled mounting holes.

J. Hybrid Brackets for Shelves:
   1. Basis of Design: Hybrid Support Bracket for wall shelving, Model #HYB(1.0)12 - 12" X 12", as manufactured by A&M Hardware Inc., Mount Joy, PA, Tel.# 888-647-0200; or approved equal.
      a. Steel brackets for the appearance of a floating shelf.
      b. Pre-drilled mounting holes.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION

A. General

1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction;
including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.

2. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plus, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.

3. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.


B. Setting Loose Lintels and Plates:


2. Set Loose Lintels, leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut-off flush with the edge of the bearing plate before packing with grout. Use metallic non-shrink grout in concealed locations where not exposed to moisture; use non-metallic non-shrink grout in exposed locations, unless otherwise indicated.

3. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 PORTABLE, FREE-STANDING GUARDRAIL SYSTEM FOR ROOF RAILINGS

A. Install in accordance with manufacturer's instructions.

B. Before installation, inspect all parts to insure no damaged parts are used.

C. Railing must be secured to base with securing pins.

D. Where there is a danger of falling materials onto someone below insert a steel Speed Board into the toeboard bracket on the base plate and secure with securing pins to base.

E. Use a Railguard 200 outrigger at any interruption in continuous railing sections. Outrigger assembly consists of a 5 foot railing (1.52 m) with base plate pinned to railing and placed 90 degrees away from danger side of continuous railing.
3.6 ADJUST AND CLEAN

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.8 mils.

B. For galvanize surfaces: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint.

END OF SECTION 05500
SECTION 06100 - CARPENTRY

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. Type of work in this section includes rough carpentry for:
   1. Dimensional lumber,
   2. Wood grounds, nailers and blocking.
   3. Rough hardware.

1.3 SUBMITTALS

A. Material Certificates: Where dimensional lumber is provided to comply with minimum allowable unit stresses, submit listing of species and grade selected for each use, and submit evidence of compliance with specified requirements. Compliance may be in form of a signed copy of applicable portion of lumber producer's grading rules showing design values for selected species and grade. Design values shall be as approved by the Board of Review of American Lumber Standards Committee.

B. Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installation and finishing of treated material.

C. Preservative Treatment: For each type specified, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained and conformance with applicable standards.

D. For water-borne treatment include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.

E. Fire-Retardant Treatment: Include certification by treating plant that treated material complies with specified standard and other requirements.

1.4 PRODUCT HANDLING

A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

B. Do not deliver finish carpentry materials, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, finish carpentry materials must be
stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

1.5 PROJECT CONDITIONS

A. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow attachment of other work.

B. Maintain temperature and humidity in installation areas as required to maintain moisture content of installed finish carpentry within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and required temperature and humidity conditions.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Lumber Standards: Manufacture lumber to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

B. Inspection Agencies: Inspection agencies and the abbreviations used to reference with lumber grades and species include the following:

   WWPA - Western Wood Products Association.

C. Factory-mark each piece of lumber with type, grade, mill and grading agency, except omit marking from surfaces to be exposed with transparent finish or without finish.

D. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.

E. Provide dressed lumber, S4S, unless otherwise indicated.

F. Provide seasoned lumber with 19 percent maximum moisture content at time of dressing.

2.2 DIMENSION LUMBER

A. For light framing (2" to 4" thick, 2" to 4" wide) provide the following grade and species:
   
   1. Construction grade.
   a. Any species of specified grade.

B. For structural framing (2" to 4" thick, 5" and wider), provide the following grade and species:

   1. Any species and grade which meets or exceeds the following values:
      a. Fb (minimum extreme fiber stress in bending); 1500 psi.
      b. E (minimum modulus of elasticity); 1,500,000 psi.
C. For exposed framing lumber provide material complying with the following requirements:

1. **Definition:** Exposed framing refers to dimension lumber which is not concealed by other work and is indicated to receive a stained or natural finish.

2. **Grading:** Hand select material at factory from lumber of species and grade indicated below for compliance with "Appearance" grade requirements of ALSC National Grading Rule; issue inspection certificate of inspection agency for selected material.

3. Same species and grade as indicated for structural framing.

### 2.3 MISCELLANEOUS LUMBER

A. Provide wood for support or attachment of other work including cant strips, nailers, blocking, furring, grounds, stripping and similar members. Provide lumber of sizes indicated, worked into shapes shown, and as follows:

1. **Moisture content:** 19 percent maximum for lumber items not specified to receive wood preservative treatment.

2. **Grade:** Construction Grade light framing size lumber of any species or board size lumber as required. Provide construction grade boards or No. 2 Boards.

### 2.4 CONSTRUCTION PANELS

A. **Construction Panel Standards:** Comply with PS 1 "U.S. Product Standard for Construction and Industrial Plywood" for plywood panels and, for products not manufactured under PS 1 provisions, with American Plywood Association (APA) "Performance Standard and Policies for Structural-Use Panels", Form No. E445.

B. **Trademark:** Factory-mark each construction panel with APA trademark evidencing compliance with grade requirements.

C. **Concealed APA Performance-Rated Panels:** Where construction panels will be used for the following concealed types of applications, provide APA Performance-Rated Panels complying with requirements indicated for grade designation, span rating, exposure durability classification, edge detail (where applicable) and thickness.

D. **APA RATED SHEATHING**

1. **Exposure Durability Classification:** EXTERIOR.
   - a. **Span Rating:** As required to suit joist spacing indicated.

E. **Fire-Retardant-Treated Plywood by Pressure Process:** Products with a flame-spread index of 25 or less when tested according to ASTM E 84, 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 (3.2 m) beyond the centerline of the burners at any time during the test.
1. Treatment shall not promote corrosion of metal fasteners.

2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.

3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841.

   a. For enclosed roof framing, framing in attics, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project’s climatological zone.

F. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant treated plywood panels with grade designation, APA C-D PLUGGED INT with exterior glue, in thickness indicated, or, if not otherwise indicated, not less than 15/32”.

2.5 MISCELLANEOUS MATERIALS

A. Fasteners and Anchorages: Provide size, type, material and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.

B. Where rough carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating (ASTM A 153).

C. Building Paper: ASTM D 226, Type I; asphalt saturated felt, non-perforated, 15-lb. type.

2.6 WOOD TREATMENT BY PRESSURE PROCESS

A. Preservative Treatment: Where lumber or plywood is indicated or required to be treated, comply with applicable requirements of AWPA Standards C2 (Lumber and C9 (Plywood) and of AWPB Standards listed below. Mark each treated item with the AWPB Quality Mark Requirements.

   1. Pressure-treat above-ground items with water-borne preservatives to comply with AWPA, UC1, UC2, UC3A and UC3B. After treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:
a. Wood grounds, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
b. Wood framing members less than 18\" above grade.

2. Treatment products: The following products, provided they comply with requirements of the contract documents will be among those considered acceptable:

   b. Or approved equal.

B. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment and to comply with AWPA M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

C. Fire-Retardant Treatment: Where fire-retardant treated wood ("FRT") is indicated or required, pressure impregnate lumber and plywood with fire-retardant chemicals to comply with AWPA C20 and C27, respectively, identify "FRT" lumber with appropriate classification marking of Underwriters Laboratories, Inc., U.S. Testing, Timber Products Inspection or other testing and inspecting agency acceptable to authorities having jurisdiction.

   1. Fire treated wood shall have a flame spread of 25 or less and shall be dried to 19% moisture content for lumber and 15% for plywood. Exposed wood or wood subject to high humidity conditions shall be identified that the moisture content shall not exceed 28% when tested at 92% relative humidity in accordance with ASTM D3201.

   2. Treatment products: The following products, provided they comply with requirements of the contract documents will be among those considered acceptable:

      a. "Dricon"; Hickson Corporation.
      b. "Flame Proof LHC"; Osmose Wood Preserving, Inc.
      c. "Pyro-Guard"; Hoover Treated Wood Products, Inc.
      d. Or approved equal.

3. Treat members shown on drawings and/or as required to meet the code requirements.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Foretop concealed spaces of wood framed walls and partitions at each floor level and at the ceiling line of the top story. Where foretops are not automatically provided by the framing system used, use close-fitted wood blocks of nominal 2" thick lumber of the same width as framing members.

B. Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.

C. Set carpentry work to required levels and lines, with members plumb and true to line and cut and fitted.
D. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards.

E. Countersink nail heads on exposed carpentry work and fill holes.

F. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

3.2 WOOD GROUNDS, NAILERS, BLOCKING AND SLEEPERS

A. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

C. Provide permanent grounds of dressed, preservative treated, key-beveled lumber not less than 1-1/2" wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

D. Height of nailers shall be matched to that of the insulation being used. Nailers shall be firmly anchored to the deck to resist a force of seventy-five pounds per lineal foot. The type of anchors shall be as recommended by the roofing manufacturer and shall be secured at intervals required to ascertain a resistance force of seventy-five pounds per lineal foot.

3.3 INSTALLATION OF CONSTRUCTION PANELS


B. Fastening Methods: Fasten panels as indicated below:

1. Sheathing: Screw to framing or substrates.

END OF SECTION 06100
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 DESCRIPTION OF WORK

A. Extent of each type of architectural woodwork is indicated on drawings and in schedules.

B. Types of architectural woodwork include the following:

1. Architectural cabinets including:
   a. Wood cabinets.
   b. Laminate clad cabinets.
   c. Countertops.

2. Standing and running trim.

3. Decorative interior wood wall surfacing system.


C. Finish carpentry is specified in another Division 6.

D. Wood doors are specified within Division 8.

E. Manufactured cabinet and casework of stock design (residential) is specified in Division 11.

1.3 QUALITY ASSURANCE

A. AWI Quality Standard: Comply with applicable requirements of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute (AWI), except as otherwise indicated.

B. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria".

1.4 REFERENCES

A. AWI Quality Marking: Mark each assembled unit of architectural woodwork with manufacturer's identification and grade mark evidencing compliance with indicated AWI quality grade. Locate grade mark on surfaces which will not be exposed after installation. For other items requiring field assembly, a certification of compliance may be substituted for marking of individual pieces.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each product and process specified as work of this section and incorporated into items of architectural woodwork during fabrication, finishing, and installation.
B. LEED Submittals:

1. **Product Data for Credit EQ 4.1:** For construction adhesive, including printed statement of VOC content.

2. **Product Data for Credit EQ 4.4:**
   
a) For each composite wood product used indicating that bonding agent used contains no urea formaldehyde.

   b) Adhesive: For each adhesive used indicating that adhesive contains no urea formaldehyde.

3. **Product Data for Credits MR 4.1 and MR 4.2:** Indicate percentages by weight of postconsumer and preconsumer recycled content for products having recycled content.

4. **Certificates for Credit MR 7:** Certificates of chain-of-custody certifying that wood products comply with forest certification requirements. Include evidence that mill is certified for chain-of-custody by an FSC-accredited certification body.

C. Quality Certification: Submit woodwork Manufacturer's (Fabricator's) certification, stating that fabricated woodwork complies with quality grades and other requirements indicated.

D. Shop Drawings: Submit shop drawings showing location of each item, dimensioned plans and elevations, large scale details, attachment devices and other components.

E. Samples: Submit the following samples:

   1. Lumber with or for transparent finish; set of 3 pieces 6" x 3/4" x 18", for each species and cut, finished on one side and one edge.

   2. Plywood or veneer with or for transparent finish, 3 finished samples 12" square, for each species and cut.

F. Laminated Plastic: Submit complete line of available patterns and colors for Architect's selection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect woodwork during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Do not deliver woodwork, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, woodwork must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

1.7 PROJECT CONDITIONS

A. Conditioning: Do not install woodwork until required temperature and relative humidity have been stabilized and will be maintained in installation areas.
B. Maintain temperature and humidity in installation area, as required, to maintain moisture content of installed woodwork within a 1.0% tolerance of optimum moisture content, from date of installation through remainder of construction period. Require Woodwork Manufacturer to establish optimum moisture content and required temperature and humidity conditions.

1.8 WARRANTY

A. Special Project Warranty: Provide Manufacturer's / Installer's / Contractor's warrantees against delamination, warping, hardware and support system failure and deterioration of finish.

1. Manufacturer’s Warranty period shall be for one (1) year which shall start from approved date of substantial completion of work.

2. Contractor's / Installer's Warranty period shall be for two (2) years which shall start from approved date of substantial completion of work.

PART 2 - PRODUCTS

2.1 BASIC MATERIALS AND FABRICATION METHODS

A. General: Except as otherwise indicated, comply with the following requirements for architectural woodwork not specifically indicated as prefabricated or prefinished standard products.

B. Wood Moisture Content: Provide kiln-dried lumber with an average moisture content range of 9% to 13% for exterior work and 6% to 11% for interior work. Maintain temperature and relative humidity during fabrication, storage and finishing operations so that moisture content values for woodwork at time of installation do not exceed the following:

1. Interior Wood finish: 5% - 10%.

C. Interior Wood for Transparent Finish:

1. Solid Wood: Rift-sawn Red Oak.

2. Plywood: Rift-cut Red Oak.

3. Match Existing Adjacent Wood Work: Where indicated or required, provide wood in finishes to match existing adjacent wood work, cabinets and other architectural wood work, and as directed by the Architect.

D. Interior Wood for Opaque Finish:

1. Solid Wood: Any closed grain hardwood complying with requirements for specified woodwork grade.

2. Plywood: Any closed grain hardwood plywood with exterior glue complying with requirements for specified woodwork grade.

3. Solid Wood: Clear - Pine
E. Plastic Laminate: Comply with NEMA LD-3 for type, thickness, color, pattern and finish indicated for each application, or if not indicated as selected by Architect from manufacturer's standard products.

2.2 FABRICATION

A. Quality Standards: For following types of architectural woodwork comply with indicated standards as applicable.

1. Standing and Running Trim: AWI Section 300
2. Casework and Countertops: AWI Section 400
3. Shelving: AWI Section 600
4. Miscellaneous Work: AWI Section 700

B. Design and Construction Features: Comply with details shown for profile and construction of architectural woodwork; and, where not otherwise shown, comply with applicable Quality Standards, with alternate details as approved by Architect.

C. Pre-Cut Openings: Fabricate architectural woodwork with pre-cut openings, where possible, to receive hardware, appliances, plumbing fixtures, electrical work and similar items. Locate openings accurately and use templates or roughing-in diagrams for proper size and shape. Smooth edges of cutoffs and, where located in countertops and similar exposures seal edges of cutouts with a water-resistant coating.

D. Measurements: Before proceeding with fabrication of woodwork required to be fitted to other construction, obtain field measurements and verify dimensions and shop drawing details as required for accurate fit.

1. Where sequence of measuring substrates before fabrication would delay the project, proceed with fabrication (without field measurements) and provide ample borders and edges to allow for subsequent scribing and trimming of woodwork for accurate fit.

2.3 INTERIOR ARCHITECTURAL WOODWORK

A. Quality Standard: Comply with AWI Section 300.

B. Standing and Running Trim:

1. Grade: Premium
2. Fabricate standing and running trim including jambs and board type paneling (if any) to dimensions, profiles and details shown. Rout or groove reverse side (backed-out) of trim members to be applied to flat surface, except for members with ends exposed in finish work.
3. Plant assemble miters unless otherwise indicated.

2.4 ARCHITECTURAL CABINETS, LAMINATE CLAD

A. Quality Standard: Comply with AWI Section 400 and its Division 400B.
B. Laminate Clad Cabinets: Comply with the following requirements:

1. Grade: Premium.

2. Type of Cabinet Construction: Flush overlay.

3. Laminate Cladding: On exposed surfaces provide high pressure decorative laminate complying with NEMA LD 3 and as follows:
   a. Horizontal surfaces: GP-50 (0.050” nominal thickness).
   b. Vertical surfaces: GP-50 (0.050” nominal thickness).

4. On semi-exposed surfaces provide plastic laminate BK-20 unless otherwise indicated.

5. Fabricate exposed edges of casework, including edges of doors and drawers when open, with matching plastic laminate, except as otherwise indicated.
   a. Provide dust panels of 1/4” plywood or tempered hardboard above compartments and drawers except where located directly below countertops.

2.5 ARCHITECTURAL CABINETS, WOOD

A. Quality Standard: Comply with AWI Section 400 and its Division 400A "Wood Cabinets".

B. Wood Cabinets for Transparent Finish: Comply with the following requirements:

1. Grade: Premium.

2. Type of Cabinet Construction: Flush overlay.

3. Where particleboard is used in construction of wood casework, comply with ANSI A108.1 for grade 1-M-1 panels with density of 45 lbs; per cubic foot for thickness of 3/4” and less and 44 lbs; per cubic foot for thicknesses of 13/16” to 1-1/4”; except as follows:
   a. Modulus of Rupture and Modulus of Elasticity: 1600 psi and 350,000 psi, respectively, for 48 lb. density: 1300 psi, and 275,000 psi respectively for 44 lb. density.
   b. Linear Expansion: 0.35% for 45 lb. density and 0.50% for 44 lb. density.
   c. Screw-holding Capacity, Face and Edges: 300 lbs. and 250 lbs. respectively, for 45 lb. density and of 250 and 175 lbs. respectively, for 44 lb. density.

C. Provide dust panels of 1/4” plywood or tempered hardboard above compartments and drawers except where located directly under tops.

2.6 PLASTIC LAMINATE COUNTERTOPS

A. Quality Standard: Comply with AWI Section 400 and its Division 400C.
B. General: Except as otherwise indicated, provide separate plastic laminate countertops installed on other casework or other support system as indicated to comply with requirements for casework for plastic laminate finish.

1. Grade: Premium.
2. Horizontal and/or vertical surfaces: GP-50 (0.050" nominal thickness).

2.7 CABINET HARDWARE AND ACCESSORY MATERIALS:

A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for items which are specified in Division-8 section "Finish Hardware".

B. Hardware Standard: Comply with ANSI/BHMA A156.9 "American National Standard for Cabinet Hardware".

1. Quality Level: Type 2, institutional, unless otherwise indicated.
2. Invisible Hinges: Wrought Steel.
3. Spring Hinges: Stanley #2060, 3-1/2" x 3-1/2".
4. Casework Pulls: Extruded Aluminum, back mounted, with US 26D Finish, Ives No. 137 or approved equal.
6. Equip each drawer with side-mounted, full-extension, ball-bearing, nylon roller drawer slides with load capacity of 75 lbs. per pair.
7. Locks: For all doors and drawers, provide standard pin type or disc-type (5 pins or discs) tumbler locks, keyed alike per room and masterkeyed throughout.
8. Shelf Supports: Where shelving is indicated as "adjustable", provide slotted type recessed standards and brackets of type needed to support shelves with uniform load of 40 lbs. per sq. ft. loading. Finish as selected. Knape and Vogt or approved equal.
10. Exposed Hardware Finish: Except where not available, provide exposed hardware with BHMA Code 626 satin chromium late finish (US26D); where not available, provide either satin aluminum or satin stainless steel finish.

C. Clear Tempered Safety Glass for Doors: FS DD-G-1403, grade B, style I, type I, quality q3, class 1; manufactured by horizontal (roller hearth) process; 1/4" thick, unless otherwise indicated.

D. Clear Tempered Safety Glass for Shelves: FS DD-G-1403, grade B, style I, type I, quality q3, class 1; seamed at edges prior to tempering; 1/4" thick, unless otherwise indicated.
2.8 FLUSH WOOD PANELING

A. Quality Standard: Comply with AWI Section 500 and its Division 500A.

B. Flush Wood Paneling: Comply with the following requirements:

1. Fire-Rated Paneling: Provide paneling as indicated below which is identical in construction to units tested per method indicated, and which are marked and classified for fire performance characteristics indicated by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

2. Grade: Premium, 3/4" thick.

3. Veneer Species: Red Oak, rift cut.


5. Veneer Matching Within Panel Face: Running match.

6. Finish: Factory stained finish, to be selected by the Architect from manufacturer available full range of stain colors.

C. Panel Matching Method: Match panels to one another within each separate area by the following method:

1. Pre-manufactured sets used full width, prefinished using AWI system.

D. Fire Performance Characteristics: Provide flush wood panels of wood veneer density and fire-retardant particleboard core construction having the following surface burning characteristics per ASTM E84.

1. Flame Spread: 75 or less.
2. Smoke Developed: 40 or less.

2.9 CLOSET SHELVING

A. Quality Standard: Comply with AWI Section 600.

B. Shelving for Natural Finish: Comply with the following requirements - Grade: Premium.

C. Shelving Material: Any closed-grain hardwood in referenced woodworking standard.

D. Shelf Brackets: Size required to support shelving widths indicated, BHMA No. B84112, zinc-plated steel.

E. Clothes Poles and Supports: Provide steel pipe or tubing cut to lengths required, with standard wrought steel flanges (one with open top).

1. Size: 1.315" O.D., 0.1333" wall thickness (1")
2. Finish: Satin chrome plated, BHMA 652.
PART 3 - EXECUTION

3.1 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.

B. Pre-Installation Meeting: Meet at project site prior to delivery of architectural woodwork and review coordination and environmental controls required for proper installation and ambient conditioning in areas to receive work. Include in meeting the Contractor; Architect and other Owner Representatives (if any); installers of architectural woodwork, wet work such as plastering, other finishes, painting, mechanical work and electrical work; and firms or persons responsible for continued operation (whether temporary or permanent) of HVAC system as required to maintain temperature and humidity conditions. Proceed with woodwork installation only when everyone concerned agrees that required ambient conditions can be maintained.

C. Deliver concrete inserts and similar anchoring devices to be built into substrates, well in advance of time substrates are to be built.

D. Prior to installation of architectural woodwork, examine shop fabricated work for completion, and complete work as required, including back priming and removal of packing.

3.2 INSTALLATION

A. Install woodwork plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level (including tops); and with no variations in flushness of adjoining surfaces.

B. 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 possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners and comply with referenced Quality Standards for joinery.

D. Anchor woodwork to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork, and matching final finish where transparent finish is indicated.

E. Countertops: Anchor securely to base units and other support systems as indicated.

F. Paneling: Anchor paneling to supporting substrate with concealed panel hanger clips, and by blind nailing on back-up strips, splined-connection strips, and similar associated trim and framing. Do not face-nail, unless otherwise indicated.
1. Comply with manufacturer’s instructions and recommendation for installation of pre-manufactured interior wood surfacing system.

G. Wood Storage Shelving: Complete the assembly of units and install in the areas indicated, including hardware and accessories as indicated.

3.3 ADJUSTMENT, CLEANING, FINISHING, AND PROTECTION

A. Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate and adjust hardware for proper operation.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.

D. Complete the finishing work specified as work of this section, to whatever extent not completed at shop or prior to installation of woodwork.

E. Refer to the Section 09900 for final finishing of installed architectural woodwork.

F. Provide final protection and maintain conditions, in a manner acceptable to Fabricator and Installer, which ensures architectural woodwork being without damage or deterioration at time of substantial completion.

END OF SECTION 06400
SECTION 06650 - SOLID POLYMER FABRICATIONS

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. Section Includes:

1. Plastic window stools.
2. Countertops.
3. Wall caps.

1.3 SUBMITTALS

A. Product Data: Written technical information for unit specified. Indicate product description, fabrication information and compliance with specified performance requirements.

B. Shop Drawings:

1. Submit rough-in drawings. Include the following details and all other information necessary to demonstrate compliance with contract documents:
   a. Dimensions.
   b. Required clearances.
   c. Methods of assembling components.
   d. Anchorages.
   e. Coordination requirements with adjacent work.

C. Samples: Submit minimum 2 inch by 2 inch samples. Indicate full range of colors and pattern variation. Approved samples will be retained as a standard for work.

D. Certificates: Submit certification that work complies with requirements of contract documents.

E. Manufacturer's Instructions: Submit for each product specified in this section.

1. Include installation instructions and instructions for examination, preparation, and protection of adjacent work.

F. Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions and maintenance video.

1. Provide maintenance kit for indicated finishes. Include in project close-out documents.
1.4 DELIVERY, STORAGE AND HANDLING:

A. Deliver no components to project site until areas are ready for installation. Store indoors.

B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.5 QUALITY ASSURANCE:

A. Allowable Tolerances: Variation in component size: ±1/8 inch.

1.6 WARRANTY:

A. Provide manufacturer's warranty against defects in materials, fabrication and installation, excluding damages caused by physical or chemical abuse or excessive heat. Warranty shall provide for replacement or repair of material and labor for a period of ten (10) years, beginning at Date of Substantial Completion.

1. For fabrications with installed warranty coverage, identify by affixing manufacturer's fabrication/installation source plate.

PART 2 - PRODUCTS

2.1 SOLID POLYMER FABRICATIONS:

A. Basis of Design: Corian Surfaces as manufactured by Du Pont De Nemours & Co., Inc., Tel.# 800.426.7426; or approved equal.

B. Subject to compliance with indicated requirements manufacturers offering products which may be incorporated in the work include the following:

1. Meganite Inc., Fessenden Hall Inc., Tel.# 800.220.2233.
2. LG Solid Surfaces, Tel.# 609 495-4081.
3. Wilsonart, Tel.# 800.433.3222.
4. Avonite Surfaces, Tel.# 800.428.6648.
5. Or approved equal.

C. Material: Cast, filled, acrylic; not coated, laminated or of composite construction, meeting ANSI Z124 1980, Type Six, and FS WW-P-541E/GEN dated August 1, 1980.
## 2.2 PERFORMANCE CHARACTERISTICS:

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<th>TEST PROCEDURE</th>
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Stain Resistance Passes ANSI Z124.3
Weatherability No change, min. 1000 hours ASTM D1499-84
Fungi and Bacteria No Attack ASTM G21, ASTM G22
Specific Gravity 1.6 min.

Water Absorption 24 hrs. Long Term ASTM D570
Weight (% max.) 0.05 (1/4") max. 0.50 (1/4") max.
                0.10 (3/4") max. 0.90 (3/4") max.

Flammability ASTM E84

Solid Colors

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Particulate Patterns

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<tr>
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</tbody>
</table>

Pittsburgh Protocol Toxicity
(solids-80 grams min. particulate patterns-65 grams min.)

"LC50" Test

2.3 ACCESSORY PRODUCTS

A. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints by chemical bond.

FVHD-5063N 2:06650-4

C. Sealant: Manufacturer's standard mildew-resistant, FDA, UL listed silicone sealant in colors matching components.

2.4 FABRICATION:

A. Factory fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed Instructions and technical bulletins.

B. Form joints between components using manufacturer's standard joint adhesive; without conspicuous joints. Reinforce with strip of solid polymer material, 2" wide.

C. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Repair or reject defective and inaccurate work.

D. Window Stools: 1/2 inch thick solid polymer material, adhesively joined with inconspicuous seams, having round edge, 1" thick minimum and with 1" minimum projection from face of wall, unless otherwise shown on the Drawings.

   1. Provide surfaces with a uniform finish, Matte, Gloss range of 5-20. Color to be selected from manufacturer’s Color Group - 1 - 5.

E. Countertops: ½-inch thick solid polymer material, adhesively joined with inconspicuous seams, edge as indicated on the drawings, unless otherwise shown on the Drawings.

   1. Provide surfaces with a uniform finish, Matte, Gloss range of 5-20. Color to be selected from manufacturer’s Color Group - 1 - 5.

F. Wall Caps: 1-inch thick solid polymer material, adhesively joined with inconspicuous seams, edge as indicated on the drawings, unless otherwise shown on the Drawings.

   1. Provide surfaces with a uniform finish, Matte, Gloss range of 5-20. Color to be selected from manufacturer’s Color Group - 1 - 5.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Prior to final approval of shop drawings, erect at project site one full size mock-up of each component required, for Architect's review.

B. Should mock-up not be approved, re-fabricate and reinstall until approval is secured. Remove rejected units from project site.

C. Approved mock-ups may remain as part of finished work.
3.2 INSTALLATION

A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

B. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Reinforce joints as required.

C. Perform installation in accordance with manufacturer's instructions, except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.

3.3 CLEANING

A. Clean shop finished surfaces, touch-up as required, and remove or refinish damaged or soiled areas, as acceptable to Architect.

3.4 PROTECTION

A. Contractor to take all precautions as recommended by the manufacturer for protection of installed window stools and other solid plastic products from damage by work of other trades.

END OF SECTION 06650
SECTION 07070 - SELECTIVE ROOF DEMOLITION

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 GENERAL

A. The Contractor will be responsible for the removal and disposal of all materials generated from work of this contract.

B. Provide all labor, material equipment, and tools as required to prepare the existing roof section for selective demolition work and installation of new RTU curbs, vents, etc. as specified in this Section and other Division 7 Sections.

C. Provide for the proper disposal of all existing materials designated to be removed. Use approved trash receptacles in areas designated by the Owner's representative.

D. Coordinate work, in such a manner as to keep the new insulation and roofing materials, building, and building interior absolutely clean, dry and watertight.

E. Contractor is to maintain the building roof in a watertight condition at the completion of each day's work and ensure that no water enters into the building. Roof areas are to be "watertight at night" at all times during the job. Failure to do so is grounds for dismissal. Contractor will reimburse Owner the cost to repair interior damages resulting from roof leaks during construction.

F. Contractor is to maintain the building and site in a neat and orderly fashion at all times. Completely remove all scrap and debris on a daily basis. Failure to do so is grounds for dismissal.

1.3 SUBMITTALS

A. Proposed Selective Demolition Activities:
   1. Submit proposed schedule of demolition activities. Indicate:
      a. Starting and ending dates for each activity as appropriate.
      b. Interruption and restoration of utility services.
   2. Submit proposed methods of operations.

B. Project Record Documents:
   1. Indicate unanticipated structural, electrical, or mechanical conditions.

C. Photographs: Before starting work, file with the Architect photographs documenting existing conditions that later could be mistaken for damage caused by demolition operations.
1.4 PROJECT CONDITIONS

A. Occupancy:

1. The Owner will continue to occupy portions of the existing building.

B. Hazardous Materials:

1. If present, the removal and disposal of said asbestos shall be handled by/ or through the General Roofing Contractor, and performed in full compliance with all State and Federal laws and regulations, and in compliance with the requirements of all authorities having jurisdiction including, but not limited to the regulations of the U.S. Dept. of Labor, the Occupational Safety and Health Administration [OSHA], the State Department of Environmental Protection and Health relating to the treatment, removal and disposal of asbestos.

2. Although this removal falls under the New Jersey Uniform Construction Code, N.J.A.C. 5:23-8 entitled Asbestos Hazard Abatement Subcode, all other pertinent regulations, such as disposal in a proper landfill, must be followed.

3. The Roofing Contractor/ or his subcontractor responsible for removal and disposal of asbestos material shall be solely responsible for the proper and safe removal and legal disposal of the material.

4. The Roofing Contractor shall be responsible to engage and pay for the services of a certified testing laboratory to write the specifications for and monitor the removal and disposal of the asbestos contaminated materials.
   a. The testing lab shall provide legal documentation to the Owner for the removal and disposal of the asbestos materials.
   b. The laboratory name and certification to perform this type of work shall be provided as part of the bid documents.

C. The Architect, has no authority or professional involvement relative to the asbestos removal or disposal phase of the project and will not be available for questions and / or directions in this regard.

1. This asbestos reference is included as a convenience to the Owner, and the Architect accepts no responsibility nor liability for the accuracy of information, bidders conclusions, methods to be used, nor for any aspect of approvals required by the contractor in undertaking and completing this project insofar as asbestos is concerned.

D. Unforeseen Conditions:

1. Should unforeseen conditions be encountered that affect design or function of project, investigate fully and submit an accurate, detailed, written report to the Owner / Architect. While awaiting the Owner / Architect's response, reschedule operations if necessary to avoid delay of overall project.
PART 2

2.1 EQUIPMENT

A. Demolition equipment and materials are provided by the Contractor.

PART 3

3.1 EXECUTION

A. Contractor shall take all necessary precautions during roof preparation work to protect the building exterior, building interior, and adjacent surfaces from being soiled or damaged.

B. When weather threatens, cease work under this Section and return roof to a watertight condition.

C. Contractor shall restore to original condition any damages caused during work on this project. Damages found on this project prior to start of work must be documented by contractor and brought to Owner's attention prior to start of work.

D. All roof drains are assumed to be in good operating condition. Contractor is to verify good operating condition of roof drains prior to start of work on this project. Damaged, clogged or partially clogged drains must be documented by Contractor and brought to Owner's attention prior to start of work on this project.

E. Return all roof drains to operating condition at the end of each working day.

F. Immediately prior to insulation attachment, sweep the deck surface. Do not allow foreign objects to become trapped under the insulation board by being left on the deck surface.

G. If, during observation of the prepared surface, the Architect or the manufacturer's representative determined the deck surface was not prepared properly, Contractor shall re-prepare the surface to the satisfaction of the Architect or manufacturer's representative.

H. Properly dispose of all debris from roof preparation on a daily basis.

I. Do not store debris on roof. Contractor shall take care not to over stress roof deck.

J. Provide closed trash chutes or other approved means for removal of debris.

K. Construct all necessary bridges, barricades, fencing, warning sign, scaffolding, etc., required to protect personnel and property.

L. Prior to the completion of the work, remove from the job site all tools, equipment, debris and waste.

END OF SECTION 07070
SECTION 07130 - WATERPROOFING

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. Section Includes:

1. Application of bentonite sheet waterproofing under the acid waste pit, as indicated.
2. Protection of installed waterproofing.

B. Related Sections:

1. Section 02200 - Earthwork.
2. Section 03300 - Concrete Work.

1.3 SUBMITTALS

A. Product Data: Submit 2 copies of specifications, installation instructions and general recommendations from manufacturers of waterproofing system materials, for types of waterproofing required. Include data substantiating that materials comply with requirements.

B. Shop Drawings: Submit complete shop drawings showing waterproofing configuration, sheet layout, seam locations, colors (as applicable), details at perimeter, and special conditions.

   1. Indicate layout of seams and type of sealant material to be used where indicated or required.

C. Samples:

   1. Waterproofing material: Submit 6-inch-square samples.

D. Certificate of Compliance: Submit a certification, signed by the contractor and installer, certifying that work of this section has been completed in accordance with the manufacturer's written instructions and in compliance with contract requirements.

E. Manufacturer’s Warranty: Manufacturer’s standard executed warranty, agreeing to repair or replace components of bentonite waterproofing system that fail in material within five (5) years starting at date of substantial completion. Failures include, but are not limited to the following:

   1. Water penetration into the building or structure.
   2. Deteriorated or displaced waterproofing material.
   3. Also refer to Section 01900 for special project warranty conditions for bentonite waterproofing system.
1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company that has produced waterproofing materials and accessories of the type included in this section for a recommended five years.

B. Installer Qualifications: A company licensed or certified by the waterproofing materials manufacturer to install waterproofing material similar to the type included in this section.

C. Pre-Application Meeting: A pre-waterproofing application meeting shall take place 5 days prior to the installation of the membrane. Those in attendance will be the Contractor, the waterproofing subcontractor, the manufacturer’s representative, the inspection service, Owner’s representative and the Architect.

D. Inspection: Manufacturer’s representative and the inspection service shall inspect the bentonite waterproofing installation on regular basis and provide written certification that waterproofing has been installed in accordance with the manufacturer’s recommendation.

1. The General Construction Work Contractor to provide and independent waterproofing Inspection Firm utilized not less than one (1) day per week, during the waterproofing activities and provide written report of same.

2. Waterproofing Inspection Firm to be approved by the Architect and the Construction Manager.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver bentonite materials to project site dry and protected from contact with moisture.

B. Store materials in dry, well ventilated space.

C. Maintain bentonite materials in dry state during placing and backfilling. Replace materials which come in contact with moisture before completion of backfill.

1.6 SITE CONDITIONS

A. Comply with manufacturer's recommendations regarding weather conditions before and during installation, condition of the substrate to receive waterproofing, and protection of the installed waterproofing system.

B. Do not install bentonite waterproofing on surfaces with visible standing water, ice, or frost.

PART 2 - PRODUCTS

2.1 BENTONITE WATERPROOFING MATERIALS AND ACCESSORIES

A. Bentonite Sheets Waterproofing:

1. Basis of Design: Provide Bentonite System; “CCW MiraClay” as manufactured by Carlisle Coatings & Waterproofing, Inc., Wylie, TX, Tel.# 800.527.7092, www.carlisle-ccw.com; or approved equal.
a. Bentonite Content: 1.0 lb./ft. sq.
b. Dry thickness: 1/4 inch.
c. Weight: 75 lb./sq. ft.
d. Permeability Rating: 5x10^-6 cm/sec., ASTM D-5084.
e. Grab Tensile Strength: 95 lb., ASTM D-4632.
g. Puncture Resistance: 120 psi., ASTM D-4833.
h. Hydrated Internal Shear: 500 psf, ASTM-D-5321.
i. Swell Index: 2g., min., ASTM D5890.

B. Bentonite waterproofing system accessories by waterproofing manufacturer:


2. Waterstop: “CCW MiraSTOP” for use as waterstop between concrete slabs and walls, between existing and new concrete, as indicated or required.

3. Termination Bar: Extruded or formed aluminum bars with upper flange formed to receive sealant.

4. Fasteners: Case-hardened nails or hardened steel powder-actuated fasteners. Provide minimum 1-inch-diameter washers under fastener heads.

5. Sealants and Waterstop Types: Manufacturer’s standard.
   a. Width and thickness of waterstops and sealant bead as per manufacturer’s recommendations and written instructions for indicated applications.

C. Subject to compliance with requirements, manufacturers of bentonite sheet waterproofing which may be incorporated in the work include, but are not limited to, the following:


2. Or approved equal.

2.2 REPAIR AND PREPARATIONS TO INTERIOR SIDE OF ACID WASTE PIT

A. Primer: Provide “Conpro Primer”; as manufactured by Conproco Corporation. Materials shall be water based bonding primer to meet requirements of ASTM C882.

B. Repair Mortar: Provide “One Shot Ag”; as manufactured by Conproco Corporation. Materials shall be single component, polymer modified, portland cement concrete with “ECB” anti-corrosion coating.

2.3 WATERPROOFING APPLICATION ON INTERIOR SIDE OF WALLS AND SLAB AT ELEVATOR PIT

A. Basis of Design: Provide “Conpro Super Seal” as manufactured by Conproco Corporation; or approved equal.
PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that substrate is clean, smooth, and dry, and that all work which will penetrate waterproofing is complete and rigidly installed. Substrate should be without sharp deflection or pockets.

B. Verify locations and limits of waterproofing termination. Coordinate waterproofing with adjacent work.

C. Formed Concrete Surfaces: Remove projections and rough concrete by grinding.

D. Fill stone or rock pockets, form tie holes, and other voids with gravel compacted to a minimum of 85% modified proctor density. Crushed stone must not be larger than 3/4" in size.

3.2 INSTALLATION - GENERAL

A. Waterproofing and Accessories: Adhere to manufacturer's instructions, standard details, and recommended installation procedures. Where contract documents and manufacturer's instructions appear to conflict, consult the architect for resolution.

B. Coordinate work in vicinity of waterproofing to ensure proper conditions for waterproofing system installation and to prevent damage to the waterproofing after installation.

3.3 INSTALLATION - BENTONITE WATERPROOFING

A. General:

1. Unless indicated otherwise, install bentonite waterproofing with ends and edges overlapped a minimum of 4 inches. Stagger sheet ends a minimum of 12 inches.

2. Protect waterproofing from damage and wetting before and during subsequent construction operations.

B. Under Slabs:

1. If concrete slabs are poured in sections, bentonite waterproofing should extend 12" beyond the slab edge to allow for overlapping for subsequent slab section pours.

2. Provide proper waterstoppage material at tie into to vertical walls.

3. Provide waterstoppage at all areas of penetrations, around piping, conduits, or at other penetrations.

C. Walls:

1. Install waterproofing starting at bottom of wall; lap ends and edges. Secure with fasteners or mastic.
2. Continue waterproofing to bottom of footing, grade beam, or wall.

3. Horizontal-to-vertical transitions: Follow manufacturer’s standard details.

4. Termination: Install bentonite waterproofing to extend indicated, but in no case less than 12" in horizontal direction under slabs. Secure top edge with termination bar. Apply sealant to top edge of termination bar.

3.4 REPAIR AND PREPARATIONS TO INTERIOR SIDE OF ACID WASTE PIT

A. Remove loose and deteriorated materials, dirt, dust, oil and any surface contaminants that will inhibit proper penetration.

B. Apply primer in a uniform 6 mils, wt application, in accordance with manufactures instructions. Apply to all surfaces to receive repair mortar materials including corners and edges.

C. Apply repair mortar materials when primer is orange color and within 72 hours. Re-apply primer if more than 72 hours pass without placing repair mortar materials.

D. Remove all Scaling rust from reinforcing steel, apply ant-rust corrosion coating.

E. Mechanically mix repair mortar materials with potable water in accordance with manufacturer’s instructions and recommendations.

F. Fill existing holes with mortar material. Trowel apply repair mortar materials to existing interior wall and slab surfaces continuously to break points.

G. Curing: Dampen the repair material with a fine mist of water for 24 hours or moist cure with wet burlap and polyethylene and/or apply manufacturer’s recommended cure and seal material. Protect all surfaces until application of waterproofing.

3.5 WATERPROOFING APPLICATION ON INTERIOR SIDE OF ACID WASTE PIT

A. Walls: At time of application, surfaces should be saturated surface dry but hold no standing water.

   1. Clean and pre-stripe non-structural cracks, up to 1/16 inch, with one 4" wide, 50 mils application of material.

   2. All dynamic cracks, joints and transitions must be properly detailed with a closed cell backer rod and polyurethane sealant. Apply 4-6 inch wide strip of material over cured sealant. Embed mesh fabric while material is plastic.

   3. Apply a 50 mils. coat over entire wall and slab surfaces with stiff bristle brush or spray, as recommended by the manufacturer for indicated application. Do not exceed 60 mils per coat.

   4. Apply a second coat once first coat is thumb-print hard.
B. Curing: Follow manufacturer’s instructions. Apply manufacturer’s recommended cure and seal material when needed. Protect all surfaces of waterproofing until substantial completion of the project.

END OF SECTION 07130
SECTION 07200 - BUILDING INSULATION

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 DESCRIPTION OF WORK

A. Work included in this Contract: Contractor shall include all labor, materials, services, installation, equipment, etc., necessary to complete all building insulation (except roof insulation) to achieve complete and tight building thermal barrier to prevent the passage of exterior air into conditioned spaces and prohibit the formation of condensation.

1. Provide indicated types of insulation as shown on drawings, as specified herein, and/or as required by all job conditions and building assemblies, whether clearly shown or not to achieve included work.

2. Insulation types include but are not limited to the following:
   a. Blanket type building insulation with foil facing for concealed application and unfaced for exposed application,
   b. Rigid board type perimeter insulation,
   c. Rigid board type cavity wall insulation,
   d. Fire safing insulation with UL approved coating,

3. Related Work:
   a. Section 03300 - Concrete Work,
   b. Section 04200 - Unit Masonry,
   c. Section 05450 - Cold-Formed Metal Framing
   d. Section 07600 - Roof Accessories,
   e. Section 07840 - Through-Penetration Firestop Systems,
   f. Section 09250 - Gypsum Drywall.

1.3 QUALITY ASSURANCE

A. Thermal Conductivity: Thicknesses shown are for thermal conductivity (k-value at 75°F) specified for each material. Provide adjusted thicknesses as directed for equivalent use of material having a different thermal conductivity. Where insulation is identified by "R" value, provide appropriate thicknesses.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

C. Fire and Insurance Ratings: Comply with fire-resistance, flammability and insurance ratings indicated, and comply with governing regulations as interpreted by authorities.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product literature and installation instructions for each type of insulation required. Include data substantiating that materials comply with specified requirements.

B. Samples: Submit triplicate samples of the following listed items, in accordance with Contract Documents. Obtain Architect's approval before proceeding with ordering or fabrication of items of this section:

1. Each type of insulation specified - 12 inches square.

C. Recycled Content: For projects seeking USGBC LEED certification or other sustainable design program, submit letter from material supplier indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating cost for each product having recycled content.

D. Regionally Manufactured Materials: For projects seeking USGBC LEED certification, submit documentation indicating location of manufacturer and percent of raw materials. Include statement indicating cost and distance from the manufacturer to project for each regionally manufactured material. Include statement indicating percent of raw materials used to make product within 500 miles of project site.

E. LEED Submittals:

1. EA Credit 1: Thermal value of insulation contributing to overall energy performance of building.

2. MR Credits 4: Recycled content of insulation indicating percentages by weight of preconsumer and postconsumer recycled content.

3. MR Credits 5: Verify location where insulation is extracted, processed and manufactured.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General Protection and Handling: Protection from Deterioration: Do not allow insulation materials to become wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Extruded-Polystyrene Board Insulation:
   a. DiversiFoam Products.
   b. Dow Chemical Company.
   c. Owens Corning.
   d. Tenneco Building Products.
   e. Or approved equal.

2. Glass-Fiber Insulation:
   a. CertainTeed Corporation.
   b. Johns Manville.
   c. Owens Corning.
   d. Guardian Building Products, Inc.
   e. Knauf Insulation.
   f. Or approved equal.

3. Fire Safing Insulation:
   a. Industrial Insulation Group, LLC
   b. Fibrex Insulations.
   c. Isolatek International.
   d. Owens Corning.
   e. Rockwool, North America.
   f. Or approved equal.

B. Mineral/Glass Fiber Blanket/Batt Insulation

1. Inorganic fibers formed into flexible resilient blankets or semi-rigid resilient sheets:
   a. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with a max. flame-spread index of 25 and smoke-developed index of 50, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

   b. Reinforced-Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

C. Mineral-Wool Board Insulation:

1. Semi-Refractory Fiber Board Fire Safing Insulation: Semi-rigid boards designed for use as a fire stop at openings between edge of slab and exterior wall panels, at top of masonry and wallboard walls/deck interface, and shall be produced by combining semi-refractory mineral fiber manufactured from slag with thermosetting resin binders.
2. Unfaced, Mineral-Wool Board Insulation: ASTM C 612; with a flame-spread index of 15 and a smoke-developed index of zero, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
   a. Nominal density of 8 lb/cu. ft., Type III, thermal resistivity of 4.35°F x h x sq. ft./Btu x in. at 75°F.

3. At all rated masonry and wallboard walls and partitions, rated slabs and exterior wall panels, the fire safing insulation shall be coated with 3M Firedam products, or approved equal, to achieve indicated UL design requirements.

D. Rigid, closed-cell polystyrene insulation board; ASTM C578-87A, Type IV, 25 psi compressive strength; 1.1 perm-inch maximum vapor transmission; 0.1% maximum water absorption; manufacturer's standard lengths and widths. Provide insulation complying with a flame spread rating of 5 when tested in accordance with ASTM E84.

1. Basis of Design: Provide "Styrofoam Square Edge", by Dow Chemical Co., U.S.A.
   a. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      1) DiversiFoam Products.
      2) Owens Corning.
      3) Tenneco Building Products.
      4) Or approved equal.
   b. k-value of 0.20 per inch and an R value of 5.0 per inch.

2. ANSI/ASHRAE/IES Standard 90.1-2013, requires R-15 rigid insulation under all slab on grade conditions along the perimeter of the exterior wall.

E. Rigid Insulation (cavity wall insulation)

1. Rigid, moisture resistant, closed-cell extruded polystyrene insulation board; ASTM C578, Type IV, 25 psi compressive strength; 1.1 perm-inch maximum vapor transmission; 0.1% maximum water absorption; manufacturer's standard lengths and widths. Provide insulation complying with a flame spread rating of 10 and smoke developed of 160, when tested in accordance with ASTM E84.
      1) Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         a) DiversiFoam Products.
         b) Owens Corning.
         c) Tenneco Building Products.
         d) Or approved equal.
b. R value of 5.6 per inch; ASTM C518.


PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.

B. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

1. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

2. Provide complete and tight building thermal barrier, to prevent the passage of exterior air into conditioned spaces and prohibit the formation of condensation.

3. Provide indicated types of insulation as shown on drawings, as specified herein, and/or as required by all job conditions, building assemblies, and whether clearly shown or not.

4. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

a. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

5. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

C. Batt Insulation

1. General:

a. Set vapor barrier faced units with vapor barrier to warm side of construction.

b. Tape joints and ruptures in vapor barriers, and seal each continuous area of insulation to surrounding construction to ensure vapor-tight installation.

c. Insert and secure insulation to fill voids to create barrier to prevent the pass of air and moisture.

2. Exterior Wall Stud Framing, (Exposed Application):

a. Install properly size unfaced fiberglass insulation tight to stud construction. Install vapor retarder and seal all joints closed to prevent passage of vapor.
D. Cavity Wall Insulation

1. On units of plastic insulation, install small pads of mortar or mastic spaced approximately 1'-0" on center both ways on inside face, as recommended by manufacturer. Press courses of insulation between wall ties and other confining obstructions in the cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

   a. Wedge insulation from outside wythe of construction with small fragments of masonry materials spaced 2'-0" on center both ways.

E. Perimeter Insulation

1. On vertical surfaces, set units in adhesive applied in accordance with manufacturer's instructions. Use type of adhesive recommended by manufacturer of insulation.

F. Fire Safing Insulation

1. Install fire safing insulation at all indicated locations, as required by authorities having jurisdiction and in accordance with manufacturer's instructions.

2. Provide sealant material and type required for indicated applications. Provide fire rated type at rated assemblies.

3. Provide coating materials at indicated UL. Rated assemblies.

G. All installations of insulation and work of this section shall meet approval of Architect and all code authorities having jurisdiction at no additional cost to the Owner.

END OF SECTION 07200
SECTION 07214 - CLOSED CELL SPRAY FOAM INSULATION

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 SECTION INCLUDES
A. Closed Cell Spray Foam Insulation.

1.3 RELATED SECTIONS
A. Section 04200 - Unit Masonry.
B. Section 05450 - Cold-Formed Metal Framing.
C. Section 09250 - Gypsum Board: Insulation installed in conjunction with interior wall finish systems.

1.4 REFERENCES
1.5 PERFORMANCE REQUIREMENTS
A. Conform to applicable code for flame and smoke, concealment, and over coat requirements.

1.6 SUBMITTALS
A. Submit under provisions of AIA A232 and Section 00800.
B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
C. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.7 QUALITY ASSURANCE
A. Manufacturer Qualifications: Manufacturer with a recommended minimum of ten years experience manufacturing products in this section shall provide all products listed.
B. Installer Qualifications: Products listed in this section shall be installed by a single organization with at least five years experience successfully installing insulation on projects of similar type and scope as specified in this section.
C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship is approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
B. Storage: Store materials in dry locations with adequate ventilation, protected from freezing rain, direct sunlight and excess heat and in such a manner to permit easy access for inspection and handling. Store at temperature between 55 and 80°F (12.7 to 26.6°C).
C. Handling: Handle materials to avoid damage.

1.9 PRE-APPLICATION MEETINGS
A. Convene minimum two weeks prior to starting work of this section.

1.10 SEQUENCING
A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.
1.11 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.

B. Do not apply insulation when substrate temperatures are under 40°F (4.4°C) prior to installation.

C. Surfaces must be dry prior to application of spray foam. Excess humidity may cause poor adhesion, and result in product failure.

D. To avoid overspray, product should not be applied when conditions are windy.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: CertainTeed Corp., Insulation Group, Valley Forge, PA; Tel: 800-233-8990; www.certainteed.com/Insulation; or approved equal.

1. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to the following:

   a. NCFI Polyurethanes, Div. of BMC, Tel. 800.346.8229.
   b. Or approved equal.

B. Requests for substitutions will be considered in accordance with provisions of AIA A232 and Section 00800.

2.2 SPRAY FOAM INSULATION

A. Insulation: HFC-blown type Closed Cell Foam: CertainTeed CertaSpray Closed Cell Foam is a medium-density, MDI-based polyurethane thermoset rigid foam. When CertaSpray A-side closed cell is mixed with CertaSpray B-side closed cell under pressure in a 1:1 volumetric ratio, they react and expand into a medium-density closed cell foam with an in-place core density of 1.9-2.2 pcf:

1. Physical and Mechanical Properties:

   a. Core Density: 1.9-2.4 pcf when tested in accordance with ASTM D 1622.

   b. Thermal Resistance (aged): 5.8 less than or equal to 2-1/2 inches / 6.4 when greater than 2-1/2 inches when tested in accordance with ASTM C 518 at 75°F, (h-ft2- degrees F)/Btu.

   c. Thermal Resistance (initial): 6.4 when tested in accordance with ASTM C 518 at 75°F, (h-ft2- degrees F)/Btu.
d. Closed Cell Content: 88-95 percent when tested in accordance with ASTM D 2842.

e. Compressive Strength: Greater than 25 psi when tested in accordance with ASTM D 1621.

f. Tensile Strength: 23 psi when tested in accordance with ASTM D 1623.

g. Water Absorption: Less than 2 percent by volume when tested in accordance with ASTM D 2842.

h. Dimensional Stability: Less than 9 percent by volume when tested in accordance with ASTM D 2126 at 75°F/95 percent RH, 28 Day.

i. Water Vapor Transmission: 1.3 perm/inch when tested in accordance with ASTM E 96.

j. Air Permeability: 0.013 when tested in accordance with ASTM E 283 at 1 inch thickness, L/s/m².

k. Fungi Resistance: Pass, with no growth when tested in accordance with ASTM C 1338.

2. Fire performance

a. Flame Spread: Less than 25 when tested in accordance with ASTM E 84.

b. Smoke: Less than 450 when tested in accordance with ASTM E 84.

3. Thermal Performance (aged): Tested in accordance with ASTM C 518 and/or ASTM C 177 at 75°F (24°C) mean temperature.

a. Thickness 1 inch (25 mm), R-Value 5.8 (h-ft²-degreesF)/Btu (1.0 (m²-degreesC)/W).

b. Thickness 1-12 inches (38 mm), R-Value 8.7 (h-ft²-degreesF)/Btu (1.5 (m²-degreesC)/W).

c. Thickness 2 inches (51 mm), R-Value 11.6 (h-ft²-degreesF)/Btu (2.0 (m²-degreesC)/W).

d. Thickness 2-12 inches (64 mm), R-Value 16.0 (h-ft²-degreesF)/Btu (2.8 (m²-degreesC)/W).

e. Thickness 3 inches (76 mm), R-Value 19.2 (h-ft²-degreesF)/Btu (3.4 (m²-degreesC)/W).

f. Thickness 3-12 inches (89 mm), R-Value 22.4 (h-ft²-degreesF)/Btu (3.9 (m²-degreesC)/W).

g. Thickness 4 inches (102 mm), R-Value 25.6 (h-ft²-degreesF)/Btu (4.5 (m²-degreesC)/W).
PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify that all exterior and interior wall, partition, and floor/ceiling assembly construction have been completed to the point where the insulation may correctly be installed.

C. Verify that substrate and cavities are dry and free of any foreign material that will impede application.

D. Verify that mechanical and electrical services in walls have been installed and tested and, if appropriate, verify that adjacent materials are dry and ready to receive insulation.

E. If substrate 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.

C. Mask and protect adjacent surfaces from overspray or dusting.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions. Product must be installed according to local code, and must be applied by a qualified applicator.

B. Apply insulation by spray method, to uniform monolithic density without voids.

C. Apply to minimum cured thickness as indicated on the Drawings or as scheduled at the end of this Section.

D. Apply to minimum cured thickness of 6-inches.
E. Apply to achieve thermal resistance **R-Value of 38.4.**

F. Apply insulation to fill voids around doors and windows. Apply insulation to fill voids around accessible service and equipment penetrations.

G. Do not install spray foam insulation in areas where it will be in contact with equipment or materials with operating temperatures of 180°F (82°C) or greater.

H. Where building is designed to meet the specific air tightness standards of the Energy Star Program, apply insulation as recommended by manufacturer to provide airtight construction. Apply sealant to joints between structural assemblies as specified in Division 7.

I. Coordinate installation of protective covering specified in Section 09250.

J. Patch damaged areas.

3.4 FIELD QUALITY CONTROL

A. Inspection will include verification of insulation and density.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 SCHEDULES

A. For the following location(s), apply the average cured thickness indicated.

1. Thermal insulation within exterior walls: 6-inches.

END OF SECTION 07214
SECTION 07220 - NAILABLE ROOF INSULATION

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 DESCRIPTION OF WORK

A. Extent of roof insulation board with nailable board shown on the drawings and includes the
   following:
   1. Non-ventilated type for application under preformed metal roofing system.

B. Securing insulation to roof deck as shown on drawings and indicated by provisions of this
   section.

C. Work included: All labor, materials, services, installation, equipment, etc., necessary to
   complete all roofing insulation as shown on drawings, as specified herein, and/or as required
   by job conditions.

1.3 QUALITY ASSURANCE

A. Thermal Resistivity: Where thermal resistivity properties of insulation materials are
   designated by r-values they represent the rate of heat flow through a homogenous material
   exactly 1" thick, measured by test method included in referenced material standard or
   otherwise indicated.

B. Fire Performance Characteristics: Provide insulation materials which are identical to those
   whose fire performance characteristics, as listed for each material or assembly of which
   insulation is a part, have been determined by testing, per methods indicated below, by UL
   or other testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Flame spread Rating: 25 or less.

C. Wind Uplift Resistance Characteristics: Provide insulation, mechanical fasteners, and plates
   which have been evaluated by Factory Mutual Systems for wind uplift and hail damage and
   are listed in Factory Mutual Approval Guide for AC Foam-II plus APA Rated OSB Panel, Class
   1 approval per FMRC standard 4450/4470.

D. Installer: The installer of insulation work specified in this section shall be the installer of the
   associated roofing, for undivided responsibility.

E. Compatibility with Roofing Materials: Insulation material must be approved by the fiberglass
   asphalt shingles manufacturer and be compatible with the fiberglass asphalt shingles roofing
   material.
F. Guarantee and Performance

1. The Contractor's guarantee shall specifically provide that it is required that roof insulation work withstand the uplift forces of wind.

2. Failures of the insulation work in bond or anchorage to the substrate, or between layers of insulation, or within the insulation, will be considered failures of materials or workmanship.

3. Provide two (2) years material and labor warranty against failure due to wind uplift resistance.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product literature and installation instructions for each type of insulation and vapor retarder material required.

B. Samples: Submit samples of the following listed items, in accordance with Contract Documents. Obtain Architect's approval before proceeding with ordering or fabrication of items of this section:

1. Each type of insulation specified - 12 inches square.

C. Shop Drawings: Submit shop drawings of tapered insulation (where required) showing location of each board.

1. Submit roof insulation Manufacturer's FM approved fastening pattern for approved fasteners.

2. Coating specification and corrosive resistance test data for mechanical fasteners and plates indicating compliance with FM 4470.

D. Manufacturer’s / Installer Certification: Submit certification by the insulation manufacturer and the installer attesting that products are in accordance with contract documents, its design intent and approved by the metal roofing manufacturer for this type of application.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General Protection: Protect insulations from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.

B. Do not overload the building structure with the storage of materials or use of installation equipment on the deck.

1.6 JOB CONDITIONS

A. Do not proceed with installation of roof insulation unless the materials, equipment and tradesmen required for the installation of the roofing material over the insulation are at the project site and scheduled to follow with roofing work immediately (same day) behind the insulation work.
B. Examine the existing substrates and conditions under which the work is to be performed, and perform whatever preparatory work is required in order to render the existing substrates and other conditions satisfactory for the installation.

PART 2 - PRODUCTS

2.1 MATERIALS AND MANUFACTURERS

A. Basis of Design: “ThermaCal” composite nailable insulation board as manufactured by Cornell Corp., Cornell, WI, Tel. # 888.439.6411, www.cornellcorporation.com; or approved equal.

B. Product shall meet ASTM C1289, Type II, Class I, Grade 2 and in compliance with the International Building Code requirements for foam insulation and the following requirements:

1. Total Thickness: 5½”.
2. LTTR R-Value: 30.50.
3. 7/16” thick nailable oriented strand board bonded to polyiso insulation.
4. Roof insulation board size shall be 4’x8’.
5. All four edges shall be tongue and grooved to reduce heat loss in joints.

C. Substitutions: At the Contractor’s option comparable products of other manufacturers will only be considered if it can be clearly shown that the substituted products and assemblies are equal to or exceed the construction quality requirements stated in standard product data of the "Basis of Design" products and as following:

1. Contractor shall provide base layers of 1½” thick of isocyanurate insulation and top layers secured to the roof decking with mechanical fasteners in accordance with FM requirements for I-90. Provide staggered joints to achieve reduction of heat loss.
2. Contractor shall provide top layers of non-ventilated type insulation board which shall meet the minimum requirements for the “Basis of Design” insulation board excluding the tongue and grooved edges.
3. Total of LTTR R-Value shall be 30.50.
4. All substitute products will be considered for substitutions only when submitted to the Architect as per the requirements of the Contract Documents, AIA A232 and Section 00800.

2.2 MISCELLANEOUS MATERIALS

A. Mechanical anchors for application of new insulation to deck shall be approved by the asphalt shingle manufacturer and shall be applied as recommended by the insulation manufacturer.
PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with manufacturer's instructions for particular conditions of installation in each case, including treatment (if any) at edges of each insulated area. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with the work.

B. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation and mastic.

C. "Phasing" is not permitted. Install water cutoffs at each end of each day's work or whenever work is interrupted and cannot be roofed over the same day. Water cutoffs to be provided by sealing the roofing edge with night seal cement.

3.2 PROTECTION

A. Protect insulation work from exposure to moisture, damage and deterioration, primarily by prompt installation of roofing work shown to be placed over the insulation. Remove and replace insulation work which has become wet, damaged or deteriorated before proceeding with other work. Test for moisture content, by suitable means, wherever there is possibility that exposed insulation work has acquired moisture in excess of the maximum content for optimum application of roofing.

B. Protect insulation from cutting and welding operations. Insulation should not be applied closer than 3" from any chimney, or flue construction and shall be protected by an approved fire resistance thermal barrier.

END OF SECTION 07220
SECTION 07241 – WATER MANAGED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 GENERAL

1.1 SUMMARY
A. Provide air and moisture barrier, and compatible EIFS for vertical above grade exterior walls
B. Related Sections
   1. Section 05450 – Cold-Formed Metal Framing
   2. Section 06100 – Carpentry for FRT Plywood Sheathing
   3. Section 07214 – Closed Cell Spray Foam Insulation
   4. Section 07272 - Fluid Applied Membrane Air Barrier
   5. Division 7 - Roofing System
   6. Section 07500 - Roofing, General
   7. Section 07600 - Flashing, Sheet Metal Flashing and Roof Accessories
   8. Section 07900 - Joint Sealer Assemblies
   9. Section 08305 – Access Doors
   10. Section 08520 - Aluminum Windows
   11. Section 09250 - Gypsum Drywall for Gypsum Sheathing

1.2 SUBMITTALS
A. Manufacturer’s specifications, details, installation instructions and product data
B. Manufacturer’s code compliance report
C. Manufacturer’s standard warranty
D. Applicator’s industry training credentials
E. Samples for approval as directed by Architect
F. Sealant manufacturer's certificate of compliance with ASTM C 1382
G. Prepare and submit project-specific details (when required by contract documents)

1.3 REFERENCES
A. ASTM Standards:
   B 117    Test Method for Salt Spray (Fog) Testing
   C 297    Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
   C 578    Specification for Preformed, Cellular Polystyrene Thermal Insulation
C 1177  Specification for Glass Mat Gypsum for Use as Sheathing
D 968  Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive
D 1784  Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
D 2247  Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
D 3273  Test for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
E 72  Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
E 84  Test Method for Surface Burning Characteristics of Building Materials
E 96  Test Methods for Water Vapor Transmission of Materials
E 119  Method for Fire Tests of Building Construction and Materials
E 330  Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
E 331  Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
E 1233  Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Difference
E 2098  Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish System after Exposure to a Sodium Hydroxide Solution
E 2178  Test Method for Air Permeance of Building Materials
E 2357  Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
G 153  Recommended Practice for Operating Light-and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials
B. Building Code Standards
   AC 235 Acceptance Criteria for EIFS Clad Drainage Wall Assemblies (November, 2009)

C. National Fire Protection Association (NFPA) Standards
   NFPA 285 Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus

D. Other Referenced Documents
   2. APA Engineered Wood Association E 30, Engineered Wood Construction Guide
   3. ICC-ES ESR-1233, StoGuard with Gold Coat, StoGuard with EmeraldCoat, and StoGuard VaporSeal Water-Resistive Barriers and StoEnergy Guard
   4. ICC-ES ESR-1748, StoTherm®

1.4 DESIGN REQUIREMENTS

A. Wind Load
   1. Design for maximum allowable system deflection, normal to the plane of the wall, of L/240.
   2. Design for wind load in conformance with code requirements.
   3. Maximum wind load resistance: ± 188 psf (9.00 kPa), provided structural supports and sheathing/sheathing attachment are adequate to resist these pressures.

B. Moisture Control
   1. Prevent the accumulation of water behind the EIFS or into the wall assembly, either by condensation or leakage through the wall construction, in the design and detailing of the wall assembly:
      a. Provide flashing to direct water to the exterior where it is likely to penetrate components in the wall assembly, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, at floor lines, and at the base of the wall.
b. Air Leakage Prevention – provide continuity of the air barrier system at foundation, roof, windows, doors, and other penetrations through the wall with connecting and compatible air barrier components to minimize condensation and leakage caused by air movement.

c. Vapor Diffusion and Condensation – perform a dew point analysis and/or dynamic hygrothermal modeling of the wall assembly to determine the potential for accumulation of moisture in the wall assembly by diffusion. Adjust insulation thickness and/or other wall assembly components accordingly to minimize risk. Avoid the use of vapor retarders on the interior side of the wall in warm, humid climates.

C. Impact Resistance
   1. Provide ultra-high impact resistance of the EIFS to a minimum height of 6'-0" (1.8 m) above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact. Indicate the areas with impact resistance other than “Standard” on contract drawings.

D. Color Selection
   1. Select finish coat with a light reflectance value of 20 or greater. (The use of dark colors is not recommended over expanded polystyrene [EPS]. EPS has a service temperature limitation of approximately 165°C [74°C]).

E. Joints
   1. Provide minimum 3/4 inch (19 mm) wide joints in the EIFS where they exist in the substrate or supporting construction, where the cladding adjoins dissimilar construction or materials, at changes in building height, at expansion, control, and cold joints in construction, and at floor lines in multi-level wood frame construction. Size joints to correspond with anticipated movement. Align terminating edges of EIFS with joint edges of through wall expansion joints and similar joints in construction. Refer to Sto Details.

   2. Provide minimum 1/2 inch (13 mm) wide perimeter sealant joints at all penetrations through the EIFS (windows, doors, mechanical, electrical, and plumbing penetrations, etc.).

   3. Specify compatible backer rod and sealant that has been evaluated in accordance with ASTM C 1382, and that meets minimum 50% elongation after conditioning.

   4. Provide joints so that air barrier continuity is maintained across the joint, and drain joints to the exterior, or provide other means to prevent or control water infiltration at joints.

F. Grade Condition

G. Trim, Projecting Architectural Features and Reveals
   1. All trim and projecting architectural features must have a minimum 1:2 [27°] slope along their top surface. All reveals must have minimum ¾ inch (19 mm) insulation thickness at the bottom of the reveal. All horizontal reveals must
have a minimum 1:2 [27°] slope along their bottom surface. Increase slope for northern climates to prevent accumulation of ice/snow and water on surface. Where trim/feature or bottom surface of reveal projects more than 2 inches (51 mm) from the face of the EIFS wall plane, protect the top surface with waterproof base coat. Periodic inspections and increased maintenance may be required to maintain surface integrity of the EIFS finish on weather exposed sloped surfaces. Limit projecting features to easily accessible areas and limit total area to facilitate and minimize maintenance. Refer to Sto Details.

2. Do not use the EIFS on weather exposed projecting ledges, sills, or other projecting features unless supported by framing or other structural support and protected with metal coping or flashing. Refer to Sto Detail 10.61.

H. Insulation Thickness

1. Minimum EPS insulation thickness is 1 inch (25 mm).
2. Maximum EPS insulation thickness is 12 inches (305 mm), except as noted below for fire-resistance rated wall assemblies.

I. Fire Protection

1. Do not use EPS foam plastic in excess of 12 inches (305 mm) thick on types I, II, III, or IV construction unless approved by the code official.

2. Where a fire-resistance rating is required by code use the EIFS over a rated concrete or concrete masonry assembly. Limit use over rated frame assemblies to non-load bearing assemblies (the EIFS is considered not to add or detract from the fire-resistance of the rated assembly). Maximum allowable EPS thickness: 4 inches (102 mm).

3. Refer to manufacturer’s testing or applicable code compliance report for other limitations that may apply.

1.5 PERFORMANCE REQUIREMENTS

A. Comply with ASTM E 2570 (Air/Moisture Barrier) and ASTM E 2568 (EIFS)

<table>
<thead>
<tr>
<th>TEST</th>
<th>METHOD</th>
<th>CRITERIA</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Weathering</td>
<td>AATCC 127 (Water Column)</td>
<td>No cracking, bond failure or water penetration after 210 hours UV exposure, 25 wet/dry cycles, and 21.6 in (55 cm) water column</td>
<td>Pass</td>
</tr>
<tr>
<td>TEST</td>
<td>METHOD</td>
<td>CRITERIA</td>
<td>RESULT</td>
</tr>
<tr>
<td>----------------------------------</td>
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</tr>
<tr>
<td>2. Durability</td>
<td>ASTM E 1233/ASTM E 72/ASTM E 331</td>
<td>No cracking or water penetration at sheathing joints after 10 cycles transverse loading, 1 cycle racking, 5 cycles environmental conditioning, and 15 minutes water spray at 2.86 psf (137 kPa) pressure differential</td>
<td>No water penetration</td>
</tr>
<tr>
<td>3. Water Resistance</td>
<td>ASTM D 2247</td>
<td>Absence of deleterious effects after 14 day exposure</td>
<td>No deleterious effects</td>
</tr>
<tr>
<td>4. Water Vapor Transmission</td>
<td>ASTM E 96 Method B (Water Method)</td>
<td>Measure</td>
<td>Sto Gold Coat: &gt; 10 perms [574 ng/(Pa·s·m²)] Sto AirSeal; &gt;12 perms [689 ng/(Pa·s·m²)]</td>
</tr>
<tr>
<td>5. Air Leakage (material)</td>
<td>ASTM E 2178</td>
<td>≤ 0.004 cfm/ft² at 1.57 psf (0.02 L/s·m² at 75 Pa)</td>
<td>Pass</td>
</tr>
<tr>
<td>6. Air Leakage (assembly)</td>
<td>ASTM E 2357</td>
<td>≤ 0.04 cfm/ft² (0.2 L/s·m²)</td>
<td>Pass¹</td>
</tr>
<tr>
<td>7. Freeze-Thaw</td>
<td>ASTM E 2485</td>
<td>No delamination or surface changes after 10 cycles when viewed under 5X magnification</td>
<td>No delamination or surface changes</td>
</tr>
<tr>
<td>8. Surface Burning</td>
<td>ASTM E 84</td>
<td>Flame Spread less than or equal to 25 Smoke developed less than or equal to 450</td>
<td>Flame Spread: &lt; 25 Smoke Density: &lt; 450</td>
</tr>
<tr>
<td>9. Tensile Bond</td>
<td>ASTM C 297</td>
<td>Greater than 15 psi (103 kPa)</td>
<td>Pass over Plywood, OSB, Glass Mat Faced Gypsum sheathings, CMU</td>
</tr>
</tbody>
</table>

1. Based on testing of air barrier joint treatment material at sheathing joints and no top coat

**Table 2  EIFS Weather Resistance and Durability Performance**

<table>
<thead>
<tr>
<th>TEST</th>
<th>METHOD</th>
<th>CRITERIA</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Accelerated Weathering</td>
<td>ASTM G 153 (Formerly ASTM G 23)</td>
<td>No deleterious effects* at 2000 hours when viewed under 5x magnification</td>
<td>Pass</td>
</tr>
<tr>
<td>2. Accelerated Weathering</td>
<td>ASTM G 154 (Formerly ASTM G 53)</td>
<td>No deleterious effects* at 2000 hours</td>
<td>Pass</td>
</tr>
<tr>
<td>3. Freeze/Thaw Resistance</td>
<td>ASTM E 2485</td>
<td>No deleterious effects* at 10 cycles when viewed under 5x magnification</td>
<td>Pass</td>
</tr>
<tr>
<td>TEST</td>
<td>METHOD</td>
<td>CRITERIA</td>
<td>RESULTS</td>
</tr>
<tr>
<td>-------------------------------</td>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4. Water Penetration</td>
<td>ASTM E 331</td>
<td>No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes at 6.24 psf (299 Pa) or 20% of design wind pressure, whichever is greater</td>
<td>Pass at 12.0 psf (575 Pa) after 30 minutes</td>
</tr>
<tr>
<td>5. Drainage Efficiency</td>
<td>ASTM E 2273</td>
<td>90% minimum</td>
<td>&gt; 90%</td>
</tr>
<tr>
<td>6. Tensile Adhesion</td>
<td>ASTM E 2134</td>
<td>Minimum 15 psi (103kPa) tensile strength</td>
<td>Pass</td>
</tr>
<tr>
<td>7. Water Resistance</td>
<td>ASTM D 2247</td>
<td>No deleterious effects* at 14 day exposure</td>
<td>Pass @ 28 days</td>
</tr>
<tr>
<td>8. Salt Spray</td>
<td>ASTM B 117</td>
<td>No deleterious effects* at 300 hours</td>
<td>Pass @ 300 hrs</td>
</tr>
<tr>
<td>9. Abrasion Resistance</td>
<td>ASTM D 968</td>
<td>No cracking or loss of film integrity at 528 quarts (500 L) of sand</td>
<td>Pass @ 528 quarts (1000 L)</td>
</tr>
<tr>
<td>10. Mildew Resistance</td>
<td>ASTM D 3273</td>
<td>No growth supported during 28 day exposure period</td>
<td>Pass @ 28 days</td>
</tr>
</tbody>
</table>

* No deleterious effects: no cracking, checking, crazing, erosion, rusting, blistering, peeling or delamination

Table 3  Air/Moisture Barrier and EIFS Fire Performance

<table>
<thead>
<tr>
<th>TEST</th>
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<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fire Endurance</td>
<td>ASTM E 119</td>
<td>Maintain fire resistance of existing rated assembly</td>
<td>Pass (4 inch [102 mm] maximum allowable insulation thickness)</td>
</tr>
</tbody>
</table>
## TEST METHOD CRITERIA RESULT

### 2. Intermediate Scale Multi-Story Fire Test
- **NFPA 285** (formerly UBC Standard 26-9)
- **CRITERIA**
  1. Resistance to vertical spread of flame within the core of the panel from one story to the next
  2. Resistance to flame propagation over the exterior surface
  3. Resistance to vertical spread of flame over the interior surface from one story to the next
  4. Resistance to significant lateral spread of flame from the compartment of fire origin to adjacent spaces
- **RESULT** Pass with 12 inches (305 mm) insulation

### 3. Radiant Heat Ignition
- **NFPA 268**
- **CRITERIA** No ignition @ 20 minutes
- **RESULT** Pass with 1 and 12 inches (25 and 305 mm) insulation

### 4. Surface Burning (individual components)
- **ASTM E 84**
- **CRITERIA** Individual components shall each have a flame spread of 25 or less, and smoke developed of 450 or less
- **RESULT** Flame Spread: < 25 Smoke Developed: < 450

<table>
<thead>
<tr>
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<th>CRITERIA</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Alkali Resistance of Reinforcing Mesh</td>
<td>ASTM E 2098</td>
<td>Greater than 120 pli (21 dN/cm) retained tensile strength</td>
<td>Pass</td>
</tr>
<tr>
<td>2. Requirements for Rigid PVC Accessories</td>
<td>ASTM D 1784</td>
<td>Meets cell classification 13244C</td>
<td>Pass</td>
</tr>
</tbody>
</table>

### Table 4 EIFS Component Performance

#### 1.6 QUALITY ASSURANCE

**A. Manufacturer Requirements**
- 1. Member in good standing of the EIFS Industry Members Association (EIMA)
- 2. Air/moisture barrier and EIFS manufacturer for a recommended minimum of thirty (30) years

**B. Contractor Requirements**
- 1. Engaged in application of similar systems for a recommended minimum of three (3) years
- 2. Knowledgeable in the proper use and handling of Sto materials

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3. Employ skilled mechanics who are experienced and knowledgeable in air/moisture barrier and EIFS application, and familiar with the requirements of the specified work

4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project

5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with Sto's published specifications and details and the project plans and specifications

C. Insulation Board Manufacturer Requirements

1. EPS board listed by an approved agency

2. EPS board manufactured under Sto licensing agreement and recognized by Sto as being capable of producing EPS insulation board to meet EIFS requirements

3. EPS board labeled with information required by Sto, the approved listing agency, and the applicable building code.

D. Mock-up Testing

1. Construct full-scale mock-up of typical air/moisture barrier and EIFS/window wall assembly with specified tools and materials and test air and water infiltration and structural performance in accordance with ASTM E 283, ASTM E 331 and ASTM E 330, respectively, through independent laboratory. Mock-up shall comply with requirements of project specifications. Where mock-up is tested at job site maintain approved mock-up at site as reference standard. If tested off-site accurately record construction detailing and sequencing of approved mock-up for replication during construction.

E. Inspections

1. Provide independent third party inspection where required by code or contract documents

2. Conduct inspections in accordance with code requirements and contract documents

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product

B. Protect coatings (pail products) from freezing and temperatures in excess of 90°F (32°C). Store away from direct sunlight.

C. Protect Portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.
1.8 PROJECT/SITE CONDITIONS

A. Maintain ambient and surface temperatures above 40°F (4°C) during application and
drying period, minimum 24 hours after application of Air/Moisture barrier and EIFS
products

B. Provide supplementary heat for installation in temperatures less than 40°F (4°C)

C. Provide protection of surrounding areas and adjacent surfaces from application of
products

1.9 COORDINATION/SCHEDULING

A. Coordinate installation of roofing membrane, windows, doors and other wall
penetrations to provide a continuously connected air and moisture barrier

B. Provide protection of rough openings before installing windows, doors, and other
penetrations through the wall

C. Install window and door head flashing immediately after windows and doors are
installed

D. Install diverter flashings wherever water can enter the wall assembly to direct water to
the exterior

E. Install splices or tie-ins from air/moisture barrier over back leg of flashings, starter
tracks, and similar details to form a shingle lap that directs incidental water to the
exterior

F. Install copings and sealant immediately after installation of the EIFS when coatings are
dry, and such that, where sealant is applied against the EIFS surface, it is applied
against the base coat or primed base coat surface

G. Schedule work such that air/moisture barrier is exposed to weather no longer than 30
days if Sto Gold Coat is used, 90 days if Sto AirSeal is used.

H. Attach penetrations through the EIFS to structural support and provide water tight seal
at penetrations

1.10 WARRANTY

A. Provide manufacturer's standard warranty

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide Air/Moisture Barrier and EIFS coatings and accessories from single source
manufacturer or approved supplier

B. The following are acceptable manufacturers:
1. Sto Corp. – Air/Moisture Barrier, EIFS; or approved equal.
2. Plastic Components, Inc. – EIFS Accessories; or approved equal.

2.2 AIR/MOISTURE BARRIER

A. StoGuard®

1. Joint Treatment, Rough Opening Protection, and Detail Components:
   a. Sto Gold Fill® – ready mixed coating applied by trowel or knife for rough opening protection of frame walls and joint treatment of sheathing when used with StoGuard Mesh. Also used as a detail component with StoGuard Mesh to splice over back flange of starter track, flashing, and similar ship lap details
   b. Sto Gold Coat® - ready mixed coating applied by brush, roller or spray for rough opening protection of frame walls and joint treatment of sheathing when used with StoGuard Fabric. Also used as a detail component with StoGuard Fabric to splice over back flange of starter track, flashing, and similar ship lap details
   c. Sto AirSeal™ - ready mixed medium-high build coating applied by brush, roller or spray for rough opening protection of frame walls and joint treatment of sheathing when used with StoGuard Fabric. Also used as a detail component with StoGuard Fabric to splice over back flange of starter track, flashing, and similar ship lap details
   d. Sto RapidGuard™ - one component STPE rapid drying gun-applied treatment for sheathing joints, rough openings, seams, cracks, penetrations and other transitions in above grade wall construction.
   e. StoGuard RapidFill™ – one component rapid drying gun-applied joint treatment for sheathing. Also used at static transition joints or seams in construction and to seal fish mouths, wrinkles, seams, gaps, holes, or other voids in StoGuard air barrier materials. Also used as a detail component to splice over back flange of starter track, flashing, and similar ship lap details
   f. StoGuard RapidSeal™ – one component rapid drying gun-applied rough opening protection for frame and CMU walls without mesh or fabric reinforcement. Also use as a joint treatment for sheathing when used with StoGuard Mesh. Also used to seal fish mouths, wrinkles, seams, gaps, holes, or other voids in StoGuard air barrier materials

2. Waterproof Coating:
   a. Sto Gold Coat® – ready mixed waterproof coating for concrete, concrete masonry, wood-based sheathing, and glass mat gypsum sheathing

3. Transition Detail Components
   a. StoGuard Transition Membrane – flexible air barrier membrane for continuity at static transitions such as sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, and
b. Sto RapidGuard: one component STPE rapid drying gun-applied treatment for sheathing joints, rough openings, seams, cracks, penetrations and other static transitions in above grade wall construction such as: shingle lap transitions to flashing, wall to balcony floor slab or ceilings, and through wall penetrations – pipes, electrical boxes, and scupper penetrations.

2.3 ADHESIVE

A. Sto BTS Plus – factory blended one-component polymer-modified portland cement based high build adhesive

2.4 INSULATION BOARD

A. Sto EPS Insulation Board: nominal 1.0 lb/ft$^3$ (16 kg/m$^3$) Expanded Polystyrene (EPS) insulation board in compliance with ASTM E 2430 and ASTM C 578 Type I requirements and listed, labeled, and furnished in accordance with Section 1.6C.

2.5 BASE COAT

B. Cementitious Base Coat

1. Sto BTS Plus – factory blended one component polymer modified portland cement based high build base coat. Also used as a leveler for concrete and masonry surfaces

C. Non-cementitious Base Coat

1. Sto RFP – ready mixed acrylic based plaster base coat material

D. Waterproof Base Coat

1. Sto Flexyl – fiber reinforced acrylic based waterproof base coat mixed with portland cement (for use as a waterproof base coat over Sto BTS Plus or BTS Xtra for foundations, parapets, splash areas, trim and other projecting architectural features)

2.6 REINFORCING MESHES

A. Standard Mesh

1. Sto Mesh – nominal 4.5 oz/yd$^2$ (153 g/m$^2$), symmetrical, interlaced open-weave glass fiber fabric made with alkaline resistant coating for compatibility with Sto materials (achieves Standard Impact Classification)

B. Ultra-High Impact Mesh

1. Sto Armor Mat – nominal 15 oz/yd$^2$ (509 g/m$^2$), ultra-high impact, double strand, interwoven, open-weave glass fiber fabric with alkaline resistant coating for compatibility with Sto materials (recommended to a minimum
height of 6’-0” [1.8m] above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact. Achieves Ultra-High Impact Classification when applied beneath Sto Mesh)

C. Specialty Meshes
   1. Sto Detail Mesh – nominal 4.2 oz/yd² (143 g/m²), flexible, symmetrical, interlaced glass fiber fabric, with alkaline resistant coating for compatibility with Sto materials (used for standard back wrapping, aesthetic detailing, and reinforcement of sheathing joints and protection of rough openings with trowel applied air/moisture barrier)

2.7 PRIMER
   A. StoPrime Sand – acrylic based tintable primer with sand for roller application

2.8 FINISH COAT
   A. Stolit® Lotusan® – acrylic based textured wall finish with graded marble aggregate and self-cleaning properties

2.9 JOB MIXED INGREDIENTS
   A. Water – clean and potable
   B. Portland cement – Type I, Type II, or Type I-II in conformance with ASTM C 150

2.10 ACCESSORIES
   A. Starter Track – rigid PVC (polyvinyl chloride) plastic track Part No. STDE as furnished by Plastic Components, Inc., 9051 NW 97th Terrace, Miami, FL 33178 (800 327 – 7077).
   B. Sto-Mesh Corner Bead Standard – one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh for outside corner reinforcement.
   C. Sto Drip Edge Profile - one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh that creates a drip edge and plaster return

2.11 MIXING
   A. Sto Gold Fill – mix with a clean, rust-free high speed mixer to a uniform consistency
   B. Sto Gold Coat – mix with a clean, rust-free high speed mixer to a uniform consistency
   C. Sto AirSeal – mix with a clean, rust-free high speed mixer to a uniform consistency
   D. Sto BTS Plus – mix ratio with water: 5-6.5 quarts (4.7-6.2 L) of water per 47 pound (21.3 kg) bag of Sto BTS Plus. Pour water into a clean mixing pail. Add Sto BTS Plus, mix to a uniform consistency and allow to set for approximately 5 minutes. Adjust mix if necessary with additional Sto BTS Plus or water and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent. Do not exceed maximum water amount in mix ratio.
E. Sto BTS Xtra – mix ratio with water: 4.75-5 quarts (4.5-4.7 L) of clean potable water per 38 pound (17.2 kg) bag of Sto BTS Xtra. Pour water into a clean mixing pail. Add Sto BTS Xtra, mix to a uniform consistency and allow to set for approximately 5 minutes. Adjust mix if necessary with additional Sto BTS Xtra or water and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent. Do not exceed maximum amount of water in mix ratio.

F. Sto Flexyl – mix ratio with portland cement: 1:1 ratio by weight. Pour Sto Flexyl into a clean mixing pail. Add portland cement, mix to a uniform consistency and allow to set for approximately five minutes. Adjust mix if necessary with additional Sto Flexyl and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent.

G. Sto Watertight Coat – pour liquid component into a clean mixing pail. Add dry component, mix to a uniform consistency and allow to set for approximately five minutes. Adjust mix if necessary and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent.

H. Sto primer – mix with a clean, rust-free high speed mixer to a uniform consistency

I. Stolit Lotusan – mix with a clean, rust-free high speed mixer to a uniform consistency. A small amount of water may be added to adjust workability. Limit addition of water to amount needed to achieve the finish texture.

J. Mix only as much material as can readily be used

K. Do not use anti-freeze compounds or other additives

PART 3  EXECUTION

3.1  ACCEPTABLE INSTALLERS

A. Prequalify under Quality Assurance requirements of this specification (para. 1.06 B)

3.2  EXAMINATION

A. Inspect masonry substrates prior to start of application for:

1. Contamination—algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances

2. Surface absorption and chalkiness

3. Cracks—measure crack width and record location of cracks

4. Damage and deterioration such as voids, honeycombs and spalls

5. Moisture content and moisture damage—use a moisture meter to determine if the surface is dry enough to receive the products and record any areas of moisture damage

6. Compliance with specification tolerances—record areas that are out of tolerance (greater than ¼ inch in 8-0 feet [6mm in 2438 mm] deviation in plane)
B. Inspect sheathing application for compliance with applicable requirement and installation in conformance with specification and manufacturer requirements:
   1. Glass Mat Faced gypsum sheathing compliant with ASTM C 1177
   2. Exterior Grade and Exposure I wood based sheathing – APA Engineered Wood Association E 30
   3. Attachment into structural supports with adjoining sheets abutted (gapped if wood-based sheathing) and fasteners at required spacing to resist design wind pressures as determined by design professional
   4. Fasteners seated flush with sheathing surface and not over-driven

C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the Air/Moisture Barrier and the EIFS installation to the General Contractor. Do not start work until deviations are corrected.

3.3 SURFACE PREPARATION

A. Remove surface contaminants on concrete masonry, gypsum sheathing, or coated gypsum sheathing surfaces

B. Repair cracks, spalls or damage in concrete masonry surfaces and level masonry surfaces to comply with required tolerances

C. Apply conditioner (consult Sto) by spray or roller to chalking or excessively absorptive surfaces or pressure wash to remove surface chalkiness

D. Remove fasteners that are not anchored into supporting construction and seal holes with air barrier material

E. Seal over-driven fasteners with air barrier material and install additional fasteners as needed to comply with fastener spacing requirement

F. Fill large gaps between sheathing or voids around pipe, conduit, scupper, and similar penetrations with spray foam and shave flush with surface (refer to Sto Details)

G. Replace weather-damaged sheathing and repair or replace damaged or cracked sheathing

3.4 INSTALLATION

3.4.1 Air/Moisture Barrier Installation over Exterior or Exposure I Wood-Based Sheathing (Plywood), Glass Mat Faced Gypsum Sheathing in Compliance with ASTM C 1177, and Concrete Masonry (CMU) Wall Construction

A. Transition Detailing
   1. Detail transition areas with Sto RapidGuard or StoGuard Transition Membrane to achieve air barrier continuity. For illustrations of installation, refer to Sto guide Details and Sto RapidGuard Installation Guide or StoGuard Transition Membrane Installation Guide (www.stocorp.com)
B. Rough Opening Protection
   1. Sto RapidGuard: apply a fillet bead of material with a caulking gun at interior corners inside the opening to seal jamb/sill and jamb/head seams. Apply material in a zig-zag pattern along sill, jambs, and head to form a generous bead of material along the surface to be covered. Use a 6 inch (152 mm) wide plastic drywall knife to spread the material to a uniform thickness of 12-20 mils (0.3-0.5 mm) before the material skins. Treat the entire rough opening surface in this manner and overlap onto the face of the sheathing 2 inches (51 mm) minimum all the way around.

C. Sheathing Joint Treatment
   1. Sto Gold Fill with StoGuard Mesh: place 4 inch (102 mm) wide mesh centered along sheathing joints and minimum 9 inch (229 mm) wide mesh centered and folded at inside and outside corners. Immediately apply Sto Gold Fill by spray or trowel and spread with a trowel to create a smooth surface that completely covers the mesh.

D. Air/Moisture Barrier Coating Installation
   1. Plywood and Gypsum Sheathing: apply waterproof coating by spray or roller over sheathing surface, including the dry joint treatment, rough opening protection, and transition areas, to a uniform wet mil thickness of 10 mils in one coat (Sto Gold Coat) or 20 mils in one coat (Sto AirSeal). Use ½ inch (13 mm) nap roller for plywood. Use ¾ inch (19 mm) nap roller for glass mat faced gypsum sheathing. Protect from weather until dry.
   2. CMU Surfaces:
      a. Repair static cracks up to 1/2 inch (13 mm) wide with Sto RapidGuard or StoGuard RapidFill. Rake the crack with a sharp tool to remove loose or friable material and blow clean with oil-free compressed air. Apply the crack filler with a trowel or putty knife over the crack and tool the surface smooth. Protect repair from weather until dry.
      b. Liberally apply coating to the surface with a ¾ inch nap roller or spray equipment to a minimum wet thickness of 10 – 30 mils (Sto Gold Coat) or 20-40 wet mils (Sto AirSeal), depending on surface condition. Apply to a uniform thickness. Additional coats may be necessary to provide a void and pinhole free surface. Protect from weather until dry.

E. Air /Moisture Barrier Connections and Shingle Laps
   1. Coordinate installation of connecting air barrier components with other trades to provide a continuous air tight membrane.
   2. Coordinate installation of flashing and other moisture protection components with other trades to achieve complete moisture protection such that water is directed to the exterior, not into the wall assembly, and drained to the exterior at sources of leaks (windows, doors and similar penetrations through the wall assembly).
3. Splice-in head flashings above windows, doors, floor lines, roof/sidewall step flashing, and similar locations with StoGuard detail component to achieve shingle lap of the air/moisture barrier such that water is directed to the exterior.

3.4.2 EIFS Installation

A. Starter Track

1. Strike a level line at the base of the wall to mark where the top of the starter track terminates.

2. Attach the starter track even with the line into structural supports with the proper fastener: Type S-12 corrosion resistant screws for steel framing with minimum 3/8 inch (9 mm) and three thread penetration, galvanized or zinc coated nails for wood framing with minimum 3/4 inch (19 mm) penetration, and corrosion resistant masonry screws with minimum 1 inch (25 mm) penetration for CMU. Attach between studs into blocking as needed to secure the track flat against the wall surface. Attach at maximum 16 inches (406 mm) on center into framing. For solid wood sheathing or masonry surfaces, attach directly at 12 inches (305 mm) on center maximum.

3. Butt sections of starter track together. Miter cut outside corners and abut. Snip front flange of one inside corner piece (to allow EPS insulation board to be seated inside of track) and abut.

4. Install Starter Track at other EIFS terminations as designated on detail drawings: above roof along dormers or gable end walls, and beneath window sills with concealed flashing (refer to Sto Details).

B. Detail Splice Strips for Starter Track, Flashing at Floor Lines, Head of Windows and Doors

1. Starter Track, Window/Door Head Flashing, Floor Line Flashing, and Roof/Side Wall Step Flashing: Install minimum 4 inch (100 mm) wide detail component over back flange of starter track, floor line flashing, head flashing, and roof/side wall step flashing. Center the detail component so it spans evenly between the back leg of flashing (or accessory) and the coated sheathing. Make a smooth transition to the coated sheathing with a trowel, knife, or roller, depending on the detail component material being used. When Sto Gold Fill with StoGuard Mesh is the detail component apply another coat of the waterproof coating over the detail area. Do not leave detail components exposed for more than 30 days.

C. Backwrapping

1. Apply a strip of detail mesh to the dry air/moisture barrier at all system terminations (windows, doors, expansion joints, etc.) except where the Starter Track is installed. The mesh must be wide enough to adhere approximately 4 inches (100 mm) of mesh onto the wall, be able to wrap around the insulation board edge and cover a minimum of 2 ½ inches (64 mm) on the outside surface of the insulation board. Attach mesh strips to the air/moisture barrier and allow them to dangle until the backwrap procedure is completed.
(paragraph 3.04 G1). Alternatively, pre-wrap terminating edges of insulation board.

D. Adhesive Application and Installation of Insulation Board

1. Ensure the air/moisture barrier surface (Sto Gold Coat) is free of surface contamination. Install the insulation board within 30 days of the application of the air/moisture barrier coating (Sto Gold Coat), or clean the surface and recoat with Sto Gold Coat.

2. Rasp the interior lower face of insulation boards to provide a snug friction fit into the Starter Track. *(Note: rasping prevents an outward bow at the Starter Track).*

3. Use either polyurethane spray foam adhesive (Sto TurboStick) or cementitious adhesive (Sto BTS Plus or Sto BTS Xtra):

   a. Polyurethane Spray Foam Adhesive (Sto TurboStick): apply adhesive to the back of the insulation board with the dispensing pistol approximately ¾ inch (19 mm) from ends. Apply 5 additional ribbons spaced equally at no greater than 7 inches (177 mm) apart between the end ribbons. Apply uniform ribbons of adhesive parallel with the SHORT dimension of the board so that when boards are placed on the wall the ribs will be VERTICAL. Apply adhesive ribbons approximately ½ inch (51 mm) in diameter which will expand to ¼ – 1 inch (19 – 25 mm). Keep adhesive ½ inch (51 mm) short of board edges. Apply adhesive uniformly so ribbons of adhesive do not converge. Allow adhesive to “dwell” and become “tacky” before placing boards on wall. Adhesive will look smooth, not jagged, when ready to apply to wall surface. Place boards while adhesive is “tacky” and before adhesive “skins”.

   Place insulation boards in a running bond pattern on the wall with the long dimension horizontal. Start by inserting the lower edge of the boards inside the starter track at the base of the wall until they contact the bottom of the track. Apply light pressure when placing the boards. After boards have been in place for 5-10 minutes use a straight edge to lightly press the boards inward and to keep board joints flush, as post-expansion of the adhesive may force boards slightly outward.

   b. Cementitious Adhesive (Sto BTS Plus or Sto BTS Xtra): apply adhesive to the back of the insulation board with the proper size (1/2 x ½ x 2 inch [13 x 13 x 51 mm]) stainless steel notched trowel. Apply uniform ribbons of adhesive parallel with the SHORT dimension of the board so that when boards are placed on the wall the ribs will be VERTICAL. Apply adhesive uniformly so ribbons of adhesive do not converge. Immediately place insulation boards in a running bond pattern on the wall with the long dimension horizontal. Start by inserting the lower edge of the boards inside the starter track at the base of the wall until they contact the bottom of the track. Apply firm pressure over the entire surface of the boards to ensure uniform contact of adhesive. IMPORTANT: do not delay installation once adhesive is applied. If adhesive “skins” remove it and apply fresh adhesive.
4. Bridge sheathing joints by a minimum of 6 inches (152 mm). Interlock inside and outside corners.

5. Butt all board joints tightly together to eliminate any thermal breaks. Care must be taken to prevent any adhesive from getting between the joints of the boards.

6. Cut insulation board in an L-shaped pattern to fit around openings. Do not align board joints with corners of openings.

7. Check for satisfactory contact of the insulation board with the substrate. If any boards have loose areas use the spray foam adhesive dispensing pistol to create a hole through the board and inject adhesive to attach the loose area. Allow the adhesive to expand to the outer face of the board while withdrawing the pistol. Cut excess adhesive flush with the surface of the insulation. Do not use nails, screws, or any other type of non-thermal mechanical fastener.

E. Slivering and Rasping of Insulation Board Surface

1. Make sure insulation boards are fully adhered to the substrate before proceeding to steps 3.04 E2 and 3.04 E3 below.

2. Fill any open joints in the insulation board layer with slivers of insulation or the spray foam adhesive.

3. Rasp the insulation board surface to achieve a smooth, even surface and to remove any ultraviolet ray damage.

F. Trim, Reveals and Projecting Aesthetic Features

1. Attach features and trim where designated on drawings with adhesive to a base layer of insulation board or to the coated sheathing surface. Fill any gaps between the trim and base layer of insulation with spray foam adhesive and rasp flush with the trim surface. Slope the top surface of all trim/features minimum 1:2 (27°) and the bottom of all horizontal reveals minimum 1:2 (27°).

2. Cut reveals/aesthetic grooves with a hot-knife, router or groove-tool in locations indicated on drawings.

3. Offset reveals/aesthetic grooves minimum 3 inches (75 mm) from insulation board joints.

4. Do not locate reveals/aesthetic grooves at high stress areas.

5. Ensure minimum ¾ inch (19 mm) thickness of insulation board at the bottom of the reveals/aesthetic grooves.

G. Completion of Backwrapping

1. Complete the backwrapping procedure by applying base coat to exposed edges of insulation board and approximately 4 inches (100 mm) onto the face of the insulation board. Pull mesh tight around the board and embed it in the base coat with a stainless steel trowel. Use a corner trowel for clean, straight lines. Smooth any wrinkles or gaps in the mesh.
H. Accessory Installation

1. Corner Bead: cut the corner bead accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the outside corner area that will receive the accessory. Immediately place the accessory directly into the wet base coat material. Do not slide into place. Press the accessory into place. A corner trowel is best for this purpose. Embed and completely cover the mesh and PVC by troweling from the corner to the edge of the mesh so that no mesh or PVC color is visible. Avoid excess build-up of base coat and feather along mesh edges. Adjoin separate pieces by abutting PVC to PVC and overlapping the mesh “tail” from one piece onto the next piece. Fully embed the accessory and mesh “tail” in base coat material. When installing field mesh reinforcement overlap accessory mesh and PVC. Remove any excess base coat from the outside corner.

2. Drip Edge: install the drip edge accessory prior to application of field mesh (paragraph 3.4.2 I5 below). Install with arrow on mesh pointing UP. Cut the accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the area that will receive the accessory. Immediately place the accessory directly into the wet base coat material and press into place. Do not slide into place. Embed and completely cover the mesh and PVC by troweling from the drip edge screed rail to the edge of the mesh. Avoid excess build-up of base coat, feather along mesh edges, and remove any excess base coat from the drip edge nosing. Abut adjoining pieces and install as described above. When installing field mesh reinforcement overlap accessory mesh 4 inches (10 cm) on both vertical and horizontal faces so the PVC is overlapped, and remove any excess base coat from the drip edge nosing. On vertical and horizontal faces of the accessory install finish to the drip edge lines and remove any protruding finish from the drip edge nosing.

I. Base Coat and Reinforcing Mesh Application

1. Ensure the insulation board is firmly adhered and free of surface contamination or UV degradation, and is thoroughly rasped before commencing the base coat application.

2. Apply minimum 9x12 inch (225x300 mm) diagonal strips of detail mesh at corners of windows, doors, and all penetrations through the system. Embed the strips in wet base coat and trowel from the center to the edges of the mesh to avoid wrinkles.

3. Apply detail mesh at trim, reveals and projecting architectural features. Embed the mesh in the wet base coat. Trowel from the base of reveals to the edges of the mesh.

4. Ultra-High impact mesh application (recommended to a minimum height of 6'-0" [1.8 m] above finished grade at all areas accessible to pedestrian traffic.
and other areas exposed to abnormal stress or impact, and where indicated on contract drawings): apply base coat over the insulation board with a stainless steel trowel to a uniform thickness of approximately 1/8 inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016 mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Butt ultra-high impact mesh at seams. Allow the base coat to dry.

5. Standard mesh application: Apply base coat over the insulation board, including areas with Ultra-High impact mesh, with a stainless steel trowel to a uniform thickness of approximately 1/8 inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016 mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Overlap mesh not less than 2-1/2 inches (64 mm) at mesh seams and at overlaps of detail mesh. Feather seams and edges. Double wrap all inside and outside corners with minimum 6 inch (152 mm) overlap in each direction (optional if corner bead accessory is used – see NOTE to paragraph 3.4.2 H1 above). Avoid wrinkles in the mesh. The mesh must be fully embedded so that no mesh color shows through the base coat when it is dry. Re-skim with additional base coat if mesh color is visible.

6. Sloped Surfaces: for trim, reveals, aesthetic bands, cornice profiles, sills or other architectural features that project beyond the vertical wall plane more than 2 inches (51 mm) apply waterproof base coat with a stainless steel trowel to the sloped surface and minimum four inches (100 mm) above and below it. Embed standard mesh or detail mesh in the waterproof base coat and overlap mesh seams a minimum of 2-1/2 inches (65 mm).

7. Allow base coat to thoroughly dry before applying primer or finish.

J. Primer Application

1. Ensure the base coat surface is free of surface contamination before commencing the primer application.

2. Apply primer evenly with brush, roller or proper spray equipment over the clean, dry base coat and allow to dry thoroughly before applying finish.

K. Finish Coat Application

1. Ensure the base coat surface or primed base coat is free of surface contamination before commencing the finish application.

2. Apply finish directly over the base coat or primed base coat when dry. Apply finish by spray or stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:
   a. Avoid application in direct sunlight.
   b. Apply finish in a continuous application, and work to an architectural break in the wall.
   c. Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results. Cool or
damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.

d. Do not install separate batches of finish side-by-side.

e. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.

f. Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.

3.5 PROTECTION

A. Provide protection of installed materials from water infiltration into or behind them

B. Provide protection of installed materials from dust, dirt, precipitation, freezing and continuous high humidity until they are fully dry

3.6 CLEANING, REPAIR AND MAINTENANCE

A. Clean and maintain the EIFS for a fresh appearance and to prevent water entry into and behind the system. Repair cracks, impact damage, spalls or delamination promptly.

B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into or behind the EIFS and anywhere into the wall assembly

C. Refer to Sto reStore Repair and Maintenance Guide (reStore Program) for detailed information on restoration – cleaning, repairs, recoating, resurfacing and refinishing, or re-cladding

END OF SECTION 07241
SECTION 07270 - FLUID APPLIED AIR / VAPOR BARRIERS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions, Supplementary Conditions, Instructions to Bidders, and Division 01- General Requirements shall be read in conjunction with and govern this section.

B. The Specification shall be read as a whole by all parties concerned. Each Section may contain more or less than the complete Work of any trade. The Contractor is solely responsible to make clear to the installing Subcontractor the extent of their Work.

1.02 SUMMARY

A. This Section includes requirements for supplying labor, materials, tools, and equipment to complete the Work as shown on the Drawings and as specified herein including, but not limited to, the following:

1. Adhesive/Primer
2. Fluid Applied Impermeable Air and Vapor Barrier
3. Air Barrier/Thru-wall Flashing
4. Sealant
5. Insulation Adhesive

1.03 RELATED SECTIONS

A. Section 04200 - Unit Masonry
B. Section 05500 - Metal Fabrications
C. Section 07200 - Building Insulation
D. Section 07500 - Roofing, General
E. Section 07530 - Single-Ply Roofing Membrane System
F. Section 07535 - Modified Bitumen Roofing System - Cold Applied
G. Section 07600 - Flashing, Sheet Metal and Roofing Accessories
H. Section 07900 - Joint Sealer Assemblies
I. Section 08410 - Aluminum/FRP Doors and Aluminum Framing Systems
J. Section 08415 – Aluminum Storefront
K. Section 08520 - Aluminum Windows
L. Section 08900 - Glazed Curtain Wall
1.04 SUBSTITUTIONS

A. Submit requests for substitutions in accordance with AIA A232 and Section 00800.

B. Substitution submission format to include:

1. Evidence that alternate materials meet or exceed performance characteristics of product requirements and documentation from an approved independent testing laboratory certifying that the performance of the system including auxiliary components exceed the requirements of the local building code.

2. References clearly indicating that the Air / Vapor Barrier Manufacturer has successfully completed projects of similar scope and nature on an annual basis for a recommended minimum of ten (10) years.

3. Air Barrier Manufacturer's guide specification.

4. Air Barrier Manufacturer's complete set of technical data sheets for assembly.

5. Air Barrier Manufacturer's complete set of details for assembly.

6. Product certification confirming assembly components are supplied and warranted by a single source Air Barrier Manufacturer.

7. Air Barrier Manufacturer statement that anticipated wall assembly compliance with NFPA 285.

8. Sample warranty, as specified.

C. Submit requests for substitutions to this specification within fourteen (14) days following award date. Include a list of a recommended twenty (20) projects executed over the past five (5) years.

D. Substitute materials not approved in writing shall not be permitted for use on this project.

1.05 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
1. AAMA 711-13 - Voluntary Specification for Self-Adhering Flashing Used for Installation of Exterior Wall Fenestration Products
2. AAMA 2400-02 - Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction

B. American Society for Testing and Materials (ASTM):
1. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting
2. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
5. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen
8. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

C. National Fire and Protection Agency (NFPA):

1.06 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meetings:
1. When required, and with prior notice, an Air Barrier Manufacturer representative will meet with the necessary parties at the jobsite to review and discuss project conditions as it relates to the integrity of the assembly.

1.07 SUBMITTALS

A. Provide the following requested information in accordance with AIA A201 and Section 00800 - Submittal Procedures.

B. Action Submittals:
1. Product Data:
   a. Air Barrier Manufacturer's guide specification.
   b. Air Barrier Manufacturer's complete set of technical data sheets for assembly.
   c. Air Barrier Manufacturer's complete set of guide details for assembly.
2. Certificates:
   a. Product certification confirming assembly components are supplied and warranted by a single source Air Barrier Manufacturer.
3. Tests and Evaluation Reports:
   a. NFPA 285 wall assembly compliance:
      1) Air Barrier Manufacturer statement that anticipated wall assembly complies with NFPA 285.
4. Warranty:
   a. Sample warranty, as specified.

1.08 QUALITY ASSURANCE

A. Single Source Responsibility:
1. Obtain air barrier and auxiliary materials including adhesive/primer, air barrier, flashings, and sealants from a single Air Barrier Manufacturer regularly engaged in the manufacturing and supply of the specified products.

B. Manufacturer Qualifications:
1. Air Barrier Manufacturer shall demonstrate qualifications to supply materials of this
section by certifying the following:

a. Air Barrier Manufacturer must not issue warranties for terms longer than they have been manufacturing and supplying specified products for similar scope of Work.

C. Installer Qualifications:
   1. Perform Work in accordance with the Air Barrier Manufacturer’s published literature and as specified in this section.
   2. Maintain one (1) copy of the Air Barrier Manufacturer’s installation instructions on site.
   3. At all times during the execution of the Work allow access to site by the Air Barrier Manufacturer representative.
   4. If meeting with the Air Barrier Manufacturer during project construction, contact the Air Barrier Manufacturer a minimum of two weeks prior to schedule meeting.

1.09 MOCK-UPS

A. Mock-ups: Construct mock-ups to verify selections made under submittals and to set quality standards for materials and execution in accordance with Section 04200 for mock-ups and as follows:

   1. Where directed by Architect, construct typical exterior wall section, incorporating substrate materials, and adjacent materials including flashing, typical wall opening (door / window), attachment of insulation; showing vapor permeable water resistive air barrier application details.

B. Notify Architect a minimum seven (7) days prior to mock-up construction.

C. Review and acceptance of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless Architect specifically notes such deviations in writing.

D. Once reviewed by Architect, acceptable mock-up can form a permanent part of the Work and will form the basis for acceptance for the remainder of the project.

E. Remove and replace materials found unacceptable at no additional cost to the Owner.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:

   1. Materials shall be delivered to the jobsite in unopened, undamaged and clearly marked containers indicating the name of the Air Barrier Manufacturer and product.

B. Storage of Materials:

   1. Store materials as recommended by the Air Barrier Manufacturer and conforming to applicable safety regulatory agencies. Refer to all applicable data including, but not limited to, SDS information, Product Data sheets, product labels, and specific instructions for personal protection.
   2. Keep solvents away from open flame or excessive heat.
   3. Store materials in original packaging.
   4. Protect rolls from direct sunlight until ready for use.
   5. Refer to Air Barrier Manufacturer’s published literature.
C. Handling:
1. Refer to Air Barrier Manufacturer's published literature.

1.11 SITE CONDITIONS

A. Environmental Requirements:
1. No Work shall be performed during rain or inclement weather.
2. No Work shall be performed on frost covered or wet surfaces.

B. Protection:
1. It is the responsibility of the installing Subcontractor to protect all surfaces not included in scope of Work from overspray including, but not limited to, windows, doors, adjacent areas, and vehicles.
2. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane. Do not proceed with the application of the field air barrier until the roof has been installed

C. Ensure all preparation Work is completed prior to installing air barrier.

D. All equipment shall be grounded during operations.

1.12 WARRANTY

A. Manufacturer's Single Source Warranty:
1. Fluid Applied Air and Vapor Barrier:
   a. Product Warranty: Manufacturer warrants the material against product defect for a period of five (5) years from date of purchase.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Air Barrier and auxiliary materials must be obtained as a single-source from the Air Barrier Manufacturer to ensure total system compatibility and integrity.

B. Basis of Design: Henry® Co., 999 N. Sepulveda Blvd., Suite 800, El Segundo, CA 90245, Tel.# 800.486.1278, www.henry.com; or approved equal.

2.02 MATERIALS

A. Air and Vapor Barrier Primary Fluid-Applied, Air and Vapor Barrier - Basis of Design: Henry® Air-Bloc® 16MR:
   1. Fluid-applied vapor impermeable air and water barrier consisting of a single component water-based elastomeric formulation that cures to a tough monolithic rubber-like membrane; having the following typical physical properties:
      a. Color: Gray
      b. Water Vapor Permeance (ASTM E96 Method A): 0.03 perms
      c. Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
      d. Air Permeance (ASTM E2178): Pass
      e. Elongation (ASTM D412): 270%
      f. Tensile Strength (ASTM D412): 100 psi (689 kPa)
      g. Surface Burning Characteristics (ASTM E84):
         1) Flame Spread: Class A
2) Smoke Development: Class A
h. Minimum Application Temperature: 20°F (-6°C)
j. Maximum VOC: 100 g/l

2. Assembly Auxiliary Materials:
a. Adhesives/Primers:
   1) Low VOC adhesive:
      a) Synthetic rubber based quick setting adhesive with low VOC content; having the following typical physical properties:
         (1) Basis of Design: Henry® Blueskin® LVC Adhesive
         (2) Color: Blue
         (3) Maximum VOC: <240 g/L
         (4) Drying time (initial set): 30 minutes
         (5) Low Application Temperature: 10°F (-12°C)
   2) Quick setting primers:
      a) Synthetic rubber based quick setting adhesive with low VOC content; having the following typical physical properties:
         (1) Basis of Design: Henry® Blueskin® LVC Spray Primer
         (2) Color: Blue
         (3) Maximum VOC: 250 g/L
         (4) Dry time: 1-3 minutes
         (5) Low Application Temperature: 40°F (4.4°C)
      b) Polymer emulsion water based quick setting adhesive with low VOC content; having the following typical physical properties:
         (1) Basis of Design: Henry® Aquatac™ Primer
         (2) Color: Aqua
         (3) Maximum VOC: 50 g/L
         (4) Drying time (initial set): 30 minutes
         (5) Low Application Temperature: 25°F (-4°C)

b. Liquid-Applied Flashing:
   1) Moisture-curing single component elastomeric liquid-applied flashing using a highly advanced Silyl-Terminated Polyether (STPE) polymer curing to a monolithic membrane; having the following typical physical properties:
      a) Basis of Design: Henry® Air-Bloc® LF Liquid-Applied Flashing
      b) Color: Blue
      c) Air Permeance (ASTM E2178): Pass
      d) Water Vapor Permeance (ASTM E96): 21.8 perms @ 25 mils
      e) Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
      g) Nail Sealability (AAMA 711): Pass
      h) Surface Burning Characteristics (ASTM E84):
         (1) Flame Spread: Class A
         (2) Smoke Development: Class A
      i) Elongation (D412): 264%
      j) Low Application Temperature: 20°F (-7°C)

b. Self-Adhered Flashing:

Note: The following product is to be used in conjunction with the copper
fabric flashing as specified in Section 04200. The self-adhered flashing shall overlap the copper fabric flashing.

1) Non-vapor permeable, self-adhered water resistive air and vapor barrier consisting of a synthetic butyl compound integrally laminated to a white engineered polypropylene film surface; having the following typical physical properties:
   a) Basis of Design: Henry® Blueskin® Butyl Flash
   b) Color: White
   c) Thickness: 14 mils (0.36 mm)
   d) Water Vapor Permeance (ASTM E96): 0.14 perms
   f) Elongation (ASTM D412): 825% minimum
   g) Low Application Temperature: 25°F (-4°C)

2) Non-vapor permeable, self-adhered water resistive air and vapor barrier consisting of an SBS rubberized asphalt compound integrally laminated to a high strength polyethylene with surface layer of metallic aluminum film; having the following typical physical properties:
   a) Basis of Design: Henry® Metal Clad® Self-Adhered Water Resistive Air Barrier
   b) Color: Metallic Aluminum
   c) Thickness: 45 mils (1.14 mm)
   d) Water Vapor Permeance (ASTM E96): 0.014 perms
   f) Elongation (ASTM D412): 85%
   g) Low Application Temperature: 20°F (-7°C)

3) Non-vapor permeable, self-adhered water resistive air and vapor barrier consisting of an SBS rubberized asphalt compound integrally laminated to a blue engineered thermoplastic film surface; having the following typical physical properties:
   a) Basis of Design: Henry® Blueskin® SA Self-Adhered Water Resistive Air Barrier
   b) Color: Blue
   c) Thickness: 40 mils (1 mm)
   d) Water Vapor Permeance (ASTM E96): 0.86 perms
   f) Elongation (ASTM D412-modified): 200% minimum
   g) Low Application Temperature: 41°F (5°C)

4) Low temperature non-vapor permeable, self-adhered water resistive air and vapor barrier consisting of an SBS rubberized asphalt compound integrally laminated to a blue engineered thermoplastic film surface; having the following typical physical properties:
   a) Basis of Design: Henry® Blueskin® SA LT Low Temp Self-Adhered Water Resistive Air Barrier
   b) Color: Blue
   c) Thickness: 40 mils (1 mm)
   d) Water Vapor Permeance (ASTM E96): 0.86 perms
   f) Elongation (ASTM D412-modified): 200% minimum
   g) Low Application Temperature: 10°F (-12°C)
d. Sealants:
   1) Building Envelope Sealant:
      a) Moisture cure, medium modulus polymer modified sealing
         compound; having the following typical physical properties:
         (1) Basis of Design: Henry® 925 BES Sealant
         (2) Color: Varies
         (3) Elongation: 450 - 550%.

e. Joint Treatment Mesh:
   1) Open weave glass fabric yarn saturated with synthetic resins, having the
      following typical physical properties:
      a) Basis of Design: Henry® 183 Repair Fabric Yellow Fiberglass

3. Additional Materials:
   a. Through-Wall Flashing:
      1) Non-vapor permeable self-adhered through-wall flashing consisting of an
         SBS rubberized asphalt compound integrally laminated to a yellow
         engineered thermoplastic film surface; having the following typical
         physical properties:
         a) Basis of design: Henry® Blueskin® TWF Thru-Wall Flashing
         b) Color: Yellow
         c) Thickness: 40 mils (1.0 mm)
         d) Water Vapor Permeance (ASTM E96): 0.03 perms
         f) Low Application Temperature: 20°F (-7°C)

   b. Insulation Adhesive:
      1) Trowel grade solvent-type, synthetic rubber-based insulation contact
         adhesive; having the following typical physical properties:
         a) Basis of Design: Henry® Air-Bloc® 21 Air and Vapor Barrier &
            Insulation Adhesive
         b) Color: Cream
         c) Water Vapor Permeance (ASTM E96): 0.03 perms
         d) Maximum VOC: < 250 g/L

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Verify substrates to receive Work and surrounding adjacent surfaces are in
      accordance with Air Barrier Manufacturer published literature prior to installation of
      self-adhered air barrier assembly.
   2. Existing substrate must be continuous and secured prior to application of air barrier.
   3. Sheathing panels must be securely fastened and installed flush to ensure a
      continuous substrate in accordance with Air Barrier Manufacturer published
      literature.
   4. Fastener penetrations must be set flush with sheathing and fastened into solid
      backing.
   5. Strike masonry joints full and flush.
   6. Concrete surfaces shall be smooth and without large voids, spalled areas or sharp
      protrusions.
7. New concrete should be cured for a minimum of sixteen (16) hours after forms are removed.
8. Curing compounds or release agents used in concrete construction must be resin based without oil, wax or pigments.
9. Do not install air barrier over saturated substrates.

B. Notify General Contractor in writing of any conditions that are not acceptable.

C. The installing contractor shall examine and determine that surfaces and conditions are ready to accept the Work of this section in accordance with published literature. Commencement of Work or any parts thereof shall mean installer's acceptance of the substrate.

D. Do not apply air barrier until substrate and environmental conditions are in accordance with Air Barrier Manufacturer's published literature.

3.02 PREPARATION

A. All surfaces must be sound, dry, clean, and free of oil, grease, dirt, excess mortar, frost, laittance, loose and flaking particles, or other contaminants.

B. Protect adjacent surfaces not included in scope of Work to prevent spillage and overspray.

C. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane.

D. Hot weather or direct-sun applications over porous substrates, such as concrete, promote rapid surface drying and can form blisters in the fluid applied membrane air barrier during curing. To aid in blister prevention prepare substrate in accordance with one of the following optional procedures:
   1. Prime coat:
      a. Apply a thin prime coat of air barrier to substrate.
      b. Allow air barrier to fully cure prior to subsequent application.
      c. Install air barrier to Air Barrier Manufacturer minimum recommended mil thickness.
   2. Two coat:
      a. Apply air barrier to achieve one-half (1/2) of Air Barrier Manufacturer minimum recommended mil thickness.
      b. Allow air barrier to fully cure prior to subsequent application.
      c. Apply air barrier to achieve one-half (1/2) of Air Barrier Manufacturer minimum recommended mil thickness.
      d. Overall dry mil thickness shall be in accordance with Air Barrier Air Barrier Manufacturer published literature.

3.03 INSTALLATION

A. Ensure substrate is ready to receive air barrier in accordance with Air Barrier Manufacturer's published literature.

B. Temperature limitation:
   1. Primary air barrier:
      a. Substrate temperature must be above 20°F (-6°C) and rising.
2. Auxiliary products:
   a. Temperature limitations may vary. Refer to Air Barrier Manufacturer published
      literature.

C. Application of Flashing:

1. Self-adhered Flashing:
   a. Where required install adhesive/primer recommended by Air Barrier
      Manufacturer continuously at rate recommended ensuring complete substrate
      coverage of anticipated flashing installation area.
      1) Allow adhesive/primer to cure to a tacky film prior to application of
         flashing.
      2) Only apply adhesive/primer to surfaces which will be covered during the
         same working day. Primed areas not covered by end of day must be
         re-primed prior to installation of flashing.
   b. Measure and cut self-adhered flashing to ensure adequate length to achieve
      continuous coverage of desired installation.
   c. Peel protective film from self-adhered flashing and align top of membrane
      verifying proper positioning prior to complete film removal and flashing
      placement.
   d. Press self-adhered flashing firmly into place by applying hand pressure to the
      middle of the membrane and working the pressure to the edges eliminating
      wrinkles and air bubbles.
   e. Install self-adhered flashings in shingle fashion to eliminate reverse laps.
   f. Where required, prime laps at rate recommended by air barrier manufacture to
      ensure complete coverage of anticipated lap installation.
   g. Lap adjoining edges a minimum of two (2) inches.
   h. Roll flashing and laps with countertop roller to obtain thorough adhesion.
   i. Seal end of day exposed reverse laps of self-adhered flashing with building
      envelope sealant.

D. Detailing/Flashing:

1. Complete detailing and flashing installations per Air Barrier Manufacturer's published
   literature.
2. Refer to Air Barrier Manufacturer guide details for further clarification and installation
   procedures including, but not limited to, the following:
   a. Inside corners
   b. Outside corners
   c. Pipe penetrations
   d. Shelf angles
   e. Wall to foundation transitions
   f. Rough openings:
      1) Install rough opening details per Window Manufacturer's published
         literature and in accordance with ASTM E2112.
      2) Wall assemblies containing a vapor retarder on the interior wall assembly:
         a) Extend flashing into rough opening to ensure sufficient membrane for
            connection with vapor retarder and provide a continuous air barrier
            assembly.
      3) Reverse laps:
         a) Seal permanently exposed reverse laps with sealant:
            (1) Building envelope sealant
            (2) Liquid flashing
      4) Moving Joints:
a) Contact Air Barrier Manufacturer.

5) Transitions:
   a) Contact Air Barrier Manufacturer to coordinate transition of self-adhered air barrier to adjacent areas including, but not limited to, the following:
      (1) Roof to air barrier
      (2) Air barrier to waterproofing
      (3) Fastener penetrations

E. Thru-Wall Flashing:
   1. Coordinate with Section 07600 and 08520.

F. Application of Primary Fluid-Applied, Air and Vapor Barrier:
   1. Apply air barrier in continuous, monolithic application without sags, runs, or voids, transitioning onto flashing membrane and overlapping one (1) inch, to create uniform drainage plane and air barrier.
   2. Install air barrier so that subsequent membrane installation laps one (1) inch onto flashing ensuring an air and air barrier assembly.
   3. Allow air barrier to fully cure prior to placement of insulation.
   4. Total Dry Film Thickness (DFT):
      a. Coverage rates may vary due to surface texture or porosity. Refer to Air Barrier Manufacturer Technical Data Sheet for recommended coverage rates.

G. Insulation Adhesive:
   1. Coordinate with Section 07200 for insulating materials.
   2. Upon curing of the air barrier apply insulation adhesive in a serpentine pattern.
   3. Immediately embed insulation into the adhesive and press firmly into place to ensure full contact. Apply additional adhesive if allowed to skin over.
   4. Fully butter all joints of insulation panels with adhesive during installation, with the exception of expansion joints.

H. Fastener Penetrations Through Primary Air Barrier:
   1. It is the responsibility of the installer penetrating the air barrier assembly to properly install fasteners and components in accordance with the Air Barrier Manufacturer’s published literature.
   2. Installation requirements:
      a. Drill fasteners and components with sufficient compression to maintain continuity in the air barrier assembly.
      b. Refer to “Self-tapping fasteners” and/or “Pre-drilled fasteners”.
   3. Supplemental sealant:
      a. Penetrations that do not meet installation requirements require the addition of sealant at point of insertion through the air barrier membrane to maintain continuity in the air barrier assembly.
   4. Self-tapping fasteners:
      a. Fastener head must be larger in diameter than the shank.
      b. Drill fasteners perpendicular to the substrate until flush with the air barrier.
      c. Drill fasteners to provide a continuous compression firmly against the air barrier membrane creating a gasketing seal without damaging the membrane.
      d. Do not install fasteners through air barrier over unsupported areas of the substrate such as sheathing joints.
      e. Overdriven fasteners, improperly installed fasteners, defective/broken fasteners, or fasteners not properly fastened into the building structure beyond the air barrier membrane should be removed and the vacated hole sealed with sealant
prior to the installation of the cladding or veneer system.

5. Pre-drilled fastening assemblies:
   a. Fastening head or assembly component must be larger in diameter than
      pre-drilled hole.
   b. Fastening head or assembly component must be mounted flush with the air
      barrier.
   c. Fastening head or assembly component must provide a continuous
      compression firmly against the air barrier creating a gasketing seal without
      damaging the integrity of the air barrier.
   d. Do not install fastening components through air barrier over unsupported areas
      of the substrate such as sheathing joints.
   e. Seal improperly drilled and/or vacated holes with sealant prior to the
      installation of the cladding or veneer system.

3.04 FIELD QUALITY CONTROL

   A. Damage to surface by other trades shall not be the responsibility of the installing
      Subcontractor.

   B. Final Observation and Verification:
      1. Final inspection of air barrier assembly shall be carried out by the Owner's
         representative, the Contractor, or Air Barrier Manufacturer as required by warranty.
      2. Contact Air Barrier Manufacturer for warranty issuance requirements.

   C. Air barrier assembly is not designed for permanent UV exposure. Refer to Air Barrier
      Manufacturer published literature for product limitations.

3.05 CLEANING

   A. Promptly as the Work proceeds, and upon completion, 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 07270
SECTION 07275 - SHEET APPLIED AIR BARRIERS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions, Supplementary Conditions, Instructions to Bidders, and Division 01- General Requirements shall be read in conjunction with and govern this section.

B. The Specification shall be read as a whole by all parties concerned. Each Section may contain more or less than the complete Work of any trade. The Contractor is solely responsible to make clear to the installing Subcontractor the extent of their Work.

1.02 SUMMARY

A. This Section includes requirements for supplying labor, materials, tools, and equipment to complete the Work as shown on the Drawings and as specified herein including, but not limited to, the following:

1. Adhesive/Primer
2. Self-Adhered Water Resistive Permeable Air Barrier
3. Air Barrier/Thru-wall Flashing
4. Sealant

1.03 RELATED SECTIONS

A. Section 01361 - Sustainable Design Requirements - LEED for New Construction and Major Renovations

B. Section 05450 - Cold-Formed Metal Framing

C. Section 05500 - Metal Fabrications

D. Section 06100 - Carpentry

E. Section 07214 - Closed Cell Spray Foam Insulation

F. Section 07415 – Aluminum Wall Panels

G. Section 07600 - Flashing, Sheet Metal and Roofing Accessories

H. Section 07900 - Joint Sealer Assemblies

I. Section 08900 - Glazed Curtain Wall
1.04 SUBSTITUTIONS

A. Submit requests for substitutions in accordance with AIA A232 and Section 00800.

B. Substitution submission format to include:

1. Evidence that alternate materials meet or exceed performance characteristics of product requirements and documentation from an approved independent testing laboratory certifying that the performance of the system including auxiliary components exceed the requirements of the local building code.

2. References clearly indicating that the Air Barrier Manufacturer has successfully completed projects of similar scope and nature on an annual basis for a recommended minimum of ten (10) years.

3. Air Barrier Manufacturer's guide specification.

4. Air Barrier Manufacturer's complete set of technical data sheets for assembly.

5. Air Barrier Manufacturer's complete set of details for assembly.

6. Product certification confirming assembly components are supplied and warranted by a single source Air Barrier Manufacturer.

7. LEED HPD declaration

8. Air Barrier Manufacturer statement that anticipated wall assembly compliance with NFPA 285.

9. Sample warranty, as specified.

C. Submit requests for substitutions to this specification within fourteen (14) days following award date. Include a list of a recommended twenty (20) projects executed over the past five (5) years.

D. Substitute materials not approved in writing shall not be permitted for use on this project.

1.05 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
1. AAMA 711-13 - Voluntary Specification for Self-Adhering Flashing Used for Installation of Exterior Wall Fenestration Products
2. AAMA 2400-02 - Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction

B. American Society for Testing and Materials (ASTM):
1. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting
2. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
5. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen

C. National Fire and Protection Agency (NFPA):

D. US Green Building Council (USGBC), Leadership in Energy and Environmental Design (LEED)

1.06 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meetings:
   1. When required, and with prior notice, an Air Barrier Manufacturer representative will meet with the necessary parties at the jobsite to review and discuss project conditions as it relates to the integrity of the assembly.

1.07 SUBMITTALS

A. Provide the following requested information in accordance with Section [project specific] Submittal Procedures.

B. Action Submittals:
   1. Product Data:
      a. Air Barrier Manufacturer's guide specification.
      b. Air Barrier Manufacturer's complete set of technical data sheets for assembly.
      c. Air Barrier Manufacturer's complete set of guide details for assembly.
   2. Certificates:
      a. Product certification confirming assembly components are supplied and warranted by a single source Air Barrier Manufacturer.
      b. LEED HPD declaration
   3. Tests and Evaluation Reports:
      a. NFPA 285 wall assembly compliance:
         1) Air Barrier Manufacturer statement that anticipated wall assembly complies with NFPA 285.
   4. Warranty:
      a. Sample warranty, as specified.

1.08 QUALITY ASSURANCE

A. Single Source Responsibility:
1. Obtain air barrier and auxiliary materials including adhesive/primer, air barrier, flashings, and sealants from a single Air Barrier Manufacturer regularly engaged in the manufacturing and supply of the specified products.
2. Contractor to verify product compliance with Federal, State, and Local regulations controlling use of Volatile Organic Compounds (VOC).

B. Manufacturer Qualifications:
1. Air Barrier Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:
   a. Air Barrier Manufacturer must not issue warranties for terms longer than they have been manufacturing and supplying specified products for similar scope of Work.

C. Installer Qualifications:
1. Perform Work in accordance with the Air Barrier Manufacturer's published literature and as specified in this section.
2. Maintain one (1) copy of the Air Barrier Manufacturer's installation instructions on site.
3. At all times during the execution of the Work allow access to site by the Air Barrier Manufacturer representative.
4. If meeting with the Air Barrier Manufacturer during project construction, contact the Air Barrier Manufacturer a minimum of two weeks prior to schedule meeting.

1.09 MOCK-UPS

A. Mock-ups: Construct mock-ups to verify selections made under submittals and to set quality standards for materials and execution in accordance with Section 04200 for mock-ups and as follows:
1. Where directed by Architect, construct typical exterior wall section, incorporating substrate materials, and adjacent materials including flashing, typical wall opening (door / window), attachment of insulation; showing vapor permeable water resistive air barrier application details.

B. Notify Architect a minimum seven (7) days prior to mock-up construction.

C. Review and acceptance of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless Architect specifically notes such deviations in writing.

D. Once reviewed by Architect, acceptable mock-up can form a permanent part of the Work and will form the basis for acceptance for the remainder of the project.

E. Remove and replace materials found unacceptable at no additional cost to Owner.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:
1. Materials shall be delivered to the jobsite in undamaged and clearly marked containers indicating the name of the Air Barrier Manufacturer and product.

B. Storage of Materials:
1. Store materials as recommended by the Air Barrier Manufacturer and conforming to applicable safety regulatory agencies. Refer to all applicable data including, but not
limited to, SDS information, Product Data sheets, product labels, and specific instructions for personal protection.
2. Keep solvents away from open flame or excessive heat.
3. Store materials in original packaging.
4. Protect rolls from direct sunlight until ready for use.
5. Refer to Air Barrier Manufacturer's published literature.

C. Handling:
1. Refer to Air Barrier Manufacturer's published literature.

1.11 SITE CONDITIONS

A. Environmental Requirements:
1. No Work shall be performed during rain or inclement weather.
2. No Work shall be performed on frost covered or wet surfaces.

B. Protection:
1. It is the responsibility of the installing Subcontractor to protect all surfaces not included in scope of Work from overspray including, but not limited to, windows, doors, adjacent areas, and vehicles.
2. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane.

C. Ensure all preparation Work is completed prior to installing air barrier.

D. All equipment shall be grounded during operations.

1.12 WARRANTY

A. Manufacturer's Single Source Warranty:
1. Sheet Applied Permeable Air Barrier:
   a. Product Warranty:
      1) Manufacturer must warrant the material against product defect for a period of twelve (12) year from date of purchase.
   b. Assembly Warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Air Barrier and auxiliary materials must be obtained as a single-source from the Air Barrier Manufacturer to ensure total system compatibility and integrity.

B. Basis of Design: Henry® Co., El Segundo, CA, Tel.# 800.486.1278, www.henry.com; or approved equal.

2.02 MATERIALS

1. Self-adhered vapor permeable, water resistive air barrier consisting of a reinforced, modified polyolefin tri-laminate film surface and patented permeable adhesive technology with split-back poly-release film; having the following typical physical
properties:

a. Color: Blue
b. Thickness: 23 mils (0.58 mm)
c. Water Vapor Permeance (ASTM E96): 29 perms
d. Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
e. Air Permeance (ASTM E2178): Pass
g. Dry Tensile Strength (ASTM D882):
   1) 41 lbf /182N MD
   2) 29 lbf /129N CD
h. Surface Burning Characteristics (ASTM E84):
   1) Flame Spread: Class A
   2) Smoke Development: Class A
i. Low Application Temperature: 20F (-7C)

B. Assembly Auxiliary Materials:

1. Adhesives/Primers:

   a. Low VOC adhesive:
      1) Synthetic rubber based quick setting adhesive with low VOC content;
         having the following typical physical properties:
         a) Basis of Design: Henry® Blueskin® LVC Adhesive
         b) Color: Blue
         c) Maximum VOC: <240 g/L
         d) Drying time (initial set): 30 minutes
         e) Low Application Temperature: 10F (-12C)

   b. Aerosol spray adhesive:
      1) Quick drying spray adhesive used to prepare construction surfaces for the
         application of flashings; having the following typical physical properties:
         a) Basis of Design: Henry® Blueskin® Spray Prep Adhesive
         b) Color: Clear amber
         c) Solids by weight: 35%
         d) Drying time (initial set): 3 minutes
         e) Low Application Temperature: -10F (-23C)

   c. Quick setting primers:
      1) Synthetic rubber based quick setting adhesive with low VOC content;
         having the following typical physical properties:
         a) Basis of Design: Henry® Blueskin® LVC Spray Primer
         b) Color: Blue
         c) Maximum VOC: 250 g/L
         d) Dry time: 1-3 minutes
         e) Low Application Temperature: 40F (4.4C)
      2) Polymer emulsion water based quick setting adhesive with low VOC
         content; having the following typical physical properties:
         a) Basis of Design: Henry® Aquatac™ Primer
         b) Color: Aqua
         c) Maximum VOC: 50 g/L
         d) Drying time (initial set): 30 minutes
         e) Low Application Temperature: 25F (-4C)
2. Liquid-Applied Flashing:
   a. Moisture-curing single component elastomeric liquid-applied flashing using a highly advanced Silyl-Terminated Polyether (STPE) polymer curing to a monolithic membrane; having the following typical physical properties:
      1) Basis of Design: Henry® Air-Bloc® LF Liquid-Applied Flashing
      2) Color: Blue
      3) Air Permeance (ASTM E2178): Pass
      4) Water Vapor Permeance (ASTM E96): 21.8 perms @ 25 mils
      5) Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
      7) Nail Sealability (AAMA 711): Pass
      8) Surface Burning Characteristics (ASTM E84):
         a) Flame Spread: Class A
         b) Smoke Development: Class A
      9) Elongation (D412): 264%
     10) Low Application Temperature: 20°F (-7°C)

3. Self-Adhered Flashing:
   a. Vapor Permeable Flashing:
      1) Self-adhered water resistive vapor permeable air barrier consisting of a reinforced modified polyolefin tri-laminate film surface and patented adhesive technology with split-back poly-release film; having the following typical physical properties:
         a) Basis of Design: Henry® Blueskin® VP160 Self-Adhered Water Resistive Air Barrier
         b) Color: Blue
         c) Thickness: 23 mils (0.58 mm)
         d) Water Vapor Permeance (ASTM E96): 29 perms
         f) Low Application Temperature: 20 degrees F (-7 degrees C)
      2) Low temperature non-vapor permeable, self-adhered water resistive air and vapor barrier consisting of an SBS rubberized asphalt compound integrally laminated to a blue engineered thermoplastic film surface; having the following typical physical properties:
         a) Basis of Design: Henry® Blueskin® SALT Low Temp Self-Adhered Water Resistive Air Barrier
         b) Color: Blue
         c) Thickness: 40 mils (1 mm)
         d) Water Vapor Permeance (ASTM E96): 0.86 perms
         f) Elongation (ASTM D412-modified): 200% minimum
         g) Low Application Temperature: 10°F (-12°C)

4. Sealants:
   a. Building Envelope Sealant:
      1) Moisture cure, medium modulus polymer modified sealing compound; having the following typical physical properties:
         a) Basis of Design: Henry® 925 BES Sealant
         b) Color: Varies
         c) Elongation: 450 - 550%
b. Termination Sealant:
   1) One-part high performance synthetic rubber sealant; having the following
typical physical properties:
      a) Basis of Design: Henry® 212 All Purpose Crystal Clear Sealant
      b) Color: Clear
      c) Elongation: 200% minimum

C. Additional Materials:
   1. Thru-Wall Flashing:
      a. Non-vapor permeable self-adhered through-wall flashing consisting of an SBS
rubberized asphalt compound integrally laminated to a yellow engineered
thermoplastic film surface; having the following typical physical properties:
         1) Basis of Design: Henry® Blueskin® TWF Thru-Wall Flashing
         2) Color: Yellow
         3) Thickness: 40 mils (1.0 mm)
         4) Water Vapor Permeance (ASTM E96): 0.03 perms
         6) Low Application Temperature: 20°F (-7°C)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Verify substrates to receive Work and surrounding adjacent surfaces are in
accordance with Air Barrier Manufacturer published literature prior to installation of
self-adhered air barrier assembly.
   2. Existing substrate must be continuous and secured prior to application of air barrier.
   3. Sheathing panels must be securely fastened and installed flush to ensure a
continuous substrate in accordance with Air Barrier Manufacturer published
literature.
   4. Fastener penetrations must be set flush with sheathing and fastened into solid
backing.
   5. Strike masonry joints flush.
   6. Concrete surfaces shall be smooth and without large voids, spalled areas or sharp
protrusions.
   7. New concrete should be cured for a minimum of fourteen (14) days after forms are
removed.
   8. Curing compounds or release agents used in concrete construction must be resin
based without oil, wax or pigments.
   9. Do not install air barrier over saturated substrates.

B. Notify Contractor in writing of any conditions that are not acceptable.

C. The installing contractor shall examine and determine that surfaces and conditions are
ready to accept the Work of this section in accordance with published literature.
Commencement of Work or any parts thereof shall mean installer's acceptance of the
substrate.

D. Do not apply air barrier until substrate and environmental conditions are in accordance
with Air Barrier Manufacturer's published literature.
3.02 PREPARATION

A. All surfaces must be sound, dry, clean, and free of oil, grease, dirt, excess mortar, frost, laitance, loose and flaking particles, or other contaminants.
B. Protect adjacent surfaces not included in scope of Work to prevent spillage and overspray.
C. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane.

3.03 INSTALLATION

A. Ensure substrate is ready to receive air barrier in accordance with Air Barrier Manufacturer's published literature.
B. Temperature limitation:
   1. Primary air barrier:
      a. Substrate temperature must be above 20°F (-7°C) and rising.
   2. Auxiliary products:
      a. Temperature limitations may vary. Refer to Air Barrier Manufacturer published literature.
C. Application of Flashing:
   1. Self-adhered Flashing:
      a. Where required install adhesive/primer recommended by Air Barrier Manufacturer continuously at rate recommended ensuring complete substrate coverage of anticipated flashing installation area.
         1) Allow adhesive/primer to cure to a tacky film prior to application of flashing.
         2) Only apply adhesive/primer to surfaces which will be covered during the same working day. Primed areas not covered by end of day must be re-primed prior to installation of flashing.
      b. Measure and cut self-adhered flashing to ensure adequate length to achieve continuous coverage of desired installation.
      c. Peel protective film from self-adhered flashing and align top of membrane verifying proper positioning prior to complete film removal and flashing placement.
      d. Press self-adhered flashing firmly into place by applying hand pressure to the middle of the membrane and working the pressure to the edges eliminating wrinkles and air bubbles.
      e. Install self-adhered flashings in shingle fashion to eliminate reverse laps.
      f. Where required, prime laps at rate recommended by air barrier manufature to ensure complete coverage of anticipated lap installation.
      g. Lap adjoining edges a minimum of two (2) inches.
      h. Roll flashing and laps with countertop roller to obtain thorough adhesion.
      i. Where flashing is installed prior to Blueskin® VP160, seal end of day exposed reverse laps of self-adhered flashing with building envelope sealant.
   2. Liquid-applied Flashing:
      a. Apply a uniform film of aerosol spray adhesive to raw edges of gypsum sheathing at rate recommended by air barrier manufacturer to completely encapsulate cut edge of gypsum sheathing.
b. Allow adhesive to cure to a tacky film prior to application of liquid-applied flashing.
c. Apply flashing in accordance with and at rate recommended by air barrier manufacturer.
d. Spread flashing to achieve a monolithic membrane over substrate requiring flashing.
e. Allow flashing to cure prior to subsequent installations.

D. Detailing/Flashing:
1. Complete detailing and flashing installations per Air Barrier Manufacturer's published literature.
2. Refer to Air Barrier Manufacturer guide details for further clarification and installation procedures including, but not limited to, the following:
   a. Inside corners
   b. Outside corners
   c. Pipe penetrations
   d. Shelf angles
   e. Wall to foundation transitions
   f. Rough openings:
      1) Install rough opening details per Window Manufacturer's published literature and in accordance with ASTM E2112.
      2) Wall assemblies containing a vapor retarder on the interior wall assembly:
         a) Extend flashing into rough opening to ensure sufficient membrane for connection with vapor retarder and provide a continuous air barrier assembly.
3. Reverse laps:
   a. Seal permanently exposed reverse laps with sealant:
      1) Primary air barrier:
         a) Termination sealant
4. Non-vapor permeable self-adhered flashing; choose from the following:
   a. Building envelope sealant
   b. Termination sealant
5. Vapor permeable self-adhered flashing:
   a. Termination sealant
6. Moving Joints:
   a. Contact Air Barrier Manufacturer.
7. Transitions:
   a. Contact Air Barrier Manufacturer to coordinate transition of self-adhered air barrier to adjacent areas including, but not limited to, the following:
      1) Roof to air barrier
      2) Air barrier to waterproofing
      3) Fastener penetrations

E. Thru-Wall Flashing:
1. Coordinate with Sections: 07241, 07415.

F. Application of Primary Sheet-Applied Vapor Permeable Water Resistive Air Barrier:
1. Where required, install adhesive/primer recommended by Air Barrier Manufacturer continuously and at rate recommended by air barrier manufacturer to ensure complete substrate coverage of anticipated flashing installation area.
   a. Allow adhesive/primer to cure to a tacky film prior to application of air barrier.
   b. Only apply adhesive/primer to surfaces which will be covered during the same
working day. Primed areas not covered by end of day must be re-primed prior to installation of air barrier membrane.

2. Peel protective film from primary air barrier and align top of membrane verifying proper positioning prior to complete film removal and placement.

3. Press primary air barrier firmly into place by applying hand pressure to the middle of the membrane and working the pressure to the edges eliminating wrinkles and air bubbles.

4. Install primary air barrier in shingle fashion to eliminate reverse laps.

5. Where lap adhesion is less than desired, install low VOC adhesive continuously at rate recommended by air barrier manufacturer to ensure complete substrate coverage of anticipated flashing installation area.
   a. Allow adhesive/primer to cure to a tacky film prior to subsequent primary air barrier installation.

6. Lap adjoining edges:
   a. Horizontal seams: Two (2) inch minimum.
   b. Vertical seams: Three (3) inch minimum.

7. Roll primary air barrier and laps with countertop roller to obtain thorough adhesion.

8. Seal permanently exposed reverse laps of primary air barrier with termination sealant.

G. Special Considerations:

1. Contact Air Barrier Manufacturer to verify product and installation requirements.

2. Wall assemblies identified as special conditions and requiring supplemental detailing may include, but are not limited to, any of the following:
   a. Panelized wall assemblies.
   b. Sloped wall assemblies.
   c. Open rain screen cladding systems permitting permanent direct exposure to bulk water onto the primary air barrier membrane within a completed wall assembly.
   d. Claddings impeding drainage and/or promoting hydrostatic pressure:
      1) Horizontal Z-girts or furring strips installed directly onto air barrier in a manner to encourage water collection.

H. Fastener Penetrations Through Primary Air Barrier:

1. It is the responsibility of the installer penetrating the air barrier assembly to properly install fasteners and components in accordance with the Air Barrier Manufacturer's published literature.

2. Installation requirements:
   a. Drill fasteners and components with sufficient compression to maintain continuity in the air barrier assembly.
   b. Refer to "Self-tapping fasteners" and/or "Pre-drilled fasteners".

3. Supplemental sealant:
   a. Penetrations that do not meet installation requirements require the addition of termination sealant at point of insertion through the air barrier membrane to maintain continuity in the air barrier assembly.

4. Self-tapping fasteners:
   a. Fastener head must be larger in diameter than the shank.
   b. Drill fasteners perpendicular to the substrate until flush with the air barrier.
   c. Drill fasteners to provide a continuous compression firmly against the air barrier membrane creating a gasketing seal without damaging the membrane.
   d. Do not install fasteners through air barrier over unsupported areas of the substrate such as sheathing joints.
   e. Overdriven fasteners, improperly installed fasteners, defective/broken fasteners,
or fasteners not properly fastened into the building structure beyond the air barrier membrane should be removed and the vacated hole sealed with termination sealant prior to the installation of the cladding or veneer system.

5. Pre-drilled fastening assemblies:
   a. Fastening head or assembly component must be larger in diameter than pre-drilled hole.
   b. Fastening head or assembly component must be mounted flush with the air barrier.
   c. Fastening head or assembly component must provide a continuous compression firmly against the air barrier creating a gasketing seal without damaging the integrity of the air barrier.
   d. Do not install fastening components through air barrier over unsupported areas of the substrate such as sheathing joints.
   e. Seal improperly drilled and/or vacated holes with termination sealant prior to the installation of the cladding or veneer system.

3.04 FIELD QUALITY CONTROL

A. Damage to surface by other trades shall not be the responsibility of the installing Subcontractor.

B. Final Observation and Verification:
   1. Final inspection of sheet applied vapor permeable air barrier assembly shall be carried out by the Owner's representative, the contractor, or Air Barrier Manufacturer as required by warranty.
   2. Contact Air Barrier Manufacturer for warranty issuance requirements.

C. Sheet-applied vapor permeable water resistive air barrier assembly is not designed for permanent UV exposure. Refer to Air Barrier Manufacturer published literature for product limitations.

3.05 CLEANING

A. Promptly as the Work proceeds, and upon completion, 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 07275
SECTION 07410 - ALUMINUM STANDING SEAM ROOF PANELS AND COPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work described in this section includes installation of underlayment, pre-formed/pre-finished aluminum roofing system, clips, perimeter and penetration flashing, closures, perimeter metal coping/fascia, snow-bar snow retention system, and aluminum gutters/downspouts.

1.2 RELATED SECTIONS

A. Section 05450 – Cold-Formed Metal Framing
B. Section 06100 – Carpentry for plywood sheathing
C. Drawings and general provisions of the Contract apply to this section.

1.3 REFERENCES

A. American Architectural Manufacturer Association (AAMA):

B. American Iron and Steel Institute (AISI):
   1. 1996 Ed. Specification for the Design of Cold-Formed Steel Structural Members.

C. American Society of Civil Engineers (ASCE):

D. American Society for Testing and Materials (ASTM):
   3. A653-96 Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.


E.  Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

F.  Underwriters' Laboratories (UL):

1.4 SUBMITTALS

A.  Shop Drawings

1.  Show roofing system with flashings and accessories in plan, sections and details. Include metal thickness' and finishes, panel lengths, joining details, anchorage details, flashings, insulation and special fabrication provisions for termination and penetrations; thermal expansion provisions and special supports.

2.  Indicate relationships with adjacent and interfacing work. Indicate fastener types and spacing; and provide fastener pullout values.

3.  Shop drawings must be specific to this project and completed by the Metal Panel Manufacturer's Engineering Department. Any and/or all changes recommended by the successful bidder must be approved by the manufacturer in writing prior to the shop drawing submittal to the Architect.
B. Product Data: Include manufacturer's detailed material and system description, sealant and closure installation instructions, engineering performance data and finish specifications. Indicate fastener types and spacing; and required fastener pullout values.

C. Design Loads: Submit copy of manufacturer's minimum design load calculations according to ASCE 7-10, Method 2 for Components and Cladding, prepared by an engineer employed by the system manufacturer as a full-time staff engineer. In no case shall the design loads be taken to be less than those detailed in paragraph 1.9 of this specification.

D. Design Test Reports: Provide certified test reports from an independent testing laboratory that bear the seal of a registered professional engineer to show compliance with the performance criteria specified in paragraph 1.9. Each of the following test reports must be submitted:

1. ASTM E1592-95: Test results must clearly demonstrate compliance with the following requirements:
   
a. The ultimate test failure load shall be reduced by the safety factor specified in paragraph 1.9 to determine the allowable working load for the panel system.

b. The proposed system has been tested to insure that the allowable working load of the panel system meets or exceeds the specified negative wind uplift pressures listed in paragraph 1.9 of this specification for all roof zones.

c. The test results are applicable for the panel material, grade, thickness, width, and profile specified. Results are not applicable for systems that are thinner, wider, lower grade, or different material/profile than the system which was tested.

d. The results must clearly show that the allowable clip spacing meets or exceeds the requirements specified in paragraph 3.3 C for all roof areas. Clip spacing shall not be increased for any roof zone from that which is specified.

2. ASTM E283-93 and E331-86: Test results must clearly demonstrate compliance with the performance requirements specified in paragraph 1.9.

3. ASTM E1646-95 and E1680-95: Test results must clearly demonstrate compliance with the performance requirements specified in paragraph 1.9. Results are not applicable for systems that are thinner, wider, lower grade, or different material/profile than the system which was tested. The differential test pressures must be equal to those specified in paragraph 1.9.
4. UL 790: The proposed roof panel shall be listed as a non-combustible roof covering material and be approved for use in a UL classification assembly.

5. UL 263: The panel system shall clearly be shown as approved for use in an UL Construction Assembly which conforms to the construction of this project.

E. Samples: Provide full scale samples of the following materials and system components. Samples shall be of identical material type, thickness, panel width, and material grade/alloy/temper as the system specified for this project. Except for item 2, samples may be of any of the manufacturer’s standard colors.

1. Submit a twelve (12) inch long by actual width sample of panel showing seam profile and stiffening mesas across the flat pan of the panel. Also include separate snap-on cap with factory applied hot melt sealant beads.

2. Provide a three by five (3 x 5) inch sample of the color selected for this project. The sample shall be the actual specified coating system on a metal substrate.

3. Provide samples of actual system components, including: each type of anchor/clip required, head closure assembly, roll goods, bearing plates and/or framing.

F. Manufacturer’s Certificate: Certify that the standing seam metal roof panels are physically manufactured by the distributing manufacturer/organization in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

1.5 DISCLOSURE OF MATERIALS/ALTERNATE MANUFACTURERS

A. The materials outlined herein are the basis of design and the type of materials that are to be used in this project. When a particular make or trade name is specified, it shall be indicative of the minimum standard required.

1. Submit each item listed in paragraph 1.4 (A through F) for evaluation of the proposed system.

2. Tests shall have been made for identical systems within the ranges of specified performance criteria.

3. Empirical calculations for roof performance shall only be acceptable for positive loads.
4. A list of a recommended minimum of five (5) jobs where the proposed alternate material was used under similar conditions. It is recommended that these jobs must be located within fifty (50) miles of the West Windsor-Plainsboro Regional School District. Each job is recommended to be at least five (5) years old, and each are to be available for inspection by the Architect. The reference list shall include date of project, size of project, project address, and telephone number of architect/owner contact.

5. Manufacturer’s Certificate: The manufacturer must also have current ISO 9001:2008 certification for the manufacturing of the products to be utilized on this project.

6. A written statement from the manufacturer stating that they will provide the building owner with a site inspections a minimum of three (3) times per week by an experienced, full time employee of the company. A report of the inspection will be forwarded to the Owner for their review and record.

7. A written statement from a corporate officer of the manufacturing company stating that he or she has reviewed the specifications and confirms that the proposed system meets or exceeds all performance requirements listed as well as meets the panel size, gauge, weight, clip design, sealant design, uplift pressures and height of the vertical seam.

9. A copy of manufacturer's thirty (30) year No Dollar Limit Watertight warranty. Warranty must be a single-source manufacturer’s warranty and must include coverage for all trim, flashing, and penetrations associated with this roof.

10. Proof that the manufacturer has been in business for a recommended minimum number of years equal to the warranty period required for this project.

11. Proof that the materials for the standing seam metal roof system are physically manufactured and guaranteed by the material supplier.


13. In making a request for submission, Bidder/Contractor represents:

   a. He/She has personally investigated the proposed product or method, and determined that it is equal or superior in all respects to that specified.

   b. He/She will provide the same guarantee for substitution as for the product and method specified (if a substitution is approved).
c. He/She will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.

d. He/She waives all claims for additional cost related to substitution, which consequently become apparent.

e. Cost data is complete and includes all related cost under his/her contract or other contracts, which may be affected by the substitution.

f. He/She will reimburse the Owner for all redesign cost by the Architect for accommodation of the substitute.

14. The Architect reserves the right to be the final authority on the acceptance or rejection of the proposed substitution roofing system(s) or materials.

B. Site Formed Panels: Panels must be factory pre-manufactured and engineered for this project unless the panels cannot be shipped. Panels in excess of shippable length shall be formed on-site and engineered for this project. Site formed panels shall meet each of the following requirements:

1. Panels shall be formed on heavy duty factory type rollformers. Rollformers shall gradually form the panel profile utilizing no fewer than twelve (12) forming stations to improve quality and minimize oil canning.

2. All tooling shall be polished and tempered to a minimum hardness of Rockwell C - 52. Tooling shall be maintained clean and in good working condition. Tooling repairs or modifications made by means of welding, sawing, grinding or the like are unacceptable, as they may contribute to poor quality, aesthetics, and performance of the end product.

3. Panels shall be of identical profile and characteristics as factory formed panels and specimens used as the basis of performance tests.

4. Sealant shall be factory applied in a separate factory formed snap on cap. Site/field applied seam sealant is unacceptable. Seam caps may be shipped in forty-five (45’) or less length and lap spliced over full length panels in accordance with manufacturer’s system details.

5. Site rollforming equipment shall be operated by a trained full time experienced technician. The installer must provide additional personnel to handle raw materials and finished product as necessary.

C. Panel Length: Panels shall be one piece from ridge/head to eave with NO splices between. Spliced panels will not be acceptable.
1.6 INSTALLER QUALIFICATIONS

A. Engage an experienced metal roofing contractor (erector) to install standing seam system who has a recommended minimum of five (5) years experience specializing in the installation of structural standing seam metal roof systems.

B. Contractor must be certified by manufacturer specified as supplier of structural standing seam system and obtain written certification from manufacturer that installer is approved for installation of specified system. If requested, contractor must supply owner with a copy of this certification.

C. Successful contractor is required to maintain a full-time supervisor/foreman who is on the job-site at all times during installation of new roof system. Foreman is recommended to have a minimum of five (5) years experience with the installation of system similar to that specified.

D. Successful contractor must obtain all components of roof system from a single manufacturer, including any roll good materials if required. Any secondary products that are required which cannot be supplied by the specified manufacturer must be recommended and approved in writing by primary manufacturer prior to bidding.

E. If required, fabricator/installer shall submit work experience and evidence of adequate financial responsibility. The Owners Representative reserves the right to inspect fabrication facilities in determining qualifications.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Manufacturer's responsibility:
   1. Protect components during fabrication and packing from mechanical abuse, stains, discoloration, and corrosion.
   2. Provide protective interleaving between contact areas of exposed surfaces to prevent abrasion during shipment, storage, and handling.

B. Installer's responsibility:
   1. Store materials off ground providing for drainage; under cover providing for air circulation; and protected from wind movement, foreign material contamination, mechanical damage, cement, lime or other corrosive substances.
   2. Stack pre-finished materials to prevent twisting, bending, abrasion and denting and elevate one end to facilitate moisture run-off.
   3. Handle materials to prevent damage to surfaces, edges and ends of panels and sheet metal items. Damaged material shall be rejected and removed from the site.
4. Unload panels using a boom or crane, supporting the panels in at least two (2) locations during lifting.

5. Protect panels from wind-related damages.

6. Protect moisture-sensitive materials from the weather.

7. Inspect materials upon delivery. Reject and remove physically damaged or marred material from project site.

1.8 JOB CONDITIONS

A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for pre-formed metal roofing system.

B. Protection:
   1. Provide protection or avoid traffic on completed roof surfaces.
   2. Do not overload roof with stored materials.
   3. Support no roof-mounted equipment directly on roofing system.

C. Ascertain that work of other trades which penetrates the roof or is to be made watertight by the roof is in place and approved prior to installation of roofing.

1.9 DESIGN AND PERFORMANCE CRITERIA

A. Thermal Expansion and Contraction.
   1. Completed metal roofing and 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.
   2. The design temperature differential shall be not less than 200 degrees F.
   3. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.
   4. Location of metal roofing rigid connector shall be at roof ridge unless otherwise approved by the Manufacturer. Metal ridge connector may require design as per job conditions by specified manufacturer.

B. Uniform Wind Uplift Load Capacity.
   1. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.
b. Safety Factor: 1.67 after any load reduction or material stress increase.

c. Category III Building with an Importance Factor of 1.

d. Wind Speed: 120 mph.

e. Ultimate Pullout Value: 467 pounds per each of the two fasteners holding the panel anchor to the metal roof deck.

f. Exposure Category: D

g. Design Roof Height: 30 feet

h. Minimum Building Width: 30 feet

i. Roof Slope: 10 inches per foot.

### Roof Area and Design Uplift Pressure:

<table>
<thead>
<tr>
<th>Roof Area</th>
<th>Design Uplift Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1 – Mid Roof</td>
<td>21.9 psf</td>
</tr>
<tr>
<td>Zone 2 – Eaves, Rake &amp; Ridge</td>
<td>25.6 psf</td>
</tr>
<tr>
<td>Zone 3 – Corners</td>
<td>25.6 psf</td>
</tr>
</tbody>
</table>

2. Capacity shall be determined using pleated airbag method in accordance with ASTM E 1592, testing of sheet metal roof panels. Allowable safe working loads shall be determined by dividing the ultimate test load by the safety factor specified above.

C. Uniform Positive Load Capacity.

1. The installed roof system shall be capable of resisting the following positive uniform roof loads: Roof Live Load of 35 psf; Ground Snow Load of 25 psf; Balanced Uniform Roof Snow Load of 19.1 psf; and Maximum Unbalanced Surcharged Load of 21.6 psf; and an Unbalanced Width of 4.02 feet.

2. Capacity to resist positive loads shall be determined by empirical calculations in accordance with AISI. Calculation shall be sealed by a registered professional engineer.

3. Installed roof system shall carry positive uniform design loads with a maximum system deflection of L/180 as measured at the rib (web) of the panel.
D. Underwriters' Laboratories, Inc., (UL) fire resistance P ratings for roof assemblies: If applicable, panel system shall be approved for use in an appropriate Construction Assembly, as defined by UL 263.

E. Underwriters’ Laboratories, Inc., (UL) fire rating per UL 790.

F. ASTM E283: Static pressure air infiltration (doors, windows, curtain walls):

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Leakage Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.57 PSF</td>
<td>0.0007 cfm/sq.ft.</td>
</tr>
<tr>
<td>6.24 PSF</td>
<td>0.0002 cfm/sq.ft.</td>
</tr>
<tr>
<td>20.0 PSF</td>
<td>0.0036 cfm/sq.ft.</td>
</tr>
</tbody>
</table>

G. ASTM E331: Static pressure water infiltration (doors, windows, curtain walls):

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Gal/Hr Per S.F. and Static Pressure Of 20.0 Psf for 15 minutes</td>
<td>No Leakage</td>
</tr>
</tbody>
</table>

H. ASTM E1680: Static pressure air infiltration (roof panels):

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Leakage Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.57 PSF</td>
<td>0.0012 cfm/sq.ft.</td>
</tr>
<tr>
<td>6.24 PSF</td>
<td>0.0001 cfm/sq.ft.</td>
</tr>
<tr>
<td>20.0 PSF</td>
<td>0.0011 cfm/sq.ft.</td>
</tr>
</tbody>
</table>

I. ASTM E1646: Static pressure water infiltration (roof panels):

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Gal/Hr Per S.F. and Static Pressure Of 20.0 Psf for 15 minutes</td>
<td>No Leakage</td>
</tr>
</tbody>
</table>

J. Water penetration (dynamic pressure): No water penetration, other than condensation, when exposed to dynamic rain and 70 mph wind velocities for not less than five minutes duration, when tested in accord with principles of AAMA 501.1.

K. Capacities for gauge, span or loading other than those tested may be determined by interpolation of test results within the range of test data. Extrapolation for conditions outside test range are not acceptable.
1.10 WARRANTY

A. Owner shall receive one (1) warranty from one manufacturer of the manufactured standing seam metal roof panels covering all of the following criteria.

1. Upon completion of installation, and acceptance by the Owner and Architect, the manufacturer will supply to the Owner a single-source, thirty (30) year No Dollar Limit (NDL), watertight warranty, including coverage for all trim, flashings, and penetrations associated with the standing seam roof system.

2. Thirty (30) year coverage on finish including checking, crazing, peeling, chalking, fading and/or adhesion.

3. Installer shall provide the Owner with a five (5) year warranty covering roofing system installation and watertightness. A copy shall be provided directly to the Owner.

4. Warranty shall commence on the date of substantial completion.

5. This warranty shall be part of a single-source manufacturer’s warranty by ONE manufacturer covering both the standing seam metal roof panels, and aluminum soffit system on this project. This warranty will include all systems and flashings.

6. At the request of the Owner, the Manufacturer will provide an annual inspection of the roof. These inspections will occur for the life of the warranty at no additional cost to the Owner.

1.11 MANUFACTURER’S INSPECTIONS

A. When the project is in progress, the roofing system manufacturer will provide the following:

1. Keep the Architect informed as to the progress and quality of the work as observed.

2. Provide job site inspections a minimum of three (3) days a week with reports to the Architect.

3. Report to the Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor’s attention.

4. Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.
PART 2 - PRODUCTS

2.1 STANDING SEAM ROOFING SYSTEM

A. General.

1. Whenever a particular make of material, trade name and/or manufacturer's name is specified herein, it shall be regarded as being indicative of the minimum standard of quality required. A bidding Contractor who proposes to quote on the basis of an alternate material and/or system will only be considered if the proposed alternate is equivalent or superior in quality to the specified system in accordance with paragraph 1.5. Additionally, all manufacturer and contractor / fabricator guidelines, performance criteria and warranty criteria must be met as specified in paragraphs 1.4, 1.5, 1.6, 1.9, and 1.10.

2. Product names for the metal roof panel system and waterproofing materials used in this section shall be based on performance characteristics of the R-MER Span System manufactured by The Garland Company, Cleveland, OH and shall form the basis of the contract documents. Any proposed alternate systems must meet or exceed the following listed characteristics and be submitted by the bidding Contractor to the Architect for approval. Additionally, all performance requirements listed in “Design Criteria” (paragraph 1.9) and Warranty Criteria (paragraph 1.10) must be met and submitted as well as all items listed in the Disclosure of Materials/Alternate Manufacturers (paragraph 1.5).

3. This specification is based on the performance characteristics of the system identified herein. Any proposed alternate system(s), specified or not, must meet or exceed the following listed characteristics and be submitted for the Architect’s approval. Additionally, all Warranty Criteria (paragraph 1.10) and Design and Performance Criteria (paragraph 1.9) must be met and submitted, as well as all items listed in the Disclosure of Materials and Substitutions (paragraph 1.5) must be submitted. Failure of a system to meet all requirements of this specification will result in the rejection of the substitution.

4. Manufacturers: The following manufacturers are acceptable, providing they meet these specifications and the minimum standards stated.

   a. The Garland Company, Inc. (Basis of Design)

   b. Or Approved Equal.

B. Materials.

1. Panel material: 0.040" thickness aluminum, 3105-H14 alloy, smooth as per ASTM B209-96.
2. Flashing and flat stock material: Unless noted otherwise, fabricate in profiles indicated on approved manufacturer's shop drawings of same material, thickness, and finish as roof system, unless indicated otherwise. Gutters and leaders shall be fabricated as specified in 0.050" aluminum with a kynar paint finish to match the roof panel.

C. Finish on surfaces:

1. Exposed surfaces for coated panels:
   a. Two coat coil applied, baked-on full-strength (70% resin) fluorocarbon coating system (polyvinylidene fluoride, PVF2), applied by manufacturer's approved applicator.
   b. Coating system shall provide nominal 1.0 mil dry film thickness, consisting of primer and color coat.
   c. Color shall be selected by Architect from manufacturers standard colors.

2. Unexposed surfaces for coated panels shall be baked-on polyester coating with .20 -.30 dry film thickness (DFT).

D. Characteristics:

1. Provide the same panel profile from a single manufacturer for ALL standing seam roof areas.

2. Configuration: Provide standing seam panels incorporating mechanically interlocked, concealed anchor clips allowing unlimited thermal movement, and of configuration which will prevent entrance or passage of water.
   a. Panel/Cap configuration must have a total of four (4) layers of aluminum surrounding anchor clip for prevention of water infiltration and increased system strength designed to limit potential for panel blow-off.
   b. Profile of panel shall have mesa's every two (2) inches on center continuous throughout panel which are a minimum of one point five (1.5) inches wide. These will absorb thermal stresses, reduce oil canning, and increase load carrying capacity.
   c. Exposed fasteners, screws and/or roof mastic are unacceptable and will be rejected. System configuration only allows for exposed fasteners at trim details (as per manufacturer's guidelines).
d. **Panels must be fabricated and furnished in continuous lengths from ridge/hip to eave with no joints/splices/overlaps.**

e. Panels lengths which exceed maximum shipping lengths shall be field rolled on equipment owned by the panel manufacturer. Contractor rolling equipment is NOT allowed. Equipment shall have at least 12 rolling stations and provide a product identical to factory manufactured product. The equipment shall be operated by a trained full time experienced technician.

f. Seam caps shall be manufactured in the factory and shall be installed with NO endlaps. Seam sealant must be factory applied.

3. Seam must be two and three-eighths (2-3/8) inches minimum height for added upward pressures and aesthetic appeal. Seam shall have continuous anchor reveals to allow anchor clips to resist positive and negative loading and allow unlimited expansion and contraction of panels due to thermal changes. **Integral (not mechanically sealed) seams are NOT acceptable.**

4. Concealed Standard Anchor Clips: Clips must be sixteen (16) gauge galvanized steel, ONE (1) piece clip with projecting legs for additional panel alignment and provision for unlimited thermal movement in each direction along the longitudinal dimension.

a. Two-piece (2) clips are **NOT** acceptable.

b. Sealant applied in panel cap must be isolated from clip to insure that no sealant damage occurs from the movement of the panel during expansion and contraction.

c. Clip must maintain a clearance of a minimum of three-eighths (3/8) inches between panel and substrate for proper ventilation to help prevent condensation on underside of panel and eliminate the contact of panel fastener head to panel.

5. Seam cap: Snap-on cap shall be a minimum of 1" wide "T" shaped of continuous length up to forty-five (45) feet according to job conditions and field seamed by means of manufacturer's standard seaming machine.

a. Cap shall be designed to receive two (2) beads of continuous hot applied gasketing sealant which will be applied independent of anchor clip to allow unlimited thermal movement of panel without damage to cap sealant.

b. Sealant shall be a SIS (Styrene-Isoprene-Styrene) block copolymer type thermoplastic rubber adhesive, non-fatigue water barrier.

6. **Standing Seam Panel Width: 16"**
7. Stiffening ribs: Located in flat of panel to minimize oil canning and telegraphing of structural members.

8. Replaceability: Panels shall be of a symmetrical design with snap on cap configuration such that individual panels may be removable for replacement without removing adjacent panels.

9. Panel ends shall be panned at ridge or where applicable per the manufacturer’s approved shop drawings.

10. **Panel length: Panels must be full length without joints.**

E. Accessories.

1. Underlayment shall be R-Mer Seal, a 45 mil self-adhering, high temperature underlayment. Install in accordance with manufacturer's recommendations.

2. Gable anchor clips: Standing Seam style, galvanized steel, minimum thickness 16 gauge.


4. Fasteners:
   
a. Concealed fasteners: Corrosion resistant steel fasteners (zinc plated, stainless steel or equal) designed to meet structural loading requirements and in accordance with recommendations from the manufacturer of the plywood decking. Provide OMG Standard as the minimum fastener size. Fasteners length as required to penetrate roof deck per the screw manufacturers recommendation to achieve the required pullout value and a minimum of one (1) inch.
   
b. Exposed fasteners: Series 410 stainless steel fasteners or one-eighth (1/8) inch diameter stainless steel waterproof rivets. All exposed fasteners shall be factory painted to match the color of the standing seam panels.

5. Closures: Factory precut closed cell foam meeting ASTM D1056 or ASTM D3575, enclosed in metal channel matching panels when used at ridge, rake, and jamb.

6. Provide all miscellaneous accessories for complete installation.

2.2 PERIMETER METAL COPING MATERIALS

A. Metal systems (pre-manufactured metal coping cap system, metal fascia extenders, surface mounted counterflashings, downspouts and external brackets
etc.), are to be comprised of Aluminum, coated on both sides with an epoxy primer and on the weathering surface with a polyvinylidene fluoride (Kynar) coated finish.

1. Materials
   
   a. Aluminum

   Aluminum, ASTM B209, alloy 3105-H14, in thickness of 0.050” nominal for all metal fascia extenders.

   1) Minimum thickness of aluminum to be specified in accordance with Architectural Sheet Metal Manual, Sheet Metal and Air Conditioning Contractor's National Association, Inc. recommendations.

   b. Color shall be selected by Architect.

B. Pre-manufactured Metal Coping Cap System: The Garland Company, Inc R-Mer Edge Snap-On Coping System (Basis of Design); or Approved Equal.

1. All components including corrosion resistant fasteners to be used in the copings shall be furnished by manufacturer. Metal shall be aluminum, ASTM B209, alloy 3105-H14, in thickness of 0.050” nominal with Kynar 500 or approved equal. Color shall be Garland’s Dark Bronze.

2. Anchor chairs shall be 16 ga. galvanized x 16” long, and spaced at 40” o.c., unless noted otherwise by the manufacturer.

3. All submittals for approved equals shall conform to Paragraphs 1.5 Quality Assurance and 1.8 Design & Performance Criteria.

4. Provide a manufacturer’s project specific edge-to-edge roof warranty. Warranted materials shall be free of defects in material and workmanship for the specified warranty period. The manufacturer will also furnish their standard decorative finish warranty.

5. The coping cap corners and transitions shall have a continuous factory welded seams.

6. Extenders shall be fabricated from 0.050” aluminum with Kynar 500 or approved equal. Color shall be Garland’s Dark Bronze.

2.3 ACCESSORY PRODUCTS

A. Concealed Gutters and Downspouts:

1. Gutters: Concealed gutter substrait is to be fabricated from ½” fire retardant treated ply sheathing.
2. Gutter lining: 60 mil fleece back membrane adhered in manufacturer approved compatible adhesive directly to concealed gutter substrait. Gutter lining is be installed 4.0” under base of standing seam roof panels and be wrapped over parapet wall and set in specified adhesive. Gutter lining seams are to be heat welded and reinforced with 6” 60 mil fleece back seam tape.

Acceptable products:
   a. 60 mil fleece back membrane: KEE-Stone FB 60 or approved equal.
   b. 60 mil fleece back seam tape: KEE-Stone Utility Roll or approved equal.

3. Downspouts: Formed from .050 Aluminum and of 4”x5” in size with curved corners. Fabricate in 10-foot long sections, complete with curved corners/elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual".

4. Downspout Brackets: Surface mounted downspout protection guards shall be fabricated from 2” wide x double folded .050 Aluminum. Install straps at five (5) feet on center maximum.

B. Sealant:

1. Acceptable products:
   a. Concealed Application: Garland’s Butyl Sealant; or approved equal.
   b. Exposed Application: Garland’s Tripolymer Sealant; or approved equal.

2. Colors: As selected by Architect from sealant manufacturer's standard color selections.

C. Prefabricated Shims:

1. Install prefabricaged high density polyethylene plastic shims under the roof panel clip and over the bearing plates to maintain a level/plumb plane to prevent buckling of the roof panel.

D. Snow Retention System:
1. Shall be S-5 Snow Retention System as supplied by the standing seam panel manufacturer designed for the appropriate local code ground snow load of 25 psf resulting in the required balanced and unbalanced snow loads, specified roof slopes and lengths, and an 16 inch wide panel; or approved equal. One (1) row of the S-5 Color Guard snow retention system will be required. An S-5 Clip shall be installed at each panel seam, and one (1) Snow Clips between each panel. Color shall match standing seam roof panel color.

2.4 FABRICATION

A. Shop fabricate metal roofing and flashing components to the maximum extent possible, forming metal work with clear, sharp, straight, and uniform bends and rises. Hem exposed edges of flashings.

B. Form flashing components from full single width sheet in minimum ten (10'-0") foot lengths. Provide mitered corners, joined using closed end pop rivets and joint sealant.

C. Fabricate roofing and related sheet metal work in accord with approved shop drawings and applicable standards.

PART 3 - EXECUTION

3.1 PREPARATION

A. Inspection: Examine the alignment and placement of the building structure and substrate. Correct any objectionable warp, waves or buckles in the substrate before proceeding with installation of the pre-formed metal roofing. The installed roof panels will follow the contour of the structure and may appear irregular if not corrected.

B. Establish straight side and crosswise benchmarks.

C. Use proper size and length fastener for strength requirements. Approximately five-sixteenths (5/16) inch is allowable for maximum fastener head size beneath the panel.

D. Rectangular shaped roofs shall be checked for square and straightness. Gable ends may require setting a true line for the gable clips and setting with string line.

E. Measure the roof lengthwise to confirm panel lengths, overhangs, coverage of flashings at eaves and ridges and verify clearances for thermal movement.
F. Pre-roofing conference:

1. Prior to beginning metal roofing work, a pre-roofing conference shall be held to review work to be accomplished. Provide **ten (10) days notice** of the meeting to all parties.

2. Owner, Architect, Contractor, metal roofing subcontractor, metal roofing system manufacturer's representative and all other subcontractors who have equipment penetrating roof or whose work involves access to roof shall be present.

3.2 METAL FABRICATION AND EQUIPMENT

A. Mechanical panel fabrication for field panels shall be operated by a trained full time experienced technician.

B. Mechanical equipment shall have at least twelve (12) rolling stations and provide a product identical to factory manufactured product.

3.3 ROOFING AND FLASHING INSTALLATION

A. Details on the project documents are provided for bidding purposes. All details will be shown on manufacturer's shop drawings to successful bidder. Comply with all details and install roofing materials and flashings in accordance with approved manufacturer's shop drawings and manufacturer's product data, within specified erection tolerances

B. Standing Seam Metal Roof Panel Underlayment Installation.

1. Underlayment shall be applied over entire roof areas having rigid insulation.

2. Underlayment shall be applied over entire roof area and turned down over the perimeter edge blocking in accordance with the manufacturer’s approved shop drawings.

C. Prepare roof for the installation of standing seam panels, including:

1. Install the specified and approved underlayment as required in this specification over the installed insulation system. The specified underlayment shall be applied over the entire roof area.

   **Roof Section**

   a. Clip spacing must be 5 ft. o.c. for Zone 1 (Mid Roof).

   b. Clip spacing must be 5 ft. o.c. for Zone 2 (Ridge, Hips and Eaves).

   c. Clip spacing must be 5 ft. o.c. for Zone 3 (Eave Corners).

   * Edge Zone Width “a” is 4 feet. Clip spacing for Zone 2 and 3 must extend onto the roof a distance equal to “a”.

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* This clip spacing must be followed to ensure integrity of the completed installation. These have been determined based on the uplift calculations for the specified roof and the test results of ASTM E-1592.

D. Installation of Roof Panels: Roof panels can be installed by starting from either end and working towards the opposite end. Due to the symmetrical design of the specified panel system, it is also acceptable to start from the middle of the roof and work toward each end.

1. Stainless steel pop rivets shall be secured through the anchor reveal of the panel leg and extend into the arms of the panel clip located at each clip on either side of the top of the curved panel. The panel is then anchored at both sides of each of the clip. Three (3) rivets per panel are required and shall be installed.

   a. Be sure to capture all drilling debris during this operation with a rag or cloth placed on the panels at the drilling operation.

   b. Panels are not securely attached to the roof until fixed to the anchor clip. To avoid damage and injury, all panels shall be fixed to the anchor clip immediately as they are installed.

2. The seam caps are shipped with two (2) beads of factory applied hot melt sealant located inside the caps. To install the caps, hook one side of the cap over the panel edge and rotate over the opposite panel leg. For ease of installation, start at one end of the panel and work toward the opposite end.

3. A hand crimping tool is used to crimp the cap around the top of two adjacent panels

4. Caps shall then be permanently seamed with manufacturer’s mechanical seamer.

5. At the end of each day’s work, seam caps shall be mechanically seamed or hand crimped (crimp 4 inches every 8 feet) to reduce the possibility of wind damage prior to completion of the project.

6. Un-installed panels which are temporarily stored on the ground or roof shall be secured in place at the end of each day’s work to prevent possible damage or injury.

E. Isolate dissimilar metals and masonry or concrete from metals with bituminous coating. Use gasketed fasteners where required to prevent corrosive action between fastener, substrate, and panels.

F. Limit exposed fasteners to extent indicated on shop drawings.
G. Anchorage shall allow for temperature expansion/contraction movement without stress or elongation of panels, clips, or anchors. Attach clips to structural substrate using fasteners of size and spacing as determined by manufacturer's design analysis to resist specified uplift and thermal movement forces.

H. Seal laps and joints in accordance with roofing system manufacturer's product data.

I. Coordinate flashing and sheet metal work to provide weathertight conditions at roof terminations. Fabricate and install in accordance with standards of SMACNA Manual.

J. Provide for temperature expansion/contraction movement of panels at roof penetrations and roof mounted equipment in accordance with system manufacturer's product data and design calculations.

K. Installed system shall be true to line and plane and free of dents, and physical defects. In light gauge panels with wide flat surfaces, some oil canning may be present. Oil canning does not affect the finish or structural integrity of the panel and is therefore not cause for rejection.

L. Maximum variation from true planes or lines shall be one-fourth (1/4) inch in twenty (20) feet and three-eighth (3/8) inch in forty (40) feet or more.

M. Form joints in linear sheet metal to allow for one-fourth (1/4) inch minimum expansion at twenty (20) feet on center maximum and eight (8) feet from corners.

N. At joints in linear sheet metal items, set sheet metal items in two (2), one-fourth (1/4) inch beads of butyl sealant. Extend sealant over all metal surfaces. Mate components for positive seal. Allow no sealant to migrate onto exposed surfaces.

O. Remove damaged work and replace with new, undamaged components.

P. Touch up exposed fasteners using paint furnished by roofing panel manufacturer and matching exposed panel surface finish.

Q. Clean exposed surfaces of roofing and accessories after completion of installation. Leave in clean condition at date of substantial completion. Touch up minor abrasions and scratches in finish.

END OF SECTION 07410
SECTION 07415 – ALUMINUM WALL PANELS

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. Work described in this section includes single-skin, labyrinth-joint metal cladding panels for rainscreen-principle wall system, complete with sub-structural metal framing, perimeter and penetration flashing, and closures.

B. Related Sections:
1. Division 05: Steel studs, girts, and furring.
2. Section 06100 – Carpentry for wood sheathing, blocking and rough carpentry.
3. Division 07: Flashing and sheet metal, water resistive air barriers, thermal insulation, joint sealants.
4. Section 09250 – Gypsum Drywall for gypsum sheathing.

1.3 DEFINITIONS
A. American Architectural Manufacturer Association (AAMA):
   1. AAMA 509-09: Voluntary Test and Classification Method for Drained and Back Ventilated Rain Screen Wall Cladding Systems.
   2. AAMA 508-07: Voluntary Test and Specification for Pressure Equalized Rain Screen Wall Cladding Systems.

B. American Iron and Steel Institute (AISI):

C. American Society for Testing and Materials (ASTM):
   2. A653-03: Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

4. **A792-03**: Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.


10. **E1886-02**: Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.


**D. National Association of Architectural Metal Manufacturers (NAAMM):**

1. Metal Finishes Manual for Architectural and Metal Products.

**E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):**


### 1.4 DESIGN AND PERFORMANCE CRITERIA

**A. General Performance:** Metal wall panel assemblies shall be furnished and installed without failure due to defective manufacture, fabrication, installation, or other defects in construction.

**B. Rainscreen Wall System Performance Rating.** The metal wall panel assemblies, and the sub-structural furring/framing system supporting the panels shall be tested in accordance with AAMA 509 and achieve the following performance results:

1. **Water Infiltration:** The water infiltration performance of the metal wall panel assembly shall not exceed the classification of W-1.

2. **Back Ventilation:** The air ventilation performance of the rainscreen cavity air space shall have a minimum classification of V-4.
C. Rainscreen Wall System Performance Rating. The metal wall panel assemblies, and the sub-structural furring/framing system supporting the panels shall be tested in accordance with AAMA 508-07 and achieve the following performance results:
1. PASS.

D. Thermal Expansion and Contraction
1. Completed metal wall panel and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, or reducing performance ability.
2. The design temperature differential shall be not less than 220 degrees Fahrenheit.
3. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.

E. Uniform Wind Load Capacity
1. Installed wall system shall withstand negative wind pressures complying with the following criteria.
   b. Safety Factor: The metal panel system shall be tested to proof load of 1.5 times the design service load condition, as required by the ASTM E330 method.
   c. Wind Speed: 90 mph.
   d. Exposure Category: B.
   e. The ultimate capacity of the panel system shall be determined based on performance testing in accordance with ASTM E330. The system shall be tested to a proof load that shall be 1.5 times the allowable design service load.

F. Missile Impact Test and Cyclic Wind Pressure Test. Demonstrate performance in accordance with the following test method:
1. ASTM E1886: The anchor clip spacing for this project shall be based on E330 requirements, but shall not exceed that of the E1886 test report.

1.5 SUBMITTALS
A. General, Rainscreen Wall Assembly Components: Complete submittals shall be made jointly and simultaneously for all components of the Rainscreen wall assembly, including:
1. Exterior wall sheathing board, if applicable;
2. Air and water resistive barrier;
3. Vapor retarders and/or barriers, if applicable;
4. Rainscreen wall continuous exterior insulation;
5. Metal rainscreen wall cladding panels and sub-framing components;
6. All other trim, flashing, sealants, and components necessary for a complete rainscreen wall assembly as required by these specifications.

B. Shop Drawings

1. Show complete rain-screen wall system with air and water barrier(s), vapor retarder (if applicable), continuous exterior insulation, sub-framing system, metal cladding panels, ventilation components, flashings and accessories in elevation, sections, and details. Include metal thicknesses and finishes, panel lengths, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations. Indicate relationships with adjacent and interfacing work.

2. All components shall be integrated into a single comprehensive and complete shop drawing set prepared by the metal cladding system manufacturer.

3. Shop drawings shall identify each product and component by manufacturer, product name, and thickness, size, style, or other uniquely distinguishing characteristics.

4. Shop drawings shall be signed and sealed by a Professional Engineer or Registered Architect authorized to practice in the State of New Jersey.

C. Warranty: Provide unexecuted specimen warranty documents for each warranty as required in paragraph 1.10.

D. Design Test Reports

1. Submit copies of design test reports for each of the performance testing standards listed in paragraph 1.4.

2. Test reports shall be performed by independent, accredited testing laboratories, and shall bear the seal of a registered professional engineer.

E. Samples

1. Submit sample of panel section, at least 6" x 6" showing seam profile, and also a sample of color selected.

2. Submit sample field applied sealants and all other system components.

1.6 QUALITY CRITERIA/INSTALLER QUALIFICATIONS

A. Engage an experienced metal wall panel contractor (erector) to install wall panel system who has a recommended minimum of ten (10) years of experience specializing in the installation of Rainscreen metal wall systems.

B. Contractor must be certified by manufacturer specified as a supplier of the metal wall system and obtain written certification from manufacturer that installer is approved for installation of the specified system.

C. Successful contractor must obtain all components of Rainscreen wall system from a single manufacturer. Any secondary products that are required which cannot be supplied by the specified manufacturer must be recommended and approved in writing by primary manufacturer prior to bidding.

D. Fabricator/Installer shall submit work experience and evidence of adequate financial responsibility. Architect reserves the right to inspect fabrication facilities in determining qualifications.
1.7 DELIVERY, STORAGE, AND HANDLING
A. Inspect materials upon delivery.
B. Handle materials to prevent damage.
C. Store materials off ground providing for drainage; under cover providing for air circulation and preventing direct UV exposure; and protected from any debris.

1.8 PROJECT CONDITIONS
A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal wall panel work to be performed according to manufacturer’s written instructions and warranty requirements.
B. Field Measurements: Verify actual dimensions of construction contiguous with metal wall panels by field measurements before fabrication.

1.9 COORDINATION
A. Coordinate sizes and locations of windows, doors, and wall penetrations with actual equipment provided.
B. Coordinate metal wall cladding system with wall sheathing, masonry, air and water resistive barriers, thermal insulation, rain drainage work, flashing, trim, and construction of other adjoining work to provide a leak-proof, secure, and non-corrosive installation.

1.10 WARRANTIES
A. Special Manufacturer's Rainscreen Wall Assembly Warranty: The metal wall cladding system must be approved for use in the Rainscreen wall assembly in conjunction with the air and water resistive barrier and exterior continuous insulation system; the use the of specified metal wall cladding system shall not nullify any manufacturers’ warranties required elsewhere in this specification. In particular, the use of the specified, substitute, or alternate metal wall cladding panel system shall be certified prior to bid by the air and water resistive barrier manufacturer as acceptable for furnishing the warranty required of the air and water resistive barrier manufacturer.
B. The Manufacturer shall furnish the following warranties for materials and finishes:
   1. Exterior metal cladding system Manufacturer’s ten (10) year warranty against defective materials and fabrication.
   2. Exterior metal cladding system Manufacturer’s twenty (20) year warranty for performance of finishes. The finish warranty shall provide coverage for the following:
      a. Fade Resistance: For a period of twenty (20) years from date of first exposure to UV or weathering, the post-painted material finishes shall exhibit no more than a 5 “delta E” rating for color change from original color standard.
b. Chalk Resistance: For a period of **twenty (20) years** from date of first exposure to UV or weathering, the post-painted material finishes shall exhibit a chalk rating of 8 or less, in accordance with ASTM D4214, Method A.

c. Film Integrity: For a period of **twenty (20) years** from date of first exposure to UV or weathering, the post-painted material finishes shall not chip, peel, crack, or blister as a result of defective coatings, improper preparation of the substrate, improper application of the coatings, or improper curing of the coating system.

C. Installer's **three (3) year** warranty covering wall panel system installation and weathertightness.

D. Warranties shall commence on date of substantial completion.

**PART 2 - PRODUCTS**

**2.1 PANEL MATERIALS**

A. Painted Aluminum Sheet

1. Recycle Content: Provide steel sheet with average recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content is at least 45 percent.

2. Panels: .080” aluminum alloy 3003, 3004, 3005, or 3105 with H14 or H24 heat treatment, as per ASTM B209/209M. Associated trim shall be .040” thick minimum. Aluminum coil shall be post-tension leveled to ensure maximum flatness of installed panels.

3. Texture: Smooth surface.

4. Prefinished Painted Aluminum:

   a. Exposed Surfaces: 2-Coat Fluoropolymer finish in accordance with AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Manufacturers’ approved applicator to prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.

   b. Exposed surface coating system shall provide nominal 1.0 mil (0.025 mm) dry film thickness, consisting of primer and color coat.

   c. Panel Colors shall be as selected from full range of IMETCO Standard and Premium colors.

   d. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).
B. Sealants:

1. Sealant Tape: Non-curing, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining tape 1-inch- (13-mm-) wide and 1/16-inch- (3-mm-) thick.

2. Exposed Sealant: ASTM C 920; elastomeric tripolymer, polyurethane, or other advanced polymer sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.


2.2 METAL SUBFRAMING

A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653, G90 (Z275) hot-dip galvanized

B. Horizontal Hat-shaped Vented Girts:

1. Dimensions:
   a. Nominal Thickness: 0.043-inch (18 gauge) (1.1-mm) nominal thickness.
   b. Depth: 1-inch (22 mm) nominal, or as indicated within drawing documents.
   c. Top flange: 2-5/8 inches (63.5 mm) nominal.
   d. Bottom Flanges: 1-1/2 inches (38 mm) nominal with 1/4 inch (6 mm) holes punched at 8” on center in each flange.

2. Free air flow: The vented girt shall not restrict chimney effect air convection in the vertical direction. The vented girt webs shall have slotted holes providing for 31% free air flow and weep holes for water drainage.

3. Drainage: Web segments of vented girt shall be formed such that when installed in the horizontal orientation the web segments are inclined at least 15 degrees from horizontal to promote drainage and prevent retention of standing water.

C. Vertical Channel-shaped Strut:

1. Dimensions:
   a. Nominal Thickness: 0.054-inch (16 gauge) (1.4-mm) nominal thickness.
   b. Depth: 1-1/2 inches (38 mm) nominal.
   c. Front Flange: 1-13/16 inches (46 mm) nominal, with 1-1/2 inches (38 mm) diameter holes punched at 8” on center.
   d. Rear Flange: 4 inches (102 mm) nominal with 1/4 inch (6 mm) holes punched at 8” on center and aligned with holes in the front flange.

D. Fasteners for Metal Sub-framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal sub-
framing members through insulation and sheathing boards into structural wall framing or substrates.

2.3 CONCEALED CLIP – REVEAL JOINT METAL WALL PANELS

A. General: Provide factory-formed metal wall panels designed to be field assembled by interlocking seams and incorporating concealed fasteners.

B. Concealed clip, longitudinal lap-seam panel with labyrinth-joint and reveal on four sides.

1. Basis of Design: Wall Panel shall be IMETCO “Element Wall” system, as manufactured by Innovative Metals Co., Inc. (IMETCO), Norcross, Georgia, Tel.# 412.670.9277; or approved equal.

2. Alternate manufacturers are subject to full compliance with specification requirements, and shall be submitted for approval as follows.

   a. Manufacturers shall submit for approval after project award, the following: Manufacturer's literature; certification of testing in accordance with specification requirements and paragraphs 1.4 and 1.5; sample warranties in accordance with paragraph 1.10; installer qualifications in accordance with paragraph 1.6, and a list of five (5) similar projects in size and scope of work.

3. Material: Aluminum sheet, post-tension leveled .080 inch (1.02 mm) thick. Paragraph 2.1 material thickness assignment, for finishes, and color selection.


   a. Fabrication: Panels shall be factory formed from specified post-tension leveled metal.

   b. The standard profile shall be flat pans with 1” reveal joints on all four sides.

   c. Panel orientation: Horizontal.

   d. Configuration: Panel shall be as indicated on drawings, with interlocking seams incorporating concealed fasteners.

   e. Panel Depth (Concealed Leg Height): 1-1/4 inch, nominal.

   f. Reveal Joint: Panel seams shall join such that adjacent panels form vertical and horizontal reveal joints 1” wide.

      1) Horizontal reveal joints shall be aligned from panel to panel, as shown on drawings.

      2) Vertical reveal joints shall be staggered from panel to panel; or as shown on drawings.

   g. End Folds: Panel ends shall be factory notched by automatic mechanical press equipment to form end tabs of 5/8 inch (16 mm) nominal length. The end tabs shall be factory folded 90 degrees to produce a “box pan” effect and allow for reveal joints on all four sides of the panel.
2.4 ACCESSORIES

A. Wall Panel Accessories: Provide components approved by panel manufacturer and as required for a complete metal wall panel assembly including trim, corner trim, closures, clips, flashings, sealants, gaskets, fillers, and similar items. Match material and finish of metal wall panels unless otherwise indicated.

1. Anchor Clips: Clips shall be 18 gauge galvanized steel designed to allow thermal movement of the panel in each direction along the longitudinal dimension.

2. Spline Strip at Vertical Reveal: At the vertical reveal joint sheet metal spline material shall be provided in the same material type and finish as the metal cladding panels for all visible space at the reveal joint. Spine strip material thickness shall be as recommended by manufacturer based on installation tolerances.

3. Ventilation strips shall be provided at top of wall panels, window sills, and transitions between metal panels and other exterior finish materials to allow for air exhaust at top of wall cavity. Vent strips shall be internally baffled to prevent wind driven rain from freely entering the wall cavity.

4. Ventilation strips shall be provided at base of wall panels, window head, and transitions between metal panels and other exterior finish materials to allow for air intake and water weep holes at bottom of wall cavity.

B. Flashing and Trim: Formed from same material, finish, and gauge as wall panels. Provide flashing and trim as required to provide finished appearance. Locations include, but are not limited to, head, sill, corners, jambs, framed openings, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

C. Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

D. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

E. Form flashing components from full single width sheet in minimum 10'-0" (3 m) sections. Provide mitered trim corners, joined using closed end pop rivets and butyl-based, solvent released one-part sealant.

F. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2. Sealed Joints: Form non-expanding but movable joints in metal to accommodate butyl-based sealant to comply with SMACNA standards.

3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
4. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal wall panel manufacturer for application, but not less than thickness of metal being secured.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Prevent unpainted metals from contact with oils or solvents, including fingerprints, which may cause staining of the natural finishes.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast. Note that some variation is anticipated and acceptable when natural (unpainted) material finishes are specified.

E. Refer to paragraph 2.1, A.4 for more information on the finishes.

PART 3 - PREPARATION & EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of the Work.

B. Examine primary and secondary wall framing to verify that girts, studs, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal wall panel manufacturer.

C. Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

D. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

E. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

B. Establish straight, side and crosswise benchmarks
C. All walls shall be checked for square and straightness. Inside and outside corners may not be plumb; set a true line for the corner flashing with string line.

D. Measure the wall lengthwise to confirm panel lengths and verify clearances for thermal movement.

3.3 METAL SUBFRAMING INSTALLATION

A. Install metal sub-framing directly over continuous thermal insulation. Metal sub-framing shall attach to the structural wall elements with screw fasteners. Metal sub-framing shall be spaced as necessary to accommodate the required clip spacing for the metal cladding panels.

B. Attachments shall be as recommended by the metal claddings system manufacturer's approved shop drawings.

3.4 METAL WALL PANEL INSTALLATION

A. All details will be shown on in accordance with approved shop drawings and manufacturer's product data, within specified erection tolerances.

B. Directly over the completed wall substrate, fasten the top flange of the panel to the metal sub-framing using panel clips. All panels clips will be fastened into the metal sub-framing as indicated on the metal cladding panel manufacturer's approved shop drawings.

C. Installation of Wall Panels: Wall panels can be installed by starting from one end and working towards the opposite end (vertical orientation), or from the bottom of wall working towards the top of the wall (horizontal orientation).

D. Metal wall panels and trim must be installed only in accordance with the manufacturer's recommendation for acceptable temperature range.

E. Isolate dissimilar metals and masonry or concrete from metals with bituminous coating. Use gasketed fasteners where required to prevent corrosive action between fastener, substrate, and panels.

F. Limit exposed fasteners to extent indicated on contract drawings.

G. Seal laps and joints in accordance with metal cladding panel system manufacturer's product data.

H. Coordinate flashing and sheet metal work to provide weathertight conditions at wall terminations. Fabricate and install in accordance with standards of SMACNA Manual.

I. Provide for temperature expansion/contraction movement of panels at wall penetrations and wall mounted equipment in accordance with system manufacturer's product data and design calculations.

J. Installed system shall be true to line and plane and free of dents, and physical defects. In light gauge panels with wide flat surfaces, some oil canning may be present. Oil canning does not affect the finish or structural integrity of the panel and is therefore not cause for rejection.
K. At joints in linear sheet metal items, other than metal cladding panels which are intended to provide ventilation, set sheet metal items in two ¼-inch- (6-mm-) beads of butyl sealant. Extend sealant over all metal surfaces. Mate components for positive seal. Allow no sealant to migrate onto exposed surfaces.

L. Remove damaged work and replace with new, undamaged components.

M. Touch up exposed fasteners using paint furnished by the panel manufacturer and matching exposed panel surface finish.

N. Clean exposed surfaces of wall panels and accessories after completion of installation. Leave in clean condition at date of substantial completion. Touch up minor abrasions and scratches in finish.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal wall panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) at location lines as indicated and within 1/16-inch (1.5-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal wall panel installation, including accessories a minimum of twice weekly. Report results in writing.

B. Remove and replace applications of metal wall panels where inspections indicate that they do not comply with specified requirements.

3.7 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07415
SECTION 07500 - ROOFING, GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The requirements of this section apply to the work specified in the following sections:

1. Section 05300 - Metal Decking,
2. Section 06100 - Carpentry,
3. Section 07070 - Selective Roof Demolition,
4. Section 07535 - Modified Bitumen Roofing System, Cold Applied,
5. Section 07600 - Flashing and Sheet Metal,
6. Section 07800 - Roof Specialties and Accessories,
7. Division 15 - Mechanical Work,
8. Division 16 - Electrical Work.

B. This section includes alterations and tie-ins to existing roofing systems and as shown on the drawings.

1.2 QUALITY ASSURANCE

A. Roofing and associated work, including work of all sections listed in 1.1 above, must be included in a single subcontract, so that there will be undivided responsibility for the specified performance of all component parts.

B. Installer Prequalification: Installer must be a recognized Roofing Contractor, skilled and experienced in the types of work required, and equipped to perform workmanship in accordance with recognized standards.

1. Minimum Experience: Not less than a recommended five (5) years experience in applications for indicated roofing systems, and in roofing projects of magnitude equivalent to the required work.

2. Maintenance Proximity: Recommended location of not more than two hours normal travel time from Installer's maintenance plant to project site.

a. Optional Proximity: At Contractor's option, and with Owner's prior acceptance of Installer's certification that work of the Maintenance Agreement will be performed by a designated roofing contractor whose plant is located not more than two hours normal travel time from project site, the above requirements will be waived.

C. Product Bid: The product bid must have past performance of installation on a roof in the state where project is located for a recommended minimum of five (5) years, under the same name of manufacturer as bid.

D. Alterations to existing roofs: Contractor shall make necessary tie ins and alterations to existing roofs in accordance with details indicated and “Basis of Design” product requirements so as to maintain original warranty on existing roofs and/or achieve complete weather tight conditions.
E. Independent Roof Inspection Services: The Contractor shall engage and pay for the services of a qualified independent Roofing Inspection Firm (RIF) to monitor and record all construction activities during the Work and provide written reports of same to the Architect.

1. A Qualified (RIF) is required to be a licensed business in the State of New Jersey and offer the services of a Registered Roof Observer (RRO) certified by the Roof Consultants Institute. The RRO is observe on-site roof construction. Qualifications and sample report format of the RIF are to be submitted to and approved by the Architect. Provide project experience and references noted below.

2. The RIF is required to be an independent competent consultant and shall provide services meeting the standard of care of a qualified roof consultant operating in the jurisdiction of this Project. The RIF will be held responsible for the accuracy of all reporting prepared by the RIF.

3. The RIF must not be affiliated with, have relation with, nor engage directly or indirectly in the manufacturing, installation or sales of any roofing or building materials used on this Project. The RIF shall not be or have been previously been an employee of the Contractor and/or Roof Subcontractor / Installer.

4. The RIF must provide on-site observation services not less than three (3) days per week during the times of all roof removal and replacement activities are in progress including all associated sheet metal, counter flashing and waterproofing Work and shall document same in a written daily report form acceptable to the Architect.

   a. Roofing projects of less than 10,000 sq. ft.: RIF must provide daily on site observations of all roofing and associated Work when in progress.

   b. The RIF firm must be on-site and monitor all roofing replacement and restoration work while the Roofing Contractor is performing their work.

5. RIF and its assigned RRO inspector(s) for the Work of this Project must have a recommended minimum of three (3) years of experience in monitoring and observing roofing reconstruction with roof systems similar to specified system. Note: Past project references including project name, roof contractor and design professional and contact phone numbers for the project are required to be submitted along with the RIF’s qualifications.

6. A computer generated daily field report must be submitted to the Architect’s office by E-mail (in PDF file format) and facsimile within three (3) days of visit. Hard copy of all reports are required to be submitted with the Contractor’s final closeout documents.

   a. Field reports shall include all roofing Work as indicated in this sections, other related roofing work sections, but not be limited to the following:

      1) Date of visit;
      2) Contractor’s company name;
      3) Contractor’s subcontractor’s name(s);
      4) Foreman’s name;
5) Extent of roofing contractor’s work force, including subcontractors, and all tasks that have been performed during the visit (number of workers);
6) Weather conditions including range of day temperatures;
7) Record of overnight rain events and presence of moisture upon arrival;
8) Documentation of materials delivered and/or used by Workers during the RIF presence on site;
9) For projects with use of hot bitumen products: record the type of materials, required EVT temperature and record the temperature at the kettle/tanker source and at the point of application on the Roof;
10) Roof area and locations of roof areas where work in progress is taken place (Roof Key Plan to be Provided by Architect);
11) Percent of roofing work completed;
12) Documentation of all fastener type, size, coating and number used by the Contractor prior to allowing concealment of same by other Work. Note: Provide digital photographs to document Contract compliance.
13) Status of Project Schedule;
14) Punch list items one week before substantial completion date of work and in accordance with Contract Documents;
15) Items which are deficient and/or not in compliance with Contract Documents;
16) Status of prior reported deficiencies;
17) Summary of visual work completed between visits;
18) Inspector’s name and report writer’s name if different.

7. The RIF is required to provide regular communications throughout the project. The RIF is to contact the Architect immediately from the project site upon observation of deviations of all the requirements of the Contract Documents by the Contractor and/or other Work forces.

1.3 SUBMITTALS

A. Submit certification that the roof materials furnished for roof alterations and tie-ins is Tested and Approved by Factory Mutual as a Class 1-SH roof system with 1-90 Wind Uplift Requirements, or Listed by Underwriters Laboratories or Warnock Hersey for external fire tests of ASTM E - 108 Class A.

B. Product Data for each type of product specified include manufacturer's technical product data, installation instructions, and recommendations for each type of roofing product required. Include data substantiating that materials comply with specified requirements.

C. For all modified bituminous sheet roofing include independent test data according to ASTM designation D-5147-91 "Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material" substantiating that materials comply with specified requirements. A separate Certificate of Analysis for each production run of material shall indicate the following information:

1. Material type.
2. Lot number.
3. Production dates.
5. Physical and Mechanical Properties.
D. Shop Drawings: Submit roofing membrane layout drawings showing the outline of existing roof and locations of flashings and tie-ins, specific roofing details illustrating relationships with adjacent construction, and flashing details at indicated tie-in conditions.

1. Submit shop drawings of manufactured and/or fabricated sheetmetal work.

2. Contract Drawing Detail Approval: If the roofing manufacturer takes exception to the contract document details, the manufacturer shall provide the roofing contractor with acceptable details to be submitted to the Architect for approval. This Project must receive Architect’s approval through this process prior to shipment of materials to the project site. All roofing work required by the roofing system manufacturer shall be included in the contract at no additional cost to the Owner.

E. Samples: Samples of each material specified, properly labeled.

1. Roof membrane: For project records, submit 8- by 10-inch samples of membrane cut from rolls of each type of material used on the project.

2. Flashing membrane: Submit 12-inch-square samples of sheet material to be used for base flashings.

3. Fasteners: Submit (2) of each type.

4. Adhesives: Submit samples for each type to be used.

1.4 JOB CONDITIONS

A. Roofing Conference: Prior to the installation of the roofing and associated work, meet at the project site with the Installer, the Installers of each component of associated work, and the Architect and other representatives directly concerned with performance of the work, including, where applicable, product manufacturers and the Owner. Record (by Contractor) the discussions of the conference and the decisions and agreements, or disagreements reached, and furnish a copy of the record to each party attending. Review foreseeable methods and procedures related to the roofing work including, but not necessarily limited to, the following:

1. Review Project requirements (drawings, specifications and other contract documents).

2. Review status of existing conditions and substrate (by the Roofing Installer), including extent of moisture penetration in existing work, drying and similar considerations.

3. Review availability of materials, tradesmen, equipment and facilities needed to make progress and avoid delays.

4. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.

5. Review regulations concerning Code compliance, environmental protection, health, safety, fire and similar considerations.

6. Establish units of work, including preparation, such that each unit may be completed prior to end of each day's work.
B. Weather Condition Limitations:

1. During periods of inclement weather, Contractor shall use wet power vacuums, on the
day following each rain, to remove standing water so as not to delay his operations.

2. Proceed with roofing and associated work only when weather conditions will permit
unrestricted use of materials and quality control of the work being installed, complying
with the requirements and the recommendations of the roofing materials
manufacturers.

3. Proceed only when the Contractor is willing to guarantee the work as required and
without additional reservations and restrictions.

4. Protect existing work and property from damage during the course of the work. Be
prepared for all weather and other contingencies as prudence may dictate. Maintain
on the site at all times sufficient and proper materials for temporary roofing and other
protection when weather conditions prevent continuance of work and do not permit
completion of each unit of work prior to the end of each working day. Temporary
protection and roofing work must be provided at no additional cost to the Owner.

5. Remove and discard materials which have been used for temporary roofs, protection,
water seals, and related work. Do not incorporate used materials into the work.

C. Storage of Materials and Property: Do not overstress roof decks and supporting structures.
Avoid placing loads at midspans of framing. All superimposed loads shall be well distributed.
Do not store more material on roofs than can be installed in one and one-half working days.
Store materials, except membrane, in dry area and protect from water and direct sunlight.
Damaged materials shall be replaced at Contractor’s expense. Protect adjacent work from
damage due to roofing operations and related work. Provide temporary protection against
walls adjacent to roofing work; remove protection upon completion.

PART 2 - PRODUCTS

2.1 GENERAL ROOFING MATERIALS

A. Refer to other sections for new roofing work and all requirements of roofing materials,
products and systems.

B. Alterations and Tie-ins to Existing Roofs

1. Provide Roofing materials, flashings, primers, adhesives and all other required
accessories to meet or exceed the following “Basis of Design” minimum performance
requirements. All roofing materials shall be UL Class A, FM Class 1-SH listed and shall
comply with the International Building Code, and CGSB 37-GP-56M standards.

2. Wood Cants and Curbs: Lumber; #2 grade free from warping and visible decay; fire
retardant treated, and marked.

3. Mechanical Fasteners: Manufacturer’s standard FM approved fasteners for this type of
application.
PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Contractor shall prepare a plan and submit it to the Architect for which identifies how the roofing repairs and all associated work will be performed so as to prevent foot traffic on the newly installed roofing system.

B. Coordinate the installation of roofing materials and associated work so as to provide a complete system complying with the combined recommendations of manufacturers and installers involved in the work.

C. Protect other work from spillage of roofing materials, and prevent materials from entering and clogging drains and conductors. Replace or restore other work which is soiled or otherwise damaged by the performance of the roofing and associated work.

3.2 PERFORMANCE REQUIREMENTS

A. Initial Weather Resistance: It is required that the roofing and associated work be durable in normal weather exposure and not leak water during rainstorms. After completion of the roofing and associated work, and either during or immediately after a rainstorm, (and just before final acceptance of the work) the Installer shall meet with the Contractor at the project and inspect the building for evidence of leaks in the roofing and associated work. Prepare a written report without delay (by Contractor) covering the inspection, and submit to Owner (with copy to Architect). Should no rain occur between the time the roof is completed and when all punch list items have been corrected, this requirement shall be waived.

B. Repair or replace roofing and associated work as required to eliminate leaks or other inability of roofing to initially withstand normal weather exposure.

1. Abnormal weather exposure is recognized to include hailstorms, lightning strikes, hurricane and tornadic winds, and other unusual phenomena of the weather as frequently covered by building insurance.

C. Alterations and Tie-ins to Existing Roofs

1. Examine substrate surfaces to receive roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

2. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane.

3. Cooperate with inspection and test agencies engaged or required to perform services in connection with roofing system installation.

4. Insurance/Code Compliance: Install roofing and flashing work (and test where required to show) compliance with governing regulations.
5. Coordinate the installation of roofing sheets, flashings, stripping, coatings and surfacing, so that felts are not exposed to precipitation nor exposed overnights. Provide cut-offs at the end of each day's work, to cover exposed felts and insulation with a course of coated felt with joints and edges sealed with roofing cement. Remove cut-offs immediately before resuming work. Glaze coats installed ply-sheet courses at the end of each day's work where final surfacing has not been installed.

6. Substrate Joint Penetrations: Do not allow adhesive to penetrate substrate joints and enter building or damage existing or new insulation, vapor barriers (retarders) or other construction.

7. General Requirements: Apply roofing membrane in accordance with roofing material manufacturer's instructions. Application of roofing shall immediately follow application of base sheet and/or insulation as a continuous operation.

D. Agreement to Maintain Roofing: See Part 1, Section 01900, Guarantees and Warranties.

END OF SECTION 07500
PRE-APPROVED INDEPENDENT ROOFING INSPECTION FIRMS

Precision Construction Consulting, LLC
524 Sunset Avenue
Maple Shade, NJ 08502
Phone: 609-560-1361
Contact: John Hoffner

H.J. Cannon Group
520 Fellowship Road - Suite A-111
Mount Laurel, NJ 08054
Phone: 856-914-0900/800-233-6986
Fax: 856-914-0600
Contact: Chris Cifone, RRO

Sharp Roofing Associates, Inc.
P.O. Box 219
Ironia, NJ 07845
Phone: 973-895-7330
Fax: 973-895-7332
Contact: Steven Sharp

System Design & Analysis, Inc.
640 Herman Road, Suite 4
Jackson, NJ 08527
Phone: 732-833-9766
Fax: 732-833-9733
Contact: Jan Chrostowski

Roof Maintenance Systems
5118 Highway 33-34
Farmingdale, NJ 07727
Phone: 732-938-7373
Fax: 732-938-9646
Contact: Bill Tipton, RRC

James D. Cummins & Co.
35 Broad Street, Suite 4
Keyport, NJ 07735
Phone: 732-203-2008
Fax: 732-203-2009
Contact: Henry Vitale, RRO
PART 1 - GENERAL

1.1 STIPULATIONS

A. The specification sections “General Conditions,” “Special Requirements” and “General Requirements” form a part of this section by this reference hereto and shall have the same force and effect as if printed herewith in full.

1.2 SUMMARY

A. Extent of Modified bitumen roof membrane system which includes but are not limited to the following:

1. Modified bitumen roof membrane system with mineral surface, cold applied.
2. Roof thermal, insulation and recovery boards.
3. Metal Roof edge / fascia and coping systems.
4. Expansion joints.
5. Roof walk-ways.

B. Related Sections:

1. Section 06100 - Carpentry for wood blocking and nailers.
2. Section 07070 - Selective Demolition.
3. Section 07500 - Roofing, General.
4. Section 07600 - Flashing, Sheet Metal and Roof Accessories.
5. Section 07800 - Roof Specialties and Accessories.
7. Section 15000 - Mechanical Work.

1.3 SCOPE OF WORK

A. Furnish and install 2-Ply Modified Bitumen Roof Membrane System, SBS Adhesive, flashing torch applied, insulation and other roofing boards, roof metal edge and coping, and all miscellaneous materials required for a “Total No Dollar Limit (NDL) Roofing System Warranty”.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer ("Roofer") incorporated under same name for a recommended period of five (5) years, with experience in installation of specified system, to perform roofing work who has specialized in the installation of roofing systems similar to that required for this project and who is acceptable to manufacturer of primary roofing materials.

1. Installer Certification: Obtain written certification from manufacturer of roofing system certifying that Installer is approved by manufacturer for installation of specified roofing system. Provide copy of certification to The Professional prior to award of roofing work.
B. Manufacturers Qualifications: Obtain primary products, including each type of roofing sheet, adhesives, mopping asphalt, composition flashings, roofing boards, roof metal edges and copings, and other roofing components from a single manufacturer. Provide secondary products as recommended by manufacturer of primary products for use with roofing system specified.

1. All roofing components shall be supplied or approved by a manufacturer having a recommended minimum of five (5) years experience in the production of the specified roofing system which having properties as further defined in this specifications.

C. MANUFACTURER’S INSPECTIONS

1. When the project is in progress, the Roofing System Manufacturer will provide the following:

   a. Keep the Professional informed as to the progress and quality the work as observed.

   b. Provide job site inspections a minimum of one day a week.

   c. Report to the Professional in writing, any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor’s attention.

   d. Confirm, after completion of the project and based on manufacturer’s observations and tests, that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

D. Certificate of Analysis: The Manufacturer shall submit, during the shop drawing process the anticipated pertinent information and an actual certificate of analysis at close-out which identifies pertinent information of the actual product which is being manufactured for this project. Refer to the following example (following this specification section) of the information which must be furnished.

1. The Architect, shall at their discretion, take samples of the product delivered to the project site and send the samples to an Independent Testing Laboratory to verify the information provided by the manufacturer.

   a. If the anticipated ‘Certificate of Analysis’ furnished by the Manufacturer during the shop drawing process vastly differs from the physical properties of the manufacturer’s product indicated in the specifications, the Architect may reject the deficient shop drawing / products before the materials are shipped to the site

   b. If the ‘Certificate of Analysis’ of the installed products differ from the physical properties indicated in the specification manual submitted with the close-out documents, the Architect shall reject the deficient product. The Manufacturer shall, at their own cost, remove all deficient products from the site including labor and materials to remove and replace the installed products, including
freight costs, and Liquidated Damages if the Milestone Dates identified in Section 01800.

E. Insurance Certification: Assist the 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.

F. ULListing: Provide roofing system and component materials which have been tested for application and slopes indicated and are listed by Underwriters Laboratories, Inc. (UL) for Class A external fire exposure.

1. Provide roof covering materials bearing UL Classification Marking on bundle, package or container indicating that materials have been produced under UL's Classification and Follow-up Service.

G. Factory Mutual Approval Standard 4470 Listing: Provide built-up roofing system and component materials which have been evaluated by Factory Mutual System for fire spread, wind-uplift, and hail damage and are listed in "Factory Mutual Approval Guide" for I-90 Wind Uplift. Roof system must be a Class 1A rate roof system. The roof shall be approved by FM Global for minimum I-90 wind uplift construction as listed in RoofNav.

1. Provide roof covering materials bearing FM approval marking on bundle, package or container, indicating that material has been subjected to FM's examination and follow-up inspection service.

H. Roof Code Requirements:


2. Roofing System Design to meet roof covering wind resistance and wind test standards as described in Section 1504 of the IBC and shall be tested in accordance FM 4474, UL 580 or UL 1897.

   a. Basic wind speed for this project as per the IBC and must be used to determine the basic Velocity Pressure (Pv) and the building minimum design wind and wind resistance standards required by code (and comply with Table 1504.8).

3. Roofing assemblies shall meet UL for external fire exposure using UL Test No. 790 (ASTM E 108) Class A, as described in Section 1505, of the IBC.


5. Roofing Insulation: Above-deck thermal insulation board shall comply with the standards in Table 1508.2, Polyisocyanurate board ASTM C 1289, Type I or Type II.

1.5 REFERENCE STANDARDS
A. References in these specifications to standards, test methods, codes etc., are implied to mean the latest edition of each such standard adopted. The following is an abbreviated list of associations, institutions, and societies which may be used as references throughout these specifications.

1. ASTM American Society for Testing and Materials, Philadelphia, PA
2. FM Factory Mutual Engineering and Research, Norwood, MA
3. NRCA National Roofing Contractors Association, Rosemont, IL
4. OSHA Occupational Safety and Health Administration, Washington, DC
5. SMACNA Sheet Metal and Air Conditioning Contractors National Association, Chantilly, VA
6. UL Underwriters Laboratories, Northbrook, IL
7. IBC International Building Code, Washington, DC

1.6 PROJECT CONDITIONS

A. Weather Condition Limitations: Proceed with roofing work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store and handle roofing materials in a manner which will ensure that there is no possibility of significant moisture pick-up. Store in a dry, well ventilated, weather-tight place. Unless protected from weather or other moisture sources, do not leave unused felts on the roof overnight or when roofing work is not in progress. Store rolls of felt and other sheet materials on end on pallets or other raised surface. Handle and store materials or equipment in a manner to avoid significant or permanent deflection of deck.

1.8 WARRANTIES

A. Manufacturer's Warranty: Submit executed copy of roofing manufacturer's agreement including flashing endorsement (including metal), signed by an authorized representative of roofing system manufacturer, on form which was published with product literature as of date of Contract Documents, for the following period of time:

1. Total Roofing System Warranty: Twenty (20) years from approved date of substantial completion.
2. Warranty must be a NDL (no dollar limit).
3. The following exclusions are permitted in the warranty:
   a. Natural disasters such as lightning, hail, floods, tornadoes or earthquakes.
   b. Damage from traffic or storage of material or equipment on roof.
   c. Structural failure of roof deck, parapet or coping.
   d. Infiltration of moisture in, through or around walls, coping, or building structure.
   e. Damage to the building, (other than roofing system and specified components), or its components adjacent to roof areas.
4. The warranty shall be supplemented by the following requirements:

a. If upon proper notification, the warrantor fails to promptly repair the roof, the Owner may take temporary action for repairs to avoid damage the facility. Such action shall not be considered a breach of the provisions of the warranty.

b. The Owner shall be permitted to make alterations, additions and repairs to the roof within the written approval guidelines of the warrantor without jeopardizing the unexpired portion of warranty’s original term.

5. Refer to Section 15000 for Roofing Manufacturer’s requirement to include warranty information for the inclusion of the new and/or retro-fit roof drains into the overall roof system warranty.

1.9 SUBMITTALS

A. Submit certification that the roof system furnished is Tested and Approved by Factory Mutual as a Class 1A roof system with 1-90 Wind Uplift Requirements, or Listed by Underwriters Laboratories or Warnock Hersey for external fire tests of ASTM E - 108 Class A and the following:

1. Evidence of Factory Mutual Approval Standard 4470 for the proposed membrane system.

2. Underwriters' Laboratories Class A acceptance of the proposed roofing system shall include cold adhesive without additional requirements for gravel or coatings. No other testing agency approvals will be accepted.

3. The roof configuration (including fastening of base sheet or insulation) shall be approved by FM for minimum 1-90 windstorm construction.

4. The roof membrane configuration shall be approved by FM for Class 1-SH (severe hail) exposure.

B. Submit product data for each type of product which is part of the roofing assembly, including sheet roofing plies, flashings, roofing boards, sheet metal work, with manufacturer's technical product data, test data and Physical Properties and Performance. Include typical details, installation instructions, and recommendations for each type of roofing product required. Include data substantiating that materials comply with specified requirements.

C. Shop Drawings: Submit roofing membrane layout drawings showing outline of roof and roofing size, specific roofing details illustrating relationships with adjacent construction, and flashing details at roof perimeter and roof penetrations.

1. **Submit shop drawings of pre-manufactured and/or fabricated sheet metal work.**

2. **Contract Drawing Detail Approval:** If the roofing manufacturer takes exception to the contract document details, the manufacturer shall provide the roofing contractor
with acceptable details to be submitted to the Professional for approval.

a. This Project must receive the Professional’s approval through this process prior to shipment of materials to the project site.

b. All roofing work required by the roofing system manufacturer shall be included in the contract at no additional cost to the Using Agency.

D. Samples: Samples of each material specified, properly labeled.

1. Roof membrane: For project record, submit 8- by 10-inch samples of membrane cut from rolls of each type of material used on project.

2. Flashing membrane: Submit 12-inch-square samples of sheet material to be used for base flashings.

3. Fasteners: Submit (2) of each type.

4. Coatings and adhesives: Submit samples for each type to be used.

E. Submit independent test data according to ASTM designation D-5147-91 "Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material" substantiating that materials comply with specified requirements.

F. Submit evidence and description of manufacturer’s quality control/quality assurance program for the primary roofing products supplied. The quality assurance program description shall include all methods of testing for physical and mechanical property values. Provide confirmation of manufacturer’s certificate of analysis for reporting the tested values of the actual material being supplied for the project prior to issuance of the specified guarantee.

G. Submit a letter from the primary roofing manufacturer confirming that proposed membrane manufacturer has been producing SBS products in the United States for a recommended minimum of five (5) years without a change in the basic product design, physical and mechanical properties, or SBS modified bitumen blend, polymer specification, asphalt and filler formulation.

1. Letter shall confirm the number of years it has directly manufactured the proposed primary roofing system under the trade name and/or trademarks as proposed.

2. Letter shall confirm that a phased roof application, with only the modified bitumen base ply in place for a period of up to 10 weeks, is acceptable and approved for this project.

3. Letter shall include a list of five (5) of the proposed primary roofing manufacturer's projects, located in the United States, of equal size and degree of difficulty which have been performing successfully for a period of at least 5 years.

4. Letter shall confirm that the filler content in the elastomeric blend of the proposed roof membrane and flashing components does not exceed 35% in weight.
5. Letter shall include a complete list of material physical and mechanical properties for each sheet including: weights and thicknesses; low temperature flexibility; maximum load; elongation @ 5% maximum load (ultimate elongation); dimensional stability; high temperature stability; granule embedment and resistance to thermal shock (foil faced products).

6. Letter shall confirm that the proposed roof membrane and flashing components meet or exceed the physical and mechanical requirements listed in Part 2 of this specification.

7. Letter shall confirm that the proposed roof membrane system meets the requirements of ASTM D 5849 Resistance to Cyclic Joint Displacement (fatigue) at 14°F (-10°C). Passing results shall show no signs of membrane cracking or interply delamination after 500 cycles in an unaged specimen and 200 cycles in a specimen after heat conditioning.

H. Submit a sample of unexecuted Manufacturer's warranty. Include separate supplement as required to comply with special warranty requirements indicated in this specifications.

I. Certifications: The Contractor / Installer / Manufacturer (grantor) shall submit certifications to the Architect that the contract documents including the materials, methods and details of work provided for therein, are adequate to accomplish the specified results.

1. Contractor shall provide manufacturer’s “Roof Assembly Letter” confirming each proposed roof system and decking description as follows:

   a. Assembly,
   b. Construction Type,
   c. Maximum Slope,
   d. Deck Type,
   e. Insulation - Layer (1),
   f. Insulation Fastening,
   g. Insulation Attachment Requirements; Field, Perimeter, Corners,
   h. Insulation - Layer (2),
   i. Insulation Attachment; Adhesive,
   j. Membrane.

2. The roofing membrane manufacturer shall submit a letter to the Architect, on the company letterhead, certifying that the roofing manufacturer’s representative has inspected all cleats, chairs and anchors plates and they have been installed in accordance with the manufacturer’s printed installation recommendations.

PART 2 - PRODUCTS

2.1 ROOFING MATERIALS

A. Basis of Design: “Paradiene 20/30 FR Roofing System”; Siplast Inc.; or approved equal.

1. Subject to compliance with the “Basis of Design” for roofing system performance requirements, the following manufacturers/roofing systems may be incorporated in
the work:

a. Soprema:

1) Base Ply Sheet: Elastophene HR - ASTM D 6163, Type II, Grade S.
2) Cap Sheet: Elastophene FR GR - ASTM D 6163, Type I, Grade G.
3) Flashing Sheet: Sopralast 50 TV ALU
4) Soprema Extruded TerminEdge
5) Sopra-Iso-25

b. Johns Manville:

1) Base Ply Sheet: DynaBase - ASTM D 6163, Type I, Grade S.
2) Cap Sheet: DynaGlas FR - ASTM D 6163, Type I, Grade G.
3) Flashing Sheet: DynaClad
4) JM - Presto-Tite Fascia
5) Enrgy 3, 25 psi

c. Or approved equal.

2.2 ROOFING MATERIALS

A. Basis of Design Roofing System: All roofing system materials and components as specified herein are based upon the Paradiene 20/30 FR Roofing System, as manufactured by Siplast Inc.; or approved equal.

B. Roofing Membrane Assembly: A roof membrane assembly consisting of two plies of a prefabricated, reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) block copolymer modified asphalt membrane, applied over a prepared substrate.

1. Both reinforcement mats shall be impregnated/saturated and coated each side with an SBS modified bitumen blend.

2. The roof system shall pass 500 cycles of ASTM D 5849 Resistance to Cyclic Joint Displacement (fatigue) at 14°F (-10°C).

3. Passing results shall show no signs of membrane cracking or interply delamination after 500 cycles.

4. The roof system shall pass 200 cycles of ASTM D 5849 after heat conditioning performed in accordance with ASTM D 5147. The assembly shall possess waterproofing capability, such that a phased roof application, with only the modified bitumen base ply in place, can be achieved for prolonged periods of time without detriment to the watertight integrity of the entire roof system.

C. Roofing Materials and Accessories:

1. Modified Membrane Sheets: Manufacturer’s standard and as following:

   a. “Siplast Paradiene 20;” Modified Bitumen Base, Stripping, and Flashing Reinforcing Ply:
1) Thickness (avg): 91 mils (2.3 mm) (ASTM D 5147)
2) Thickness (min): 87 mils (2.2 mm) (ASTM D 5147)
3) Weight (min per 100 ft² of coverage): 62 lb (3.0 kg/m²)
4) Maximum filler content in elastomeric blend - 35% by weight
5) Low temperature flexibility @ -13ºF (-25ºC): PASS (ASTM D 5147)
6) Maximum Load (avg) @ 73ºF (23ºC): 30 lbf/inch (5.3 kN/m) (ASTM D 5147)
7) Maximum Load (avg) @ 0ºF (-18ºC): 70 lbf/inch (12.3 kN/m) (ASTM D 5147)
8) Elongation @ 5% Maximum Load (avg.) @ 73ºF (23ºC): 50% (ASTM D 5147)
9) Dimensional Stability (max): 0.1% (ASTM D 5147)
10) High Temperature Stability (min): 250ºF (121ºC) (ASTM D 5147)
11) Approvals: UL Class listed, FM Approved (products shall bear seals of approval)
12) Reinforcement: Fiberglass mat or other meeting the performance and dimensional stability criteria

**b. “Siplast Paradiene 30 FR”; Modified Bitumen Finish Ply:**

1) Thickness (avg): 130 mils (3.3 mm) (ASTM D 5147)
2) Thickness at selvage (coating thickness) (avg): 98 mils (2.5 mm) (ASTM D 5147)
3) Thickness at selvage (coating thickness) (min): 94 mils (2.4 mm) (ASTM D 5147)
4) Weight (min per 100 ft² of coverage): 90 lb (4.4 kg/m²)
5) Maximum filler content in elastomeric blend: 35% by weight
6) Low temperature flexibility @ -13ºF (-25ºC): PASS (ASTM D 5147)
7) Maximum Load (avg) @ 73ºF (23ºC): 30 lbf/inch (5.3 kN/m) (ASTM D 5147)
8) Maximum Load (avg) @ 0ºF (-18ºC): 75 lbf/inch (13.2 kN/m) (ASTM D 5147)
9) Elongation @ 5% Maximum Load (avg.) @ 73ºF (23ºC): 55% (ASTM D 5147)
10) Dimensional Stability (max): 0.1% (ASTM D 5147)
11) High Temperature Stability (min): 250ºF (121ºC) (ASTM D 5147)
12) Granule Embedment (max loss): 2.0 grams per sample (ASTM D 5147)
13) Approvals: UL Class listed, FM Approved (products shall bear seals of approval)
14) Reinforcement: Fiberglass mat or other meeting the performance and dimensional stability criteria
15) Surfacing: ceramic granules

**c. Flashing Sheets:**

1) **“Siplast, Veral Flashing System”**: 
   a) 134 mil SBS Fiberglass reinforced with fiberglass scrim composite, homogeneous (Styrene-Butadiene-Styrene) block copolymer modified asphalt membrane, UL Class listed, FM approved (products
shall bear seals of approval).

b) Weight: 90 lbs. Average per 100 square foot of coverage.

c) Low Temperature Flexibility: Passes @ -0°F (-18°C), (ASTM D-5147).

d) Breaking Load: 85 lbf/inch @ 73°F, (ASTM D-5147).

e) Elongation: 45% @ 73.0°F, (ASTM D-5147).


g) Surfacing: Aluminum metal foil.

d. “Parapro 123 Flashing System by Siplast”; Catalyzed Acrylic Resin Flashing System: A specialty flashing system consisting of a liquid-applied, fully reinforced, multi-component acrylic membrane installed over a prepared or primed substrate. The flashing system consists of a catalyzed acrylic resin primer, basecoat and topcoat, combined with a non-woven polyester fleece. The resin and catalyst are pre-mixed immediately prior to installation. The use of the specialty flashing system shall be specifically approved in advance by the membrane manufacturer for each application.

Concrete and masonry surfaces to receive Parapro must be cleaned and wire brushed down to a new surface and primed with Pro Primer W.

NOTE: Parapro is not compatible with the solvents in PA-311 M cold adhesive used to install the 20/30 system. Hold back the PA-311 M twelve (12) inches from the Parapro. Use SFT adhesive (solvent free technology) or PS-304 elastomeric sealant to adhere the 20/30 membrane adjacent to and underneath the Parapro. Use SFT flashing cement or PS-304 to adhere the stripping ply on the vertical surface. Priming is not required.

2. Mechanically Fastened Base Sheet: Provide ParaBase FS; Siplast - asphalt coated fiberglass base sheet, ASTM D 4601, Type II with polyolefin film backing.

3. Membrane Cold Adhesive: An asphalt, solvent blend conforming to ASTM D 4479, Type II requirements.

a. Siplast PA-311 R Cold Adhesive by Siplast; or approved equal.

4. Flashing Adhesive: A slump resistant, asphalt cutback flashing adhesive, reinforced with non-asbestos fibers, conforming to ASTM D 4586 Type II requirements.

a. Siplast PA-828 Flashing Cement; or approved equal.

5. Rigid Roofing Boards: Types which provided or approved by the roofing system manufacturer which include but are not limited to the following

a. ROOF INSULATION BOARD: Provide “Paratherm CG” polyisocyanurate insulation with coated fiberglass facer by Siplast Inc; for Uniform and Tapered Insulation; or approved equal:

1) Board Size: 4’ x 4’ only.

2) Thickness (Uniform): As necessary to achieve the required "R" value. See also minimum thickness indicated on drawings and tapered areas.
a) Bottom layers on existing flat metal / wood decking shall be a minimum of 3½ thick, two layers of 1½” thick with staggered joints plus ½” minimum of tapered insulation at the low point, as indicated.
(1) Tapered insulation; 1/4” to the foot slope for the roof area; and ½” or 3” to the foot slope for gussets/crickets (Refer to Roof Plans). Stagger all joints between layers.

3) R-Value (Uniform): Minimum of R=30.0, per one layer of 2½” and one layer of 3½” thick,[LTTR: R-5.6 per 1”; R-11.4 per 2”; R-17.4 per 3”; R-23.6 per 4’], unless indicated otherwise in the roof assemblies illustrations.

4) Meet or exceed ASTM C 1289 Type II Class 2. Compressive Strength: 25 psi, minimum, Grade 3.

5) Density: 1.5 pcf.

6) Surface - Burning Characteristics: Tested in accordance with ASTM E 84;
   a) Flame Spread: Not more than 25
   b) Smoke - developed: Not more than 200

7) FM approved for Wind Uplift, tested for 90 psf.

b. Top Over laying Board:

1) THERMAL BARRIER BOARD
   a) Basis of Design: “Securerock Gypsum-Fiber” Roof Board as manufactured by USG; or approved equal.
      (1) Water-resistant and silicone-treated gypsum core board, UL 790 Class A listing as a barrier board, and tested in accordance with ASTM E-84;
         (a) Flame Spread: 0
         (b) Smoke developed: 0
      (2) Board Size: 4’ x 4’.
      (3) Thickness (Uniform): 1/2”, R-Value per ASTM C518 = R.5.
      (4) FM approved for Wind Uplift, tested for 90 psf.
      (5) Stagger all joints with bottom layer.

c. Adhesive for Top Over Laying Boards: Para-Stik; Flexible Products Co.; or approved equal.

1) Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a) Fas-n-Free Adhesive, as manufactured by Tremco
   b) High Velocity Insulation III adhesive by Soprema.
   c) Urethane Insulation adhesive by Johns Manville.
   d) Or approved equal.

6. Sealant: A moisture-curing, non-slump elastomeric sealant designed for roofing applications. The sealant shall be approved by the roof membrane manufacturer for use in conjunction with the roof membrane materials. Acceptable types are as follows:

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a. Siplast PS-209 Elastomeric Sealant by Siplast; or approved equal.

7. Ceramic Granules: No. 11 grade specification ceramic granules of color scheme matching the granule surfacing of the finish ply.

8. Perlite Cant Strips: A cant strip composed of expanded volcanic minerals combined with waterproofing binders. The top surface shall be pre-treated with an asphalt based coating. The face of the cant shall have a nominal 4 inch dimension.

   a. Thickness: 0.217 in (5.5 mm)
   b. Weight: 1.8 lb/ft² (8.8 kg/m²)
   c. Width: 30 in (76.2 cm)
10. Bituminous Cutback Material:
   a. Primer: A high flash, quick drying, asphalt solvent blend which exceeds ASTM D 41-85 requirements; PA-917 LS Asphalt Primer; Siplast.
   b. Mastics: Asphalt cutback mastic, reinforced with non-asbestos fibers, conforming to ASTM D 4586-86 Type II requirements; PA-1021 Plastic Cement; Siplast.

11. Metal Roof Edge and Copings: Manufacturer’s standard; “Paraguard Formed Aluminum, .050" thick, prefinished Kynar 500, with preformed mitered corners.
   a. Color to be selected by the Architect / Owner after award of contract. See Section 07600 for additional information.

12. Metal Roof Edge: Manufacturer’s standard; “Paraguard Extruded Edge TE - Custom Sizes”, .050" thick, prefinished Kynar 500, with preformed mitered corners.
   a. Color to be selected by the Architect / Owner after award of contract. See Section 07600 for additional information.

13. Wood Blocking & Curbs: Lumber; #2 grade free from warping and visible decay; fire retardant treated (FRT) to meet AWPA C20 (lumber), and marked and in accordance with requirements indicated in section 06100.

14. Mechanical Fasteners: Manufacturer’s standard approved fasteners for this type of application.
   a. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel. Nails and fasteners shall be flush-driven through flat metal discs of not less than 1-inch diameter. Metal discs may be omitted when one piece composite nails or fasteners with heads not less than 1-inch diameter are used.

15. Metal Discs: Flat discs or caps of zinc-coated sheet metal not lighter than 28 gauge and not less than 1-inch in diameter. Discs shall be formed to prevent dishing. Bell or cup-shaped caps are not acceptable.

16. Siplast Expansion Joint Cover: Paraguard - .050" thick pre-finished aluminum, color as selected by Architect; or approved equal.

17. Siplast Metal Extenders: Paraguard (see drawings for thickness of aluminum).

17. Acoustical Inserts: Provide mineral fiber acoustical insulation strips of profile to fit void space between vertical ribs, with a noise Reduction Coefficient of 0.90. Submit test results per ASTM C423 certifying acoustical performance.
PART 3 - EXECUTION

3.1 INSPECTION EXISTING SUBSTRATE

A. Immediately after removal of existing roofing materials and exposing existing concrete decking, the Contractor shall schedule on-site field visit with manufacturer’s representatives to determine suitability of existing decking. Contractor shall notify the Professional and the Construction Manager for the date and time of the field visit.

1. Remove existing roofing in accordance with Section 07050.

2. Correct, repair and patch any damage and/or defects to existing metal / wood decking prior to start of installation of new roofing system.

3.2 PREPARATION OF SUBSTRATES

A. Roof substrate shall be dry and free of foreign materials. Remove nails, nail heads and other protrusions from existing deck.

1. Roof substrate shall be free of ponded water, ice, or snow to eliminate future condensation problems.

2. Preparations, repair and patching of existing metal, wood decking shall be completed prior to start of any roofing work.

3.4 CLEANING OF ROOF DRAIN LINES

A. Drain lines from the roof shall be electrically cleaned to invert of house storm sewer using power rooter (“Roto-Rooter”). Contractor shall provide certification to The Professional at completion of project that this work has been satisfactorily performed.

3.5 INSTALLATION - GENERAL REQUIREMENTS

A. Comply with instructions of the primary roofing materials manufacturer, and comply with the requirements for (20) Years Total Roofing System Warranty.

B. Coordinate with all roof mounted items to facilitate roofing installation.

C. Coordinate with the installation of all metal flashing and sheet metal work.

D. Confinement of Materials: Do not allow fluid and plastic to spill or migrate beyond surfaces of intended application.

1. Contractor to clean all migrated materials exposed to view.

E. Performance: It is required that roofing work be water-tight for normal weather exposure and not deteriorate in excess of normal weathering.

F. Clean site of all debris and contractor materials; restore damaged site work, i.e.; shrubs, turf, curbs, etc. to conditions prior to start of this work.
G. Install accessories as shown and as recommended by the prime materials manufacturer.

H. Insulation Under Roofing: Do not advance the installation of new roof insulation excessively ahead of roofing. Do not install roofing or new insulation over wet insulation; remove and replace with dry insulation before proceeding.

I. Coordinate Roofing with flashing and other adjoining work to ensure proper sequencing of entire work.

J. Cooperate with inspection and test agencies engaged or required to perform services in connection with roofing system installation.

K. Protect other work from spillage of roofing materials, and prevent liquid materials from entering or clogging drains and conductors. Replace/restore other work damaged by installation of roofing system work.

L. Insurance/Code Compliance: Install roofing system for (and test where required to show) compliance with governing regulations.

M. Coordinate the installation of insulation, roofing sheets, flashings, stripping, coatings and surfacing, so that insulation and felts are not exposed to precipitation nor exposed overnight. Provide cut-offs at end of each day's work, to cover exposed felts and insulation with a course of coated felt with joints and edges sealed with roofing cement. Remove cut-offs immediately before resuming work. Glaze coat installed ply-sheet courses at end of each day's work where final surfacing has not been installed.

N. Substrate Joint Penetrations: Do not allow adhesive to penetrate substrate joints and enter building or damage insulation or other construction.

O. Where acoustical deck is encountered, the Roofing Contractor shall vacuum all acoustical metal deck flutes to remove all debris prior to the installation of the new acoustical inserts. Additionally, the Roofing Contractor shall protect all interior surfaces from debris which may enter the finished space via the acoustical deck and shall vacuum up all debris.

3.6 PROTECTION

A. Contractor shall provide protection for roofing during construction period, so that the work will be without damage or deterioration except for normal weathering at time of acceptance.

3.7 INSTALLATION OF THE INSULATION / ROOFING BOARDS

A. Each 4’x4’ insulation board of the base layer of insulation must be mechanically fastened to the roof deck with at least one (1) fastener every two (2) square feet. Fastening pattern may be increased by Factory Mutual, the insulation manufacturer, and the roofing materials’ manufacturer.

B. Secure subsequent layers and the top cover board to bottom insulation layers using
manufacturer’s approved adhesive as indicated.

1. Insulation boards will have joints staggered. Gaps between panels of insulation will not exceed 1/4” at wood blocking and joints in the field of insulation will be tight. Panels with broken corners, damaged faces or wet panels of insulation will not be used. Where joints in field in insulation are not tight, joints will be taped with six (6) inch fiberglass tape adhered to insulation in approved adhesive.

C. Install top laying thermal board in cold adhesive and in accordance with manufacturers’ requirements. Stagger all joints with bottom insulation layer.

D. Install only that amount of insulation that can be covered the same day with new roof system. No phased roofing will be accepted unless pre-approved by the roofing manufacturer.

3.8 INSTALLATION OF MODIFIED BITUMINOUS SYSTEM:

A. General Requirements: Apply roofing membrane in accordance with roofing system manufacturer’s instructions and the following requirements. Application of roofing shall immediately follow application of base sheet and/or insulation as a continuous operation.

1. Fully bond the base ply to the prepared substrate, utilizing minimum 3 inch side and end laps. Apply each sheet directly behind the cold adhesive applicator. Cut a dog ear angle at the end laps on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger end laps of the finish sheet a minimum twelve (12) inches from side laps in the underlying base sheet. Stagger end laps of finish sheet a minimum three (3) feet from end laps in the underlaying base sheet.

2. Fully bond the finish ply to the base ply, utilizing minimum 3” side and end laps. Apply each sheet directly behind the cold adhesive applicator. Stagger end laps of the finish ply a minimum 3 feet. Cut a dog ear angle at the end laps on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger side laps of the finish ply a minimum 12 inches from side laps in the underlying base ply. Stagger end laps of the finish ply a minimum 3 feet from end laps in the underlying base ply.

3. Apply layers of roofing free of wrinkles, creases or fishmouths. Exert sufficient pressure on the roll during application to ensure prevention of air pockets. Lap seams in the base ply layer should not coincide with the lap seams of the finish ply layer and to be staggered to ensure this.

4. Choose sheet orientation and application techniques as applicable for the specific roof assembly proposed. Apply all layers of roofing perpendicular/parallel to the slope of deck.

5. Obtain the manufacturer’s acceptable sheet lengths and the required fastening schedule for all roofing sheet applications to specific roof slopes.

6. The roofing membrane manufacturer shall submit a letter to the Architect, on the company letterhead, certifying that the roofing manufacturer’s representative has
inspected all cleats, chairs and anchors plates and they have been installed in accordance with the manufacturer’s printed installation recommendations.

a. The Roofing Contractor can start snapping on the manufacturer’s pre-finished metal edge, coping, fascia only after the cleats, chairs and anchor plates are inspected and approved by the manufacturer.

B. AESTHETIC CONSIDERATIONS. An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this project. Make necessary preparations, utilize recommended application techniques, apply the specified materials (i.e. granules, metallic powder, etc.), and exercise care in ensuring that the finished application is acceptable to the Owner.

Contractor shall avoid working off finished cap sheet. Contractor will be responsible for finished cap sheet to be clean and free of excessive adhesive and foot print marks. If it is determined by the Architect, that the cap sheet has excessive marks, the contractor will be responsible for coating the entire roof area with the Manufacturers’ approved coating at no cost to the owner. It’s the Contractor responsibility to relay this information to the foreman and working crew.

3.9 WALL / CURB FLASHING-COUNTER FLASHING

A. Abutment wall flashing locations will require the installation of fiber cant strip.

B. The wall/cant juncture will be examined for air passage. If air flow is present, joint between cant and the wall will be sealed with closed cell joint backing and approved general purpose sealant.

C. Flash masonry parapet walls and curbs using the reinforcing sheet and the metal foil flashing membrane.

1. The reinforcing sheet shall have a minimum three (3) inch side laps and extend a minimum of three (3) inches onto the base sheet surface and three (3) inches up the parapet wall above the cant.

2. Fully adhere the flashing reinforcing sheet.

3. The laps of the metal foil flashing layer and the lap seams in the reinforcing layer should not coincide.

4. After the final roofing sheet has been applied to the top of the cant, prepare the surface area that is to receive flashing coverage by torch heating granular surfaces or by application of asphalt primer; allow primer to dry thoroughly.

5. Torch apply the metal foil-faced flashing into place using three (3) foot widths (cut off the end of roll) and always lapping the factory selvage edge.

6. Extend flashing sheet a minimum of four (4) inches beyond the toe of the cant onto the prepared surface of the finished roof and up the wall to the desired flashing height.
7. Exert pressure on the flashing sheet during application to ensure complete contact with wall/roof surfaces, preventing air pockets.

8. Nail the top edge of flashing at nine (9) inch on centers. Set the flashing in place while exerting pressure on the flashing sheet to ensure complete contact with the wall/roof surfaces and to prevent air pockets. Check and seal all loose laps and edges. Nail the top edge of the flashing on 9 inch centers.

3.10 WATER CUT-OFF

A. At end of day's work, or when precipitation is imminent, construct a water cut-off at all open edges. Cut-offs can be built using asphalt or plastic cement and roofing felts, constructed to withstand protracted periods of service. Cut-offs must be completely removed prior to the resumption of roofing.

3.11 GRANULE EMBEDMENT

A. Broadcast mineral granules over all bitumen overruns on the finish ply surface, while the bitumen is still hot or the adhesive is soft, to ensure a monolithic surface color.

3.12 WALKTREAD

A. Cut the walktread into maximum 5 foot lengths and allow to relax until flat. Adhere the sheet using the specified plastic cement. Apply the specified cement in a 3/8 inch thickness to the back of the product in 5 inch by 5 inch spots in accordance with the pattern as supplied by the walktread manufacturer. Walk-in each sheet after application to ensure proper adhesion. Use a minimum spacing of 2 inches between sheets to allow for proper drainage.

3.13 DRAINS, PIPING, PITCH POCKETS AND VENT PIPING

A. Follow manufacturer’s standard details and printed instructions for installation of membrane sheet and flashing around drains and vent piping.

3.14 FIELD QUALITY CONTROL AND INSPECTIONS

A. Site Condition: Leave all areas around job site free of debris, roofing materials, equipment and related items after completion of job.

B. Notification Of Completion: Notify the manufacturer by means of manufacturer's printed Notification of Completion form of job completion in order to schedule a final inspection date.

C. Final Inspection

1. Post-Installation Meeting: Hold a meeting at the completion of the project, attended by all parties that were present at the pre-job conference. A punch list of items required for completion shall be compiled by the Contractor and the manufacturer's representative. Complete, sign, and mail the punch list form to the manufacturer's headquarters.
D. Issuance of the Guarantee: Complete all post installation procedures and meet the manufacturer's final endorsement for issuance of the specified guarantee.

END OF SECTION 07535
# Roof Membrane Products Certificate of Analysis

**DATE:**

**LOT NUMBER:**

**MATERIAL TYPE:**

## Dimensions & Mass

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## Physical & Mechanical Properties

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<td>Resistance to Thermal Shock (%)</td>
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*Note: Must be provided from Roof Membrane Manufacturer for each Product.*
SECTION 07600 - FLASHING, SHEET METAL AND ROOF ACCESSORIES

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. Section Includes:

1. Pre-manufactured/pre-engineered fascia / metal edge / coping systems.
2. Pre-manufactured metal flashing and counterflashing.
3. Pre-manufactured roof expansion joint covers.
5. Roof expansion joint covers.
6. Exposed metal field and shop fabricated sheet trim and fascia units, where indicated.
7. Gutters and Downspouts.
8. Snow bar system.

B. Related Sections:

1. Wood nailers and blocking: Section 06100.
3. Roofing Manufacturer’s furnished metal edge: Section 07535.
4. Roof Specialties and Accessories: Section 07800.
5. Joint Sealer Assemblies: Section 07900.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Requirements: Design and install work of this section, including attachment to the structure, to safely withstand dead, live and wind loads prescribed by the International Building Code.

B. Environmental Requirements: Provide for expansion and contraction of system components due to air temperature and solar heat gain. Provide systems which will accommodate movement due to temperature change without buckling, failure of seals, undue stress on structural elements, reduction of performance, or other detrimental effects.

1. Anticipated air temperature range: Minus 10°F to +105°F.

1.4 REFERENCES

A. Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

B. ASTM B 32; Standard Specification for Solder Metal.


E. American Architectural Manufacturers Association (AMMA), standards as referenced herein.


1.5 SUBMITTALS

A. Product Data: Manufacturer's specifications, standard details, and installation recommendations.

B. Shop Drawings: Submit manufacturer’s shop drawings showing material types, thickness, sizes, shapes, connections, layout, joining, profiles and anchorage of fabricated work and relation to adjacent work, edited product data or shop drawings, or a combination thereof, as required to accurately describe products to be provided. Show elevations, field measurements, reinforcement, expansion provisions, installation accessories, and detail sections of composite members. Draw layouts at scale of 1/4 inch per foot, details at scale of 3 inches per foot.

1. Provide shop drawings for, but not limited to, the following:
   a. Covering on minor flat, pitched or curved surfaces.
   b. Building control and expansion joints.
   c. Metal edge, fascia, coping.
   d. Base flashing and counterflashing.
   e. Flashing for roof drains and roof penetrations.
   f. Gutters, rain water conductors (downspouts), anchors and accessories.
   g. Drain insert strainer.
   h. All other sheet metal work requiring fabrication.
   i. Details of all joints for above.
   j. Reglets and wedges.

2. Sheet metal shop drawings shall be prepared to reflect SMACNA detail standards and in accordance with ANSI/SPRI ES-1 Test Protocols.

C. Samples for Color Selection of Coated Finishes: Coating manufacturer's color selection data.

D. Samples for Color Verification of Coated Finishes: For each type and color of coated finish submit 12-inch-long sections of extrusions and formed sections and 6-inch-square sheets.

E. Pre-engineered fabricated and pre-finished sheet metal manufacturer's product literature, finish specification and sample finish warranty.

F. Sheet metal fabricators and installers qualifications.

1.6 QUALITY ASSURANCE

B. Fabricator / Installer: A firm having a recommended minimum of 5 years of successful experience in fabrication and installation of sheet metal work of type and scope equivalent, to work of this section.

**NOTE:** Metal Coping, Metal Edging and Fascia shop fabricated by Contractor is unacceptable and will not be approved by Architect. These metals shall be pre-engineered, fabricated and furnished by the roofing manufacturer and or approved manufacturers below.

1. Pre-engineered shop drawing must be submitted to the Architect before payment is authorized by the Architect for the work.

C. Pre-engineered and Contractor: Fabricate and install sheet metal work in accordance with indicated reference standards.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials off ground, under cover. Protect from damage and deterioration.

B. Handle materials to prevent damage to surfaces, edges and ends of sheet metal items. Damaged material shall be rejected and removed from the site.

1.8 WARRANTY

A. Warrant fascia, coping, gutters, downspout work to be free of defects in materials and workmanship, to resist blow-off and to be leak tight, due to conditions within stated design limits.

B. Warrant Fluoropolymer coating to remain free, under normal atmospheric conditions, from peeling, checking, or cracking, and chalking in excess of numerical rating of 8 when measured in accordance with ASTM D659-86, or fading in excess of 5 N.B.S. units during warranty period.

1. The Warranty period shall be **twenty (20) years** which starts the approved date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide pre-engineered manufactured products approved by the roofing system manufacturer(s) which may include but not limited to the following:

1. Formed-Aluminum Metal Edging, Coping and Fascia:
   b. Imetco, an ESOP Company.
   e. or approved equal.
2. Formed-Aluminum Gutters and Downspouts:
   d. Berger Building Products, Tel. 800.523.8852, www.bergerbuildingproducts.com
   e. or approved equal.

3. Aluminum Reglets:
   d. CertainTeed, Saint-Gobain, Tel.# 800-233-8990, www.certainteed.com
   e. or approved equal.

4. Stainless-Steel Reglets:
   d. Or approved equal.

2.2 METALS

A. Type “C”; Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:

1. Type “C-4”; Factory-Painted Aluminum Sheet: ASTM B 209, 3003-H14, with a minimum thickness of 0.040 inch, unless otherwise indicated.

B. Type “D”; Stainless-Steel Sheet: ASTM A 167, Type 304, soft annealed, with No. 2D finish, except where harder temper is required for forming or performance; minimum 0.0187 inch thick, unless otherwise indicated.

2.3 COPINGS, FASCIA & ROOF EDGE

A. Provide pre-engineered manufactured exposed coping components fabricated from the following metal:

1. Formed-aluminum sheet in thickness indicated. Refer to the Architectural drawings for thickness / height requirement(s).

2. Pre-engineered shop drawing must be submitted to the Architect before payment is authorized by the Architect for the work.

B. Provide fascia in shapes and sizes indicated, with shop-mitered and -welded corners.

1. Include water dams formed from at least 0.028-inch- thick, galvanized steel sheet; anchor plates; cleats or other attachment devices; concealed splice plates; and trim and other accessories indicated or required for complete installation, with no exposed fasteners.
2.4 GUTTERS AND DOWNSPOUTS

A. Provide gutters and downspouts in shapes and sizes indicated, with mitered and welded corners.

B. Include aluminum straps formed from at least 0.080-inch-thick, aluminum sheet; hangers or other attachment devices; screens; end plates; and trim and other accessories indicated or required for complete installation.

1. Additional Features: Provide items below fabricated from the same metal as gutters and downspouts.

2. Downspout starters (fascia sump) with downspout starter hole.

3. Flow-through gravel stop with perforated vertical leg.

4. Gutter Leaf Guard / Screen:

5. Drain Insert Strainer:
   a. Basis of Design: Overflow Type: Provide Drain inset and ball strainer as manufactured by Portal Plus Inc., Tel. (800) 624-8642; or approved equal.
      1) Drain shall be 15" O.D. spun aluminum drain flange and extruded aluminum outlet pipe in size indicated or as required for indicated applications.

6. Downspout hanger; SMACNA FIG 1-35 H, and as indicated

7. Concealed brackets for attachment to wall surface.

C. Provide gutters and downspouts fabricated from the following metal:

1. Formed-aluminum sheet in thickness indicated, but not less than the following:
   a. Gutters: Thickness: 0.050 inch.
   b. Downspouts: Thickness: 0.050 inch.

2.5 REGLETS

A. General: Provide reglets of type, material, and profile indicated, compatible with flashing. Form to securely interlock with counterflashing.

1. Type - 1: Surface-Mounted Type: Provide “SM” springlok surface Mounted Reglet by Fry Reglet Corp.; or approved equal.
   a. Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
   b. Aluminum: 3003-H14 alloy, meeting ASTM B209-95, 0.040" thick aluminum, color as selected by Architect from manufacturer’s standard colors.
1. Type - 2: Masonry Type: Provide “MA-1.5” (Brick) and “MA-4” (CMU) springlok Reglet by Fry Reglet Corp.; or approved equal.
   a. Aluminum: 3003-H14 alloy, meeting ASTM B209-95, 0.040" thick aluminum, color as selected by Architect from manufacturer’s standard colors.
   b. Stainless Steel: Type 304 alloy, meeting ASTM A666-96a, 0.020" thick, 2B finish.
   c. Provide 3" minimum lap joints.
   d. Sawcut joint to receive reglet to a depth of approximately 1/4" greater than the depth of the horizontal back leg of reglet.
   e. Insert reglet into sawcut and wedge in place using lead wedges installed at 12" o.c., minimum. Hammer wedges to a depth that will not interfere with sealant or backer rod.
   f. Install sealant exterior sealant to form fillet bead minimizing holding of water.

2. Type - 3: Masonry Type: Provide “MA-1.5” (Brick) and “MA-4” (CMU) springlok Reglet by Fry Reglet Corp.; or approved equal.
   a. Aluminum: 3003-H14 alloy, meeting ASTM B209-95, 0.040" thick aluminum, color as selected by Architect from manufacturer’s standard colors.
   b. Stainless Steel: Type 304 alloy, meeting ASTM A666-96a, 0.020" thick, 2B finish.
   c. Provide 3" minimum lap joints.
   d. Sawcut joint to receive reglet to a depth of approximately 1/4" greater than the depth of the horizontal back leg of reglet.
   e. Insert reglet into sawcut and wedge in place using lead wedges installed at 12" o.c., minimum. Hammer wedges to a depth that will not interfere with sealant or backer rod.
   f. Install sealant exterior sealant to form fillet bead minimizing holding of water.

3. Type - 4: Stucco Type: Provide “ST” springlok Reglet by Fry Reglet Corp.; or approved equal.
   a. Aluminum: 3003-H14 alloy, meeting ASTM B209-95, 0.040" thick aluminum, color as selected by Architect from manufacturer’s standard colors.
   b. Stainless Steel: Type 304 alloy, meeting ASTM A666-96a, 0.020" thick, 2B finish.
   c. Provide 3" minimum lap joints.
   d. Put in place over base material prior to lathing, and the flashing is locked into place after the roofing material base sheet is applied.

4. Type - 5: Roof Top Equipment Curb: Provide “MA” springlok Reglet by Fry Reglet Corp.; or approved equal.
   a. 0.040" thick aluminum, with 1-1/2" top flange, color as selected by Architect.
   b. Stainless Steel: Type 304 alloy, meeting ASTM A666-96a, 0.020" thick, 2B finish.
   c. Provide 3" minimum lap joints.

5. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing’s lower edge.
2.6 COUNTERFLASHING

A. Provide springlok counterflashing by Fry Reglet Corp.; Metal-Era; Xtreme Trim; or approved equal.

1. 0.040" thick aluminum, as indicated on the drawings.
2. 0.020" thick, type 304 stainless steel, as indicated on the drawings.
3. Provide inside and outside corners including special angle where required.

B. At rising walls above roofs where through wall mechanically keyed flashing, provide 2-piece type 302/304 stainless steel, 0.018" thick counter flashing as manufactured by Keystone Flashing Company, Inc.; or approved equal.

2.7 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. GENERAL REQUIREMENTS:

1. All miscellaneous materials, accessories or other items essential to the completion of sheet metal installation, though not specifically shown or specified, must be provided.

2. All such items, unless otherwise indicated on drawings or specified herein, shall be applied using sheet metal gauges which conform to recognized industry standards of sheet metal practices and without additional cost to the Owner. For sheet metal and pre-manufactured units, provide type of solder, ASTM B23, and corrosion-resistant metal as recommended by the producer of the metal sheets for fabrication and installation.

3. Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, non-corrosive, size and gauge required for performance.

B. Fasteners: Same metal as flashing/sheet metal, as indicated or other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

C. Bituminous Coating: FS TT-C-494 or SSPC - Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

D. Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.

E. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed; comply with FS TT-S-00227, TT-S-00230, or TT-S-001543.

F. Epoxy Seam Sealer: 2-part non-corrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.


H. Polyethylene Underlayment: 6-mil carbonated polyethylene film; FS L-P-512.
I. Prefabricated Accessories: Provide prefabricated accessories by Metal-Era, Roof Edge Systems, or approved equal.

1. Exposed Termination Bar: 0.05 x ½" x 1½" x ½" aluminum channel or 1" x 3/16" aluminum bar as manufactured by Metal-Era Inc.; or approved equal. Provide fastening at 8" o.c.

J. Gutter Stripping Material: Provide “CCW-705-TWF” Membrane Flashing, as manufactured by Carlisle Coatings & Waterproofing Inc. or approved equal. Provide units in required width, trim as required.

K. Snow Bar Retention System:

1. Provide “Snobar System with ColorBar” snow retention system as manufactured by Action Manufacturing LLC., Tel # 800.711.9724; or approved equal.

   a. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
      1) “E-Rail™ Snow Retention System” by Berger Building Products.
      2) “S-5! ColorGard” by Metal Roof Innovations, Ltd.
      3) “Sno Barricade” by Sno-Gem
      4) Or approved equal.

   b. Provide stainless steel components.

   c. Provide clips to suit indicated roofing systems.

   d. Provide finish paint coating as selected by the Architect to match roofing panels.

   e. Provide end caps to be installed in each end of bar.

   f. Provide aluminum “Ice Stopper” in the middle of the panel to prevent sliding ice (used over pedestrian areas).

2. Design Requirements:

   a. Clamps must be used at every roof seam in roof areas needing protection.

   b. Snow retention system should have a minimum performance of 500 lbs. per lineal foot of bar without deflection and 500 lbs per clamp without significantly damaging the roof panel.

3. Metal Roofing and Substrate Criteria:

   a. Metal roofing must be a minimum of 24 ga. steel.

   b. All loads incurred by the ‘Snobar’ system will be transferred to the metal roof panels; therefore proper roof panel attachment to substrate / structure is necessary to prevent roof panels from sliding under snow load.
L. Pipe Curb Assembly:

1. Manufacturer: Products of the following manufacturers, provided they comply with requirements of the contract documents, will be among those considered acceptable:

   a. Pipe Portal Systems as manufactured by Portals Plus, Inc., Tel.# 800.624.8642.
   b. The Pate Company, Tel.# 800.243.3018 or 630.705.1920.
   c. ThyCurb, Tel.# 216.762.0061.
   d. Or approved equal.

2.8 FABRICATION, GENERAL

A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

   1. Seams (Metal other than Aluminum): Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.


   3. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

   4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

   5. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

   6. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

   7. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
a. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

D. SHEET METAL FABRICATIONS

1. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements.

2.9 ALUMINUM FINISHES

A. General: Comply with Aluminum Association's (AA) "Designation System for Aluminum Finishes" for finish designations and application recommendations.

B. High-Performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited 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's instructions.

1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.

   a. Color(s): As selected by the Architect from manufacturer’s available full range of colors including custom colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence.

B. Verify that substrates and openings are rigidly set, at proper lines and elevation, properly sized, and ready to receive units.

C. Do not proceed with installation until conditions detrimental to proper installation have been corrected.

D. Coordinate installation with roofing work and other adjacent elements of building envelope to ensure watertight construction.

3.2 PREPARATION

A. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

B. Isolate all dissimilar metals by means of a heavy bituminous coating, approved paint coating, adhered polyethylene sheet, or other means recommended by SMACNA.
3.3 INSTALLATION

A. General: Except as otherwise indicated, comply with manufacturer’s installation instructions and recommendations, and with SMACNA “Architectural Sheet Metal Manual.” Anchor units of work securely in place by methods indicated, providing for thermal expansion in metal units. Set units true to line and level indicated. Install work with laps, joints, and seams permanently weatherproof and watertight.

B. Sealed Joints: Form minimum 1-inch hooked joints and embed flange into sealant or adhesive. Form metal to completely conceal sealant or adhesive.

1. Use joint adhesive for nonmoving joints specified not to be soldered.

2. Moving Joints: When ambient temperature is moderate (40-70°F) at time of installation, set joined members for 50% movement either way. Adjust setting position of joined members proportionally for temperatures above 70°F. Do not install sealant at temperatures below 40°F. Refer to section on sealants elsewhere in Division 7 for handling and installation requirements for joint sealers.

C. Workmanship: Install sheet metal work with lines, arises, and angles sharp and true. Exposed surfaces shall be free from visible waive, warp, buckle, and tool marks. Exposed edges shall be folded back neatly to form a ½-inch hem on the concealed side. Sheet metal exposed to the weather shall be watertight with provisions for expansion and contraction.

D. Nailing: Nailing of sheet metal shall be confined generally to sheet metal having a maximum width of 18 inches. Nailing of flashings shall be confined to one edge only. Nails shall be evenly spaced not over 3 inches on centers and approximately ½-inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, detailed shop drawings shall include locations for sleepers and nailing strips required to properly secure the work.

E. Cleats: Provide cleats for sheet metal 18 inches and over in width. Space cleats evenly not over 12 inches on centers unless otherwise specified or indicated. Unless otherwise specified, cleats shall be not less than 2 inches wide by 3 inches long, and of the same material and thickness as the sheet metal being installed. One end of the cleat shall be secured with two nails and the cleat folded back over the nailheads. The other end shall be folded back over the nailheads. The other end shall be locked into the seam. Cleats for soldered seams shall be pretinned.

F. Bolts, Rivets and Screws: Install bolts, rivets, and screws where indicated or required. Provide compatible washers where required to protect surface of sheet metal and to provide a watertight connection.

G. Seams; General: Comply with SMACNA, Figures 3-2 & 3-3, Tables 2-1 & 3-1R, and other applicable designs to specific installation.

1. Seams: straight and uniform in width and height with no solder showing on the face.

2. Flat-lock Seams for All Non-Moving Seams; Finish not less than 3/4-inch wide.
3. Loose-lock Expansion Seams: Not less than 3 inches wide, and shall provide minimum one-inch movement within the joint. Joint shall be completely filled with the specified sealant, applied at no less than 1/8 inch thick bed. Sealants are specified in Section 07900 - Joint Sealer Assemblies and shall be completely concealed.

4. Flat Seams: Make seams in the direction of the flow.

H. Soldering, Welding, and Mechanical Fastening: Where soldering is specified herein, it shall apply to copper and lead coated copper and galvanized metal items.
1. Soldering: Crease edges of sheet metals, except lead coated material, before soldering is begun. Soldering shall be done slowly with well heated soldering irons, so as to thoroughly heat the seams and completely sweat the solder through the full width of the seam. Edges of lead-coated material to be soldered shall be scraped or wire-brushed to produce a bright surface, and seams shall have a liberal amount of flux brushed in before soldering is begun.

I. Counterflashing: Except where indicated or specified otherwise, insert counterflashing receiver in horizontal saw cut joints locations as indicated. Snap counterflashing in receiver and extend down vertical surfaces over upturned vertical leg or base flashings not less than 4 inches. Exposed edges of counterflashing shall be folded 1/2-inch. End laps in counterflashings shall be overlapped 6", and shall be made weathertight with sealant.
1. Lengths of metal counterflashings shall not exceed 10 feet. The flashings shall be formed to the required shapes before installation. Corners shall be factory-formed with joints not less than 24 inches from the angle.
2. Flashing receivers shall be secured in the horizontal joint with lead wedges spaced not to exceed 12 inches apart; on short runs, wedges shall be placed closer together.
3. Counterflashing receiver joints shall be filled with caulking compound. Caulking is covered in Section 07900 - Joint Sealer Assemblies.

J. Cap Fascia Coping: Prefabricate in the shapes and sizes indicated and in lengths not less than 8 feet. Provide prefabricated mitered corners for internal and external corners.
1. Conceal Splice Plates: 6" wide with vertical legs as required to match coping. Install a continuous bead of sealant on both sides of joint before installing coping to form a watertight gutter.
2. Hook Strips: The lower edge of fascias shall be hooked at least 3/4 inch over a continuous hook strip of the same material bent outward at an angle of 45° to form a drip. Nail hook stip to a wood nailer at 6 inches maximum on centers.
3. Where fastening is made to concrete or masonry, screws spaced 12 inches o.c. shall be used and shall be driven in expansion shields set in the concrete or masonry. Where necessary, install hook strips over 1/16 inch thick compatible spacers or washers.
4. Mechanically fasten fascia at roof side with a stainless steel fastener with a neoprene washer at 2'-0" o.c.
K. Aluminum Gutters and Leaders Systems: Install in longest sections available and to allow for expansion and contraction.

1. Where metal cannot be welded, joints in gutters shall be lapped 1", riveted 2" o.c. and stripped-in with EPDM Peel and Stick Type membrane.

3.4 PROTECTION FROM CONTACT OF DISSIMILAR MATERIAL

A. Copper or Copper-Bearing Alloys: Surfaces in contract with dissimilar metal shall be painted with heavy bodied bituminous paint, or shall be separated by means of moisture-proof building felts.

B. Aluminum: Surfaces shall not contact other metals except stainless steel, zinc, or zinc coating. Where aluminum contacts another metal, the dissimilar metal shall be painted with a primer followed by two coats of aluminum paint.

C. All Metal: Surfaces in contact with mortar, concrete, or other masonry materials shall be painted with alkali-resistant coatings such as heavy-bodied bituminous paint.

D. Wood or Other Absorptive Materials: Surfaces that may become repeatedly wet and in contact with metal shall be painted with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.

E. Dissimilar Metal: Paint with a non-lead pigmented paint if drainage from it passes over aluminum.

F. All fasteners shall be compatible with the metal with which it is connected.

3.5 PROTECTION OF ROOFING

A. Protection of Applied Insulation: Completely cover each day’s installation with finished roofing specified. Protect open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, until permanent roofing and flashing is applied. Storing, walking, wheeling, or trucking will not be permitted directly on insulation or on roofed surfaces. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary to distribute weight to conform to indicated live load limits of roof construction.

B. Upon completion of roofing work (including associated work) Installer shall advise Contractor of recommended procedures for surveillance and protection of roofing during remainder of construction period. At end of construction period, or at a time when remaining construction work will in no way affect or endanger roofing (at Contractor’s option), Installer shall make a final inspection of roofing and prepare a written report to Contractor with copy to Owner describing nature and extend of deterioration or damage found in the work.

C. Installer shall repair or replace (as required) deteriorated or defective work found at time of final inspection. Installer shall be engaged by Contractor to repair damages to roofing which occurred subsequent to roofing installation and prior to final inspection.

D. Repair or replace the roofing and associated work to a condition free of damage and deterioration at time of substantial completion.
3.6 CLEAN-UP

A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.

B. Upon completion of the specified work, remove all waste, debris, unused material and equipment from the site. Remove all misplaced material from nearby surfaces. Leave the job in a clean condition, acceptable to Owner.

C. Advise Contractors of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.

END OF SECTION 07600
SECTION 07800 - ROOF SPECIALTIES AND ACCESSORIES

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 DESCRIPTION OF WORK

A. Extent and locations of roof accessories is indicated on the drawings and by provisions of this section.

B. Type of units specified in this section includes the following:
   1. Roof hatches.
   2. Ladder up safety post.
   3. Prefabricated curb and support units.
   4. Pipe and conduit supports.
   5. Roof Drains, where noted and as specified herein.

C. Related Sections:
   1. Refer to roofing system sections, for roofing accessories to be built into roofing system (not work of this section).
   2. Section 06100 - Carpentry.
   3. Section 07600 - Flashing, Sheet Metal and Roof Accessories.
   4. Section 07900 - Joint Sealer Assemblies.
   5. Division 15 - Mechanical related work.

1.3 SUBMITTALS

A. Product Data; Roof Accessories: Submit manufacturer's technical product data, rough-in diagrams, details, installation instructions and general product recommendations.

B. Samples; Roof Accessories: Submit 2 samples, min. 8" square, of each exposed metal and plastic sheet materials, and 2 samples, min. 24" long, of formed or extruded exposed metal member; color and finish as specified.

C. Coordination Drawings: Submit coordination drawings for items interfacing with or supporting mechanical or electrical equipment, ductwork, piping, or conduit. Indicate dimensions and locations of items provided under this section, together with relationships and methods of attachment to adjacent construction and to mechanical/electrical items.

1.4 QUALITY ASSURANCE

A. Standards: Comply with SMACNA "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap-flashing to coordinate with type of roofing indicated. Comply with "NRCA Roofing and Waterproofing Manual" details for installation of units.
B. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

C. Provide a letter of certification to the Architect indicating that all existing internal roof drain lines have been electrically power cleaned for full length in accordance with this Section.

D. The installation of roof drain systems shall be in accordance with the National Standard Plumbing Code, International Mechanical Code - New Jersey Edition (latest edition), and all local codes having jurisdiction over this project.

1.5 WARRANTY

A. Manufacturer's Warranty: Roofing manufacturer must submit warranty agreement including retrofit roof drain(s), signed by an authorized representative of roofing system manufacturer, on form which was published with product literature as of date of Contract Documents, for the following period of time:

1. Total Roofing System Warranty: Twenty (20) years from approved date of substantial completion.

2. Warranty must be a NDL (no dollar limit).

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

A. Provide manufacturers' standard units, modified as necessary to comply with requirements. Shop fabricate each unit to greatest extent possible.

2.2 MATERIALS, GENERAL

A. Zinc-Coated Steel: Commercial quality with 0.20 percent copper, ASTM A 525, G90 hot-dip galvanized, mill phosphatized.

B. Stainless Steel: AISI TYPE 302/304, ASTM A 167, 2D annealed finish except as otherwise indicated, temper as required for forming and performance.

C. Aluminum Sheet: ASTM B 209, alloy 3003, temper as required for forming and performance; anodized finish, except mill finish prepared for painting where indicated for field painting.

D. Extruded Aluminum: Manufacturers standard extrusions of sizes and general profiles indicated, alloy 6063 T6, architectural grade aluminum; 0.078 inch minimum thickness for primary framing and curb member legs and 0.062 inch for dome retaining angle.

E. Insulation: Manufacturer's standard rigid polyisocyanurate or semi-rigid board of glass fiber of thicknesses indicated.

F. Wood Nailers: Softwood lumber, fire retardant treated wood, not less than 1-1/2" thick. Refer to Specification Section 06100.
G. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.

1. Where removal of exterior exposed fasteners affords access to building, provide non-removable fastener heads.

H. Gaskets: Tubular or fingered design of neoprene or polyvinyl chloride, or block design of sponge neoprene.

I. Bituminous Coating: FS TT-C-494A or SSPC-Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coating.

J. Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.

K. Elastomeric Sealant: Generic type recommended by unit manufacturer, which is compatible with joint surfaces; comply with FS TT-S-00227E, TT-S-00230C, or TT-S-001543A.

L. Roofing Cement: ASTM D 2822, asphaltic.

2.3 PREFABRICATED ROOF HATCH

A. Basis of Design: “Type F” thermally broken roof hatch units as manufactured by Bilco Co.; or approved equal, of size(s) shown, single-leaf type unless otherwise indicated, for 40 lbs. per sq. ft. external loading and 20 lbs. per sq. ft. internal loading pressure.

1. Cover: Shall be 11 gauge (2.3mm) aluminum with a 5" (127mm) beaded flange with formed reinforcing members. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. Cover shall have a heavy extruded EPDM rubber gasket bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb. Cover insulation: 3" (75mm) thick polyisocyanurate with an R-value = 18 (U=0.315 W/m2K), fully covered and protected by an 18 gauge (1mm) aluminum liner.

2. Curb: Shall be 12" (305mm) in height and of 11 gauge (2.3mm) aluminum. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. The curb shall be formed with a 5-1/2" (140mm) flange with 7/16" (11mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal cap flashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6" (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place. Curb insulation: 3" (75mm) thick polyisocyanurate with an R-value = 18 (U=0.315 W/m2K).

3. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.
4. Hardware:
   a. Heavy stainless steel pintle hinges.
   b. Cover shall be equipped with a spring latch with interior and exterior turn handles.
   c. Roof hatch shall be equipped with interior and exterior padlock hasps.
   d. The latch strike shall be a stamped component bolted to the curb assembly.
   e. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" (25mm) diameter red vinyl grip handle to permit easy release for closing.
   f. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed. [For installation in highly corrosive environments or when prolonged exposure to hot water or steam is anticipated, specify Type 316 stainless steel hardware].
   g. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

5. Finishes: Factory-applied powder coat paint finish.

6. Warranty
   a. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five (5) years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

B. Sloping Roofs: Where slope or roof deck exceeds 1/4" per ft., fabricate hatch curbs with height tapered to match slope, to result in level installation of tops of units.

C. Manufacturers: Subject to compliance with requirements, manufacturers offering prefabricated roof hatch units which may be incorporated in the work include the following:
   2. Bristol Fiberlite Industries; Santa Anna, CA, Tel.# 800.854.8618 / www.bristolite.com.
   3. Or approved equal.

D. Ladder-Up Safety Post: Provide manufacturer's standard for all new roof hatch ladders.
   1. Telescoping post permanently mounts to the top two rungs of any fixed ladder.
      a. Adjustable mounting hardware accommodates virtually any ladder rung size or spacing.
   2. Automatically locks into the fully raised position.
   3. Release lever allows the post to be lowered to its retracted position.
   4. Provide steel safety post with yellow powder coat finish.
2.4 PREFABRICATED CURBS / EQUIPMENT SUPPORTS

A. Comply with loading and strength requirements as indicated where units support other work. Coordinate dimensions with rough-in sheets or shop drawings of equipment to be supported. Fabricate of structural quality sheet steel (ASTM A 570, Grade as required) which has been prepared for painting and factory-primed and painted with 2-mil thickness of baked-on synthetic enamel, after fabrication.

1. Fabricate with welded or sealed mechanical corner joints. Provide complete with cant strips and base profile coordinated with roof insulation thickness. Provide preservative-treated wood nailers at tops of curbs, coordinate with thickness of insulation and roof flashing as indicated, tapered as necessary to compensate for roof deck slopes of 1/4" per ft. and less.

2. Except as otherwise indicated or required for strength, fabricate units of minimum 14-gauge (0.0747") metal, and to minimum height of 12".

3. Sloping Roofs: Where slope of roof deck exceeds 1/4" per ft., fabricate curb/support units with height tapered to match slope, to result in level installation of tops of units.

B. Manufacturers: Subject to compliance with requirements, manufacturers offering prefabricated thermally broken curbs/equipment supports which may be incorporated in the work include the following:

1. Custom Curb, Inc.; Chattanooga, TN
2. The Pate Company; Broadview, IL
3. ThyCurb Div./ThyBar Corp.; Addison, IL
4. Or approved equal.

2.5 PIPE AND CONDUIT SUPPORTS

A. Comply with loading and strength requirements as indicated where units support other work.

B. Basis of Design: Pillow Block Pipe stand as manufactured by Miro Industries, Inc., Tel.# 800-768-6978; or approved equal.

1. Roller bearing pipe support designed to absorb thermal expansion and contraction of pipes and conduits. Pipes and conduits rest on self-lubricating roller which is a 304 stainless steel rod and a polycarbonate resin roller. Support base is polycarbonate resin.

2. Load weight may not exceed manufacturer’s stated capacity. Spacing of supports may not exceed manufacturer’s stated maximum. Adjust all pipe stands so that each unit bears equal weight.

3. For up to 3” I.D. (3.75” O.D.) pipe: Model 3-RAH-12.
4. For 3” I.D. (3.75” O.D.) to 4” I.D. (5” O.D.) pipe: Model 4-RAH-12.
5. For 4” I.D. (5” O.D.) to 6” I.D. (8.5” O.D.) pipe: Model 6-RAH-12.
2.6 NEW ROOF DRAINS

A. New Roof Drains: Provide roof drains, where indicated, as manufactured by J.R. Smith Mfg. Co.; or approved equal.

1. Comparable items as manufactured by Josam, Zurn, Wade, or approved equal are acceptable.

2. Basis of Design:
   a. General Purpose Regular Type Roof Drains: “Model #1010 RC”; or approved equal.
   b. Cast iron body with combined flashing collar and gravel stop, underdeck clamp and removable metal dome
      1) Pipe outlet size to be 4-inch.

3. Overflow Drain:
   a. Basis of Design: Overflow Type: Provide Drain inset and ball strainer as manufactured by Portal Plus Inc., Tel. (800) 624-8642; or approved equal.
      1) Drain shall be 15” O.D. spun aluminum drain flange and extruded aluminum outlet pipe in size indicated or as required for indicated applications.

2.7 ALUMINUM FINISH

A. General: Comply with Aluminum Association's (AA) "Designation System for Aluminum Finishes" for finish designations and application recommendations.

B. High-Performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited 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's instructions.

   1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.
      a. Color and Gloss: As selected by Architect from manufacturer's full range of choices for color and gloss.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's instructions and recommendations. Coordinate with installation of roof deck and other substrates to receive accessory units, and vapor barriers,
roof insulation, roofing and flashing; as required to ensure that each element of the work performs properly, and that combined elements are waterproof and weathertight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.

B. Except as otherwise indicated install roof accessory items in accordance with construction details of “NRCA Roofing and waterproofing Manual”.

C. Isolation: Where metal surfaces of units are to be installed in contact with non-compatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation.

D. Flange Seals: Except as otherwise indicated, set flanges of accessory units in a thick bed of roofing cement, to form a seal.

E. Cap Flashing: Where cap flashing is required as component of accessory, install to provide adequate waterproof overlap with roofing or roof flashing (as counter-flashing). Seal with thick bead of mastic sealant, except where overlap is indicated to be left open for ventilation.

F. Operational Units: Test operation of units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

3.2 ROOF DRAINS

A. Follow roof manufacturer's printed instruction pertaining to the installation of new roofing flashing and membranes and roof clamping ring and strainers.

1. Installation of drains and flashings shall be in strict accordance with roof drain and roof membrane manufacturer's printed instructions.

2. Anchor through solid treated wood blocking into decking.

B. Drain lines from the roof shall be electrically cleaned to invert of house storm sewer using power rooter ("Roto-Rooter"). Contractor shall provide certification to Architect at completion of project that this work has been satisfactorily performed.

3.3 CLEANING AND PROTECTION

A. Clean exposed metal surfaces in accordance with manufacturer's instructions. Touch up damaged metal coatings.

END OF SECTION 07800
SECTION 07840 - THROUGH-PENETRATION FIRESTOP SYSTEMS

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 through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:

1. Floors.
2. Walls and partitions.
3. Smoke barriers.
4. Construction enclosing compartmentalized areas.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for construction of openings in concrete slabs and walls.
2. Division 7 Section "Building Insulation" for saing insulation and accessories.
3. Division 7 Section "Sprayed Fire-Resistive Materials."
4. Division 15 Sections specifying duct and piping penetrations and firestop systems to be performed by the Plumbing and HVAC work Contractors.
5. Division 16 Sections specifying cable and conduit penetrations and firestop systems to be performed by the Electrical Contractor.

1.3 PERFORMANCE REQUIREMENTS

A. General: For the following constructions, provide through-penetration firestop 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 penetrated.

1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
3. Fire-resistance-rated floor assemblies.
B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

1. Penetrations located outside wall cavities.
2. Penetrations located outside fire-resistant shaft enclosures.
3. Penetrations located in construction containing fire-protection-rated openings.
4. Penetrating items larger than 4-inch-diameter nominal pipe or 16 sq. in. in overall cross-sectional area.

D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.

3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

E. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.4 SUBMITTALS

A. Product Data: For each type of through-penetration firestop system product indicated.

B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.

2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.
C. 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 Architect and Owner, and other information specified.

D. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.

E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems 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. Installer Qualifications: An experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualification on buyer.

C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:

1. Firestopping 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 firestop systems acceptable to authorities having jurisdiction.

2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:

   a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.

   b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:

      1) UL in "Fire Resistance Directory."

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and
manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi component materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJ ECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Contractor’s inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Contractor’s inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 PRODUCTS / MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application in the Through-Penetration Firestop System Schedule at the end of Part 3 and as shown on drawings and as produced by one of the following manufacturers:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Hilti Construction Chemicals, Inc.
2. Isolatek International.
4. 3M Fire Protection Products.
5. Or approved equal.
2.2 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:
   a. Slag-/rock-wool-fiber insulation.
   b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
   c. Fire-rated form board.
   d. Fillers for sealants.
2. Temporary forming materials.
5. Steel sleeves.

2.3 FILL MATERIALS

A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

I. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.

J. Silicone Foams: Multi component, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

K. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.

2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.


2.4 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.

3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Inspecting Agency: The Owner will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.

1. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.
B. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.

C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.5 IDENTIFICATION

A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

3.7 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to the alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.

1. Firestop Systems with No Penetrating Items: Comply with the following:
   a. Latex sealant.
   b. Silicone sealant.
   c. Intumescent putty.
   d. Mortar.

END OF SECTION 07840
SECTION 07900 - JOINT SEALER ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Part 1 through Part 6 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes joint sealant assemblies for the following applications which include performances of materials, installation requirements, as indicated herein in this specification and as specified by cross references in other Parts 1 through 6 specification sections.

B. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:

1. Control and expansion joints in cast-in-place concrete.
2. Control and expansion joints in unit masonry.
3. Joints in exterior insulation and finish systems.
4. Joints between metal panels.
5. Joints between different materials listed above.
6. Perimeter joints between materials listed above and frames of doors, windows, storefront and curtainwall systems, as applicable.
7. Control and expansion joints in ceiling, soffits and overhead surfaces.
8. Other joints, as indicated.

C. Exterior joints in the following horizontal traffic surfaces:

2. Joints between different materials.
3. Other joints, as indicated.

D. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

1. Control and expansion joints on exposed interior surfaces of exterior walls.
2. Perimeter joints of exterior openings, where indicated.
3. Tile control and expansion joints.
4. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
a. Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefront and curtainwall systems.
b. Joints between plumbing fixtures and adjoining walls, floors, and counters.
c. Other joints, as indicated.

5. Interior joints in the following horizontal traffic surfaces:
   a. Control and expansion joints in cast-in-place concrete slabs.
   b. Control and expansion joints in tile flooring.
   c. Other joints, as indicated.

E. Preparation of all joints to be sealed.

F. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:
   1. Cutting out as needed to give proper depth.
   2. Installation of proper back up material for each joint.
   3. Cleaning to remove all dust, dirt, oil films, loose material etc.
   4. Masking of adjacent surfaces.
   5. Priming of joint surfaces.

1.3 QUALITY ASSURANCE

A. VOC Content of Interior Sealants and Sealant Primers: Comply with the following limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

   1. Sealants: Not more than 250 g/L.
   2. Sealant Primers for Nonporous Substrates: Not more than 250 g/L.
   3. Sealant Primers for Porous Substrates: Not more than 775 g/L.

B. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

   1. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

   2. Preconstruction Compatibility and Adhesion Testing: Submit to joint sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

      a. Use manufacturers standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

      b. Testing will not be required if joint sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
c. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates as follows:

1. Locate test joints where indicated or, if not indicated, as directed by Architect.
2. Conduct field tests for each application indicated below:
   a. Each type of elastomeric sealant and joint substrate indicated.
   b. Each type of nonelastomeric sealant and joint substrate indicated.
3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Sealant Manufacturer Responsibility:
   a. Manufacturer shall provide Technical Representative to perform Sealant Joint Field Pull Test. Manufacturer Sales representative is not acceptable to perform Field Pull Test.
   b. Technical Representative performing Field Pull Test must be an employee of the Sealant Manufacturer. Outside Sales Agent or Contract Technical Representative is not acceptable to perform Field Pull Test.
5. Test Method: Test joint sealants by hand-pull method described below:
   a. Install joint sealants in 60-inch long joints using same materials and methods for joint preparation and joint-sealant installation required for the completed Work. Allow sealants to cure fully before testing.
   b. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.
   c. Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
   d. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.
6. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
7. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

3. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution:
   a. 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.
b. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

4. PROJECT CONDITIONS

a. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

   (1) When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
   (2) When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40°F.
   (3) When joint substrates are wet.

b. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

c. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

C. Special Project Warrantee and Guarantee:

1. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

   a. Warranty Period: **Five (5) years** from approved date of Substantial Completion.

2. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing 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.

   a. Warranty Period: **Five (5) years** from approved date of Substantial Completion.

3. Guarantee shall further state that all exterior sealant will be guaranteed against:

   a. Adhesive or cohesive failure in joints where movement is under maximum 25% extension or compression.

   b. Any crazing greater than 3 mils in depth developing on surface of material.

1.4 SUBMITTALS

A. Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application, include color samples showing full range of colors available, for each product exposed to view.
1. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.

B. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers.

2. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40°F (4.4°C).

3. When joint substrates are wet due to rain, frost, condensation, or other causes.

B. Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealers, joint fillers 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. Colors: Provide color of exposed joint sealers indicated or, if not otherwise indicated, as selected by Architect from manufacturer's available full range of standard and optional colors.

C. Grade of Sealant: For each application, provide the grade of sealant (nonsag, self-leveling, no track, knife grade, etc.) as recommended by the manufacturer for the particular condition of installation (location, joint shape, ambient temperature, and similar conditions) to achieve the best possible overall performance. Grades specified herein are for normal condition of installation.
2.2 MISCELLANEOUS MATERIALS

A. Joint Primer/Sealer: Provide the type of joint primer/sealer recommended by the sealant manufacturer of the joint surfaces to be primed or sealed.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape as 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.

C. Sealant Backer Rod: Provide materials which are in compliance with ASTM D 1056; compressible rod stock of polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable non-absorptive material as recommended for compatibility with sealant by the sealant manufacturer.

1. Materials shall be capable of remaining resilient at temperatures down to minus 26°F.

D. Joint Fillers:

1. Joint Fillers for Concrete Sidewalks: Provide Isomeric polymer foam, W.R. Meadows Sealtight Ceramar; or approved equal.
   a. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of plastic foam of material indicated below, and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
   b. Closed-cell isomeric foam, flexible.
   c. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
      2) Or approved equal.

2. Joint Fillers for Concrete Slab on Grade: Provide “Fiber”, as manufactured by WR. Meadows Sealtight Ceramar; or approved equal.

   a. Flexible foam expansion joint filler composed of a unique synthetic foam of isomeric polymers in a very small, closed-cell structure. Gray in color, Ceramar is a lightweight, flexible, highly resilient material offering recovery qualities of over 99%. The compact, closed-cell structure will absorb almost no water.
b. Non-impregnated and will not stain or bleed.

c. Non-gassing.

d. Complies with:
   (1) ASTM D 5249, Type 2,
   (2) ASTM D 1752, Sections 5.1 - 5.4, with compression requirement modified to 10 psi minimum and 25 psi maximum,
   (3) ASTM D 7174-05.

4. Joint Fillers for Horizontal and Vertical Control and Expansion Joints at Wall and Roof Assemblies:

   a. Provide “EMSEAL” as manufactured by EMSEAL Joint Systems, Ltd.; or approved equal.

   b. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

       2) Or approved equal.

2.3 SEALANTS

A. Sealant Type 1: For all control and expansion joints in concrete sidewalks and slabs on grade, two-part, self leveling polyurethane traffic grade sealant, complying with, and ASTM C 920 and ASTM D 1850.

   1. Products: Subject to compliance with requirements, provide one of the following:

       a. "NR-200 Urexpans"; Pecora Corporation.
       b. "THC 900/901"; Tremco, an RPM Co.
       d. Or approved equal.

2. Color to be selected by the Architect.

B. Sealant Type 2: For sealing exterior joints, provide a Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

   1. Products: Subject to compliance with requirements, provide one of the following:

       a. "Spectrum 1 / Spectrum 800"; Tremco, an RPM Co.
       b. "SikaSil - WS290"; Sika Corporation
       c. "Dowsil 790 Silicone Building Sealant; Dow Corning Corporation
       d. Or approved equal.
C. **Sealant Type 3:** For all interior joints, provide a one-part, non-sag, moisture-curing polyurethane rubber sealant, complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT, M, A, O and as recommended by manufacturer for general use as an interior exposed building construction conditions sealant including floor tiles in Toilets and Kitchens - Section 09300.

1. Products: Subject to compliance with requirements, provide one of the following:
   b. “Dymonic or Dymonic FC for cold weather”; Tremco, an RPM Co.
   d. “Sikaflex 1a or Sikaflex 15LM”; Sika Corporation.
   e. Or approved equal.

D. **Sealant Type 4:** For all joints at plumbing fixtures, provide one-part, neutral-curing, silicone rubber sanitary sealant, complying with ASTM C920; and containing fungicide for mildew resistance recommended by manufacturer for use at joints for plumbing fixtures; tub and shower, sinks countertops, appliances, etc.

1. Products: Subject to compliance with requirements, provide one of the following:
   b. “Tremsil 200”; Tremco, an RPM Co.
   c. “786 Mildew Resistant”; Dow Corning.
   d. “Sikasil N-Plus”; Sika Corporation.
   e. Or approved equal.

E. **Sealant Type 5:** For all interior joints between drywall partitions, CMU walls, hollow metal framing, cabinet heater, other metal mechanical or electrical assemblies, (sealant work performed by other trades and cross-referenced to the work of this section), etc., where all adjacent surfaces will receive paint:

1. Latex Sealant: Non-elastomeric, one part, non-sag, paintable latex sealant recommended for exposed joints applications, complying with ASTM C 834, Type P (opaque sealants), Grade NF.

2. Products: Subject to compliance with requirements, provide one of the following:
   b. “Tremflex 834”; Tremco, an RPM Co.
   c. “Sonolastic Sonolac”; Sonneborn Building Products Div., ChemRex, Inc.
   d. Or approved equal.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

A. Examine joints indicated to receive joint sealers, with Installer present, compliance with requirements for joint configuration, installation tolerances and other conditions affecting
joint sealer -performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

B. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellants; water; surface dirt; and frost.

C. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar 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 sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

D. Remove laitance and form release agents from concrete.

E. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile; and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

F. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

G. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which 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.

H. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint fillers.
2. Do not stretch, twist, puncture, or tear joint fillers.
3. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.

I. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.

J. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.
K. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

3.3 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

END OF SECTION 07900
SECTION 08110 - HOLLOW METALWORK

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 DESCRIPTION OF WORK
A. Extent of hollow metalwork for doors, frames, side lites is indicated and scheduled on the drawings.
B. Related Sections:
   1. Section 04200 - Masonry Work.
   2. Section 08211 - Wood Doors.
   3. Section 08523 - Fire Rated Transaction Window
   4. Section 08700 - Finish Hardware.
   5. Section 08800 - Glazing.
   6. Section 09250 - Gypsum Drywall
   7. Section 09900 - Painting.

1.3 QUALITY ASSURANCE
A. Provide doors and frames complying with the following:
   1. Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames" (SDI-100) and as herein specified.
   2. American National Standard Institute:
      a. ANSI Standards A156 Series for Hardware.
      b. ANSI A115 Steel Door Preparation Standards.
B. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that have been tested, listed, and labeled in accordance with ASTM E 152 "Standard Methods of Fire Tests of Door Assemblies" by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction, (i.e., UL, Warnock Hersey).

1.4 SUBMITTALS
A. Product Data: Submit manufacturer's technical product data substantiating that products comply with requirements.
B. Shop Drawings: Submit for fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
1. Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.

C. Samples: Full range of color samples for Architect selection; 2 samples, 6” square min., of each color and texture as selected for factory-finished doors and frames.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Before shipping, label each frame with metal or plastic tags to show its location, size, door swing, and other pertinent information. Deliver hollow metal work cartoned or crated to provide protection during transit and job storage. Provide additional sealed plastic wrapping for factory-finished doors.

B. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4” high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4” spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering steel doors and frames which may be incorporated in the work include; but are not limited to, the following:

2. Republic Builders Products Corp./Subs. Republic Steel.
3. Curries Company, Mason City, Iowa
4. Or approved equal.

2.2 MATERIALS

A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.

B. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A1008 and ASTM A 568.

C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526, with ASTM A 525, G60 zinc coating, mill phosphatized.

D. Supports and Anchors: Fabricate of not less than 18-gauge galvanized sheet steel.

E. Inserts, Bolts, and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.
F. Shop Applied Paint:

1. Primer: Rust-inhibitive enamel or paint, either air-drying or baking, capable of passing a 100 hours salt spray and 250 hours humidity test in accordance with ASTM test methods B 117 and D 3322 and shall be suitable as a base for specified finish paints indicated in specification section 09900.

2.3 ACCESSORIES

A. Inserts: For required anchorage into concrete work, furnish inserts of cast iron, malleable iron or 12 gauge steel hot-dip galvanized after fabrication.

B. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled in, expansion bolt anchors.

2.4 FABRICATION, GENERAL

A. Fabricate frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site.

B. Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold rolled steel.

C. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at fabricator's option).

D. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.

E. Finish Hardware Preparation: Prepare doors and frames to receive finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.

F. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.

G. Locate finish hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware", published by Door and Hardware Institute.

2.5 STANDARD STEEL DOORS

A. Provide metal doors of type and styles indicated on drawings or schedules.

1. Interior Doors: SDI-100, Grade II, heavy-duty, Model 2, minimum 18 gauge faces.

   a. 90 minute fire-rated doors in Corridors shall be SDI-100, Grade III, extra heavy-duty, Model 3, minimum 16 gauge faces.
2.6 STANDARD STEEL FRAMES

A. Provide metal frames for doors, transoms, sidelights, borrowed lights, transaction windows and other openings, of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated.

1. Fabricate frames of minimum 16-gauge cold-rolled furniture steel at interior locations and 14 gauge galvanized cold-rolled furniture steel at exterior locations.

   a. Frames for 90 minute fire-rated doors in Corridors shall be 14-gauge cold-rolled furniture steel.

2. Fabricate frames with mitered and welded corners.

3. Fabricate “Knock-Down” frames, where indicated or required.

B. Hardware reinforcing shall be as follows:

1. All frames are to be mortised reinforced, drilled and tapped in factory for all template mortise hardware, in accordance with “Approved” Finish Hardware Schedule and templates as provided by the Hardware Supplier. Where surface mounted hardware is to be applied, all frames shall have reinforcing plates.

2. Reinforcement plates shall be as follows:

   a. Hinge Preps:
      1) Masonry: For “F” Series: 7 gauge, minimum.
      2) Metal Stud/Drywall: For “DW” Series: 7 gauge, minimum.

   b. Strike Preps:
      1) Masonry: For “F” Series: 12 gauge, minimum.
      2) Metal Stud/Drywall: For “DW” Series: 12 gauge, minimum.

   c. Closure Reinforcement: All Series - 12 gauge, minimum.

   d. Surface mounted hardware: All Series - 12 gauge, minimum.

3. Base anchors for frames to be installed in masonry and drywall wall and partition assemblies, shall be adjustable type, shipped loose and to be 14 gauge, minimum.

4. Jamb Anchors:

   a. For “F” Series frames in masonry walls provide adjustable wire type anchors (0.156" dia.), or strap type anchors (16 gauge), and “DW” Series frames in metal stud / drywall walls field adjustable compression anchors, provide quantities as follows:
      1) Frames up to 7'-6" in height: 3 per jamb.
      2) Frames over 7'-6" to 12'-0" in height: 4 per jamb.
      3) and one (1) adjustable base anchor per jamb.
b. At existing masonry wall opening to remain, provide “Butterfly Existing Wall Anchors”, 18 gauge galvannealed steel, provide quantities as follows:
   1) Frames up to 7'-6" in height: 3 per jamb.
   2) Frames over 7'-6" to 12'-0" in height: 4 per jamb.
   3) and one (1) adjustable base anchor per jamb.

5. Reinforce heads and jambs where indicated on drawings with 10 gauge channel, continuously welded to frame.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install standard steel doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.

B. Placing Frames: Comply with provisions of SDI-105 "Recommended Erection Instructions For Steel Frames", unless otherwise indicated.

C. Place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position so that the head and jambs of the frame are square, plumb, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

D. In masonry construction, locate 3 wall anchors per jamb at hinge and strike levels.

E. At in-place concrete or masonry construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices.

F. Install fire-rated frames in accordance with NFPA Std. No. 80.

G. In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels, or as indicated. In open steel stud partitions, place studs in wall anchor notches and wire tie. In closed steel stud partitions, attach wall anchors to studs with tapping screws. Use indicated anchors and as per manufacturer’s recommendations.

H. Door Installation:
   1. Fit hollow metal doors accurately in frames within clearances specified in SDI-100.
   2. Place fire-rated doors with clearances as specified in NFPA Standard No. 80.

3.2 ADJUST AND CLEAN

A. Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

B. Check and re-adjust operating Finish Hardware items, without causing any damage to frames. Provide complete work for doors and frames, leave clean and in proper operating conditions.

END OF SECTION 08110
SECTION 08170 – INTEGRATED DOOR OPENING ASSEMBLIES

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. Integrated door opening assemblies including metal frame, integrated door system with operating hardware, and associated door hardware as specified in this section.
2. Factory finishing of wood doors.
3. Factory fitting and hardware preparation for doors and frames.

B. Related Sections:

1. Division 08 Section "Hollow Metal Frames" for integrated assembly doors installed in standard hollow metal frames.
2. Division 08 Section “Finish Hardware”.
3. Division 08 Section "Glazing" for glass view panels in integrated assemblies.
4. Division 09 Section "Interior Painting" for field painting integrated assembly doors and frames.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

2. ANSI A156.32 - Integrated Door Opening Assemblies.
3. ANSI/SDI A250.4 - Test Procedures for and Acceptance Criteria for Physical Evidence for Steel Doors and Reinforcement.
4. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
5. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
6. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
12. NFPA 105 - Installation of Smoke Door Assemblies.
13. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
14. CARB – California Air Resources Board.
15. State Building Codes, Local Amendments.
D. Standards: All hardware specified herein to comply with the current version year of the following industry standards:

   1. ANSI/BHMA Certified Product Standards, A156 Series.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including integrated opening assembly construction and installation details, material descriptions, core descriptions, hardware reinforcements, profiles, anchorage, fire resistance rating, operational descriptions and finishes.

B. Door Hardware Schedule: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Include the following information:

   1. Type, style, function, size, label, hand, and finish of each door hardware item.
   2. Manufacturer of each item.
   3. Fastenings and other pertinent information.
   4. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   5. Explanation of abbreviations, symbols, and codes contained in schedule.
   6. Mounting locations for door hardware.

C. Shop Drawings: Include the following:

   1. Elevations of each door design.
   2. Details of door and frames types including dimensioned profiles and metal thicknesses.
   3. Locations of reinforcement and preparations for hardware.
   4. Details of anchorages, joints, field splices, and connections.
   5. Details of accessories.
   6. Details of moldings, removable stops, and glazing.
   7. Details of conduit and preparations for power, signal, and control systems.
   8. Provide all dimensions necessary required to complete recessed pockets.

D. Keying Schedule: Reference Division 08 Section "Door Hardware" for keying requirements.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete integrated assembly installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the installed assemblies and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.
1.4 QUALITY ASSURANCE

A. Quality Standard: In addition to requirements specified, comply with ANSI A156.32, latest edition, "Integrated Door Opening Assemblies".

B. Source Limitations: Obtain complete integrated opening assemblies, including metal frame and integrated door system with operating hardware, through one source and from a single manufacturer wherever possible.

C. Supplier Qualifications: Factory authorized distributor of manufacturer(s) systems and products. Submit written documentation upon request.

D. Installer Qualifications: Installers acceptable by the primary assembly manufacturer, with a recommended minimum 3 years documented experience installing both standard and electrified integrated door opening assemblies 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.

E. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:

1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:
   a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
   b. Door Closers: Comply with the following maximum opening-force requirements indicated:
      1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
      2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

2. NFPA 101: Comply with the following for means of egress doors:
   a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
   b. Thresholds: Not more than 1/2 inch high.

3. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 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 252 (neutral pressure at 40" above sill) or UL-10C.
   a. Test Pressure: Positive pressure labeling.
F. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing integrated door opening assemblies.

1. Prior to installation, arrange for manufacturers' representatives to hold a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project site under provisions Division 01 Section "Product Storage and Handling Requirements". Inspect doors, frames, and hardware with representatives of the supplier to verify shipment is complete and to rectify discrepancies promptly.

1. Integrated door assembly systems to be delivered to the job site complete with necessary screws, miscellaneous parts, instructions, and installation templates. Each package legibly and properly labeled to correspond to the approved Door Schedule.

B. Furnish integrated door opening assemblies with operating hardware flush to door skin, using protective wrappings and spacers between projecting hardware. Maintain and protect door assemblies using cardboard spacers and protective edge guards along the door edges, to reduce exposure to marring or damage during storage.

C. Store integrated door opening assemblies in dry and secure area. Do not store electronic access control software, credentials, or accessories at Project site without prior authorization.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

A. Electrical Connections: Coordinate the layout and installation of scheduled electrified hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
1.8  WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article will not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and are in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty Periods: Manufacturer's standard written form, with the exceptions noted below, warranting integrated door opening assemblies to be free of defect in material or workmanship under normal use for a period of five (5) years.

1. Continuous Hinges: Ten (10) years.
2. Door Closers: Ten (10) years.

C. Warranty includes the manufacturer, at their sole option, agreeing to repair or replace products or parts found to be defective in material or workmanship according to details contained in the warranty certificate.

1.9  MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of integrated door opening assemblies.

PART 2 - PRODUCTS

2.1  MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Adams Rite Manufacturing (RD) - The RITE Door.
2. Total Door.
3. Or approved Equal.

B. Substitutions: Requests for substitutions and product approval for inclusive integrated door opening assembly systems in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2  WOOD DOOR MATERIAL REQUIREMENTS

A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty; Aesthetic Grade: Custom.

B. Fire Rated Doors: Provide construction and core as needed to provide fire ratings indicated.
1. Category A Edge Construction: Provide fire rated door edge construction with intumescent seals concealed by outer stile (Category A) at 45, 60, and 90 minute rated doors. Comply with specified requirements for exposed edges.

2. Pairs: Provide fire retardant stiles that are listed and labeled for applications indicated without formed steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

C. Core Construction:

1. Engineered Composite Core Wood Doors:
   a. Structural Composite Lumber: Engineered hardwood composite wood products tested in accordance with WDMA I.S.1A, Testing Cellulosic Composite Materials for Use in Fenestration Products containing no added Urea Formaldehyde. Comply with minimum performance levels below:
      1) Screw Withdrawal, Face: 700 lbf (3100 N).
      2) Screw Withdrawal, Edge: 550 lbf (2440 N).
   b. Basis of Design: RITE Door EC.

2. Mineral Core Doors:
   a. Core: Non-combustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire protection rating indicated.
   b. Blocking: Provide composite blocking with improved screw holding capability approved for use in doors of fire protection ratings indicated as needed to eliminate through-bolting hardware.
   c. Edge Construction: At hinge stiles, provide laminated edge construction with improved screw holding capability and split resistance. Comply with specified requirements for exposed edges.
   d. Basis of Design: RITE Door FD.

D. Veneered Doors for Transparent Finish:

1. Grade: Custom

2. Faces: Veneer grades as noted below; veneer minimum 1/50-inch (0.5mm) thickness at moisture content of 12% or less.
   a. Plain Sliced Select White Maple, A grade faces.


4. Assembly of Veneer Leaves on Door Faces:
a. Running Match.

5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.

6. Vertical Edges: Matching same species as faces. Wood or composite material, one piece, laminated, or veneered. Minimum requirements per WDMA section P-1, Performance Standards for Architectural Wood Flush Doors.

7. Horizontal Edges: Solid wood or structural composite material meeting the minimum requirements per WDMA section P-1, Performance Standards for Architectural Wood Flush Doors

8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit sanded before applying face veneers.

E. Light Frames and Glazing:

1. Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish.

2. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with the flush wood door manufacturer's written instructions.

   a. Factory Glazing: Factory install glazing in doors as indicated. Doors with factory installed glass to include all of the required glazing material.

2.3 STEEL MATERIAL REQUIREMENTS

A. General:

1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

2. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

B. Steel Frames:

Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M. Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

1. Fabricate frames with mitered or coped corners.

2. Fabricate frames with "closed and tight" miter seams continuously welded on face, finished smooth with no visible seam unless otherwise indicated.

3. Frames for openings up to 48 inches in width: Minimum 16 gauge thick steel sheet.

5. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

6. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

7. Provide suitable adjustable type anchors for wall condition, minimum 4 each per jamb.

2.4 DOOR HARDWARE MATERIAL REQUIREMENTS:

A. Provide a complete integrated door opening assembly, including the installation and adjustment of the latching mechanism within the door construction.

B. Door hardware to include the following minimum products for each integrated door opening assembly as specified in the Door Hardware Sets under Part 3.

1. Hanging Device: Continuous Hinges (geared or pinned), Pocket Pivots, Offset/Intermediate Pivots, or Butt Hinges.

2. Integrated Locking/Latching Hardware: Exit Devices, Lever Handle Trim, or Flush Push/Pulls.

C. Integrated exit device hardware to be clean and unobtrusive in design with a minimal bar height of 2-7/16-inches. Push rails not exceed a projection of 1-1/8-inches when in the latched position and be made of heavy-duty aluminum extrusion, available in anodized and architectural finishes using metal cladding. Exit device end caps to be of metal construction, and should match the trim cover caps when available.

D. Push and pull hardware to be clean and unobtrusive in design with a maximum projection of 1/4-inches on pull side and 5/8-inches on the push side. To be used on hollow metal doors only.

E. Lever handles to be clean and unobtrusive in design with a maximum projection of 3-1/2-inches and match design of similar lever locking hardware furnished on project.

F. Door hardware may include the following optional products for each integrated door opening assembly as specified in the Door Hardware Sets under Part 3:

1. Door Closers: Surface Closer or Pocket Closer.

2.5 FINISH REQUIREMENTS

A. Veneered Wood Finishes:
1. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
   a. Finish veneer wrapped metal light kits to match door faces, if specified.

2. Transparent Finish: Provide a clear protective coating over the wood veneer allowing the natural color and grain of the selected wood species to provide the appearance specified. Stain is applied to the wood surface underneath the transparent finish to add color and design flexibility.
   a. Grade: Premium.
   b. Finish: Meet or exceed WDMA I.S. 1A TR6 Catalyzed Polyurethane finish performance requirements.
   c. Staining: As selected by Architect from manufacturer's full range.
   d. Sheen: Satin.

B. Steel Finishes:
   1. Prime Finishes: Frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
      a. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

C. Hardware Finishes: As specified in Hardware Sets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify the accuracy of dimensions given to the integrated door opening assembly manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

C. Proceed with installation only after unsatisfactory conditions have been corrected. Beginning of installation indicates acceptance of the existing conditions.

D. Verify power supplies, as required, are available to power electrically operated devices.
3.2 INSTALLATION

A. General: Install integrated door opening assemblies plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; integrated locking/latching devices; closing devices; and seals.

C. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

2. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
3. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

D. Coordinate installation and interface wiring with fire alarm and smoke detection systems.

E. Remove or protect furnished hardware accessories, prior to painting or finishing completed after the installation of the hardware accessories.

3.3 FIELD QUALITY CONTROL

A. Field Inspection: Perform a final inspection of installed integrated door opening assemblies and state in report whether work complies with or deviates from specification requirements, including whether door hardware is properly installed, operating and adjusted.

3.4 ADJUSTMENT

A. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Remove and 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.

3.5 CLEANING AND PROTECTION

A. Protect all door opening assemblies and hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install hardware at the latest possible time frame.
B. Clean operating items as necessary to restore proper finish and provide final protection and maintain conditions that ensure integrated door and operating hardware is without damage or deterioration at time of owner occupancy.

C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer or finish paint.

3.6 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain integrated door opening assemblies and hardware.

3.7 HARDWARE SETS

A. The integrated door opening hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should 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 and functionality.

END OF SECTION 08170
SECTION 08211 - WOOD DOORS

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.

B. Related Sections:
   1. Section 01030 - Alternate Bids
   2. Section 01800 - Time of Completion and Liquidated Damages
   3. Section 04200 - Unit Masonry
   4. Section 08110 - Hollow Metalwork
   5. Section 08700 - Finish Hardware
   6. Section 08800 - Glass and Glazing
   7. Section 08870 - Security Window Film
   8. Section 08871 - Security Glazing (Alternate Bid)
   9. Section 09250 - Gypsum Drywall
   10. Section 09900 - Field Painting of metal lites

1.2 SUMMARY

A. Extent and location of each type of flush wood door is indicated on drawings and in the door schedule.

B. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive plained before veneering. Assembly of face veneer and crossband to core in accordance with WDMA.
   1. Solid core wood doors with solid hardwood edging.
   2. Solid core 20 min. labeled flush wood doors with solid hardwood edging.
   3. Mineral core 45, 60, and 90 min. labeled flush wood doors with hardwood edging.

C. Shop-priming of wood doors is included in this Section.

D. Factory-finishing of wood doors is included in this Section.

E. Factory-prefitting to frames and factory-premachining for hardware for wood doors is included in this Section.

1.3 QUALITY ASSURANCE

A. Construction per WDMA I.S. 1A - 11.

B. Fire-Rated Wood Doors: Provide wood doors which are identical in materials and construction to units tested in door and frame assemblies per ASTM 2074-00 Fire Test (Category A Positive Pressure). For mineral core doors, provide composite blocking with improved screw holding capability as needed to eliminate through-bolting of hardware. They are to be labeled and listed for ratings indicated by UL, Warnock Hersey or other testing and
inspection agency acceptable to authorities having jurisdiction. Fire labels shall be affixed at the factory of the door manufacturer, and shall be from the Underwriter's or Warnock Hersey Testing Laboratories. Each label shall show the testing time of the label, and no approval will be given to "Construction Type" labels.

1. Temperature Rise Rating: At stairwell enclosures, provide doors which have temperature rise rating of 450°F maximum in 30 minutes of fire exposure.

2. All "Category A" doors shall have concealed intumescent seals.

C. Door Construction Field Examination: Upon direction of the Architect, the Contractor may be instructed to destroy a randomly selected wood door or panel by sawing it in half, vertically and horizontally, to verify conformance of the contract requirements. If the door(s) do not meet the specifications, all of the doors delivered for the project will be rejected, and the doors shall be replaced at the Contractor's expense. Further door inspection, to insure conformity to specifications, shall also be at the expense of the Contractor.

1. All such delays as a result of the fabrication and delivery of non-compliant doors which vary from the processed shop drawing submittal will be the responsibility of the Contractor (refer to Section 01800 for Liquidated Damages).

D. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body and is a certified participant in AWI's Quality Certification Program.

E. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.4 REFERENCE STANDARDS

A. Comply with the applicable requirements of the following standards unless otherwise indicated.

1. Window & Door Manufacturers Association (WDMA)
   a. I.S. 1A - 11 Architectural Wood Flush Doors (WDMA).

2. American National Standards Institute

3. Underwriter's Laboratories, Inc. (UL)
   a. UL 10C Fire Test

4. American Society for Testing and Materials:
   a. ASTM 2074-00 (Category A Positive Pressure) Fire Tests of Door Assemblies.

1.5 SUBMITTALS
A. The shop drawing submittal will not be reviewed by the Architect unless a complete shop drawing submittal (technical data, details of core and edge construction, location and extent of hardware blocking, fire ratings, factory finish samples, 8" x 10" minimum for finish and 4" x 5" minimum for construction assembly) are made as one complete submittal, by the Contractor, and will be returned to the Contractor if incomplete.

1. Subsequent delays as a result of an incomplete submittal will be the responsibility of the Contractor (refer to Section 01800 for Liquidated Damages).

B. Product Data: Door manufacturer's technical data for each type of door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications.

1. Include certifications as may be required to show compliance with specifications.

2. The door manufacturer’s shop drawing literature which may include language for the substitution of door construction at the option of the manufacturer is not permitted. Doors which are switched will be rejected and all costs associated with the manufacturing of the door type(s) specified will be by the Contractor/Manufacturer.

C. LEED Submittals:

1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.

2. Certificates for Credit MR 7: Chain-of-custody certificates indicating that flush wood doors comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC accredited certification body. Include statement indicating cost for each certified wood product.

3. Product Data for Credit IEQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.

D. Shop Drawings: Submit 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 factory finishing and other pertinent data.

1. For factory-premachined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light openings.

E. Samples: Submit samples, 8" x 10" minimum for finish and 4" x 5" minimum for construction assembly, for the following:

1. Doors for Transparent Finish: Flat samples illustrating finish and color of wood grain for each species of veneer and solid hardwood lumber required.

2. Factory-Finished Doors: Each type of factory finish required.
3. Metal Frames for Light Openings: Manufacturers product samples or product cut sheets for light frames and color selector guide for each material and finish required.

F. Warranties and Certification Markings: Furnish with shop drawings:
   1. Door supplier must attest, in writing addressed to Architect, that the order has been placed in conformance with specification requirements in all respects.
   2. All doors shall carry a "Lifetime" guarantee, including rehang and finish for all door(s) which do not comply with the manufacturer's warranty.
   3. Copy of Warranty shall be given to the Architect and Owner prior to the completion of the project.
   4. All doors shall be factory marked, on the top of the door, showing the order number, item number on the order, size of finished door, material, and core construction, for future information should replacement of the door be necessary.

G. The Wood Door Supplier shall provide a letter indicating all of the following:
   1. The wood door supplier has completely reviewed the contract documents (drawings, specifications and addenda) and has worked with the distributor in the preparation and submission of a complete shop drawing submittal to the Architect.
   2. The wood door supplier shall attest that the order has been placed in accordance with the contract document drawings, specifications and addenda,
   3. The wood doors ordered and delivered to the job site are in conformance with the requirements of the job and per the approved shop drawings.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with requirements of referenced standards and recommendations in WDMA pamphlet "How to Store, Handle, Finish, Install, and Maintain Wood Doors", as well as with manufacturer's instructions.

B. Protect all doors from damage and moisture under cover. Use wood blocking under horizontally stored doors. At no time will doors be allowed to come in contact with floor or water.
   1. The location where the doors are being stored on the job site shall be between 25 - 55% relative humidity. The Contractor shall forward independent certified testing that confirms compliance.

C. All doors not finished at factory must be sealed on all surfaces within one (1) week after arrival at jobsite.

D. Remove all damaged doors from jobsite prior to completion of project.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Provide “Aspiro™ Series I Marshfield-Algoma™” wood doors as manufactured by Masonite Architectural, Tel.# 877.332.4484, www.masonitearchitectural.com; or approved equal.

1. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.

2. Comparable products from other manufacturers will be considered if it can be clearly shown that their products are tested, equal to or will exceed the construction quality requirements, intended performances and all other design attributes listed above and provided that deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances as judged solely by the Architect.

   
   
   
   d. Or approved equal.

3. The use of one manufacturer's catalog numbers, and the specific requirements set forth in drawings and specifications are not intended to preclude the use of other manufacturer's products or procedures which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.

4. Substitutions: Substitution of products will only be considered when the Contractor/Door Supplier have submitted, to the Architect, all appropriate documents and in the time frame as outlined in the requirements indicated in Specification Section 00800.

2.2 MATERIALS AND COMPONENTS

A. General: Provide wood doors complying with applicable requirements of referenced standards for kinds and types of doors indicated and as specified.

1. Regional Materials: Flush wood doors shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

2. Certified Wood: Flush wood doors shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
3. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

B. Solid Core Doors for Transparent Finish: Comply with the following requirements:

1. Faces: Veneer leaves shall be Slip Match and veneers assembled in Running Match, Grade ‘A’, plain sliced red oak for transparent finish; CS-171, Type II.
   a. At existing buildings, provide veneer faces to match the species of the existing veneer or as directed by the Architect.

2. Construction: Premium Construction Grade, SCLC-5 Bonded (5-ply, with no added urea-formaldehyde glues).

C. Edges

1. Vertical stiles of same species to the face veneer, with a minimum of 1/4 inch solid hardwood after trimming.
   a. Manufacturers standard construction with hardwood outer.

D. Core: Structural Composite Lumber Core consisting of an engineered wood product that is made by fusing a network of wood strands together with a water-resistant adhesive to produce a strong, solid and stable product that has true structural properties with excellent screw holding properties and very high split resistance.

1. Core Edge Interface: Vertical and horizontal edges of solid core doors must be securely bonded to the core with waterproof glue containing no added urea formaldehyde resin.

E. Fire-Rated Solid Core Doors

1. Faces and WDMA Grade: Provide species and grade to match non-rated doors in same area of building, unless otherwise indicated.

2. Core Construction
   a. 20 Min. Doors: Single Leaf - Same Structural Composite Lumber Core as noted above.
   b. 20 Min. Doors: Double Leaf - Structural Composite Lumber Core which utilizes an engineered hardwood strand board that is oriented and resin bonded to provide physical properties that equal or exceed solid lumber.
   c. 45, 60 and 90 Min. Doors: Mineral core composite, tested and approved by the Underwriter's or Warnock Hersey Testing Laboratories, for various levels of fire retardation within a total door assembly.

3. Edge Construction
   a. 20 Min. Doors: Single Leaf - Same Structural Composite Lumber edge construction noted above.
b.  20 Min. Doors: **Double Leaf** - Stiles to match face veneer, with minimum of 1/4 inch solid hardwood (after factory trimming).

1) Manufacturers standard core construction with hardwood outer.

c.  45, 60, and 90 Min. Doors: WDMA Extra Heavy Duty Construction. Stiles and rails to be made of special laminated material matching the face veneer, and tested for the following tests for performance.

1) Split Resistance: Not less than 950 load pounds when tested in accordance with ASTM D 143 test specimen, modified to having a 3/4 inch hole in center.
2) Direct Screw Withdrawal: Not less than 650 load pounds when tested in accordance with ASTM 1037 modified to use a #12 x 1-3/4" steel screw threaded to head with wood threads.
3) Cycle/Slam: 200,000 cycles with no loosening of hinge screws or other visible signs of failure when tested in accordance with requirements of ANSI A 151.1, Section 2.5.
   a) Stile Thickness: Hinge stile minimum 5/8". Lock stile minimum 3/4 inch.
   b) Rail Thickness: Top: 1/4" (except where required for hardware; reinforcing then to be 5\textsuperscript{th}). Bottom: 1-1/16" minimum.
   c) Provide hardware reinforcing as needed and shall be indicated on the shop drawings to the attachment of surface applied hardware without thru bolts.

d. All “Category A” doors shall have concealed intumescent seals.

F. Acoustical Doors

1. Faces and WDMA Grade: Provide species and grade to match other doors in building.
2. Core and edge construction shall be considered in any of the above noted types, having been tested as a fully operable door assembly in accordance with ASTM E 90-90 by Warnock Hersey Testing Laboratories.

G. Glazing of Wood Doors:

1. Glazing shall be by the wood door manufacturer.
2. Glass shall be in accordance with requirements of Section 08800.

2.3 LITE FRAMES

A. Metal Lite Frames:

1. Standard Metal Vision Frames:

   a. Basis of Design: Model “LoPro™” as manufactured by Anemostat Door Products, San Antonio, TX; Tel.# 210.662.6300; or approved equal.
b. Material: 20 ga. (1mm) Cold Rolled Steel.

c. Finish: Grey Primer, Beige or Bronze Baked Enamel.

d. Glazing: Should be 1/4" (6mm), 3/16" (5mm) or 5/16" (8mm) fire and/or safety rated with U.L. and/or W.H.I classification markings. Nominal glazing space of 3/8" (10mm) allows for glazing tape to be used on both sides of the glass.

e. Fire Ratings with U.L. & W.H.I Classification markings:

1) 20* Minute: Approved listing at 3204 sq.in. visible lite, max. width 36", max. height 89".
2) 45/60* Minute: Approved listing at 2772 sq.in. visible lite, max. width 36", max. height 77".
3) 90* Minute: Approved listing at 1296 sq.in. visible lite, max. width 36", max. height 54".

Note: *Must be used with Firelite Plus or NT and fire listed glazing tape, or another manufacturer’s equivalent product. Glazing combination must be used in appropriately tested door assembly.

f. Refer to Section 08870 - Security Window Film pertaining to the application of the film on the glazing and lite frame.

g. Refer to Section 08871 - Security Glazing (Alternate Bid).

2.4 GENERAL FABRICATION REQUIREMENTS

A. Fabricate wood doors to produce doors complying with following requirements:

B. In sizes indicated for job-site fitting.

C. Factory-prefit and premachine doors to fit frame opening sizes indicated with the following uniform clearances and bevels:

1. Comply with tolerance requirements of WDMA for prefitting. Comply with final hardware schedules and door frame shop drawings and with hardware templates.

2. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory premachining.

3. Pre-fit and pre-machine wood doors at factory. Machining shall be in accordance with necessary templates supplied by the Builders Hardware supplier, in accordance with the approved Finish Hardware Schedule for this project. Each door shall be machined for all necessary mortise hardware (ie, locks, hinges, closers, etc.) but face or thru bolt holes shall be done in the field, if such machining is not called for on templates, or is not normally machined at factory. No field preparation will be allowed.

4. Sizing of single doors to be undersized for nominal 1/4 inch, with edges beveled on two edges, as required by the frame manufacturer. Pairs of doors will be undersized 3/16 inch to permit no more than 1/8 inch gap between door leaves. Beveling same as single doors. Door edges beveled 1/8 inch in 2 inch thickness of door.
5. Door clearances are to be 1/8 inch at top and the bottom shall be a maximum of 1/2 inch, or as required by job condition or labeling requirements.

D. Metal Astragals: Metal astragals **will not** be accepted, unless otherwise indicated in Section 08700. Pairs of doors shall be equipped with formed steel edges where required for pairs of fire-rated doors.

E. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of doors required.

F. Factory Finish and Uniform Range of Veneers
   1. Prefinish wood doors at factory only.
   2. All face veneer shall have uniform range of colors, as specified by Architect, in selection of the range of color of the veneer.
   3. Pairs of doors are to have matching grain pattern and color.
   4. End match panels or transoms to have a continuous grain pattern and color of door in total door assembly.
   5. Comply with recommendations of WDMA for factory finishing of doors, including final sanding, immediately before application of finishing materials.
   6. Provide finish WDMA, #TR-6, transparent water-based stain and ultraviolet (UV) cured water based polyurethane sealer and topcoat material, color as selected by Architect.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. Install doors using finish hardware in accordance with approved hardware schedule. Protect doors from damage until completion of Project. Except where through bolting is required to meet Code for "A" or "B" label doors, install surface applied hardware on metal or wood doors using all thread screws inserted in pilot drilled holes filled with white acrylic glue.

B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's printed instructions and of referenced WDMA standard and indicated in the printed instructions provided by the manufacturer.

C. Install fire-rated doors in corresponding fire-rated frames in accordance with requirements of NFPA No. 80.

D. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors.

E. Fitting Clearances for Non-Rated Doors: Provide 1/8" at jambs and heads; 1/16" per leaf at meeting stiles for pairs of doors; and 1/8" from bottom of door to top of decorative floor.
finish or covering. Where threshold is shown or scheduled, provide 1/4" clearance from bottom of door to top of threshold.

F. Fitting Clearances for Fire-Rated Doors: Comply with NFPA 80.
   1. Bevel non-rated doors 1/8" in 2" at lock and hinge edges.
   2. Bevel fire-rated doors 1/8" in 2" in lock edge; trim stiles and rails only to extent permitted by labeling agency.
   3. Prefit Doors: Fit to frames for uniform clearance at each edge.

G. Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at the job site.

H. Manufacturer of wood doors shall install glass in wood doors.

3.2 ADJUSTING AND PROTECTION

A. Operation: Rehang or replace doors which do not swing or operate freely.

B. Finished Doors: Refinish or replace doors damaged during installation.
   1. Protect doors, as recommended by door manufacturer, to ensure that wood doors will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 08211
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. Section Includes:
1. Wall access doors.
2. Fire-rated wall access doors.
3. Ceiling access doors.
4. Fire-rated ceiling access doors.
5. Floor access doors.

B. Types of construction in which access doors are installed include:
1. Concrete.
2. Masonry.

C. Exact locations and sizes of access doors may not be indicated on the drawings. Obtain specific locations and sizes for access doors from trades requiring access to concealed equipment.

D. Products Furnished and Installed under This Section:

1. Installation of anchors for access doors placed in masonry: Division 4.

E. Related Sections:
1. Painting of access doors: Division 9.
2. General requirements for access doors: Division 15.
3. General requirements for access doors: Division 16.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions and directions for installation of anchorage devices.

   1. Include complete schedule, including types, general locations, sizes, wall, floor and ceiling construction details, finishes, latching or locking provisions, and other data pertinent to installation.

B. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.

C. Special Size Access Doors: Use where required or requested; indicate on schedule.
D. Shop Drawings: Submit shop drawings for fabrication and installation of customized access
doors and frames, including details of each frame type, elevations of door design types,
anchorage and accessory items.

E. Samples: 3” x 5” minimum size, of each panel face material showing factory-finished color
and texture.

1.4 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Wherever a fire-resistance classification is indicated, provide access
door assembly with panel door, frame, hinge, and latch from manufacturer listed in
Underwriters Laboratories, Inc.; "Building Materials Directory" for rating shown.

1. Attach UL Label on each fire-rated access door.

2. For fire-rated ceiling access doors, provide door assembly from manufacturer whose
products have been tested by independent testing agency acceptable to the building
official and have been found acceptable for fire ratings indicated.

   a. Provide testing agency label on each fire-rated access door.

B. Test Reports: Submit manufacturer's test reports which demonstrate that products comply
with required fire ratings.

C. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units which
are different than actual opening size necessary for access.

D. Coordination: Furnish inserts and anchoring devices which must be built into other work for
installation of access doors. Coordinate delivery with other work to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering
access doors which may be incorporated in the work include, but are not limited to, the
following:
1. Bilco Company.
2. J. L. Industries.
3. Milcor/Lima Register.
4. Bar-Co., Inc.
5. Syracuse Castings Sales Corp., (for Access Door Assembly #1 only).
6. Or approved equal.

2.2 MANUFACTURED UNITS

A. Access Door Assembly 2:
1. Location: Wall.
2. Type: Flush door panel with exposed frame.
4. Fire rating: 1-1/2 HR (B).
5. Frame: 16 gauge steel.
6. Door: 20 gauge steel flush panel.
7. Hinge: Continuous type hinge with stainless steel pin.
8. Locking device: Keyed cylinder lock.

B. Access Door Assembly 3:
1. Location: Wall.
2. Type: Flush door panel with exposed frame.
5. Doors: 14 gauge steel flush panel.
6. Hinge: Continuous type hinge with stainless steel pin.
7. Locking Device: Keyed cylinder lock.

C. Access Door Assembly 4:
1. Location: Wall.
2. Type: Flush door panel with concealed frame.
5. Door: 14 gage steel flush panel.
6. Hinge: Double-acting concealed spring hinges allowing door to open a minimum of 165 degrees.
7. Locking device: Keyed cylinder lock.

D. Access Door Assembly 5:
1. Location: Ceiling.
2. Type: Flush door panel with concealed frame.
4. Fire rating: 1 HR (B).
5. Frame: 16 gauge steel.
6. Door: 18 gauge steel recessed panel.
7. Hinge: Continuous type hinge with stainless steel pin.
8. Locking device: Keyed cylinder lock.

E. Access Door Assembly 6:
1. Location: Ceiling.
2. Type: Flush door panel with concealed frame.
5. Door: 14 gage steel flush panel.
6. Hinge: Double-acting concealed spring hinges allowing door to open a minimum of 165 degrees.
7. Locking device: Keyed cylinder lock.
F. Access Door Assembly 7:
1. Location: Floor.
2. Type: Recess door panel to receive vinyl enhanced resilient tile finish, (Custom Size: 7'-0" x 6'-0").
3. Substrate: Concrete.
5. Door: 1/4" aluminum plate.
6. Locking Device: Snap lock with removable handle.
7. Hinge: Continuous stainless steel hinges with compression spring operation.

2.3 ACCESSORIES

A. Locking Devices:
1. Where locking devices are indicated, provide one lock per access door.
2. Supply four (4) keys with each lock.
3. Key access door locks alike.

2.4 MATERIALS AND FABRICATION

A. General: Furnish each access door assembly manufactured as an integral unit, complete with all parts and ready for installation.

B. Steel Access Doors and Frames: Fabricate units of continuous welded steel construction, unless otherwise indicated. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of support shown.

C. Frames: Fabricate from 16 gauge steel.

D. Fabricate frame with exposed flange nominal 1" wide around perimeter of frame for units installed in the following construction:
1. Exposed masonry.
2. Exposed concrete.
3. Drywall finish.
4. Ceramic tile finish.

E. For gypsum drywall or gypsum plaster, furnish perforated frames with drywall bead.

F. For installation in masonry construction, furnish frames with adjustable metal masonry anchors.

G. For full-bed plaster applications, furnish frames with galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame.

H. Flush Panel Doors: Fabricate from not less than 14 gauge sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees. Finish with manufacturer's factory-applied prime paint.
I. Flush Panel Doors: Fabricate from not less than 14 gauge stainless steel sheet, with concealed spring hinges or concealed piano hinge set to open 175 degrees. Buff exposed surfaces to #4 satin finish.

J. For fire-rated units, provide manufacturer's standard insulated flush panel/doors, with continuous piano hinge and self-closing mechanism.

K. Recessed Panel Doors: Fabricate from not less than 18 gauge sheet steel with face of panel formed to provide recess below surface of applied finish. Reinforce panel as required to prevent buckling. Finish with manufacturer's factory-applied prime paint.

L. Furnish recessed panels for concealed installation in acoustic tile ceiling systems.

M. Furnish recessed panels and frames with expanded metal lath for concealed installation in plaster.

N. Locking Devices: Furnish flush, screwdriver-operated cam locks of number required to hold door in flush, smooth plane when closed.

O. Provide one cylinder lock per access door. Furnish four (4) keys per lock. Key all locks alike, unless otherwise scheduled.

P. Where shown or scheduled, provide one cylinder lock per access door. Furnish four (4) keys per lock. Key all locks alike, unless otherwise indicated.

Q. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's instructions for installation of access doors.

B. Coordinate installation with work of other trades.

C. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.

3.2 ADJUST AND CLEAN

A. Adjust hardware and panels after installation for proper operation.

B. Remove and replace panels or frames which are warped, bowed or otherwise damaged.

END OF SECTION 08305
SECTION 08330 - OVERHEAD ROLLING DOORS

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. Interior rolling service door, manual chain hoist operated.

1.3 RELATED SECTIONS

A. Section 01030 - Alternate Bids.
B. Section 04200 - Unit Masonry.
C. Section 05400 - Miscellaneous Structural Steel.
D. Section 05500 - Metal Fabrications.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for type and size of overhead coiling door. Include operating instructions and maintenance data.

B. Shop Drawings: Submit shop drawings for special components and installations which are not fully dimensioned or detailed in manufacturers product data.

C. Closeout Submittals:
   1. Operation and Maintenance Manuals.
   2. Certificate stating that installed materials comply with this specification.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001:2000 registered and a recommended minimum of five (5) years experience in producing grilles of the type specified.

B. Provide overhead rolling door(s) as complete units produced by one manufacturer, including hardware, accessories, mounting and installation components.

C. Unless otherwise acceptable to Architect, furnish overhead rolling door units by one manufacturer for entire project.

D. Inserts and Anchorages: Furnish inserts and anchoring devices which must be built into masonry for installation of overhead rolling door units. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.
1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer Qualifications: ISO 9001:2000 registered and a minimum of five years experience in producing doors of the type specified.
   2. Installer Qualifications: Manufacturer's approval.

1.7 DELIVERY STORAGE AND HANDLING

A. Refer to Section 01600 for Product Storage and Handling Requirements.

B. Follow manufacturer's instructions.

1.8 WARRANTY

A. Standard Warranty: **Two (2) years** from date of shipment against defects in material and workmanship.

B. Maintenance: Submit for Owner's consideration and acceptance of a maintenance service agreement for installed products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Model “ESD10”, as manufactured by Cornell-Cookson, Mountaintop, PA; Tel.# 800.233.8366; or approved equal.

B. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to the following:
   1. Amarr
   2. Clopay
   3. Or approved equal.

C. Substitutions shall be in accordance with AIA A232 and Section 00800.

2.2 MATERIALS

A. Curtain:
   1. Slats: No. 5F, 20 gauge AISI type 304 series stainless steel.
   2. Bottom Bar: Two 2x2x1/8 inch (50x50x3.2 mm) AISI 300 series stainless steel angles.
   3. Fabricate interlocking sections with high strength nylon endlocks on alternate slats each secured with two 1/4" (6.35 mm) rivets.
4. Slat Finish: Stainless steel: No. 4 finish.


B. Guides: Fabricate with stainless steel angles. Top of inner and outer guide angles to be flared outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar. Top 16 1/2" (419.10 mm) of coil side guide angles to be removable for ease of curtain installation and as needed for future curtain service.

1. Finish: Stainless steel: No. 4 finish.

C. Counterbalance Shaft Assembly:

1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width.

2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs (110 N). Provide wheel for applying and adjusting spring torque.

D. Brackets: Fabricate from minimum 3/16 inch (5 mm) steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures.

1. Finish: Steel: Phosphate treatment followed by baked-on polyester powder coat, color as selected by the Architect from manufacturer’s standard color range, minimum 32 colors and custom colors; minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better.

E. Hood: 24 gauge galvanized steel with reinforced top and bottom edges. Provide minimum 1/4 inch (6.35 mm) steel intermediate support brackets as required to prevent excessive sag.

1. Finish: Stainless steel: No. 4 finish.

F. Cycle Life: Design doors of standard construction for normal use of up to 20 cycles per day maximum.

2.3 ACCESSORIES

A. Locking:

2.4 OPERATION

A. Manual Chain Hoist: Provide chain hoist operator with endless steel chain, chain pocket wheel and guard, geared reduction unit, and chain keeper secured to guide.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings.

B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.

C. Commencement of work by installer is acceptance of substrate.

3.2 INSTALLATION

A. General: Install door and operating equipment with necessary hardware, anchors, inserts, hangers and supports.

B. Follow manufacturer's installation instructions.

3.3 ADJUSTING

A. Following completion of installation, including related work by others, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion.

3.4 CLEANING

A. Clean surfaces soiled by work as recommended by manufacturer.

B. Remove surplus materials and debris from the site.

3.5 DEMONSTRATION

A. Demonstrate proper operation to Owner's Representative.

B. Instruct Owner's Representative(s) in maintenance procedures.

END OF SECTION 08330
SECTION 08340 - OVERHEAD COILING GRILLES

PART I - 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. Extent of overhead coiling grille(s) is shown on the drawings.

B. Provide complete operating grille assemblies including curtains, guides, counterbalance mechanisms, hardware, operators and installation accessories, as indicated.

1. Design grille(s) of standard construction for normal use of up to 5 cycles per day (maximum).

1.3 RELATED SECTIONS

A. Related Sections:

1. Section 04200 - Unit Masonry.
2. Section 05500 - Metal Fabrications. Door opening jamb and head members.
3. Section 08700 - Finish Hardware - Masterkeyed cylinders.
4. Section 16000 - Electrical Work - Electrical wiring and conduit, fuses, disconnect switches, connection of operator to power supply, and installation of control station and wiring.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of overhead coiling grille. Include operating instructions and maintenance data.

B. Shop Drawings: Submit shop drawings for special components and installations which are not fully dimensioned or detailed in manufacturers product data.

C. Closeout Submittals:

1. Operation and Maintenance Manuals.
2. Certificate stating that installed materials comply with this specification.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001:2008 registered and a recommended minimum of five (5) years experience in producing grilles of the type specified.

B. Provide each overhead coiling grille as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.
C. Unless otherwise acceptable to Architect, furnish overhead coiling grille units by one manufacturer for entire project.

D. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of overhead coiling grille units. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

E. See concrete and masonry sections of these specifications for installation of inserts and anchorage devices.

1.6 WARRANTY

A. Standard Warranty: Two (2) years from date of shipment against defects in material and workmanship.

B. Maintenance: Submit for Owner’s consideration and acceptance of a maintenance service agreement for installed products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: “VisionAire® Model ESG10”, as manufactured by Cornell-Cookson, Tel.# 800.233.8366; or approved equal.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Atlas Door Corp.
2. Kinneal Div., Harsco Corp.
3. Overhead Door Corp.
4. Or approved equal.

2.2 GRILLE CURTAIN

A. General: Fabricate grille curtain consisting of a network of 5/16” diameter solid horizontal rods spaced at 2” o.c. Interconnect rods by vertical links approximately 5/8” wide, spaced at 6” apart and rotating on the rods.

B. Bottom Bar: 2 x 3-1/2 inch extruded aluminum tubular section, finished to match grille.

C. Finish, Aluminum Curtain and Bottom Bar: Mill Finish.

D. Guides, Tube Mounted: Heavy duty extruded aluminum sections with [snap-on cover to conceal fasteners and] polypropylene pile runners on both sides of curtain. Provide aluminum tubes, floor saddles and hardware as recommended by manufacturer to support grille.

E. Counterbalance Shaft Assembly:

1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width.

2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of grille to ensure that maximum effort to operate will not exceed 25 lbs (110 N). Provide wheel for applying and adjusting spring torque.

F. Brackets: Fabricate from minimum 3/16 inch (4.76 mm) steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures.

1. ASTM A 123, Grade 85 zinc coating, hot-dip galvanized after fabrication.

2.3 ACCESSORIES

A. Locking - Motor Operated: Keyed cylinder locking into both jambs operable from both sides of curtain with motor interlock cutout switches.

2.4 OPERATION

A. Supply Cornell Model MG Electric Motor Operator, industrial duty - rated for a maximum of 20 cycles per hour, cULus listed, Totally Enclosed Non Ventilated gear head operator(s) rated (1/3) (1/2) or (3/4) hp, as recommended by door manufacturer for size and type of door, ____Volts, ____Phase. Provide complete with electric motor and factory pre-wired motor control terminals, maintenance free solenoid actuated brake, and control station(s). Motor shall be high starting torque, industrial type, protected against overload with an auto-reset thermal sensing device. Primary speed reduction shall be heavy-duty, lubricated gears with mechanical braking to hold the door in any position. Fully adjustable, driven linear screw type cam limit switch mechanism shall synchronize the operator with the door. The electrical contractor shall mount the control station(s) and supply the appropriate disconnect switch, all conduit and wiring per the overhead door wiring instructions.

1. Control Station: Flush mounted key switch station, "Open/Close"; NEMA 1B.

2. CONSTANT PRESSURE CLOSE OPERATION

a. Select the operator function below when constant pressure close operation is acceptable. The motor control station(s) must be mounted within visible sight of the entire door opening and pressure must be maintained on "close" for the duration of each close cycle.

1) Entrapment Protection: Provide the following primary entrapment protection device to enable momentary contact close operation.

a) Provide NEMA 1 photo eye sensors consisting of a transmitter and receiver that are to be mounted within 6" (152.4 mm) of the floor, projecting an IR beam across the entire width of the grille. Interruption of beam before grille fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position. Electrical contractor to provide low voltage wiring from the transmitter and receiver to the door operator.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Install grilles and operating equipment complete with necessary hardware, in accordance with final shop drawings, manufacturer's instructions, and as specified herein.

B. Upon completion of installation including work by other trades, lubricate, test and adjust grilles to operate easily, free from warp, twist or distortion.

END OF SECTION 08340
SECTION 08410 - ALUMINUM / FRP DOORS

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 DESCRIPTION OF WORK

A. The contractor shall furnish all labor, tools, equipment, and services required to remove existing frames, doors and hardware as required to install doors, hardware, glazing, etc. In general, the work under this section includes the following:

1. The removal of all necessary portions of existing frames, doors, hardware and related entrance material to permit the installation of new material as specified hereafter. Material removed shall be disposed of by contractor or salvaged as directed by the architect and/or owner.

2. New masonry opening construction will not require removal of existing doors and frames.

3. The furnishing and installation of doors, hardware, glazing and caulking, as required, for a complete installation including all necessary cleaning and adjustments.

B. The following types of doors, and accessories are required:

1. Fiberglass Reinforced Polyester (FRP) Doors.
2. Monumental Aluminum Stile and Rail Doors.
4. Hardware.
5. Sealants.

C. Related Sections

1. Section 01030 - Alternate Bids.
2. Section 04200 - Unit Masonry.
4. Section 08415 - Aluminum - Framed Entrances and Storefront System
5. Section 08700 - Finish Hardware.
7. Section 08870 - Security Window Film.

1.3 REFERENCES

A. Fiberglass Reinforced Polyester (FRP) Flush Doors and Monumental Stile and Rail Door

2. ANSI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
4. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.
5. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
8. ASTM D 570 - Water Absorption of Plastics.
17. ASTM D 6670-01 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products.
20. ASTM E 283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
22. ASTM E 331 - Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
23. ASTM F 476 - Security of Swinging Door Assemblies.
25. NWWDA T.M. 7-90 - Cycle Slam Test Method
26. SFBC PA 201 - Impact Test Procedures.
27. SFBC PA 203 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
28. SFBC 3603.2 (b) (5) - Forced Entry Resistance Test.
29. ASTM E 1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls and Doors, and Storm Shutters Impacted by Missile(s) and exposed to Cyclic Pressure Differentials. (Monumental Stile and Rail Doors only)
1.4 PERFORMANCE REQUIREMENTS

A. Fiberglass Reinforced Polyester (FRP) Flush Doors

1. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.

2. Air Infiltration: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.24 psf. Door shall not exceed 0.90 cfm per linear foot of perimeter crack.

3. Water Resistance: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.

4. Indoor air quality testing per ASTM D 6670-01: GREENGUARD Environmental Institute Certified including GREENGUARD for Children and Schools Certification.

5. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles.


10. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503-98: Maximum of 0.29 BTU/hr x sf x degrees F. Maximum of R-Value 3.4 Minimum of 55 CRF value.

11. Surface Burning Characteristics, FRP Doors and Panels, ASTM E 84:
   a. Flame Spread: Maximum of 200. (Class C).
   b. Smoke Developed: Maximum of 450. (Class C).

12. Surface Burning Characteristics, Class A Option On Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
   b. Smoke Developed: Maximum of 450.

13. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 15.0 foot-lbs per inch of notch.


15. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.

16. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.


19. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.

20. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to crayon and crankcase oil.

   a. Acetic acid, Concentrated.
   b. Ammonium Hydroxide, Concentrated.
   c. Citric Acid, 10%.
   d. Formaldehyde.
   e. Hydrochloric Acid, 10%
   f. Sodium hypochlorite, 4 to 6 percent solution.

22. Compressive Strength, Foam Core, Nominal Value, ASTM D 1621: 79.9 psi.


24. Tensile Adhesion, Foam Core, Nominal Value, ASTM D 1623: 45.3 psi.

25. Thermal and Humid Aging, Foam Core, Nominal Value, 158°F and 100 % Humidity for 14 Days, ASTM D 2126: Minus 5.14 percent volume change.


B. Monumental Stile and Rail Doors

1. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.

2. Air Infiltration: For a single door, test specimen shall be tested in accordance with ASTM E 283 at a pressure differential of 6.24 psf. Door shall not exceed 0.01 cfm per square foot.

3. Uniform Structural Load: For a single door, test specimen shall be tested in accordance with ASTM E 330. Plus or minus 67.5 pounds per square foot.

4. Water Resistance: For a single door, test specimen shall be tested in accordance with ASTM E 331 at a pressure differential of 3.75 psf. No leakage.


6. Indoor air quality testing per ASTM D 6670-01: GREENGUARD Environmental Institute Certified including GREENGUARD for Children and Schools Certification.

1.5 SUBMITTALS

A. Comply with AIA A232 and Section 00800 - Submittal Procedures.

B. Product Data: Submit door manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.

C. Submit six sets of factory shop drawings for the fabrication and installation of the Fiberglass Reinforced Polyester (FRP) Doors, and associated components of the work. Include wall elevations at 1/2" scale, and half-sized detail sections of every typical composite member. Show anchors, joint system, expansion provisions, and other components not included in the manufacturer's standard data. Include field-verified dimensions and glazing details, and include Catalog cuts for all Finish Hardware.
D. Samples:

1. FRP Door: Submit corner samples of manufacturer's door showing face sheets, core, internal framing, finish, glazing, hardware, options, and accessories.
   a. The Architect reserves the right to require samples of typical fabricated sections, showing joints, exposing fastenings, (if any) quality of workmanship, hardware and accessory items, before fabrication of the work proceeds.

2. Stile and Rail Door: Submit manufacturer's sample of doors showing, rails, framing, hardware, glazing and finish.

3. Color: Submit manufacturer's color chip samples of Standard of Classic and or Painted FRP Door and Panel Skins and either Standard or Optional Anodized or Painted finished at the Door Stiles and Rails, and Door Perimeter.

E. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.

F. Manufacturer's Project References: Submit list of successfully completed projects including project name and location, name of architect, and type and quantity of doors manufactured.

G. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.

H. Warranty: Submit manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

A. Standards: Comply with the requirements and recommendations in applicable specifications and standards by NAAMM, AAMA and AA, including the terminology definitions and specifically including the "Entrance Manual" by NAAMM, except to the extent more stringent requirements are indicated.

B. Code Compliance and Regulations: All materials supplied shall be in accordance with the International Building Code, State of New Jersey "Barrier-Free" Subcode, and all applicable State or Local Codes.

C. Manufacturer shall have produced Fiberglass Reinforced Polyester (FRP) Doors for a recommended ten (10) years, and shall have completed projects similar to this building in type and size.

1. Door components from same manufacturer.

D. Bidders are expected to visit the jobsite to make a complete survey of project requirements prior to bid. All dimensions, quantities and conditions relating to the installation shall be fully understood. Failure to visit the site will not relieve the successful bidder from the responsibility of furnishing all materials and services required to comply with the true intent and meaning of the specifications without any additional costs to the Owner.

E. Instructions: The manufacturer or representatives will be available for consultation to all parties engaged in the project, including instruction to installation personnel.

F. An examination of product will include cutting and/or disassembly of the entrance to reveal the construction of the particular component. If the door or component fails, replacement of the project's material will be required. This process will assure the Owner of proper adherence to the bid documents.
1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All materials supplied shall be delivered to the jobsite in their original, unopened packages, with labels intact. Materials shall be inspected for damage, and the manufacturer shall be advised immediately of any discrepancies. Unsatisfactory materials are not to be used.

B. All materials supplied shall be packaged in individual corrugated cartons. Doors shall be "floated" within cartons, with no portion of the door having contact with the outer shell of the container.

C. Handling: Protect materials and finish from damage during handling and installation.

1.8 SPECIAL PROJECT WARRANTY

A. Provide a written warranty, signed by Manufacturer, Installer and Contractor, agreeing to replace, at no cost to the Owner, any doors that fail in materials or workmanship, within the time period of acceptance, as indicated below.

1. Failure of materials or workmanship includes excessive deflection, faulty operation of entrances, deterioration of finish, or construction, in excess of normal weathering and defects in hardware, weather-stripping and other components of the work.

B. Warranty Period: Ten (10) years from approved date of Substantial Completion as determined by the Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. FRP Doors: Basis-of-Design: Special-Lite Inc., Tel.# 800.821.6531, www.special-lite.com; or approved equal.

1. Subject to compliance with requirements, provide either the named product or product by one of the following manufacturers:

   a. Kawneer Co.
   b. FRP Architectural Doors Inc.
   c. Or approved equal.

B. Aluminum Doors: Basis-of-Design: Special-Lite Inc., Tel.# 800.821.6531, www.special-lite.com; or approved equal.

1. Subject to compliance with requirements, provide either the named product or product by one of the following manufacturers:

   a. Kawneer Co.
   b. Oldcastle Building Envelope.
   c. US Aluminum
   d. FRP Architectural Doors Inc.
   e. Or approved equal.

2.2 FIBERGLASS REINFORCED POLYESTER (FRP) FLUSH DOORS

A. Model: SL-17 Flush Doors with SpecLite3 fiberglass reinforced polyester (FRP) face sheets.

B. Door Opening Size: As indicated on the drawings.

C. Door Construction:

1. Doors are to be 1-3/4" thick Special-Lite, Series SL-17 (FRP).
2. Stiles and Rails: Constructed of aluminum extrusions made from prime-equivalent billet that is produced from 100% reprocessed 6063-T5 alloy recovered from industrial processes, minimum/maximum 2-5/16-inch depth, joined with steel tie rods.

3. Stiles to be tubular shape to accept hardware as specified.

4. Top and bottom rails to be extruded with legs for interlocking "rigidity weather bar."

5. Corners: Mitered or butted mortise and tenon joints.

6. Joinery to be 3/8" tie rods, top and bottom, bolted through an extruded spline, in both top and bottom rails with 3/16" mechanically fastened (screwed) reinforcing angles, and secured with hex type nuts. Welds, glue, or other methods are not acceptable.

7. All doors shall be pre-machined in accordance with templates from the hardware manufacturer. For surface applied hardware, doors shall have necessary reinforcement, including the attachment of RIVNUT blind bolt fasteners. With the exception of door closers and holders, which require field applications, doors are to be shipped with hardware attached.

8. Vision Lites: Provide glazed openings in doors as indicated, with manufacturer's standard aluminum moldings and stops, with removable stops on inside only. Glass to be "factory installed" for warranty purposes. Refer to Section 08800 - Glass and Glazing for type (Refer to other Div. 8 Sections for security window film requirements and Alternate Bid conditions, if awarded).

9. Face sheets to be locked in with extruded interlocking edges, which are the integral reglets of the Vertical and Horizontal rails permitting a flush appearance.

10. Core is to be of foamed in place Urethane foam minimum of 5 lbs. per cubic foot density. Minimum R Value of 9.

   a. All doors are to be properly reinforced for hardware prior to urethane core foaming in door.

11. Face sheets for Fiberglass Reinforced Polyester (FRP) Doors are to be Kemlite SpecLite3®, 120" thick (pebble like texture) with color throughout; or approved equal. Color: Standard or Classic as approved by the Architect.

2.3 MONUMENTAL STILE AND RAIL DOORS

A. Model: SL-14 medium stile monumental aluminum stile and rail doors (Refer to Door Type and Door Schedule on drawings).

B. Door Opening Size: As indicated on the Drawings.

C. Door Thickness: 1-3/4 inches.

D. Stiles and Rails:

   1. Material: Aluminum extrusions made from prime-equivalent billet that is produced from 100% reprocessed 6063-T5 alloy recovered from industrial processes, 0.125-inch minimum wall thickness, 1-piece.

   2. Stile Width: SL-14 doors = 5 inches.

   3. Rail Width:

      a. Top: 6-1/2 inches.

      b. Bottom: 10 inches.
E. Corners:
   1. True mortise and tenon joints.
   2. Full-width 3/8-inch diameter galvanized steel tie rods secured with locking hex nuts.

F. Welding of Joints: Not permitted.

G. Mid Rail:
   1. Width: As indicated on the drawings.
   2. One-piece extrusion with integral exterior glass stops.
   3. Secure to vertical stiles with mortise and tenon joints and 3/8-inch diameter galvanized steel tie rod with locking hex nuts.

2.4 MATERIALS AND ACCESSORIES - Fiberglass Reinforced Polyester (FRP) Flush Doors

A. Aluminum Members: Provide alloy and temper as recommended by manufacturer for strength, corrosion resistance, and application of required finish and control of color; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate, with a minimum wall thickness of 0.125".

B. All materials shall be of the same manufacturer. No splitting of Door, Frame or components will be permitted.

C. Fasteners: Provide aluminum, non-magnetic stainless steel or other non-corrosive metal fasteners, guaranteed by the manufacturer to be compatible with the doors, frames, stops, panels, hardware, anchors, and other items being fastened. For exposed fastener (if any), provide Vandal-proof flat head screws with finish matching the item to be fastened.

   1. Do not use exposed fasteners, except where unavoidable for the assembly of units, or unavoidable for the fastening of hardware. Provide only concealed screws in glazing stops.

D. Reinforcement and Brackets: Manufacturer's standard formed or fabricated steel units, of shapes, plates, or bars, with 2.0 ounce hot-dip zinc coating, complying with ASTM A 123, applied after fabrication.

E. Expansion Anchor Devices: Lead shield or toothed steel, drill-in, expansion bolt anchors.

F. Bituminous Coating: Cold applied asphalt mastic complying with SPC-PS 12, compounded for 30-mil thickness per coat.

G. Sealants and Gaskets: Provide sealants and gaskets in the fabrication, assembly and installation of the work, which are recommended by the manufacturer to remain permanently elastic, non-shrinking, non-migrating and weatherproof.

H. Glazing Gaskets: For glazing factory-installed glass, and for gaskets, which are factory-installed in "captive" assembly of glazing stops, provide manufacturer's standard stripping of molded neoprene, complying with ASTM D 2000 (Designation 2BC415 to 3 BC620), or molded PVC complying with ASTM C 509, Grade 4.

2.5 FABRICATION

A. Sizes and Profiles: The required sizes for door units, and profiles requirements are to be "field verified".

B. Coordination of Fabrication: Check the actual frame or door openings in the construction work by accurate field measurements before fabrication, and show recorded measurements on final shop drawings.

C. Assembly:
1. Complete the cutting, fitting, forming, drilling and grinding of all metal work prior to the cleaning, finishing, treatment and application for coatings.

2. Remove burrs from cut edges, and ease edges and corners to a radius of approximately 1/64".

D. Welding: No Welding of any Door joints will be accepted.

E. Fasteners: Conceal fasteners, wherever possible, except as otherwise noted.

F. Fit:
   1. Maintain continuity of line and accurate relation of planes and angles.
   2. Provide secure attachments and support at mechanical joints, with hairline fit at contacting members.

G. Reinforce the work as necessary for performance requirements and as required for support to the structure. Separate dissimilar metals and bituminous paint or performed separators, which will prevent corrosion. Separate metal surfaces at moving joints with non-metallic separators to prevent “freeze-up” of joints.

2.6 HARDWARE

A. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.

B. Hardware Schedule: As indicated on the drawings and as specified in Section 08700.

2.7 GLAZING AND VISION LITES

A. Provide glazing system for doors to receive lites. Design system for replacement of glass, but for non-removal of glass from the exterior.
   1. All glass in doors is to be factory installed.
   2. Glass for exterior doors to be: As detailed on drawings. Refer to Section 08800.

B. Factory Glazing: 1/4-inch glass (Aluminum) and 1-inch glass insulating units (Aluminum & FRP).

C. Lites in Exterior Doors: Allow for thermal expansion

D. Rectangular Lites:
   1. Size: As indicated on the drawings.
   2. Factory glazed with screw-applied aluminum stops anodized to match perimeter door stile and rails.

2.8 ALUMINUM FINISH

A. Anodized Finish:
   1. Medium Bronze, AA- M10C12C22A44, Class I, 0.7 mils thick (Match Existing).
PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION (Fiberglass Reinforced Polyester (FRP), Monumental Stile and Rail Doors)
   A. Install doors in accordance with manufacturer's instructions.
   B. Install doors plumb, level, square, true to line, and without warp or rack.
   C. Separate aluminum from other metal surfaces with bituminous coatings or other means approved by Architect.
   D. Set thresholds in bed of mastic and backseal.
   E. Install exterior doors to be weathertight in closed position.
   F. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
   G. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

3.3 FIELD QUALITY CONTROL
   A. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for installation of doors.

3.4 ADJUSTING
   A. Adjust doors, hinges, and locksets for smooth operation without binding.

3.5 CLEANING
   A. Clean doors promptly after installation in accordance with manufacturer's instructions.
   B. Do not use harsh cleaning materials or methods that would damage finish or glazing.

3.6 PROTECTION
   A. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

END OF SECTION 08410
SECTION 08411 - INSULATED ALUMINUM PANELS

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. Extent of type, grade and performance class of insulated aluminum panel units required is indicated on the drawings.

B. Type of panel unit components required includes the following:

1. All metal to metal sealants.
2. Insulated metal panels.

C. Work of this section shall include field verification of existing dimensions, conditions and installation of curtain wall system.

D. Related Sections:

1. Section 07900 - Joint Sealer Assemblies.
2. Section 08950 - Fiberglass Sandwich Wall Panel Assemblies.

1.3 SUBMITTALS

A. Shop Drawings: Submit shop drawings for insulated panel including information not fully detailed in the manufacturer's standard product data and the following:

1. Submit four copies of shop drawings for the assembly and erection.
2. Indicate clearly on all shop drawings any deviations from the Contract Drawings.
3. It is understood that the dimensions of all materials shall be the Contractor's responsibility. Neither the Owner nor any representative thereof will be in any way responsible for the sizes shown nor will any such sizes be approved before production.
4. The materials shown are expected to fit the job conditions, and the Contractor shall be fully responsible.

B. Product Data: Submit manufacturer's product specifications, technical product data required.

C. Samples: Submit sample(s) of the specified finish on a 6" x 6" panel to the Architect for their approval.
1.4 PRODUCT HANDLING

A. Use all means necessary to protect the materials of this section before, during and after installation and to protect the installed work and materials of all other trades.

B. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 – PRODUCTS

2.1 INSULATING PANELS

A. Provide insulated prefinished aluminum panels from: "OMEGA-LITE"; Architectural Windows; Cap Industries, Inc.; or approved equal.

1. Overall Thickness: As indicated on the drawings to fit into the Fiberglass Sandwich Wall Panel framing system.

2. Exterior Face: 0.032 aluminum Kynar finish, Smooth or pebble like surface as selected by the Architect from manufacturer's available full range of available types.
   a. Color: Color as selected by the Architect from manufacturer’s standard colors.

3. Interior Face: Smooth aluminum primed painted as selected by the Architect from manufacturer’s standard colors.

4. Substrates: 5 mm corrugated polyallomer.

5. Core: Polystyrene 2.5 lbs density

2.2 FABRICATION

A. General: Except to the extent that more specific or stringent requirements are indicated, provide manufacturer's standard fabrication that complies with indicated standards and that produces units that are reglazable without dismantling sash framing. Include a complete system for assembly of components and anchorage of curtain wall system, and prepare sash for glazing except where preglazing at the factory is indicated.

B. Sizes and Profiles: Required sizes for panel units are indicated on the drawings.

1. Details shown are based upon standard details by one or more manufacturers. Similar details by other manufacturers will be acceptable, provided they comply with size requirements, minimum/maximum profile requirements, and performance standards as indicated or specified.

C. Glazing Stops: Provide snap-on glazing stops, coordinated with insulated panel system indicated. Finish glazing stops to match curtain wall system.
2.3 FINISHES AND COLORS

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

1. 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.

2. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

3. Preparation: Prior to fabrication of doors and frames, prepare the aluminum surfaces for finishing in accordance with the aluminum producer’s recommendations and the standards of the finisher or processor. Process all components of each assembly simultaneously to attain complete uniformity of color.

   b. Color and Gloss: As selected by Architect from manufacturer's full range.

5. Exterior Finish - High-Performance Organic Finish: 2-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   a. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSPECTION

A. Metal surfaces shall be dry, clean, free of grease, oil, dirt, rust and corrosion, and welding slag, without sharp edges or offsets at joints.

B. Inspect panels furnished by the manufacturer, verify existing dimensions and conditions, and provide all required additional aluminum trim to complete the installation.

3.2 INSTALLATION

A. Comply with manufacturer's specifications and recommendations for installation of panel units, and other components of the work.
B. Set units plumb, level and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.

C. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with the requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101-85.

D. Set panels in a bed of compound or with joint fillers or gaskets, as shown, to provide weathertight construction. Refer to the "Joint Sealer" sections of Division-7 for compounds, fillers, and gaskets to be installed concurrently with panel units.

E. Compounds, joint fillers and gaskets to be installed after installation of curtain wall system are specified as work in another section in Division-7.

3.3 CLEANING

A. Clean aluminum surfaces promptly after installation of panels. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt and other substances.

B. Clean panel units promptly after installation.

3.4 PROTECTION

A. Initiate and maintain protection and other precautions required through the remainder of the construction period, to ensure that, except for normal weathering, curtain wall system will be free of damage or deterioration at the time of substantial completion.

END OF SECTION 08411
SECTION 08415 - ALUMINUM – FRAMED ENTRANCES AND STOREFRONT SYSTEM

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. This Section includes pre-engineered, thermally broken center glazed aluminum screw spline storefront and related accessories.

1. Sun shading devices including anchorage, fasteners, accessories and supports from the curtain wall system.

2. Interior Light Shelf including anchorage, fasteners, accessories and supports from the curtain wall system.

1.3 RELATED SECTIONS

A. Section 01030 – Alternate Bids

B. Section 07900 – Joint Sealer Assemblies

C. Section 08871 – Security Glazing

D. Section 08872 – Security Window Film

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design:

1. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated. Designated Design includes, but is not limited to:

a. Aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by a qualified professional engineer responsible for their preparation in the State of New Jersey.

2. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.
a. Engineering Responsibility: Prepare data for entrance and storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Testing Agency Qualifications: Demonstrate to Architect's satisfaction, based on Architect's evaluation of criteria conforming to ASTM E 699, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Source Limitations: Obtain each type of entrance and storefront system through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of entrance and storefront systems and are based on the specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

1. Do not modify intended aesthetic effect, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Preconstruction Sealant Testing: Perform sealant manufacturers' standard tests for compatibility and adhesion of sealants with each material that will come in contact with sealants and each condition required by system.

1. Test a minimum of 8 samples of each metal, glazing, and other material.

2. Prepare samples using techniques and primers required for installed systems.

3. Perform tests under environmental conditions that duplicate those under which systems will be installed.

4. For materials that fail tests, determine corrective measures required to prepare each material to ensure compatibility with and adhesion of sealants, including, but not limited to, specially formulated primers. After performing these corrective measures on the minimum number of samples required for each material, retest materials.


G. Mockups: Before installing entrance and storefront systems, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed Work.
1. Locate mockups in the location and of the size indicated or, if not indicated, as directed by Architect.

2. Notify Architect 7 calendar days in advance of the 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 proceeding with installation of systems.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   a. When directed, demolish and remove mockups from Project site.
   b. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of providing aluminum framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum-framed storefront system through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum-framed storefront system and are based on the specific system indicated. Refer to Division 01 Section “Product Requirements”. Do not modify size and dimensional requirements.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. 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 mockup for type(s) of storefront elevation(s) indicated, in location(s) shown on Drawings.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination”.
1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of aluminum-framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.7 SUBMITTALS

A. Contractor shall submit shop drawings; finish samples, test reports, and warranties.

1. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.

B. An NFRC Component Modeling Approach (CMA) generated label certificate shall be provided by the manufacturer. The label certificate shall be project specific and will contain the thermal performance ratings of the manufacturer’s framing combined with the specified glass, and the glass spacer used in the fabrication of the glass, at NFRC standard test size as defined in table 4-3 in NFRC 100-2010.

C. Samples: Submit samples of each type and color of aluminum finish, on 12" long sections of extrusions or formed shapes and on 6" squares of sheet or plate. Include 2 or more samples in each set, showing near-limits of variations, if any, in color and texture of finish.

1. Provide manufacturer’s full-size sample for sun screen system (sun shade and light shelf).

1.8 WARRANTIES

A. Total Storefront Installation

1. The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total storefront installation. This includes the glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water and structural adequacy as called for in the specifications and approved shop drawings.

2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at their expense during the warranty period.

B. Window Material and Workmanship

1. Provide written guarantee against defects in material and workmanship for three (3) years from the date of final shipment.

C. Glass

1. Provide written warranty for insulated glass units that they will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship.
2. Warranty period shall be for **ten (10) years**.

D. Finish

1. Warranty period shall be for **twenty (20) years** from the date of final shipment.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

A. Basis of Design: “System 403 Thermal Flush-Glazed Screw Spline Storefront System”, as manufactured by EFCO Corp.; or approved equal.

B. Subject to compliance with requirements, manufacturers of products which may be incorporated in the work include, but are not limited to, the following:

1. Kawneer Company, Inc.,
2. Architectural Window Manufacturing Corporation,
3. Oldcastle Building Envelope,
4. Tubelite,
5. Or approved equal.

C. Provide “E-Shade™” Sunshades in manufacturer’s engineered aluminum sun screen system in shape, profile, size and dimensions indicated. Finish and color shall match aluminum framing for curtain wall system.

1. Provide Sunshade “Arms” in lengths of 36", at locations as indicated on the drawings.
2. Provide Sunshade “Blades” in shape of 3", at locations as indicated on the drawings.

D. Provide “E-Lite™” Interior Light Shelf in components fabricated from 6063-T6 aluminum. Finish and color shall match aluminum framing for curtain wall system.

1. Provide Interior Light Shelf in depth of 36", at locations indicated on the drawings.

**2.2 MATERIALS**

A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.

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 or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

G. Thermal Barrier

1. 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.

2. Barrier material shall be poured-in-place, two-part polyurethane. A nonstructural thermal barrier is unacceptable.

2.3 FABRICATION

A. General

1. All aluminum frame extrusions shall have a minimum wall thickness of .080" (2 mm).
2. All exposed work shall be carefully matched to produce continuity of line and design with all joints. System design shall be such that raw edges will not be visible at joints.

B. Frame

1. Depth of frame shall not be less than 4-1/2" (114 mm).
2. Face dimension shall not be less than 2" (50 mm).
3. Frame components shall be screw spline construction.

C. Glazing:

1. All units shall be “dry glazed” with gaskets on both exterior and interior of the glass.

D. Finish:

2. Class I, Color Anodic Finish: AA-M12C22A42/A44 etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker complying with AAMA 611.
   a. Color: Medium Bronze (to match the existing).
PART 3 - EXECUTION

3.1 INSPECTION

A. Job Conditions

1. All openings shall be prepared by others to the proper size and shall be plumb, level and in the proper location and alignment as shown on the architect's drawings.

3.2 INSTALLATION

A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.

B. Storefront system shall be erected plumb and true, in proper alignment and relation to established lines and grades.

C. Entrance doors shall be securely anchored in place to a straight, plumb and level condition, without distortion. Weather stripping contact and hardware movement shall be checked and final adjustments made for proper operation and performance of units.

D. Furnish and apply sealing materials to provide a weather tight installation at all joints and intersections and at opening perimeters.

E. Sealing materials specified shall be used in strict accordance with the manufacturer's printed instructions, and shall be applied only by mechanics specially trained or experienced in their use. All surfaces must be clean and free of foreign matter before applying sealing materials. Sealing compounds shall be tooled to fill the joint and provide a smooth finished surface.

3.3 ANCHORAGE

A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.4 PROTECTION AND CLEANING

A. The general contractor shall protect the aluminum materials and finish against damage from construction activities and harmful substances. The general contractor shall remove any protective coatings as directed by the architect, and shall clean the aluminum surfaces as recommended for the type of finish applied.

END OF SECTION 08415
SECTION 08422 - SLIDING GLASS DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Telescopic Frameless Glass Sliding Doors.

1.2 REFERENCES

A. ANSI Z97.1 Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Tests
B. ASTM C 1036 Specification for Flat Glass
C. ASTM C 1048 Specification for Heat-Treated Flat Glass - Kind FT
E. Section 05120 - Structural Steel for track supports.
F. Section 08800 - Glass and Glazing

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Deflection: Limit deflection to flexure limit of glass with full recovery of glazing.

1.4 SUBMITTALS

A. Submit under provisions of AIA A232 and Section 00800.
B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
C. Shop Drawings:
   1. Include plans, elevations, sections, and details.
   2. Indicate dimensions, weights, and required installation.
   3. Indicate details of track and door connections, rail sections, fittings and hardware components.
   4. Indicate glass type, sizes and details.
   5. Indicate location and installation requirements for hardware and track including floor tolerances required and direction of travel.
D. Verification Samples: For each finish product specified, two samples, representing actual product finishes.
   1. Aluminum extrusions: on request 7” (200 mm) long sections of rails and other items.
E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
F. Manufacturer's warranties.
G. Contract Closeout: Submit
   1. Manufacturer's Warranty.
   2. Parts lists and installation instructions including data on operating hardware.
1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Glass door manufacturer to have a recommended minimum of five years documented experience in the fabrication of glass doors of the type required for this project and be capable of providing field service representation during installation.

B. Installer Qualifications: Experienced installer to have a recommended minimum of five years documented experience in the work of this section and who has specialized in the installation of work similar to that required for this project.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation in dry, protected and well-ventilated area.

B. Protect materials from damage and exposure to moisture.

1.7 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.

B. Field Measurements: Verify opening dimensions of all-glass entrances by field measurements before fabrication and indicate the measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1.8 WARRANTY

A. Provide written warranty signed by the fabricator of the glass doors and glass door systems agreeing to provide a five (5) year warranty covering replacements of those doors that develop manufacturing defects defined as any defect materially obstructing vision through the glass, and any mechanical failure of hardware which prevents the proper operation of the doors and appropriate installation.

1.9 COORDINATION

A. Coordinate work with other operations and installation of adjacent surfaces to avoid damage to installed materials.

B. Coordinate work with adjacent floor, wall, and ceiling construction to accommodate frame anchorage, panel track, and concealed hardware.

C. Coordinate work with concrete floors and floor finishes for adequate tolerances and clearances between door panels and floor finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: KLEIN USA Inc., 1 Madison St., East Rutherford, NJ 07073; Tel.# 973.246.8181; Web: www.klein-usa.com; or approved equal.

B. Substitutions: Or approved equal in accordance with AIA A232 and Section 00800.
2.2 GLASS PRODUCTS

A. General:
1. Safety Glazing Standard: Provide fully tempered glass, Kind FT, compiling with ASTM C 1036 and ASTM C 1048 requirements, including glass indicated by reference to type, class, quality.
2. Sizes: Fabricate glass to size required for openings indicated, with edge clearances and tolerances complying with recommendations of glass and hardware manufacturer.
3. Provide glass type and thickness, as indicated below.

2.3 ALL FRAMELESS GLASS SLIDING DOORS

A. Basis of Design: “EXTENDO” Telescopic Frameless Glass Sliding Doors; or approved equal.
1. Extendo 2+2 System for telescopic top hung frameless glass doors sliding simultaneously, 6 panels along a wall, glass sidelights including track and complete set(s) of accessories in a single kit. Synchronized gear already included and pre-mounted into the track for a faster, easier and nicer installation.
2. Track: Clear anodized aluminium finish with track's custom length.
   a. Track size from 4'11/16" (119mm) high x 3-3/8" (86mm) wide.
3. Carriers: Top hung clamp-on roller Carriers (with Full Ball Bearings wheels), two per panel, pressure applied (no glass drilling).
4. Hardware including in the kit:
   a. 2 pressure clamps with rollers / sliding door.
   b. Stoppers-brakes.
   c. 1 guide / sliding door (2" wide).
   d. Bottom extrusion to handle fixed glass sidelights.
   e. Upper track with pre-installed gear.
5. Door Panels: For glass panels up to 3m (10'-0") high. Total opening from 50" to 100" to reach an opening and closing force of maximum 5,1 lbs (23n) to fit ADA requirements.
6. Door Panel Glazing:
   a. Clear Glass: Conforming to the requirements.
      1) ASTM C1048, Kind FT (fully tempered), Condition A (uncoated surfaces), Type 1 (transparent), Class 1 (clear) requirements.
      2) Provide products that have been tested for surface and edge compression according to ASTM C 1048 and for impact strength according to CPSC 16 CFR, part 1201 for Category II materials.
   b. Door cutouts: No drillings necessary.
   c. Thickness: 1/2 inch (12 mm)
   d. Exposed Edges: Flat polished.

2.4 FABRICATION

A. Fabricate all-glass entrance components in sizes, profiles, and configurations indicated on the approved shop drawings.
B. Fabricate doors and sidelights with required top and bottom fittings. Reinforce with steel sections or tie rods, where required.
C. Fabricate doors and sidelights to allow for minimum clearances and shim spacing around perimeter of assembly.
D. Rigidly fit and secure joints and comers with internal reinforcement. Make joints and connections flush, and hairline.
PART 3 - EXECUTION

3.1 EXAMINATION
A. Do not begin installation until support and floor substrates have been properly prepared.
B. Verify wall openings are ready to receive work of this section.
C. Verify concealed overhead structural supports, are sized and located properly.
D. Supporting structure must be level.
E. Ensure finished floor under operable glass partition is leveled.
F. Verify opening dimensions prior to fabrication and assembly.
G. Notify Architect of unsatisfactory conditions.

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.
C. Preparation of the opening shall conform to the criteria set forth per ASTM E 557 "Standard Practice for Architectural Application and Installation of Operable Partitions."

3.3 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Comply with manufacturer's written installation instructions, Drawings, and approved Shop Drawings.
C. Install glass partition(s) and accessories after other finishing operations, including painting, have been completed.
D. Match glass partitions by installing panels from marked packages in numbered sequence indicated on instruction sheet.

END OF SECTION 08422
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. Section includes: Interior aluminum framed bullet resistant sliding transaction window, as indicated in drawings.
   B. Related Sections:
      1. Section 04200 - Unit Masonry.

1.3 REFERENCES
   A. American Architectural Manufacturers Association (AAMA)
   B. American Society for Testing and Materials (ASTM)
   C. Aluminum Association (AA)
   D. National Wood Window & Door Association (NWWDA)

1.4 SYSTEM DESCRIPTION
   A. General: In addition to requirements shown or specified, comply with:

1.5 QUALITY ASSURANCE
   A. Single Source Responsibility: Obtain transaction windows through one source from a single manufacturer.
   B. Provide test reports from AAMA accredited laboratories certifying the performances as specified in 1.03.

1.6 SUBMITTALS
   A. Product Data: Submit Manufacturer's technical product data substantiating that product complies.
B. Shop drawings: Submit for fabrication and installation of transaction window system. Include details, elevations and installation requirement of finish hardware and cleaning. Certification: Provide printed data in sufficient detail to indicate compliance with the contract documents.

1.7 PROJECT CONDITIONS

A. Field measurements: Check opening by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver transaction window crated to provide protection during transit and job storage.

B. Inspect transaction window upon delivery for damage. Unless minor defects can be made to meet the Architect's specifications and satisfaction, damaged parts should be removed and replaced.

C. Store transaction window at building site under cover in dry and safe location.

1.9 WARRANTY

A. Special Warranty: All material and workmanship shall be warranted against defects for a period of **two (2) years** from the original date of purchase.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: “Model# SBRWDU1”, interior aluminum bullet resistant sliding transaction window as manufactured by C.R. Laurence Co., Inc.; or approved equal.

2.2 MATERIALS

A. Frame: 4" Aluminum bullet resistant frame modules shall be to the standards established by U.L. 752 Protection Level 1.

   1. Frame is to be constructed of .125" (3 mm) thick extruded 6063-T5 aluminum alloy.
   2. Shape and size is to be in accordance with the contract drawings.

B. Glazing: 1-1/4" (32 mm) Level 1 Acrylic in accordance with U.L. 752 testing standards.

C. Selected Options:

   1. Stainless steel counter,
   2. Deal Tray,

D. Configuration: OX

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2.3 **FINISH**

A. Finish all exposed areas of aluminum and components, as indicated.

1. Class I, Color Anodic Finish: AA-M12C22A42/A44 etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker complying with AAMA 611.
   a. Color: Bronze.

**PART 3 - EXECUTION**

3.1 **EXAMINATIONS**

A. Examine conditions and verify substrate conditions are acceptable for product installation.

3.2 **INSTALLATION**

A. Install frame and glazing in accordance with manufacturer's printed instructions and recommendations.

B. Repair damaged unit as directed (if approved by the manufacturer and the Architect) or replace with new units.

3.3 **CLEANING**

A. Clean frame and glazing surfaces after installation, complying with requirements contained in the manufacturer's instructions. Remove dirt or other substances.

3.4 **PROTECTION**

A. Institute protective measures required throughout the remainder of the construction period to ensure that all the windows do not incur any damage or deterioration, other than normal weathering, at the time of acceptance.

3.5 **FIELD QUALITY CONTROL**

A. Contractor's responsibility to make all necessary final adjustments to attain normal operation of each window and its mechanical hardware.

**END OF SECTION 08522**
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this section.

1.2 DESCRIPTION OF WORK

A. The work in this section includes providing all labor, materials, appliances, and services required to completely furnish and deliver all finish hardware and related work, complete in accordance with the Architect’s drawings and specifications, including, but not limited to the following:

1. All finish hardware for aluminum/FRP, hollow metal and wood doors in aluminum and hollow metal frames.

2. All keying and cylinders.

3. Furnish all finish hardware necessary to complete the project, whether particularly mentioned or not, and match in quality and finish the material specified.

1.3 WORK NOT INCLUDED

A. Furnish finish hardware, except for certain noted items, under other sections for the following items:

1. Toilet partitions
2. Windows
3. Washroom accessories
4. Millwork
5. Factory fabricated mechanical or electrical equipment.

1.4 RELATED WORK IN OTHER SECTIONS

A. Refer to the following sections for these related items:

1. Wood Doors - Section 08211
2. Hollow Doors and Metal Frames - Section 08110
3. Aluminum/FRP Doors and Frames - Section 08410
4. Electrical - Section 16000

1.5 QUALITY ASSURANCE

A. Manufacturer: Obtain each kind of material (latch and locksets, hinges, closers, etc.) from only one manufacturer of the respective item, although several may be indicated as offering products complying with requirements.

B. Supplier: A recognized supplier, who has been furnishing Builders Hardware, in the project’s vicinity, for a recommended period of not less than 3 years, and who is, or employs an experienced Architectural Hardware Consultant who is a recognized member of the Door
and Hardware Institute, available at reasonable times during the course of the work, for consultation about the project’s material requirements to the Owner, Architect, and Contractor. All hardware is to be supplied by one dealer.

C. Integrated Wiegand Products Supplier Qualifications: Integrated access control products and accessories are required to be supplied and installed through current members of the manufacturers "Authorized Channel Partner" (ACP) and "Certified Integrator" (CI) programs. Suppliers are to be factory trained, certified prior to project bid, and a direct purchaser of the specified product. Installers are to be factory trained, certified prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project.

D. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA 80. Provide only material which has been tested and listed by Underwriter’s Laboratories, or other approved Testing Laboratories, for the types and sizes of doors required, and complies with requirements of Door and Frame labels.

E. Where applicable, all hardware shall be in conformance with the State of New Jersey “Barrier-Free” sub code and ICC - ANSI A117.1

1.6 SUBMITTALS

A. Submittals shall conform to the requirements specified in Part 1.

B. The hardware dealer shall submit to the Architect and/or Owner, at least six (6) copies of a detailed Hardware Schedule and Catalog Cut Sheets. These schedules shall be complete and describe in detail the finish hardware for all door openings, or occurrences of finish hardware. These schedules are to be checked and approved by the Contractor and Architect. No hardware is to be ordered nor templates issued, prior to the receipt, by the Hardware Dealer, of these approved schedules. Upon approval of the schedules, the Contractor shall supply the Architect with six (6) final copies.

C. The finish hardware schedules submitted shall include information as indicated below. These schedules are intended for coordination of the work.

D. Final finish hardware content: Based on materials indicated, organize schedule into “Hardware Sets”, indicating complete destinations of every item required for each door or opening. Include the following information:

1. Type, style, function, size and finish of each item.

2. Name and manufacturer of each item including catalog cuts of each item.

3. Fastenings and other pertinent information.

4. Location of Hardware Set, cross-referenced to indications on drawings, both on floor plan and in door and frame schedule.

5. Explanation of all abbreviations, symbols, codes, etc., contained in the schedule.

6. Mounting locations for hardware.

7. Wiring diagrams and electrical data.
E. Submittal Sequence: Submit detailed finish hardware scheduled within 30 days of award of contract.

1.7 DELIVERY AND PACKAGING

A. All items of finish hardware shall be delivered to the project site or applicable fabricators of doors and frames.

B. Package each item of hardware and each lockset, separately in individual containers, complete with necessary screws, keys, instructions, and installation template for spotting mortising tools. Mark each container with item number corresponding to the number shown on the hardware schedule.

C. Furnish wrapping for all knobs, handles, and pulls for protection during construction.

1.8 WARRANTY

A. Guarantee workmanship and material provided against defective manufacture. Repair or replace defective workmanship and material appearing within period of two (2) years after substantial completion.

B. Provide twenty-five (25) year factory warranty on door closers against defects in material and workmanship from date of occupancy of project.

C. Provide five (5) year factory warranty on exit devices, locksets and overhead stops against defects in material and workmanship from date of occupancy of project.

D. Provide ten (10) year factory warranty on locksets against defects in material and workmanship from date of occupancy of project.

1.9 JOB CONDITIONS

A. Field Service: Hardware Supplier: Assign a competent representative, acceptable to the Architect to be at the jobsite each time a major shipment of finish hardware is received. Such representative shall assist in “checking in” these shipments and shall secure a receipt covering the contents of each shipment. In addition, such representative shall be available for immediate call to the jobsite when, in the opinion of the Architect, their presence is necessary.

B. Templates: Following approval of the Hardware Schedule by the Architect, furnish and deliver template information to the fabricators of items to which finish hardware is to be applied in ample time to avoid delays in such work of said fabricators. Provide drawings, schedules and detailed information to other trades as necessary for them to accommodate and prepare their work to receive the finish hardware.

C. Cooperation and Coordination:

1. Cooperate and coordinate work with that of other trades supplying materials or performing work in contact with, connecting to, underlying, or overlaying the work of this Section.

2. Provide complete data of requirements for work of this Section to those other trades whose work is affected by or dependent upon the work of this Section.
3. Furnish all items to be built into other work in ample time to avoid delaying the progress of such work.

4. Examine all drawings covering the work of this Section and refer to all other drawings, including mechanical and electrical drawings, which may affect the work of this Section or require coordination by this trade.

D. Existing Conditions: Hardware supplier: Verify all existing conditions in the field to ensure compatibility with finish hardware specified in Hardware Sets herein, prior to submission. Any discrepancies between the existing field conditions and finish hardware specified shall be brought to the attention of the Architect immediately. Hardware supplier shall not order any finish hardware until all discrepancies are rectified and the Architect grants written approval.

1.10 GENERAL

A. The material called for under this section shall provide for all of the hardware required, whether the same is particularly specified or not. If the hardware for any particular location is not described herein, it should be provided and shall be like that specified for similar locations so far as practicable. If no similar locations are specified, such hardware must be of a suitable type approved by the Architect.

B. Provide screws of proper type and compatible material, with shields, anchors, plugs, toggle nuts, etc., as required for the attachment of all items of hardware herein specified. All exposed screws shall have flat head, Phillips-type heads and shall be finished to match the item of hardware for which it is intended.

1.11 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

1.12 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1. SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing
requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2. HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:
   a. Two Hinges: For doors with heights up to 60 inches.
   b. Three Hinges: For doors with heights 61 to 90 inches.
   c. Four Hinges: For doors with heights 91 to 120 inches.
   d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
   a. Widths up to 3'0": 4-1/2” standard or heavy weight as specified.
   b. Sizes from 3'1" to 4'0": 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
   a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
   b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:
   a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.

5. Manufacturers:
   a. Bommer Industries (BO).
   b. Hager Companies (HA).
   c. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
   d. Or approved equal.

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy
hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:
   a. Bommer Industries (BO).
   b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
   c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
   d. Or approved equal.

2.3. POWER TRANSFER DEVICES

A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:
   a. Hager Companies (HA) - ETW-QC (# wires) Option.
   b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - QC (# wires) Option.
   c. Or approved equal.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
   b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Connector Hand Tool: QC-R003.
   c. Or approved equal.

2. Manufacturers:
   a. Hager Companies (HA) - Quick Connect.
   b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) – QC-C Series.
   c. Or approved equal.
2.4. DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:
   a. Door Controls International (DC).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Trimco (TC).
   d. Or approved equal.

B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Manufacturers:
   a. Door Controls International (DC).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Trimco (TC).
   d. Or approved equal.

C. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer’s designated fastener type as indicated in Hardware Sets.
5. Manufacturers:
   a. Hiawatha, Inc. (HI).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Trimco (TC).
   d. Or approved equal.
2.5. CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:
   1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
   2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
   4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
   1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.

E. Keying System: Each type of lock and cylinders to be factory keyed.
   1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
   2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
   3. Existing System: Key locks to Owner's existing system.

F. Key Quantity: Provide the following minimum number of keys:
   1. Change Keys per Cylinder: Three (3).
   2. Master Keys (per Master Key Level/Group): Five (5).
   4. Construction Control Keys (where required): Two (2).
   5. Permanent Control Keys (where required): Two (2).

G. Construction Keying: Provide temporary keyed construction cores.

H. Key Registration List (Bitting List):
   1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
   2. Provide transcript list in writing or electronic file as directed by the Owner.

I. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
1. Manufacturers:
   a. Lund Equipment (LU).
   b. MMF Industries (MM).
   c. Telkee (TK).
   d. Or approved equal.

J. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into “Key Wizard” software.

2.6. MECHANICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.

1. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4” at rated paired openings) throw brass or stainless steel latchbolt.

2. Locks are to be non-handed and fully field reversible.

3. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA 156.2 requirements to 2 million cycles.

4. Manufacturers:
   a. Stanley Best (BE) - 9K
   b. Corbin Russwin Hardware (RU) – CL3300 Series.
   c. Sargent Manufacturing (SA) – 10 Line.
   d. Or approved equal.

2.7. LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.
2.8. CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with key cylinder dogging device to hold the pushbar and latch in a retracted position.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.

   a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
   b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.


10. Rail Sizing: Provide exit device rails factory sized for proper door width application.

11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in
the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Manufacturers:
   a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
   b. Sargent Manufacturing (SA) - 80 Series.
   c. Von Duprin (VD) - 35A/98 XP Series.
   d. Or approved equal.

C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish.

1. Provide keyed removable feature where specified in the Hardware Sets.
2. Provide stabilizers and mounting brackets as required.
3. Provide electrical quick connection wiring options as specified in the hardware sets.
4. Manufacturers:
   a. Corbin Russwin Hardware (RU) - 700/900 Series.
   b. Sargent Manufacturing (SA) - 980S Series.
   c. Von Duprin (VD) - 9954 Series.
   d. Or approved equal.

2.9. INTEGRATED WIEGAND OUTPUT ACCESS CONTROL EXIT DEVICES

A. Wiegand Output Integrated Card Reader Exit Hardware: Wiegand output ANSI 156.3 Grade 1 rim, mortise, and vertical rod exit device hardware with integrated proximity card reader, latchbolt and touchbar monitoring, and request-to-exit signaling, in one complete unit. Hard wired, solenoid driven locking/unlocking control of the lever handle exit trim with 3/4" throw latch bolt. U.L listed and labeled for either panic or "fire exit hardware" for use on up to 3 hour fire rated openings. Available with or without keyed high security cylinder override.

1. Open architecture, hard wired platform supports centralized control of locking units with new or existing Wiegand compatible access control systems. Inside push bar (request-to-exit) signaling and door position (open/closed status) monitoring (via separately connected DPS).
2. Reader supports either HID 125 kHz proximity (up to 39 bits, including Corporate 1000) or 13.56 MHz (2K-32K) iClass® credentials.
3. 12VDC external power supply required for reader, with optional 24VDC operation available with iClass® reader (125 kHz reader is always 12VDC). 24VDC required for solenoid operated exit trim (12VDC if applicable). Fail safe or fail secure options.
4. Installation requires only one cable run from the exit hardware to the access control panel without requirements for additional proprietary lock panel interface boards or modules.
5. Manufacturers:
a. Corbin Russwin Hardware (RU) - Access 600 - ED5000 RNE1 Series.

b. Sargent Manufacturing (SA) - Harmony - H1/H2 80 Series.

c. Or approved equal.

2.10. DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:

   a. Corbin Russwin Hardware (RU) - DC8000 Series.

   b. Sargent Manufacturing (SA) - 351 Series.

   c. Norton Door Controls (NO) - 7500 Series.

   d. Or approved equal.
2.11. SURFACE MOUNTED CLOSER HOLDERS

A. Electromagnetic Door Holders: Certified ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate 12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.

1. Manufacturers:
   a. LCN Door Closers (LC) - SEM7800 Series.
   b. Rixson (RF) - 980/990 Series.
   c. Sargent Manufacturing (SA) - 1560 Series.
   d. Or approved equal.

2.12. ELECTROHYDRAULIC DOOR OPERATORS

A. General: Provide low energy operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.

1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

B. Standard: Certified ANSI/BHMA A156.19.

C. Performance Requirements:
   1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
   2. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.

D. Configuration: Surface mounted or in-ground as required. Door operators to control single swinging and pair of swinging doors.

E. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19. When not in automatic mode, door operator to function as manual door closer with fully adjustable opening and closing forces, with or without electrical power.

F. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.

G. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.
H. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.

I. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. LCN Closers (LC) - 4640 Series.
3. Norton Door Controls (NO) - 6000 Series.
4. Or approved equal.

2.13. DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:
   a. Hiawatha, Inc. (HI).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Trimco (TC).
   d. Or approved equal.

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:
   a. Rixson Door Controls (RF).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Sargent Manufacturing (SA).
   d. Or approved equal.

2.14. ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are 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.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 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 UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. National Guard Products (NG).
2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
4. Or approved equal.

2.15. ELECTRONIC ACCESSORIES

A. Switching Power Supplies: Provide switching power supplies that are dual voltage, UL listed, supervised units. Units shall be field selectable with a dedicated battery charging circuit that provide 4 Amp at 12VDC or 24VDC continuous, with up to 16 independently controlled power limited outputs. Units shall tolerate brownout or overvoltage input ± 15% of nominal voltage and have thermal shutdown protection with auto restart. Circuit breaker shall protect against overcurrent and reverse battery faults and units shall be available with a single relay fire trigger or individually triggered relayed outputs. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Manufacturers:

    a. Securitron (SU) - AQ Series.
    b. Or approved equal.

2.16. FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.
2.17. FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer’s standards, but in no case less than specified by referenced standards for the applicable units of hardware.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.18. HARDWARE SUPPLIER’S RESPONSIBILITY

A. The finish hardware listed herein shall in no way be construed as a complete hardware schedule and shall be considered as an indication of the finish hardware requirements desired by the Owner. It shall be the finish hardware supplier’s responsibility to examine the drawings and door schedule, and provide all necessary or additional hardware as required, but not specified herein. Such items of finish hardware shall be of the same type, quality, and quantity as that scheduled for similar doors used for similar purposes in other parts of the building. A schedule of fabrication and delivery shall be executed to avoid any delay of the entire project.

2.19. HARDWARE SUPPLIER’S RESPONSIBILITY

A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should 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 and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Products listed in the Door Hardware Sets must meet the requirements described in the specification sections noted.

1. Section 08700 – Finish Hardware.
2. Section 16000 – Electrical Work.

D. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. SA - SARGENT
4. BE - Dormakaba Best
5. HS - HES
6. RO - Rockwood
7. RF - Rixson
8. NO - Norton
## Hardware Sets

### Set: 1.0
Description: Exterior Alum/FRP Pair - Card Access

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Model/Spec</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Continuous Hinge (PT prep)</td>
<td>CFM-HD1 PT Series PE</td>
</tr>
<tr>
<td>1</td>
<td>Removable Mullion</td>
<td>(12- if rated) L980 PC SA</td>
</tr>
<tr>
<td>1 Access Control Rim Exit</td>
<td>16 70 56-H2-8804 (Div 16) US32D SA</td>
<td></td>
</tr>
<tr>
<td>1 Exit Device (exit only)</td>
<td>16 55 70 8810 US32D SA</td>
<td></td>
</tr>
<tr>
<td>1 Mullion Cylinder</td>
<td>70 980C1 US26D SA</td>
<td></td>
</tr>
<tr>
<td>2 Door Pull</td>
<td>BF158 12HD US32D RO</td>
<td></td>
</tr>
<tr>
<td>2 Surface Closer</td>
<td>UNI7500 689 NO</td>
<td></td>
</tr>
<tr>
<td>1 Threshold (coord w/ details)</td>
<td>2005AT FHSL14SS PE</td>
<td></td>
</tr>
<tr>
<td>1 Mullion Gasketing</td>
<td>5110BL PE</td>
<td></td>
</tr>
<tr>
<td>2 eLynx Frame Harness</td>
<td>QC-C-P Series MK</td>
<td></td>
</tr>
<tr>
<td>2 eLynx Door Harness</td>
<td>QC-C Series MK</td>
<td></td>
</tr>
<tr>
<td>2 Position Switch (concealed)</td>
<td>3287 SA</td>
<td></td>
</tr>
<tr>
<td>1 Wiring Diagrams</td>
<td>Elevation and Point to Point SA</td>
<td></td>
</tr>
<tr>
<td>2 Electric Power Transfer</td>
<td>EL-CEPT SU</td>
<td></td>
</tr>
<tr>
<td>1 Power Supply</td>
<td>AQD6-8F8R SU</td>
<td></td>
</tr>
<tr>
<td>1 Battery Backup</td>
<td>B-12 / 24-5 (as required) SU</td>
<td></td>
</tr>
<tr>
<td>1 Weather Seals</td>
<td>Supplied with door/frame assembly</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
Operation: Doors are normally closed and locked. Valid card at reader retracts latch for momentary access. Monitoring by door position switches. During a loss of power the door will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Depressing pushrail will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

### Set: 2.0
Description: Exterior/Vest Alum/FRP Pair - Secure Entrance - Card Access; Auto; Lockdown

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Model/Spec</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Continuous Hinge (PT prep)</td>
<td>CFM-HD1 PT Series PE</td>
</tr>
<tr>
<td>1</td>
<td>Removable Mullion</td>
<td>(12- if rated) L980 PC SA</td>
</tr>
<tr>
<td>1 Exit Device (exit only)</td>
<td>16 55 70 8810 US32D SA</td>
<td></td>
</tr>
<tr>
<td>1 Exit Device (rim,NL,EL,RX,LX,CD)</td>
<td>16 53 55 56 70 8804 US32D SA</td>
<td></td>
</tr>
<tr>
<td>1 Mullion Cylinder</td>
<td>70 980C1 US26D SA</td>
<td></td>
</tr>
<tr>
<td>2 Door Pull</td>
<td>BF158 12HD US32D RO</td>
<td></td>
</tr>
<tr>
<td>2 Conc Overhead Stop</td>
<td>1-X36 630 RF</td>
<td></td>
</tr>
<tr>
<td>1 Door Operator</td>
<td>6061 D 689 NO</td>
<td></td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>PR7500 689 NO</td>
<td></td>
</tr>
<tr>
<td>1 Threshold (coord w/ details)</td>
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<td></td>
</tr>
<tr>
<td>1 Mullion Gasketing</td>
<td>5110BL PE</td>
<td></td>
</tr>
<tr>
<td>2 eLynx Frame Harness</td>
<td>QC-C-P Series MK</td>
<td></td>
</tr>
<tr>
<td>2 eLynx Door Harness</td>
<td>QC-C Series MK</td>
<td></td>
</tr>
<tr>
<td>1 Card Reader</td>
<td>By Division 16</td>
<td></td>
</tr>
<tr>
<td>2 Position Switch (concealed)</td>
<td>3287 SA</td>
<td></td>
</tr>
<tr>
<td>1 Wiring Diagrams</td>
<td>Elevation and Point to Point SA</td>
<td></td>
</tr>
<tr>
<td>2 Electric Power Transfer</td>
<td>EL-CEPT SU</td>
<td></td>
</tr>
<tr>
<td>2 Door Switch</td>
<td>501 NO</td>
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</table>

FVHD- 5063N 2:08700-17
### Set: 3.0
**Description:** Exterior/Vest Alum/FRP Pair - Secure Entrance - Elec Stk; Auto; Lockdown

<table>
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<th>Notes</th>
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<td>Power Supply</td>
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<td>Weather Seals</td>
<td>Supplied with door/frame assembly</td>
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<tr>
<td>2</td>
<td>Remote Release Switch</td>
<td>By Division 16 00</td>
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</tr>
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</table>

**Notes:** Field verify existing conditions.

Operation: Doors are normally closed and locked. Valid card at reader (or signal from remote switches) retracts latch for momentary or extended access, then enables outside actuator. Remote switches relock door. Inside actuator unlatches and auto opens door. Monitoring by door position switches. During a loss of power the door will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Depressing pushrail will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

### Set: 4.0
**Description:** Exterior Alum/FRP Pair

<table>
<thead>
<tr>
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<th>Description</th>
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<tr>
<td>2</td>
<td>Continuous Hinge</td>
<td>CFM-HD1 Series</td>
<td>PE</td>
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<tr>
<td>1</td>
<td>Removable Mullion</td>
<td>(12- if rated) L980</td>
<td>PC SA</td>
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<tr>
<td>1</td>
<td>Exit Device (exit only)</td>
<td>16 70 8810</td>
<td>US32D SA</td>
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<tr>
<td>1</td>
<td>Exit Device (nightlatch)</td>
<td>16 70 8804</td>
<td>US32D SA</td>
</tr>
<tr>
<td>1</td>
<td>Mullion Cylinder</td>
<td>70 980C1</td>
<td>US26D SA</td>
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<tr>
<td>1</td>
<td>Electric Strike</td>
<td>9600-LBM</td>
<td>630 HS</td>
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<tr>
<td>1</td>
<td>SMART Pac Bridge Rectifier</td>
<td>2005M3</td>
<td>HS</td>
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<tr>
<td>2</td>
<td>Door Pull</td>
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<td>US32D RO</td>
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<td>2</td>
<td>Conc Overhead Stop</td>
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<td>630 RF</td>
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<td>1</td>
<td>Door Operator</td>
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<td>Mullion Gasketing</td>
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<td>2</td>
<td>eLynx Frame Harness</td>
<td>QC-C-P Series</td>
<td>MK</td>
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<tr>
<td>1</td>
<td>Wiring Diagrams</td>
<td>Elevation and Point to Point</td>
<td>SA</td>
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<td>Door Switch</td>
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<tr>
<td>1</td>
<td>Weather Seals</td>
<td>Supplied with door/frame assembly</td>
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</tr>
<tr>
<td>2</td>
<td>Remote Release Switch</td>
<td>By Division 16 00</td>
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</tr>
</tbody>
</table>

**Notes:**
Operation: Doors are normally closed and locked. Signal from remote switches unlocks door for momentary or extended access and enables outside actuator. Remote switches relock door. Inside actuator unlatches, then auto opens door. During a loss of power the door will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Depressing pushrail will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.
2 Position Switch (concealed) 3287  
1 Weather Seals Supplied with door/frame assembly

Notes: Provide outside key override for one door where multiple doors are shown.

Set: 5.0
Description: Exterior/Vest Alum/FRP Sgl - Card Access

1 Continuous Hinge (PT prep) CFM-HD1 PT Series PE
1 Access Control Rim Exit 16 70 56-H2-8804 (Div 16) US32D SA
1 Door Pull BF158 12HD US32D RO
1 Surface Closer UNI7500 689 NO
1 Threshold (coord w/ details) 2005AT FHSL14SS PE
1 eLynx Frame Harness QC-C-P Series MK
1 eLynx Door Harness QC-C Series MK
1 Position Switch (concealed) 3287 SA
1 Wiring Diagrams Elevation and Point to Point SA
1 Electric Power Transfer EL-CEPT SU
1 Power Supply AQD6-8F8R SU
1 Battery Backup B-12 / 24-5 (as required) SU
1 Weather Seals Supplied with door/frame assembly

Notes: 
Operation: Doors are normally closed and locked. Valid card at reader retracts latch for momentary access. Monitoring by door position switches. During a loss of power the door will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Depressing pushrail will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 6.0
Description: Existing Entry Pair (VIF) - Add Elec Stk; Auto; Remote Release

1 Electric Strike 9600-LBM 630 HS
1 SMART Pac Bridge Rectifier 2005M3 HS
1 Door Operator 6061 D 689 NO
2 eLynx Frame Harness QC-C-P Series MK
1 Wiring Diagrams Elevation and Point to Point SA
2 Door Switch 501 NO
2 Remote Release Switch By Division 16 00
1 Remainder of hardware Reuse existing OT

Notes: 
Operation: Door is normally closed and locked. Signal from remote switches unlocks door for momentary or extended access and enables outside actuator. Inside actuator unlocks, then auto opens door. Remote switches relock door. During a loss of power the door will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated.

Set: 7.0
Description: Existing Entry Pair (VIF) - Add Panics; Mullion; Elec Stk; Auto; Lockdown

1 Removable Mullion (12- if rated) L980 PC SA
1 Exit Device (exit only) 16 70 8810 US32D SA
1 Exit Device (nightlatch) 16 70 8804 US32D SA
1 Mullion Cylinder 70 980C1 US26D SA

FVHD- 5063N 2:08700-19
## Set: 8.0
**Description:** Existing Entry Pair (VIF) - Add Elec Stk; Card Access

<table>
<thead>
<tr>
<th>Item</th>
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<th>Description</th>
<th>Model</th>
<th>Grade</th>
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<tbody>
<tr>
<td>Electric Strike</td>
<td>1</td>
<td>9600-LBM</td>
<td>630 HS</td>
<td></td>
</tr>
<tr>
<td>SMART Pac Bridge Rectifier</td>
<td>1</td>
<td>2005M3</td>
<td>HS</td>
<td></td>
</tr>
<tr>
<td>eLynx Frame Harness</td>
<td>1</td>
<td>QC-C-P Series</td>
<td>MK</td>
<td></td>
</tr>
<tr>
<td>Card Reader</td>
<td>1</td>
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<td>Wiring Diagrams</td>
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<tr>
<td>Power Supply</td>
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<td>BPS-12/24-1</td>
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<td>Remainder of hardware</td>
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<td>Reuse existing</td>
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**Notes:**
Operation: Doors are normally closed and locked. Signal from remote switches unlocks door for momentary or extended access and enables outside actuator. Remote switches relock door. Inside actuator unlatches, then auto opens door. During a loss of power the door will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Depressing pushrail will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

## Set: 9.0
**Description:** Alum/FRP Vestibule Pair - Classroom

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
<th>Model</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Hinge</td>
<td>2</td>
<td>CFM-HD1 Series</td>
<td>PE</td>
<td></td>
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<tr>
<td>Removable Mullion</td>
<td>1</td>
<td>(12- if rated) L980</td>
<td>PC SA</td>
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<tr>
<td>Exit Device (classroom)</td>
<td>2</td>
<td>16 70 8813 ETL</td>
<td>US32D SA</td>
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<tr>
<td>Mullion Cylinder</td>
<td>1</td>
<td>70 980C1</td>
<td>US26D SA</td>
<td></td>
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<tr>
<td>Surface Closer</td>
<td>2</td>
<td>UNI7500</td>
<td>689 NO</td>
<td></td>
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<tr>
<td>Threshold (coord w/ details)</td>
<td>1</td>
<td>271A FHSL14SS</td>
<td>PE</td>
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<tr>
<td>Mullion Gasketing</td>
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<td>5110BL</td>
<td>PE</td>
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<tr>
<td>Weather Seals</td>
<td>1</td>
<td>Supplied with door/frame assembly</td>
<td></td>
<td></td>
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</table>

## Set: 10.0
**Description:** Elec; Mech; Storage; Jan

<table>
<thead>
<tr>
<th>Item</th>
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<th>Description</th>
<th>Model</th>
<th>Grade</th>
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<tr>
<td>Hinge (heavy weight)</td>
<td>3</td>
<td>T4A3786</td>
<td>US26D MK</td>
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</tr>
<tr>
<td>Cylindrical Lock (storeroom)</td>
<td>1</td>
<td>9K37D 15D S3</td>
<td>626 BE</td>
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<tr>
<td>Door Closer</td>
<td>1</td>
<td>(PR)7500 (Reg or P/A)</td>
<td>689 NO</td>
<td></td>
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<td>Kick Plate</td>
<td>1</td>
<td>K1050 10&quot; B4E</td>
<td>US32D RO</td>
<td></td>
</tr>
<tr>
<td>Wall Stop</td>
<td>1</td>
<td>404 (or per spec)</td>
<td>US26D RO</td>
<td></td>
</tr>
</tbody>
</table>

**FVHD- 5063N 2:08700-20**
### Set: 11.0
**Description:** Office Area

- **3** Hinge (heavy weight) | T4A3786 | US26D | MK
- **1** Cylindrical Lock (intruder/office) | 9K37UA 15D S3 | 626 | BE
- **1** Door Closer | (PR)7500 (Reg or P/A) | 689 | NO
- **1** Kick Plate | K1050 10" B4E | US32D | RO
- **1** Wall Stop | 404 (or per spec) | US26D | RO
- **1** Gasketing | S88D (Head & Jambs) | PE

**Notes:** Provide alum geared hinge at alum doors.

### Set: 12.0
**Description:** Gang Restroom

- **1** Continuous Hinge | CFM-HD1 Series | PE
- **1** Cylindrical Lock (classroom) | 9K37R 15D S3 | 626 | BE
- **1** Door Closer | (PR)7500 (Reg or P/A) | 689 | NO
- **1** Kick Plate | K1050 10" B4E | US32D | RO
- **1** Wall Stop | 404 (or per spec) | US26D | RO
- **1** Gasketing | S88D (Head & Jambs) | PE

### Set: 13.0
**Description:** Gang Restroom - Push-Pull

- **1** Continuous Hinge | CFM-HD1 Series | PE
- **1** Push Pull | 111x73C/73CL | US32D | RO
- **1** Door Closer | (PR)7500 (Reg or P/A) | 689 | NO
- **1** Kick Plate | K1050 10" B4E | US32D | RO
- **1** Wall Stop | 404 (or per spec) | US26D | RO
- **3** Silencer | 608 | RO

### Set: 14.0
**Description:** Toilet - Sgl User

- **3** Hinge | TA2714 | US26D | MK
- **1** Cylindrical Lock (staff toil) | 9K37H 15D S3 | 626 | BE
- **1** Door Closer | (PR)7500 (Reg or P/A) | 689 | NO
- **1** Kick Plate | K1050 10" B4E | US32D | RO
- **1** Wall Stop | 404 (or per spec) | US26D | RO
- **3** Silencer | 608 | RO

**PART 3 - EXECUTION**

#### 3.1 INSTALLATION

A. Mount Hardware units at heights indicated in “recommended locations for Builders Hardware for Standard Steel Doors and Frames”, by the Door and Hardware Institute, except as specifically indicated, required to comply with governing regulations, or may be otherwise directed by the Architect.
B. Install each hardware item in compliance with the manufacturer’s instruction and recommendations. Wherever cutting and fitting is required to install finish hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protection with finishing work specified in the Division 9 sections. Do not install surface-mounted items until finishes have been completed on the substrate.

C. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

3.2 ADJUST AND CLEAN

A. Adjust and check each operating item of finish hardware and each door to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Final adjustment: Wherever finish hardware installation is made more than one month prior to acceptance of occupancy of a space or area, return to the work site during the week prior to acceptance or occupancy, and make final check and adjustment of all finish hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of finish hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

C. Instruct Owner’s personnel in proper adjustment and maintenance of finish hardware finishes during the final adjustment of finish hardware.

D. Continued Maintenance Service: Approximately six months after the acceptance of finish hardware in each area, the installer, accompanied by the representative of the lock and latch manufacturer shall return to the project and re-adjust every item of finish hardware to restore proper function of doors and finish hardware. Consult with and instruct Owner’s personnel in recommended additions to the maintenance procedures. Replace finish hardware items that have deteriorated or failed due to faulty design, materials or installation of finish hardware units.

END OF SECTION 08700
SECTION 08800 - GLASS AND GLAZING

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.

B. Related Sections:

1. Section 01030 - Alternate Bids
2. Section 08110 - Hollow Metalwork
3. Section 08211 - Wood Doors
4. Section 08415 - Aluminum Storefront
5. Section 08520 - Aluminum Windows
6. Section 08522 - Aluminum Transaction Window
7. Section 08870 - Security Window Film
8. Section 08871 - Security Glazing (Alternate Bid)

1.2 SUMMARY

A. Extent of glass and glazing work is indicated on drawings and schedules.

B. Types of work or locations requiring glass and glazing include, but are not limited to, glass types scheduled herein and on the drawings.

1. Windows.
2. Doors and side lites.
4. Interior borrowed lites.
5. Storefronts.
6. Transaction windows with speaker holes and associated work in aluminum frames.

1.3 QUALITY ASSURANCE

A. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 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 252.

C. Safety Glass: Categories I and II materials complying with testing requirements in CPSC 16CFR1201 and permanently marked with label of:

1. Safety Glazing Certification Council (SGCC).
D. Insulating Glass Seal Standard: Comply with ASTM E 774, Class C.
   2. Label each unit permanently on spacer or on one pane.
   3. Certification agency:
      a. Insulating Glass Certification Council (IGCC).
      b. Associated Laboratories, Inc. (ALI).

E. Single Source Responsibility for Glass: To ensure consistent quality of appearance and
   performance, provide materials produced by a single manufacturer or fabricator with a
   recommended 5 years of successful experience in the production of each kind and condition
   of glass indicated and composed of primary glass obtained from a single source for each type
   and class required.

F. Installer (Glazier): A qualified installer who employs glass installers for this Project who are
   certified under the National Glass Association’s Certified Glass Installer Program
   1. Firm with a recommended 5 years of successful experience in glazing work similar to
      required work.

G. All glass shall bear the Label of the manufacturer.

H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least
   one component lite of units with an appropriate certification label of IGCC.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each glazing material and fabricated
   glass product required, including documentation of compliance with requirements and
   instructions for handling, storing, installing, cleaning and protecting each type of glass and
   glazing material, and installation and maintenance instructions.

B. Before any glass is delivered to the job site, submit sections and details of glass installation
   at framing members.

C. Samples: Submit for verification purposes, 12" square samples of each type of glass indicated
   except for clear single pane units, and 12" long samples of each color required (except black)
   for each type of sealant or gasket exposed to view. Install sealant or gasket sample between
   two strips of material representative of adjoining framing system in color.
   1. Submit insulating glass samples with completed edge-seal construction, but hermetic seal
      need not be maintained.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect glass and glazing materials during delivery, storage and handling to comply with
   manufacturer's directions and as required to prevent edge damage to glass, and damage to
   glass and glazing materials from effects of moisture including condensation, of temperature
   changes, of direct exposure to sun, and from other causes.
1.6 PROJECT CONDITIONS

A. Examine framing and substrate work to receive glass and glazing materials, and condition under which glass is to be installed. Do not proceed with glazing until unsatisfactory conditions have been corrected.

B. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

1. Install liquid sealants at ambient and substrate temperatures above 40°F.

1.7 WARRANTY

A. Manufacturer's Special Warranty on Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass manufacturer agreeing to furnish replacements for those 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: Ten (10) years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-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: Ten (10) years from date of Substantial Completion.

C. Manufacturer’s Limited Warranty on Fire-Rated / Impact Gazing: Written warranty, made out to the Owner and signed by manufacturer, warrants only that the product will be free of manufacturing defects resulting in material obstruction through the glass area and/or edge separation and changes in properties of the interlayer for a period of five (5) years from the date of purchase, provided the Products have been properly shipped, stored, handled, installed and maintained.

1. Limitation of Remedy - Inspection: The remedy for product proved to be defective under the terms of this warranty is limited to shipment of replacement product. With respect to all claims under this warranty, the Manufacturer shall have the right to inspect any and all products alleged to be defective.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include; but are not limited to, the following:
1. Standard Glass, Insulating Glass and Spandrel Glazing Products:
   a. Pilkington, Libbey-Owens-Ford, (LOF)
   b. Vitro Architectural Glass (formally PPG Glass)
   c. Guardian Industries Corp.
   d. Or approved equal

2. Fire Rated Glass Assemblies:
   a. SuperLite II-XL by Safti First, a Division of O'Keeffe's Inc.
   b. Pyran® Platinum by Schott Glass Products
   c. Or approved equal.

2.2 PRIMARY GLASS PRODUCTS

A. Clear Float Glass: ASTM C 1036, Type I (transparent glass, flat), Class 1 (clear), Quality-Q3 (glazing select).

B. Heat Treated Float Glass (Tempered Glass): ASTM C 1048; Type I; Quality-Q3; Class I (clear)
   1. Provide prime glass of color and type indicated, which has been heat treated to strengthen glass in bending to not less than 4.5 times annealed strength.

C. Uncoated Tinted Float Glass: Type I (transparent glass, flat), Class 2 (tinted heat absorbing and light reducing), Quality-Q3 (glazing select), and as follows:
   1. Manufacturer's standard bronze tint (match existing), with visible light transmittance of 38% and shading coefficient of 0.31 for 1/4" thick glass.
   2. Manufacturer's standard clear, with visible light transmittance of 70% and shading coefficient of 0.44 for 1/4" thick glass.

D. Energy Advantage Low-E Glass: Manufacturer’s standard clear color Low-E glass, coated on third surface with light transmittance:
   1. Bronze Tint: 38% and shading coefficient of .33 for 1/4" thick glass.
   2. Clear: 33% and shading coefficient of .44 for 1/4" thick glass.

E. Obscure Glass: Manufacturer’s frosted float glass, light transmittance: 85%, privacy: 100%.
   1. Product: Subject to compliance with requirements, provide "Optifloat Satin" translucent float glass by Pilkington North America; or approved equal.

F. Ceramic-Coated Heat-Treated Spandrel Glass: ASTM C 1048, Condition B (spandrel glass, one surface ceramic coated), Type I (transparent glass, flat), Class 1 (clear), Quality-Q3 (glazing select), with ceramic coating applied to second surface and complying with the following requirements:
   1. Color: As selected by Architect from manufacturer’s standard colors.
2.3 INSULATING GLAZING

A. Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

B. Provide insulating glass for applications in exterior doors, side lites, storefront units, curtain wall systems, aluminum windows and as follows:

   1. Exterior pane shall 1/4-inch thick tinted glass to meet indicated requirements.
   2. Interior pane shall be 1/4-inch thick “Low-E” coating on the third surface.
   3. Units shall be tempered where within 6 feet of a door or where "tempered" or "safety" glass is required by Code.
   4. Double Glass Performance Data:

      a. **Clear:**
         1) Visible light transmittance of 70%,
         2) Solar Energy Transmittance of 33%,
         3) U-Factor: Summer (Air) of 0.27,
         4) U-Factor: Winter (Air) of 0.29,
         5) Solar Heat Gain Coefficient of 0.38,
         6) Shading coefficient of 0.44.

      b. **Bronze Tint (3rd surface):**
         1) Visible light transmittance of 38%,
         2) Solar Energy Transmittance of 14%,
         3) U-Factor: Summer (Air) of 0.27,
         4) U-Factor: Winter (Air) of 0.28,
         5) Solar Heat Gain Coefficient of 0.27,
         6) Shading coefficient of 0.31.

2.4 DUAL GLAZING

A. Provide dual glazing for applications in hollow metal vision panels, which includes integral blinds between panes and as follows:

   1. Exterior and interior panes shall be 1/4-inch thick clear glass to meet indicated requirements.
   2. Exterior and interior panes shall be tempered where within 6 feet of a door or where "tempered" or "safety" glass is required by Code.

2.5 FIRE-RATED / IMPACT GLAZING AND FRAMING ASSEMBLIES

A. Fire protection rated and impact safety rated glazing material with a thickness of approximately 3/8” (9mm), made from laminated glass ceramic with a transparent appearance.
1. Units are tested listed and labeled by Underwriters Laboratories Inc., UL, for the following applications and comply with the following Agencies:
   a. Classified and labeled by Underwriters Laboratories, Inc.®. Test report number for labeled fire-rated assemblies is UL File No. R22036.
   b. All above tests performed in accordance with UL 9, UL 10B, UL 10C, NFPA 257, NFPA 80, ASTM E2010-01, ASTM E2074-00.
   c. This product is not considered a barrier to radiant heat and has not met the ASTM E-119 or UL 263 test standards.
   d. Fire rated for up to 90 minutes with required hose-stream test.
   e. Fire-rated for up to 180 minutes in doors with required hose-stream test.
   f. Withstands thermal shock.

3. Impact rating: ANSI Z97.1 (Class A) and CPSC 16CFR1201 (Cat. I and II).

4. Passes positive pressure test standard UL 10C.

5. Laminated floated glass-ceramic.

6. Clear and colorless without the distracting amber tint associated with competitive glass-ceramics. Microfloat process allows for smooth surface and distortion-free mirror finish.

7. Approved for use with any fire-rated frame.

8. Sound Tranmission Class (STC): 36

9. The panel must be placed on calcium silicate or hardwood setting blocks and glazed using PYRAN® Platinum classified glazing tape, such as closed cell PVC, Fiberfrax tape or Pemko FG3000S90.

B. Subject to compliance with requirements, provide the following:

1. **FRIG -1:** Fire-Rated / Impact Gazing; Provide “Pyran® Platinum L”, as manufactured by Schott Glass Products; or approved equal.
   a. Door lites, transoms or sidelites, and windows with fire rating requirements up to 90 minutes.
   b. Doors up to 3 hours.

2. **FRIG -2:** Fire-Rated / Impact Glazing and Fire-Rated Framing Assemblies: Provide “Pyrostop with Heat Barrier Fireframes” or approved framing for use with “Pyrostop” glazing by a single source manufacturer; as manufactured by TGP Technical Glass Products; or approved equal.
a. Up 2-hours with hose stream test and also meets: ASTM E119, UL 263 and NFPA 251:

1. Up to 45 minutes: \( \frac{3}{4} \)" thick.
2. Up to 60 minutes: \( \frac{15}{16} \)" thick.
3. Up to 90 minutes: \( 1\frac{7}{16} \)" thick.
4. Up to 2 hours: \( 2\frac{1}{8} \)" thick

2.6 INSULATING LAMINATED GLAZING - (ACOUSTICAL):

A. Provide insulating laminated acoustical glass for applications in interior wood doors where acoustical glass is indicated. Assemblies shall comply with the following:

1. Overall thickness: 1-inch.
2. Air Space: 1/2-inch.
3. Glass Pane: 1/4 inch thick laminated:
   a. Basis of Design: 1/8" - Salflex SilentGlass Technology 0.030 PVB interlayer by Viracon; or approved equal.
4. STC Rating: 42 Minimum; ASTM E90.
5. Provide manufacturer’s standard pliable mastic for holding in place units.

2.7 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for category II materials, for kinds of laminated glass indicated and other requirements specified as following:

1. Interlayer: Interlayer material as indicated below, clear or in colors, and 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.
2. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:
   a. Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.
3. Inner Lite: Type I (transparent glass, flat), Class 2 (tinted heat absorbing and light reducing), Quality q3 (glazing select).
   a. Class 2 (tinted).
   b. Thickness: 1/4"

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4. Outer Lite: Tempered glass type.
   a. Thickness: 1/4".

5. Plastic Interlayer: 0.060 inch thick.

2.8 ELASTOMERIC GLAZING SEALANTS AND PREFORMED GLAZING TAPES

A. General: Provide color of exposed glazing sealant compound as selected by Architect from manufacturer's standard colors, or black if no color is so selected. Comply with manufacturer's recommendations for selection of hardness, depending upon the location of each application, conditions at time of installation, and performance requirements as indicated. Select materials, and variations or modifications, carefully for compatibility with surfaces contacted in the installation.

B. 1 Part Silicone Rubber Glazing Sealant: Elastomeric silicone sealant complying with FS TT-D-001543, Class A, non-sag. Provide acid type recommended by manufacturer where only non-porous bond surfaces are contacted; provide non-acid type recommended by manufacturer where one or more porous bond surfaces are contacted.

C. Butyl Rubber Glazing Tape: Partly-vulcanized, self-adhesive, non-staining, elastomeric butyl rubber tape. 98% solids, intended for 35% compression, no appreciable deterioration for 3000 hour test in Atlas Weatherometer; either plain or pre-shimmed as required for proper installation of glass.

2.9 GLAZING COMPOUND FOR FIRE-RATED GLAZING MATERIALS

A. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.

1. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.
   a. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.10 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

B. Setting Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness.

C. Spacers: Neoprene, EPDM or silicone blocks, or continuous extrusions, as required for compatibility with glazing sealant, of size, shape and hardness recommended by glass and sealant manufacturers for application indicated.
D. Edge Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.

E. Compressible Filler Rods: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5-10 psi compression strength for 25 percent deflection.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Require Glazier to inspect work of glass framing erector for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system; for existence of minimum required face or edge clearances; and for effective sealing of joinery. Obtain Glazier's written report listing conditions detrimental to performance of glazing work. Do not allow glazing work to proceed until unsatisfactory conditions have been corrected.

3.2 STANDARDS AND PERFORMANCE

A. Comply with combined printed recommendations of glass manufacturers, of manufacturers of sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing standards.

B. Glazing channel dimensions as indicated in details are intended to provide for necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by job conditions at time of installation.

C. Protect glass from edge damage during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Inspect each piece of glass immediately before installation, and discard pieces which have significant edge damage or face imperfections.

F. Unify appearance of each series of lites by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other piece.

G. Install insulating glass units to comply with recommendations by Sealed Insulating Glass Manufacturers Association, except as otherwise specifically indicated or recommended by glass and sealant manufacturers.
3.3 PREPARATION FOR GLAZING

A. Clean glazing channel and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrate. Remove lacquer from metal surfaces where elastomeric sealants are used.

B. Apply primer or sealer to joint surfaces where recommended by sealant manufacturer.

3.4 GLAZING

A. Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but with edge nearest corner not closer than 6" from corner, unless otherwise required. Set blocks in thin course of sealant which is acceptable for heel bead use.

B. Provide spacers inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50 united inches (length plus height), except where gaskets or glazing tapes with continuous spacer rods are used for glazing. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.

C. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.

D. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

E. Provide compressible filler rods or equivalent back-up material, as recommended by sealant and glass manufacturers, to prevent sealant from extruding into glass channel weep systems and from adhering to joints back surface as well as to control depth of sealant for optimum performance, unless otherwise indicated.

F. Force sealants into glazing channels to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.

G. Tool exposed surfaces of sealants to provide a substantial "wash" away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel, so as to eliminate dirt and moisture pockets.

H. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when installation is subjected to movement.

I. Miter cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent pull away at corners; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.5 PROTECTION AND CLEANING

A. Cure glazing sealants and compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.
B. Protect glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.

C. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

D. Maintain glass in a reasonably clean condition during construction, so that it will not be damaged by corrosive action and will not contribute (by wash-off) to deterioration of glazing materials and other work. Comply with manufacturer's instructions.

E. Wash and polish glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Comply with glass manufacturer's recommendations for final cleaning.

END OF SECTION 08800
SECTION 08815 - MIRRORED GLASS

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 safety mirrored glass.

1.3 DEFINITIONS
A. Deterioration of Mirrored Glass: Defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning silvered mirrored glass contrary to mirrored glass manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1.4 PERFORMANCE REQUIREMENTS
A. Provide mirrored glass that will not fail under normal usage. Failure includes glass breakage and deterioration attributable to defective manufacture, fabrication, and installation.

1.5 SUBMITTALS
A. Product Data: For the following:
   1. Mirrored glass. Include description of materials and process used to produce mirrored glass that indicates source of glass, glass coating components, edge sealer, and quality-control provisions.
   2. Mirror mastic.
   3. Mirror hardware.

B. Shop Drawings: Include elevations, sections, details, and attachments to other Work.

C. Samples for Verification: For the following products, in sizes indicated below:
   1. Mirrored glass, 12 inches square, including edge treatment on 2 adjoining edges.
   2. Mirror trim, 12 inches long.

D. Product Certificates: Signed by manufacturers of mirrored glass and mirror mastic certifying that products furnished comply with requirements.

E. Mirror Mastic Glass Coating Compatibility Test Reports: From an organic protective coating manufacturer indicating that mirror mastic has been tested for compatibility and adhesion with organic protective coating applied to silvered mirrored glass. Include organic coating manufacturers' interpretation of test results relative to performance and recommendations for use of mastics with organic protective coating.
1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in mirrored glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Glazier Certification Program as Level 3 (Master Glaziers).

B. Source Limitations for Mirrored Glass: Obtain mirrored glass from one source for each type of mirrored glass indicated.

C. Glazing Publications: Comply with published recommendations in GANA's "Glazing Manual," unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.

D. NAAMM's Publication: For silvered mirrored glass, comply with recommendations in NAAMM's "Mirrors, Handle with Extreme Care, Tips for the Professional on the Care and Handling of Mirrors."


F. Preconstruction Mirror Mastic Glass Coating Compatibility Test: Submit mirror mastic products to organic protective coating manufacturer for testing to determine compatibility of adhesive with mirrored glass coating.

1.7 REFERENCES


1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to mirrored glass manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirrored glass manufacturer's written instructions for shipping, storing, and handling mirrored glass as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not install mirrored glass until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.
1.10 WARRANTY

A. Manufacturer's Special Warranty for Mirrored Glass: Written warranty, made out to Owner and signed by mirrored glass manufacturer agreeing to replace mirrored 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: **Ten (10) years** from date of approved Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Mirror Company, Inc.
2. Carolina Mirror Company.
3. Donisi Mirror Company.
5. Gilded Mirrors, Inc.
7. Stroupe Mirror Co., Inc.
8. Sunshine Mirror.
9. Virginia Mirror Co., Inc.
10. VVP America, Inc.; Binswanger Mirror Products.
11. Walker Glass Co., Ltd.
12. Or approved equal.

2.2 FLOAT GLASS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent glass, flat), class, quality, and other properties as indicated below:

1. Clear Annealed Float Glass: Class 1 (clear), Quality q2 (mirror).
   a. Thickness: 1/4”.

B. Tempered Float Glass: ASTM C 1048, Type I (transparent glass, flat), Condition A (uncoated), Kind FT (fully tempered), Quality q3 (glazing select) float glass, complying with the following requirements:

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of mirror as installed, unless otherwise indicated.

2. Clear Tempered Float Glass: Class 1 (clear).
   a. Thickness: 1/4”.

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2.3 **MIRRORED GLASS**

A. Pyrolytic Mirrored Glass: Tempered float glass with thin layers of silicon, silica, and tin oxide applied to first glass surface of clear annealed float glass, while in the float bath, by the pyrolytic deposition process to produce an abrasive- and moisture-resistant coating with a minimum and nominal reflectivity of 75 and 78 percent, respectively.

1. Subject to compliance with requirements, provide "Mirage" by Pilkington Libbey-Owens-Ford; or approved equal.

2.4 **FABRICATION**

A. Mirrored Glass Sizes: Cut mirrored glass to final sizes and shapes to suit Project conditions.

B. Cutouts: Fabricate cutouts for notches and holes in mirrored glass without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrored glass.

C. Mirrored Glass Edge Treatment: Treat edges as indicated below.

1. Seal edges of silvered mirrored glass after edge treatment to prevent chemical or atmospheric penetration of glass coating.

2. Require mirrored glass manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

D. Laminated Safety Glass Mirrors: Provide laminated mirrored glass fabricated to produce units complying with ASTM C 1172, Kind LM, and the following:

1. Glass Lites: Outer lite of mirrored float glass with silvered coating on second surface or pyrolytic coating on first surface and inner lite of clear float glass.

2. Interlayer Material: Mirrored glass manufacturer's standard 0.030-inch-thick, polyvinyl-butyral interlayer with a proven record of showing no tendency to delaminate from, or cause damage to, glass and silvered coating.

3. Laminating Process: Laminate glass using laminator's standard heat-plus-pressure process to produce glass free from foreign substances, air or glass pockets, and other defects.

4. Seal edges of laminated units to comply with written requirements of interlayer manufacturer.

E. Vinyl-Backed Safety Mirrored Glass: Apply vinyl backing with pressure-sensitive adhesive coating over glass coating as recommended by vinyl-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections. Use adhesives and vinyl backing compatible with mirrored glass as certified by organic coating manufacturer.

2.5 **MISCELLANEOUS MATERIALS**

A. Setting Blocks: Neoprene, 70 to 90 Shore A hardness.
B. Edge Sealer: Coating compatible with glass coating and approved by mirrored glass manufacturer for use in protecting against silver deterioration at mirrored glass edges.

C. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrored glass by spot application, certified by both mirrored glass manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrored glass will be installed.

1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Gunther Mirror Mastics.
   b. Palmer Products Corporation.
   c. Or approved equal.

D. Extruded-Aluminum Top and Bottom Trim: J-channels formed with a return deep enough to produce a glazing channel to accommodate mirrored glass units of thickness indicated and in lengths required to cover bottom edge of each mirrored glass unit in a single piece.

   1. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.05 inch.

   2. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.062 inch.

3. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   a. Bottom Trim:
      1) CRL Standard "J" Channel; C. R. Laurence Co., Inc.
      2) Medium Gauge Aluminum Shallow Nose "J" Moulding Lower Bar; Sommer & Maca Industries, Inc.
      3) Heavy Gauge Aluminum Shallow Nose "J" Moulding Lower Bar; Sommer & Maca Industries, Inc.
      4) Or approved equal.

   b. Top Trim:
      1) CRL Deep "J" Channel; C. R. Laurence Co., Inc.
      2) Medium Gauge Aluminum Deep Nose "J" Moulding Upper Bar; Sommer & Maca Industries, Inc.
      3) Heavy Gauge Aluminum Deep Nose "J" Moulding Lower Bar; Sommer & Maca Industries, Inc.
      4) Or approved equal.

E. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

F. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrored glass units are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance.

1. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.

2. Proceed with mirrored glass installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating surfaces with mastic manufacturer's special bond coating where applicable.

3.3 GLAZING

A. General: Install mirrored glass units to comply with written instructions of mirrored glass manufacturer and with referenced GANA and NAAMM publications. Mount mirrored glass accurately in place in a manner that avoids distorting reflected images.

B. Provide space for air circulation between back of mirrored glass units and face of mounting surface.

C. Mastic Spot Installation System: Install mirrored glass units with mastic as follows:

1. Apply barrier coat to mirrored glass backing where approved in writing by manufacturers of mirrored glass and backing material.

2. Apply mastic in spots to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrored glass units and face of mounting surface.

3. After mastic is applied, align mirrored glass units and press into place while maintaining a minimum air space of 1/8 inch (3 mm) between back of mirrored glass and mounting surface.

D. For wall-mounted mirrored glass units, install permanent means of support at bottom and top edges with bottom support designed to withstand mirrored glass weight and top support designed to prevent mirrored glass from coming away from wall along top edges.

1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrored glass units.
2. For continuous bottom supports, provide setting blocks 1/8 inch by 4 inches long at quarter points. For channels or other continuous supports in which water could be trapped, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long.

3.4 PROTECTION AND CLEANING

A. Protect mirrored glass from breakage and contaminating substances resulting from construction operations.

1. Do not permit edges of silvered mirrored glass to be exposed to standing water.

2. Maintain environmental conditions that will prevent silvered mirrored glass from being exposed to moisture from condensation or other sources for continuous periods of time.

B. Wash mirrored glass not more than four days before date scheduled for inspections intended to establish date for Substantial Completion. Wash mirrored glass by methods recommended in NAAAMM publication and in writing by mirrored glass manufacturer. Use water and glass cleaners free from substances capable of damaging mirrored glass edges or coatings.

END OF SECTION 08815
SECTION 08870 - SECURITY WINDOW FILM

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 SECTION INCLUDES

A. Field applied security film and rigid pvc cap system applied to glazed surfaces and glazing framing systems.

1.3 RELATED SECTIONS

A. Section 08110 - Hollow Metal Doors and Frames
B. Section 08211 - Wood Doors
C. Section 08410 - Aluminum/FRP Doors and Aluminum Framing Systems
D. Section 08415 - Aluminum Storefronts
E. Section 08800 - Glass and Glazing

1.4 REFERENCES

A. ASHRAE - American Society for Heating, Refrigeration, and Air Conditioning Engineers; Handbook of Fundamentals.
B. ASTM International (ASTM):
   2. ASTM D 1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
   3. ASTM D 1044 - Standard Method of Test for Resistance of Transparent Plastics to Surface Abrasion (Taber Abrader Test).
   5. ASTM D 4830 - Standard Test Methods for Characterizing Thermoplastic Fabrics Used in Roofing and Waterproofing.
7. ASTM E 308 - Standard Recommended Practice for Spectrophotometry and Description of Color in CIE 1931 System.


C. Window 5.2 - A Computer Tool for Analyzing Window Thermal Performance; Lawrence Berkeley Laboratory.


F. GSA Standard Test for Glazing and Glazing Systems Subject to Airblast Loadings.


1.5 PERFORMANCE REQUIREMENTS

A. Fire Performance: Surface burning characteristics when tested in accordance ASTM E 84:

1. Flame Spread: 25, maximum.
2. Smoke Developed: 450, maximum.

B. Abrasion Resistance: Film must have a surface coating that is resistant to abrasion such that, less than 5 percent increase of transmitted light haze will result in accordance with ASTM D 1044 using 50 cycles, 500 grams weight, and the CS10F Calbrase Wheel.

1.6 SUBMITTALS

A. Submit under provisions of AIA A232 and Section 00800.

B. Product Data: Manufacturer’s data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
C. Selection Samples: For each film specified, submit film samples representing manufacturer's film type for the project.

D. Verification Samples: For each film specified, two samples representing film color and pattern.

E. Performance Submittals: Provide laboratory data of emissivity and calculated window U-Factors for various outdoor temperatures based upon established calculation procedure defined by the ASHRAE Handbook of Fundamentals, Chapter 29, or Lawrence Berkeley Laboratory Window 5.2 Computer Program.

F. Letter from the manufacturer of the security film that the contractor is a certified installer.

G. Shop drawings from the installer / manufacturer of the security window film illustrating all conditions of the Impact Protection Adhesive (IPA) overlap distance onto the adjacent glazing framing system.

Note: Installation of the security window film shall not proceed until the submittals of all conditions are submitted.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.

1. Provide documentation that the installer is authorized by the Manufacturer to perform Work specified in this section.

2. Provide a commercial building reference list of 5 properties where the installer has applied window film. This list will include the following information:

   a. Name of building.
   b. The name and telephone number of a management contact.
   c. Type of glass.
   d. Type of film.
   e. Amount of film installed.
   f. Date of completion.

3. Provide a Glass Stress Analysis of the existing glass and proposed glass/film combination as recommended by the film manufacturer.

4. Provide an application analysis to determine available energy cost reduction and savings.

C. Window Security Film Pre-Installation Meeting: Prior to installation of the Security Window Film, there shall be a Pre-Installation Meeting with the General Contractor, Window Security Film Subcontractor, and the Architect. At this meeting, products and installation requirements and shall be reviewed.
D. Mock-Up: Provide a mock-up for evaluation and approval by the Architect of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.

2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

3. Refinish mock-up area as required to produce acceptable work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.9 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.

1.10 WARRANTY

A. At project closeout, provide to Owner or Owners Representative an executed current copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

B. Basis of Design Manufacturer and the Authorized Window Film Dealer (collectively referred to as “Seller”) warrant for twelve (12) years from installation, and provided that the product is maintained in accordance with the Window Care Instructions below, that the Safety & Security Window Film will:

1. Maintain Adhesion Properties without blistering, bubbling, or delaminating from the glass,

2. Maintain Appearance without discoloration,

3. Maintain Strength, Tear, and Penetration Resistant Properties as defined in product literature.

Warranty Applicable with additional purchase & installation of Impact Protection System Adhesive or Profile:

4. With the purchase of Impact Protection Profile or Impact Protection Adhesive on all four (4) sides of the window, for the entire project, Manufacturer and the Authorized Window Film Dealer agree to extend the terms of this warranty an additional two (2) years, for a total of a fourteen (14) year warranty. This includes the film, attachment system, and labor. No changes are made to the glass breakage warranty.
5. The Impact Protection System Adhesive or Profile warranty applies to new Safety & Security Window Film installations. The adhesive or profile Product will meet Product specifications in effect at time of installation. The warranty period is twelve (12) years from the date of installation for a two sided application, and fourteen (14) years for a 4 sided application. This shall not cover failure due to disintegration of the underlying substrate, movement of the structure exceeding specification for elongation and/or compression, changes in appearance of the adhesive due to dirt or other contaminates, tampering or other modifications applied after installation.

a. Film warranty is void if the attachment system is removed for reasons other than to replace product found defective under this warranty. Application of Non-System Manufacturer wet glaze attachment system voids the Safety & Security Film Warranty. If the product does not conform to this warranty, the sole and exclusive remedy is:

1) Replacement of the quantity of film proved to be defective; and,
2) Provide removal and reapplication labor of like quality product free of charge.

6. Seller also warrants against glass failure due to thermal shock fracture, (maximum value of $500 per window) caused only as a direct result of the application of Safety & Security Window Film provided the film is applied to recommended types of glass and the glass failure is reported to the Seller within the specified time (listed below) from the start of the installation. Glass breakage coverage is only valid for Safety & Security Window Films.

a. Sixty (60) months coverage against thermal shock fracture,
b. Any glass failure covered by this warranty must be reviewed by Seller prior to repair, and only covers film and glass replacement.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: “Ultra S140 Safety and Security Window Film” by 3M Window Film, Tel: #800.480.1704/651.733.2222; Web: www.3m.com/windowfilm;/ or approved equal.

1. Subject to compliance with requirements of the Contract Documents, manufacturers offering products which may be incorporated in work include the following:

b. Or approved equal.

2. Requests for substitutions will be considered in accordance with provisions of AIA A232 and Section 00800.

B. Basis of Design: “BondKap Attachment System” as manufactured by FilmFastener LLC, Odessa, FL, Tel: # 813.926.8721; www.filmfastener.com / www.bondkap.com; or approved equal.
2.2 CLEAR MICROLAYERED SAFETY AND SECURITY WINDOW FILM

A. Clear Microlayered Safety and Security Window Film: 3M Ultra S140 Safety and Security Window Film; or approved equal.

1. Physical / Mechanical Performance Properties:
   a. Film Color: Clear.
   b. Thickness: Nominal 14.0 mils (0.36 mm), comprised three laminated layers of optically clear polyester and contain a durable abrasion resistant coating over one surface.
   c. Tensile Strength (ASTM D 882): 25,000 psi.
   d. Break Strength (ASTM D 882) 25,000 psi (350 lbs. Per inch width)
   e. Percent Elongation at Break (ASTM D 882): >125%
   f. Percent Elongation at Yield (ASTM D882): greater than 100%.

2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.

3. Variation in Total Transmission Across the Width: Less than 2 percent over the average at any portion along the length.

4. Identification: Labeled as to Manufacturer as listed in this Section.

5. Solar Performance Properties: Film applied to 1/4 Inch (6.4 mm) thick clear glass.
   b. Visible Reflection (ASTM E 903): Not more than 10 percent.
   c. Ultraviolet Transmission (ASTM E 903): Less than 1 percent.
   d. Solar Heat Gain Coefficient (ASTM E 903): 0.78.

   a. Shall pass a 400 ft-lb impact when tested according to 16 CFR CPSC Part 1201 (Category 2) and ANSI Z97.1 (Class A, Unlimited).

7. Bomb Blast Mitigation:
   a. GSA Rating of “3B” (Low Hazard) with minimum blast load of 10 psi overpressure and 89 psi*msec blast impulse.

8. Impact Protection per ASTM’s E1888 / E1996:
   a. Film shall pass impact of Medium Large Missle “C” and withstand subsequent pressure cycling at 50 psf Design pressure with use of 3M Impact Protection Adhesive attachment system.

   a. Properties, as supplied:
      1) Color to closely match the existing glazing framing system:
         a) Black
         b) White
2) Typical Cure Time: 3 – 7 days (25°C, 50% RH)
3) Full Adhesion: 7 – 14 days
4) Tack-Free Time (ASTM D 5895): 21 minutes (25°C, 50% RH)
5) Flow, Sag or Slump (ASTM D 2202): 0 inches
6) Specific Gravity: 1.4
7) Working Time: 10 – 20 minutes (25°C, 50% RH)
8) VOC Content: 16 g/L

b. Uniformity: Product shall have uniform consistency and appearance, with no clumping.
   1) Contractor shall use “painters type” tape to maintain a uniform installation of IPA on the glazing metal frame.

c. Identification: Labeled as to Manufacturer as listed in this Section.

D. On various installation conditions, the glazing stop can have various profile(s). The contractor shall ensure that the IPA is installed a minimum dimension as indicated above and in accordance with the manufacturer’s printed instructions.

2.3 BONDKAP ATTACHMENT SYSTEM

A. BondKap Attachment System: Weatherable Rigid PVC secured using approved structural silicones such as Dow Corning 995 or GE SCS2000 "Wet Glaze" type attachment. BondKap aids in the integrity of the silicone to maintain proper alignment and increases the tensile/tear strength of the silicone, while provided and aesthetic cover to an unsightly large bead of silicone.

   a. Width: 1.516 inches.
   b. Typically used for commercial storefront applications where added protection is necessary such as high profile faculties.

   a. Width: 1.30 inches.
   b. Typically used for commercial storefront applications.

   a. Width: 2.588 inches.
   b. Typically used for commercial storefront doors.

   a. Width: 1.78 inches.
   b. Typically used for commercial storefront doors.

5. Material properties.
   a. Full cure of silicone 30 to 60 days depending on BondKap profile.
   b. Strength and elongation dependent upon silicone used.
PART 3 - EXECUTION

3.1 EXAMINATION

A. If preparation of glass surfaces is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

1. Glass surfaces receiving new film should first be examined to verify that they are free from defects and imperfections, which will affect the final appearance:

B. Do not proceed with installation until glass surfaces have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.

C. At the request of the specifying authority, an adhesion test to the frame surface may be conducted by applying a 4 - 6 inch long bead, approximately 0.5 – 1 inch in width, masking one side of the frame surface underneath the strip with tape. Allow the Impact Protection Adhesive to cure for 7 days and test adhesion by pulling up on the masked end and a 90 degree angle. If cohesive failure is observed (adhesive residue left behind on the frame surface), adhesion is acceptable; if adhesive failure is observed (clean peel from the frame), adhesion is unacceptable and product is not recommended.

D. Commencement of installation constitutes acceptance of conditions.

E. BondKap Examination.

1. Assure the BondKap is the correct length, color and profile for the installation.
2. Assure the BondKap has not been subject to direct sunlight and has warped. If damage has occurred replace as necessary. BondKap will not warp once properly installed and has full adhesion with the structural silicone.

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.

C. Pre-cut the BondKap strips as directed from the manufacturer.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions (See attached 3M Impact Protection Adhesive Attachment System document).

1. Install film on surface 2 (single pane glass).
B. Cut film edges neatly and square at a uniform distance of 1/8 inch (3 mm) to 1/16 inch (1.5 mm) of window sealant. Use new blade tips after 3 to 4 cuts.

C. Spray the slip solution, composed of one capful of baby shampoo or dishwashing liquid to 1 gallon of water, on window glass and adhesive to facilitate proper positioning of film.

D. Apply film to glass and lightly spray film with slip solution.

E. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.

F. Bump film edge with lint-free towel wrapped around edge of a 5-way tool.

G. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly, and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.

H. Recommended minimum bead overlap for blast mitigation is 0.5 inch on both film and frame surfaces (excluding the glazing stops or compression gaskets).

I. To ensure a straight and consistent bead width is achieved, masking tape may be applied to film and frame surfaces before application of 3M Impact Protection Adhesive.

J. Dispense Impact Protection Adhesive with a caulk gun and nozzle having an opening cut to approximate size of desired bead width.

   a. Install as specified by silicone manufacturer and BondKap manufacturer.

   b. Cut the tip of the silicone the appropriate size for the BondKap in use.

   c. Apply the silicone to the frame and glass or on the BondKap depending on which profile is in use.

   d. Place the BondKap on the silicone at the specified angle to achieve maximum contact with silicone frame and glass.

      1) If alternative BondKap selection is used and silicone has been applied to the BondKap, press the silicone BondKap combination to the desired position on the glass and frame.

   e. Apply sufficient pressure to assure silicone is mated to BondKap, glass and frame. You should be able to perceive the silicone under the BondKap. If not lift the BondKap and apply more silicone. If an excess of silicone is protruding past the BondKap see cleaning and protection.

3.4 CLEANING AND PROTECTION

A. Remove left over material and debris from Work area. Use necessary means to protect film before, during, and after installation.
B. Touch-up, repair or replace damaged products before Substantial Completion.

C. After application of film, wash film using common window cleaning solutions, including ammonia solutions, 30 days after application. Do not use abrasive type cleaning agents and bristle brushes to avoid scratching film. Use synthetic sponges or soft cloths.

D. Common window cleaning solutions may be used 30 days after installation.

END OF SECTION 08870
**3M™ Impact Protection Adhesive Attachment System**

**Installation Instructions**

3M™ Impact Protection Adhesive improves the overall performance of 3M™ Safety and Security Window Films. This unique window protection system combines the toughness of 3M's patented micro-layer safety film with 3M's world-class expertise in adhesives to help shield against impact energy from severe weather, earthquakes, bomb blasts or forced entry events. The 3M Impact Protection System also helps protect against personal injury from flying glass.

**3M Impact Protection Adhesive:**
- Commercial and Residential Applications
- Bomblast and Windsstorm Testing results available upon request

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**The following procedure describes the materials and steps that are necessary to install the 3M™ Impact Protection Adhesive attachment system.**

**Recommended Products:**
- 3M™ Citrus Base Cleaner
- 3M™ Adhesive Remover, Citrus Base
- 3M™ Foaming Glass Cleaner
- 3M™ Super Fine Synthetic Steel Wool Pad
- 3M™ Scotch™ Safe Release™ Masking Tape
- 3M™ Scotch™ Long Mask™ Masking Tape
- 3M™ Impact Protection Adhesive
- 3M™ 94 Tape Primer

**Window Preparation**
Glass panel shall be uniform in appearance. No fractures, holes or what is considered contaminated glass, or damaged glass, to be present.

Window frame to be uniform in appearance and free from dents, holes and cracks within two inches of the glass.

A thorough cleaning of the glazing and frame systems before applying film and attachment is required to remove all foreign matter and contaminants such as adhesives, grease, oil, dust, water, surface dirt, old sealant or glazing compounds by using 3M Citrus Base Cleaner, alcohol or commercial cleaning solution.

**Detergent or soap and water treatments are not recommended for this step.**

1. IPA does not require the glazing stop to be trimmed. Note: If the glazing stop overlaps frame, trimming the glazing stop is optional (Reference Detail 1 on back).

2. Spray the glazing bead, glass and frame surface with an appropriate cleaning product and remove with a lint free cloth. Repeat if necessary to remove all foreign materials from the glass and inside window frame surfaces. If the area is particularly dirty, a light scrub with a 3M 0000 Super Fine Synthetic Steel Wool Pad is recommended to loosen contaminants. Finish with a final cleaning if needed.

3. Spray the glass with 3M Foaming Glass Cleaner or a soap and water solution. Flush the glazing bead to glass area starting at the top and working down to clean or remove any remaining contaminant from the area. Scrape the glass with a razor to remove all foreign matter. Thoroughly clean the glass a final time with soapy water and a window cleaning squeegee. Wipe around the glazing bead and frame area one final time to remove all of the soap and water solution.

**Film Installation**

1. Apply the 3M™ Ultra Safety & Security Window Film to the glass, making sure that the film is installed as far into the glazing channel as possible. Cut film as you normally would around the remaining glazing bead. Remember to leave enough spacing between film and glazing bead to facilitate the removal of the slip solution.

2. Squeegee the film to the glass by pressing firmly to remove as much of the slip solution as possible, especially at the edges of the film. Two “edge-drying” methods can be used before applying the Impact Protection attachment system.

   A. The panels can be left for a few weeks to ensure proper drying of the film before the IPA system is applied.

   OR

   B. Using a hair dryer, gently heat and bump the edges of the film to hasten the removal and drying of the water from the edges. Make sure that all of the soap and water solution has been removed from the film/glaze/glazing channel before applying the IPA attachment system.
Impact Protection Adhesive Installation

1. Clean and prime window frame prior to installing the 3M™ Impact Protection Adhesive (IPA). To clean the frame, wipe area using a cloth dampened with a citrus-based cleaner. Then clean same area using a cloth dampened with an ammonia-based glass cleaner. Allow to dry. 3 minutes before applying the 3M IPA. If window frame is painted (latex, oil, polyurethane or powder coated), 3M™ 94 Tape Primer is recommended in the area that IPA will be applied.

2. Apply a 1" (25 mm) strip of 3M™ Scotch™ Safe Release™ White Masking Tape to the ultra film surface 3/8 (9 mm) from the edge of the film to all four sides. Note: This dimension will depend on application—1/2".

3. Apply a 1" (25 mm) strip of 3M Safe Release Blue Masking Tape to the window frame 3/8" (9 mm) from the edge of the trimmed gasket. This will form a parallel sealant channel that will allow a uniform sealant bead to be applied to the glass/frame interface. Note: Use a clean drop cloth before processing to Step 3.

4. Apply a triangular bead of IPA Impact Protection Adhesive, and tool as needed to form an acceptable finish. Refer to Figure 1. Read and follow all product information and installation instructions provided by 3M Company. We recommend you start in a corner and apply the sealant bead out approximately 6". Then turn the gun and push the sealant bead to the next corner where the same method is repeated. Pushing the sealant bead will ensure proper penetration and minimize the chances of air gaps in the bead. Pulling the gun can also be done if confident no air gaps are formed.

5. Smooth the sealant bead with an appropriate tool, if necessary, to give a finished look. Tooling should be completed in one continuous stroke immediately after adhesive application and before a skin forms.

6. Carefully remove the two masking strips from the glass/frame immediately after coining. Do not allow the excess adhesive to contact the film, frame, or flooring surfaces. A lightly clothed drop cloth is needed to protect the work area. Be careful not to step on adhesive and transfer it to surrounding surfaces.

Note: Should you get some of the adhesive on the surrounding surfaces, an application and gentle wipe with a 3M Citrus Based Cleaner is recommended. Curing time for the IPA will vary depending on temperature and relative humidity. It is not recommended to clean the film/IPA system for at least 36 hours following the installation. Full curing adhesion can take up to 7 days, depending on conditions.

<table>
<thead>
<tr>
<th>Table 1</th>
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<tbody>
<tr>
<td>Property</td>
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<tr>
<td>Curing Time (25°C (77°F), 50% RH)</td>
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<tr>
<td>Full Adhesion</td>
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<tr>
<td>Task-Free Time (25°C (77°F), 50% RH)</td>
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<tr>
<td>Flow, Sag or Slump</td>
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<tr>
<td>Working Time (25°C (77°F), 50% RH)</td>
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<tr>
<td>Specific Gravity</td>
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<tr>
<td>VOC content</td>
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As Cured—After 21 Days at 25°C (77°F), 50% RH

| Property | Test Method Used | Units | 3M IPA |
| Ultimate Tensile Strength | ASTM D412 | psi (Mpa) | 380 (2.62) |
| Ultimate Elongation | ASTM D412 | % | 640 |
| Diameter Hardness, Shore A | ASTM D2240 | points | 36-39 |
| Tear Strength, Die B | ASTM D6264 | ppi | 72 |

Beams, Blast and Windstorm Testing results available upon request.

Technical Information: The technical information, recommendations and other statements contained in this document are based upon tests or experiences that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed. Product Use: Many factors beyond 3M’s control and uniquely within a user’s knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user’s method of application. Warranty, Limited Remedy and Disclaimer: Unless an additional warranty is specifically stated in the applicable 3M product packaging or product literature, 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. IF THIS PRODUCT DOES NOT CONFORM TO THE WARRANTY, THEN THE SOLE AND EXCLUSIVE REMEDY FOR USER IS AT 3M’S OPTION, REPLACEMENT OF THE 3M PRODUCT OR REFUND OF THE PURCHASE PRICE. LIMITATION OF LIABILITY: EXCEPT AS PROHIBITED BY LAW, 3M WILL NOT BE LIABLE FOR ANY LOSS OR DAMAGE ARISING FROM THE 3M PRODUCT, WHETHER DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL, REGARDLESS OF THE LEGAL THEORY ASSERTED (INCLUDING WARRANTY, CONTRACT, NEGLIGENCE OR STRICT LIABILITY). IMPORTANT NOTE: Please consult Federal, State and Local Regulations. State Vehicle Organic Compounds (VOC) regulations may prohibit the use of certain classes of solutions or solvents. You should check with your state environmental authorities to determine whether the use of a solvent or solvent is restricted or prohibited. When using paints, extenders of any waterborne, including paint filters, and follow the manufacturer’s recommendations and directions for use. Some of the products recommended may require the use of Personal Protection Equipment (PPE). Such as gloves and/or respiratory ventilation irritants. Consult the product SDS or IPE recommendations as well as other handling recommendations.

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St. Paul, MN 55144-1000
www.3M.com/windowfilm

IMPORTANT NOTICE: This product is not approved in the State of Florida for use as hurricane, windstorm, or impact protection from wind-borne debris from hurricanes or windstorms. In compliance with Florida Statutes 653.840, this product may not be advertised, sold, offered, promoted, distributed, or marketed in the State of Florida as hurricane, windstorm, or impact protection from wind-borne debris from hurricanes or windstorms.

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SECTION 08871 - SECURITY GLAZING (ALTERNATE BID)

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following where security glazing will be installed in lieu of security window film where indicated on the drawings:
   1. Fire-rated Security Glazing
   2. Laminated Security Glazing
   3. Insulated Security Glass Units

B. Related Sections:
   1. Section 01030 - Alternate Bids.
   2. Section 08110 – Hollow Metalwork
   3. Section 08211 – Wood Doors
   4. Section 08410 – Aluminum/FRP Doors and Aluminum Framing Systems
   5. Section 08415 – Aluminum Storefronts
   6. Section 08900 – Glazed Curtain Wall

1.03 QUALITY ASSURANCE

A. Manufacturers Qualifications: Provide glazing systems produced by a manufacturer with a recommended 5-years successful experience in the fabrication of assemblies of the type and quality required.

B. Installer’s Qualifications: Glazed systems shall be installed by a firm with a recommended 5-years successful experience in the installation of systems like those required.

1.04 ACTION SUBMITTALS

A. Samples: Submit 12 inch square samples of each glass product. Submit 6-inch-long samples of glazing sealant and glazing tape, for color review.

B. Manufacturer’s Data: Submit manufacturers’ technical data and instructions for installing and maintaining each glazing material

1.05 EXTENDED WARRANTIES

A. General: Submit warranties provided by the manufacturer agreeing to repair or replace defective material or workmanship within the specified warranty periods, starting from the date of substantial completion.

   1. Fire Rated Security Glazing: Submit a five (5) year warranty from date of shipping
2. Laminated Security Glazing: Submit a **ten (10) year** warranty against delamination.

3. Insulated Security Glass Units: Submit a **ten (10) year** warranty against defects including loss of seal, interior clouding, and discoloration.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURER**

A. Security Glazing Manufacturers and Fabricators: Subject to compliance with requirements, firms producing glass products which may be incorporated into the work include the following:

1. Armoured One LLC: [www.ArmouredOne.com](http://www.ArmouredOne.com); or approved equal.
   a. Products:
      1) AOTSG416L – 1/4-inch Laminated Security Glass
      2) AOTSG1IGU – 1-inch Insulated Security Glass Unit
      3) AOTSG616FR – 3/8-inch Fire Rated Security Glass

**2.02 AOTSG416L - LAMINATED SECURITY GLAZING**

A. Thickness: 1/4-inch Clear
B. ASTM C1172 – Standard Specification for Laminated Architectural Flat Glass
C. WEY-SA-C1 – Standard for shooter/attack certification and forced entry class 1.
F. UL972 – Standard for Burglary Resisting Glazing.

**2.03 AOTSG1IGU - INSULATED SECURITY GLASS UNITS**

A. Thickness: 1-inch Clear
B. ASTM C1172 – Standard Specification for Laminated Architectural Flat Glass
C. WEY-SA-C3 – Standard for shooter/attack certification and forced entry class 3.

F. UL972 – Standard for Burglary Resisting Glazing.


2.04 AOTSG616FR - FIRE RATED SECURITY GLAZING

A. Thickness: 3/8-inch Fire Rated

B. 20-90 Minute Fire Rating for sidelites, windows, and transoms up to 3,143 sq./in (Max Width 75in. & Max Height 75in. with ½-inch stops)

C. 20-90 Minute Fire Rating for doors (Non-Temp. Rise). up to 2,736 sq./in (Max Width 36in. & Max Height 75in. with 5/8-inch stops)

D. 180 Minute Fire Rating for doors (Temp. Rise) up to 100 sq/in (Max Width 12in. & Max Height 33in. with 5/8-inch stops)

E. Tested in accordance with NFPA 80, NFPA 252, NFPA 257, UL 9, UL 10B, UL 10C, ASTM E2074-00, ASTM E2010-01, ASTM E2074-00, ASTM E2010-01, CAN4-S104 and CAN4-S106.

F. WEY-SA-C2 – Standard for shooter/attack certification and forced entry class 2.


I. UL972 – Standard for Burglary Resisting Glazing.


2.05 GLAZING MATERIALS

A. General: Provide standard color of glazing materials as selected by Architect. Comply with manufacturer's recommendations for applications and conditions at time of installation.
B. Polyurethane Glazing Gasket: Polyurethane gasket or stick tape, color to be selected by Architect, thickness and size as shown on drawings.

C. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

D. Setting Blocks: Neoprene, silicone or EPDM, 70-90 durometer hardness, with proven compatibility with glazing materials used.

E. Spacers: Neoprene, silicone or EPDM, 40-50 durometer hardness with proven compatibility with glazing materials used.

F. Compressible Fillers: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with sealants used, flexible and resilient, with 5-10 psi compression strength for 25% deflection.

G. Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.

H. Dowsil 995 – Dow Corning Corp. (Applied to interior of vision kit to adhere security glazing to the interior or the frame.); or approved equal.

I. Glazing Materials for Fire-Rated Glazing

1. Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to affect an air and vapor seal.

2. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:
   a. Dowsil 795 - Dow Corning Corp.
   b. Silglaze-II 2800 - General Electric Co.
   c. Spectrem 2 - Tremco Inc.
   d. Or approved equal.

3. Setting Blocks: Hardwood or calcium silicate; glass width by 4 inches (102-mm) by 3/16 inch (4.7-mm) thick.

4. Spacers: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.

5. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.
PART 3 – EXECUTION

3.01 GENERAL

A. Each glazing installation must withstand normal temperature changes, and impact loading without failure of glass, failure of sealants or gaskets, deterioration of glazing materials and other defects in the work.

B. Protect glass from damage during handling and installation, and subsequent operation of glazed components of the work. Discard units with edge damage or other imperfections.

C. Glazing channel dimensions are intended to provide for necessary bite on glass, minimum edge clearance, and adequate tape or sealant thicknesses, with reasonable tolerances.

D. Comply with recommendations by manufacturers of glass and glazing products, except where more stringent requirements are indicated, including those of referenced glazing standards.

3.02 PREPARATION

A. Clean glazing channel and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrate.

B. Where sealants are used, apply primer or sealant to joint surfaces where recommended by sealant manufacturer.

3.03 GLAZING

A. Where indicated, provide spacers for size and spacing required for glass sizes larger than 50 united inches, except where gaskets or pre-shimmed tapes are used for glazing. Provide ¼-inch minimum bite of spacer on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.

B. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

C. Where sealants are used at butt joints, apply sealant in thin continuous clear bead. Tool sealant to a uniform, continuous, even profile.

D. Using DOW 995 structural sealant, bond the security glazing to interior of frame, by adding a bead of sealant to the edges of glazing and the framing on both sides of glazing.

E. Apply glazing stops and clean up any excess structural sealants from finished surfaces.

3.04 PROTECTION AND CLEANING

A. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

B. Wash and polish glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish Date of Substantial Completion in each area of project. Comply with glass manufacturer's recommendations for final cleaning.

END OF SECTION 08871
SECTION 08900 - GLAZED ALUMINUM CURTAIN WALL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

A. Furnish and install architectural aluminum curtain wall complete with related components as shown on the drawings and specified in this section.

B. Single Source Requirement

1. All products listed in paragraph 2.01 shall be by the same manufacturer.

1.03 RELATED SECTIONS

A. Section 04200 – Unit Masonry

B. Section 07900 – Joint Sealer Assemblies

C. Section 08410 – Aluminum / FRP Doors

D. Section 08415 – Aluminum Framed Entrances and Storefronts

E. Section 08800 – Glass & Glazing

1.04 SYSTEM DESCRIPTION

A. General: Provide glazed aluminum curtain wall system that has the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project

1. Withstands loads and thermal and structural movement requirements indicated without failure. Failure includes the following:

   a. Air infiltration and water penetration exceeding specified limits.
   b. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

B. Primary components of glazed curtain wall work include the following, including work cross-referenced to other specification sections for requirements:

1. Aluminum curtain wall framing system.
2. Glass and glazing work in curtain wall and window units in the curtain wall system; refer to "Glass and Glazing" section.

3. Joint sealer work that is associated with components of the curtain wall system; refer to "Joint Sealers" section.

4. Anchorages, shims, fasteners, accessories and support brackets for components of the curtain wall system.

5. Refer to Division-8 Section "Aluminum / FRP Doors and Aluminum Framing Systems" for coordination with the work of this section.

C. Glazing is physically and thermally isolated from framing members.

D. System is pressure equalized at its interior face.

E. System is reglazable from the exterior.

F. Wind Loads: Provide glazed aluminum curtain wall system, 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.

1. Provide the manufacturer's stock system, adapted to the application indicated, which has been tested in accordance with ASTM E 330 to withstand at least a uniform pressure of 25 psf inward and 20 psf outward.

G. Deflections and Thermal Movements: Provide manufacturer's stock products and system which are capable of withstanding building movements and weather exposures including wind loading, and which are capable of performing within the following limitations:

1. Normal-to-wall deflection not exceeding 1/200 of the span, except 1/300 for glass supporting members.

2. Parallel-to-wall deflections not exceeding 75 percent of glass edge clearances.

3. Thermal movements resulting from an ambient temperature range of 120 F (67 C), which may cause curtain wall framing range of 180 F (100 C).

H. Leakage Resistance, Water and Air: Provide the manufacturer's standard curtain wall system that has been tested to demonstrate permanent resistance to leakages as follows with a test pressure differential of 20 percent of design loading (excluding operable window or door edge joints, if any):

I. Air Leakage: Not more than 0.06 cfm per sq. ft. at 6.24 psf of wall area when tested in accordance with ASTM E 283.
J. Water Penetration: Provide glazed aluminum curtain wall system that does not evidence water leakage when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 15 lbf/sq. ft.

1. Uncontrolled water infiltrating system or appearing on system's normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

K. Condensation Requirements: Provide the manufacturer's standard or improved thermal-break construction which has been tested and certified by the manufacturer, in accordance with AAMA 1503, with 0 F (-18 C) outside and 25% relative humidity inside, to provide a condensation resistance factor (CRF) of at least 79 for framing system.

L. Thermal Transmittance: Provide window units which have a "U"-value maximum of 0.64 BTU/hour/sq. ft./deg. F at 15 mph exterior wind velocity.

M. Thermal Movements: Provide glazed aluminum curtain wall system, including anchorage, that accommodates thermal movements of system and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, noise or vibration, and other detrimental effects.

1. Test High Exterior Ambient Air Temperature: That which produces an exterior metal surface temperature of 180 F.

2. Test Low Exterior Ambient Air Temperature: That which produces an exterior metal surface temperature of 0 F.

3. Test Interior Ambient Air Temperature: That which produces an exterior metal surface temperature of 75 F.

N. Structural Support Movement: Provide glazed aluminum curtain wall system that accommodates structural movements including, but not limited to, sway, twist, column shortening, long-term creep, and deflection.

O. Dimensional Tolerances: Provide glazed aluminum curtain wall system, including anchorage, that accommodates dimensional tolerances of building frame and other adjacent construction.

1.05 QUALITY ASSURANCE

A. Delegated Design:

1. Professional Engineer Qualifications: A professional engineer who is legally qualified 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 installations of glazed aluminum curtain wall systems that are similar to those indicated for this Project in material, design, and extent.

a. Glazed aluminum curtain walls and associated components indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by a qualified professional engineer responsible for their preparation in the State of New Jersey.

2. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing glazed aluminum curtain wall systems similar to those required for this Project and who is acceptable to manufacturer.

a. Engineering Responsibility: Prepare data for glazed aluminum curtain wall systems, including drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Source Limitations: Obtain each type of glazed aluminum curtain wall system from one source and by a single manufacturer.

C. Testing Agency Qualifications: Demonstrate to Architect's satisfaction, based on Architect's evaluation of criteria conforming to ASTM E 699, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

D. Product Options: Information on Drawings and in Specifications establishes requirements for system's 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 and relationships to one another and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code–Aluminum."

1. Engage welders who have satisfactorily passed AWS qualification tests for welding processes involved and who are currently certified for these processes.

F. Mockups: Prior to installing glazed aluminum curtain wall system, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for Work.
1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.

2. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.

3. Demonstrate the proposed range of aesthetic effects and workmanship.


5. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   a. When directed, demolish and remove mockups from Project site.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." Review methods and procedures related to glazed aluminum curtain wall system including, but not limited to, the following:

1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.

2. Review structural loading limitations.

3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

4. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions.

1.06 FIELD TESTING AND PERFORMANCE REQUIREMENTS

A. Test Units

1. Air, water, and structural test unit size shall be a representative sample of typical construction and shall have no outstanding punch list or other visible defects. If no test area and/or location have been identified, the persons doing the test shall select an area. This area shall be selected to provide representative performance data, usually a minimum of 100 ft². The area to be tested shall include perimeter caulking, typical splices, frame intersections, and, if applicable, at least 2 entire vision lites and 2 entire spandrel lites containing an intermediate horizontal member. All operable components within the test area shall be isolated and exempt from the test procedure.

B. Test Procedures and Performance

1. Air Infiltration Test
a. Test unit in accordance with AAMA 503-03 for field testing. The unit test shall be conducted at a minimum uniform static test pressure differential of at least 1.57 psf (75 Pa), but at a pressure differential not to exceed 6.24 psf (300 Pa).

b. The maximum allowable rates of air leakage for field testing shall not exceed 1.5 times the project specification rate or .09 cfmSF (.45 l/s • m²), whichever is greater.

2. Water Resistance Test

a. Test unit in accordance with AAMA 503-03.

b. The field water penetration resistance tests shall be conducted at a static test pressure of two-thirds of the specified project water penetration test pressure, but not less than 6.24 psf (300 Pa).

1.07 QUALITY ASSURANCE

A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in 1.05.

B. Test reports shall be accompanied by the curtain wall manufacturer’s letter of certification stating that the tested curtain wall meets or exceeds the referenced criteria for the appropriate curtain wall type.

1.08 SUBMITTALS

A. Shop Drawings: Submit shop drawings showing adaptation of the manufacturer's standard system to the project; include typical unit elevations at 1/2" scale and details at 3" scale, to show dimensioning, member profiles, anchorage system, interface with building construction, and glazing. Indicate the section module of wind-load-bearing members, and calculations of stresses and deflections for performance under design loading. Show clearly where and how the manufacturer's system deviates from contract drawings and these specifications.

1. Drawings and structural calculations shall be prepared, signed and sealed by a structural engineer licensed in the State of this project and shall be for all indicated systems including solar shading devices.

   a. Engineering Responsibility: Manufacturer’s fabrication and shop drawings, design calculations and other structural data shall be prepared, signed and sealed by a qualified structural engineer licensed in the State of this project.

B. Product Data: Submit manufacturer's specifications for materials and fabrication of curtain wall, and instructions and recommendations for installation and maintenance. Include certified test reports showing compliance with requirements where a test method is indicated.

C. Samples: Submit samples of each type and color of aluminum finish, on 12" long sections of extrusions or formed shapes and on 6" squares of sheet or plate. Include 2 or more samples in each set, showing near-limits of variations, if any, in color and texture of finish.
D. The Architect reserves the right to require fabrication samples showing the following:

Prime members.
Joinery.
Anchorage.
Expansion provisions.
Glazing and similar details.
Profiles.
Intersections.

E. Test Reports: Submit certified copies of previous test reports which have been performed by Independent Laboratory substantiating performance of the system and indicating compliance with requirements of the Contract Documents.

F. Certificates of Conformance: Submit Manufacturer/Installer/Contractor certificates indicating conformance with specified system. Certificates shall be signed and notarized by an authorized officers and representatives.

1.09 WARRANTIES

A. Total Curtain Wall Installation

1. The responsible contractor shall assume full responsibility and warrant for two (2) years the satisfactory performance of the total curtain wall installation. This includes the glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc. as it relates to air, water, and structural adequacy and the specifications and approved shop drawings.

2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at their expense during the warranty period.

B. Window Material and Workmanship

1. Provide written guarantee against defects in material and workmanship for ten (10) years from the date of final shipment.

C. Glass

1. Provide written warranty for insulated glass units, that they will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship.

2. Warranty period shall be for ten (10) years.

D. Finish: Warranty period shall be for ten (10) years from the date of final shipment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
A. **Basis of Design:** “Series 5600 Outside Glazed Aluminum Curtain Wall System” as manufactured by EFCO Corporation; or approved equal.

B. **Subject to compliance with requirements, manufacturers of equivalent products which may be incorporated in the work include but not limited to the following:**

1. Kawneer Company Inc.
4. Tubelite.
5. Or approved equal.

### 2.02 MATERIALS

A. **Aluminum:** Extruded aluminum shall be 6063-T6 alloy and temper. Provide members such as extrusions, formed members, sheet and plate, of the alloy, temper and thickness recommended by the manufacturer to comply with the requirements of ASTM B 221 for extrusions, and ASTM B 209 for sheet or plate.

B. **Glazing Gaskets:** Provide manufacturer's standard sealed-corner pressure-glazing or wedge-lock dry glazing system of black, resilient elastomeric glazing gaskets, setting blocks and shims or spacers as required; hardness as selected by curtain wall manufacturer.

C. **Gasket Material:** Provide extruded or molded EPDM synthetic rubber gaskets, compound as recommended by the curtain wall manufacturer.

D. **Glass is specified in Section 08800 - Glass and Glazing.**

E. **Framing System Gaskets and Joint Fillers:** Provide the curtain wall manufacturer's standard permanent type framing system gaskets and joint fillers, depending on joint movement and sealing requirements, such as sliding joints, compression joint translation, or non-moving joints.

F. **Sealants and joint fillers are specified in "Joint Sealers" section, both for joints within the curtain wall construction and for joints at the interface of curtain wall construction and other work.**

G. **Brackets and Reinforcements:** Where feasible, provide the manufacturer's standard high-strength aluminum units; otherwise provide non-magnetic stainless steel. At the fabricator's option, brackets not exposed to weather or abrasion may be hot-dip galvanized steel complying with requirements of ASTM A 386. Provide non-staining, non-ferrous shims for installation and alignment of curtain wall work.

H. **Concealed Flashing:** Provide dead-soft 26-gauge stainless steel concealed flashing, of type selected for compatibility by the manufacturer.

I. **Fasteners and Accessories:** Provide the manufacturer's standard non-corrosive fasteners and accessories that are compatible with materials used in the framing system and with exposed
portions that match finish of the curtain wall system. Where movement should be expected, provide slip-joint linings of sheets, pads, shims, or washers of fluorocarbon resin or a similar material recommended by the manufacturer.

J. Where fasteners anchor into aluminum less than 0.125” thick, provide non-corrosive pressed-in splined grommet nuts or other type reinforcement to receive fastener threads.

K. Concrete or Masonry Inserts: Provide cast-iron, malleable iron or hot-dip galvanized steel inserts complying with requirements of ASTM A 386.

L. Anchors: Perimeter and floor line anchors shall be aluminum or steel. All steel anchors shall be properly insulated from the aluminum.

M. Thermal Barrier: The thermal barrier shall be extruded PVC used as an applied thermal isolator.

2.03 FABRICATION

A. General: All aluminum vertical and horizontal extrusions shall have a minimum wall thickness of .093” (2.3 mm) to .125” (3 mm).

B. Frame:

1. Frame components shall be mechanically fastened by means of extruded aluminum shear blocks attached to vertical mullions.
2. Curtain wall system is able to accommodate separate interior and exterior finishes and colors.

C. Glazing: Outside glazed curtain wall system shall be dry glazed with an exterior aluminum pressure plate and snap cover with interior and exterior dense EPDM preset gaskets.

A. Finish:

1. Class I, Color Anodic Finish: AA-M12C22A42/A44 etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker complying with AAMA 611.
   a. Color: Medium Bronze (to match the existing).
PART 3 - EXECUTION

3.01 INSPECTION

A. Job Conditions

1. All openings shall be prepared by others to the proper size and shall be plumb, level, and in the proper location and alignment as shown on the architect's drawings.

2. Provide for manufacturer representation to conduct pre-installation site meeting.

3.02 INSTALLATION

A. Use only skilled tradesmen with work done in accordance with approved shop drawings and established specifications, and erect all curtain wall components to all building bench marks and column center lines.

B. Plumb and align curtain wall faces in a single plane for each wall plane, and erect curtain wall materials square and true. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, building movement, and specified wind loads.

C. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material, leave all exposed surfaces and joints clean and smooth.

3.03 ANCHORAGE

A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.04 PROTECTION AND CLEANING

A. The General Contractor shall protect the aluminum materials and finish against damage from construction activities and harmful substances. The General Contractor shall remove any protective coatings as directed by the Architect, and shall clean the aluminum surfaces as recommended for the type of finish applied.

END OF SECTION 08900
SECTION 08950 - FIBERGLASS SANDWICH WALL PANEL ASSEMBLIES

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

A. The General Conditions, Supplementary Conditions, Instructions to Bidders, and Division 01- General Requirements shall be read in conjunction with and govern this section.

1.2 SECTION INCLUDES

A. Translucent sandwich panel wall systems.

1.3 RELATED SECTIONS

A. Section 04200 – Unit Masonry
B. Section 05120 – Structural Steel
C. Section 05400 – Miscellaneous Structural Steel
D. Section 05500 – Metal Fabrications
E. Section 07600 – Flashing, Sheet Metal and Roof Accessories
F. Section 07900 – Joint Sealer Assemblies
G. Section 08411 – Insulated Aluminum Panels
H. Section 08900 – Glazed Aluminum Curtain Wall.

1.4 ADMINISTRATIVE REQUIREMENTS FOR SEQUENCING

A. Ensure that locating templates and other information required for installation of wall system(s) are furnished to affected trades in time to prevent interruption of construction progress.

B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.5 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including preparation instructions and recommendations, storage and handling requirements, installation methods and maintenance instructions.

B. Shop Drawings: Include plans, elevations, sections, and details, indicating dimensions, tolerances, profiles, anchorage, connections, fasteners, provisions for expansion and contraction, drainage, flashing, finish, glazing, and attachments to other Work.
C. Samples:

1. Submit sample sets of color chips for initial selection representing manufacturer's full range of available colors and finishes.
2. Submit samples for verification, consisting of at least one sample, minimum 6 inches high by 12 inches wide, representing actual product (including framing) and color(s).

D. Delegated Design Data:

1. Submit manufacturer's structural calculations of full assembly showing sizes of framing members and loads applied to supporting structure based on design loads.
2. Submit any required signed and sealed structural calculations prepared by a qualified professional engineer who is licensed in the state where system is to be installed.

E. Manufacturer's Certificates: Submit documentation certifying products meet or exceed specified requirements.

F. Sustainable Design Submittals:

1. Submit material as requested, including percentages by weight of post-consumer/post-industrial recycled content, locally manufactured/harvested materials and any applicable VOC content.

G. Test Reports: Submit certified test reports from a qualified independent testing agency, indicating wall systems comply with specified requirements. Submit results from the following:

1. Flame spread and smoke development, ASTM E 84.
2. Burn extent, ASTM D 635.
3. Color change, ASTM D 2244 in accordance with ASTM D 1435.
4. Impact strength, exterior face sheets, UL 972.
5. Accelerated aging, ASTM D 1037.
10. Air infiltration, ASTM E 283.
14. Certification authorization under the NFRC PCP (Framing and Panel).

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Recommended minimum of ten years documented experience in the fabrication of wall systems of the type required for this project and capable of providing field service representation during installation.
B. Installer Qualifications: Recommended minimum of five years documented experience in the work of this section, specializing in work similar to project requirements and approved by manufacturer.

C. Delegated Design:

1. Professional Engineer Qualifications: A professional engineer who is legally qualified 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 installations of glazed aluminum curtain wall systems that are similar to those indicated for this Project in material, design, and extent.

   a. Translucent sandwich panel wall system and associated components indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by a qualified professional engineer responsible for their preparation in the State of New Jersey.

2. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing translucent sandwich panel wall systems similar to those required for this Project and who is acceptable to manufacturer.

   a. Engineering Responsibility: Prepare data for translucent sandwich panel wall systems, including drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, and installation location.

B. Storage/Handling: Store products above the floor and under cover in a clean, dry area until installation. Protect materials and finish from damage during handling and installation.

1.8 SITE 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 recommended limits.

1.9 WARRANTIES

A. Material Workmanship: Provide manufacturer's two (2) year warranty.

B. Exterior Fiberglass Color Change: Provide manufacturer's standard ten (10) year warranty.

C. Fiberglass Fiberbloom: Provide manufacturer's standard twenty-five (25) year warranty.
1. Metal Finishes: Medium Bronze Anodize (to match existing / new glazing framing systems).
2. Provide manufacturer's standard five (5) year warranty.

PART 2 – PRODUCTS

2.1 TRANSLUCENT WALL SYSTEMS

A. Guardian 275® Translucent Wall System; or approved equal.

2.2 DESIGN / PERFORMANCE REQUIREMENTS

A. Performance Requirements:
   1. Framing Members: Sufficient sizes, as required to support design loads.

B. Deflection Limits: Shall not exceed: L/120 per IBC code requirements.

C. Safety Factors: Allowable stresses shall incorporate following safety factors, unless otherwise specified: Load Carrying Members: 1.65, Load Carrying Fasteners: 2.0.

D. Expansion and Contraction: Design and install components with provisions for expansion and contraction due to a 100 degree F (56 degrees C) temperature variation.

E. Structural Loads: Provide system capable of handling the following loads when supporting full dead load:
   1. Positive Wind Load: 31 PSF
   2. Negative Wind Load: 31 PSF

2.3 MANUFACTURERS

A. Major Industries Inc., 7120 Stewart Ave, Wausau, WI 54401; Amy Stalbosky, representative, Tel: 888-759-2678; Fax: 715-848-3336; info@majorskylights.com; or approved equal.

B. Requests for substitutions considered in accordance with provisions of AIA A232 and Section 00800.

2.4 COMPONENTS

A. Translucent Panel Units:
      b. Panel Maximums: 5 feet (1.52 m) wide / 20 feet (4.88m) long.
      c. U-Factor: Center of Panel U-factor
1) 2-3/4 inch:
   a) 0.20 (Insul 24).

d. Grid Pattern: As indicated on the drawings.

e. Unbonded Areas: Maximum of 4 unbonded areas, a maximum of 3/64 inch (.11 mm) in diameter, in an area a maximum of 40 square feet of panel surface.

f. Panel Weeps: Weep holes provided on down slope side of installed panels to permit condensation to leave panel interior.


g. Panel Corners: Notch and interlock or reinforce with aluminum for radius conditions.

h. Assembly: Factory assembled. Field assembly of panels not allowed.

2. Physical Properties:
   a. ASTM E 108 - Burning Brand: Class A rating.

   b. ASTM E 72 and E 330 - Uniform Load Deflection.

   c. ASTM E 661 - Concentrated and Impact.

   d. ASTM E 283 - Air Infiltration through fixed panel system and perimeter framing: less than 0.01 cfm/ft air leakage at 6.24 psf air pressure.

   e. ASTM E 331 - Water penetration through fixed panel system and perimeter framing. No leakage when water is applied to entire panel surface at rate of 5 gal/hr/sq ft for 15 minutes at 12 psf air pressure.

3. I-Beam Grid Core:

   b. 7/16 inch (11 mm) minimum flange width, 0.050 inch (1.27 mm) web thickness.

   c. Full surface contact with face sheets.

4. Adhesive:
   a. Waterproof resin for use in laminating face sheet to aluminum grid core.


   c. Adhesive Bond Line: Straight, black, cover entire width of I-beam, with neat edge.


5. Translucent Face Sheets:
   a. Appearance of Face Sheets:
      1) Uniform in color to prevent splotchy appearance.

      2) Free of ridges, wrinkles, clusters of air bubbles and pinholes.

      3) ICC-ES listed (ER 2026).

   b. Exterior Face Sheet:
      1) ASTM D 2244: Color change shall not exceed 3.0 Delta E units after 15 years of weathering (accelerated Arizona / simulated South Florida testing).
2) Protective Weathering Surface:
   a) Application: Factory-applied.
   b) Minimum Thickness: 1.0 mil.
   c) Repairs: Fully field repairable.
3) Impact Strength, UL 972 / Thickness:
   a) Standard - 60 foot-pounds / 0.070 inches (1.77 mm).
4) Color:
   a) Desert Rose.

   c. Interior Face Sheet:
      1) Flame Spread, ASTM E 84: 10 maximum.
      2) Smoke Development, ASTM E 84: 300 maximum.
      3) Burn Rate, ASTM D 635: 1.0 inch per minute maximum.
      4) Self-Ignition, ASTM D 1929: Greater than 650 degrees F.
      5) Thickness:
         a) High-impact - 0.060 inches (optional).
      6) Color:
         a) White.

B. Components and Framing:
   1. Aluminum:
      c. Minimum Thickness: 0.040 inch.
   2. Interior/Exterior Glazing Gaskets:
      a. Factory installed (in extruded dovetail slots) EPDM hybrid, 9/16 inch wide.
      b. Compression Deflection, 25% Deflection Limits, ASTM D 1056, 13 to 24 psi.
      c. Compression Set, 22 Hours at 158 degrees F, ASTM D 395, Method B: 30 psi.
      d. Heat Aging, 70 Hours at 212 degrees F, Change in Compression Values, ASTM D 865 and D 1056: 0 to 10 psi.
      e. Ozone Resistance at 40% Elongation, 100 Hours at 104 degrees F, ASTM D 1149:
         Type I, 1 Ppm Ozone: No cracks / Type II, 3 Ppm Ozone: No cracks.
      f. Straining of Surface, ASTM D 925: Non-straining, no migratory strain.

C. Condensation Control System:
   1. Mechanically design to function properly with minimal dependency upon sealants.
   2. Provide an integral gutter system on all framing members.

D. Custom Designs: 3D modeling used to verify custom fitting and assembly.

E. Expansion and Contraction: Design and install components with provisions for expansion and contraction due to a 100 degree F temperature variation.

F. Concealed Fastener Glazing Caps:
   1. Extruded aluminum.
   2. Attach with fasteners a maximum of 12 inches on center or as required to resist negative loading.
   3. Fastener covers with finish to match system framing.
G. Fasteners:
   2. Construction and Glazing Cap Fasteners: 18-8 stainless steel - include gasketed sealing washers.
   3. Field Anchors: Cadmium plated, unless otherwise specified.

2.5 FABRICATION

A. Construct wall systems of extruded aluminum shapes similar to sections indicated on the Drawings.

B. Weep Holes Components: Located as required to control condensation and allow it to pass to the exterior.

2.6 ALUMINUM FINISH

A. Anodized Coating: Architectural Class I pigmented anodized, Type AA-M10C22A42/A44.
   1. Color: Medium Bronze (to match existing).

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine areas to receive translucent wall system with installer and manufacturer's representative present, including supporting structure and substrate for dimensions, tolerances, material conditions, and support.

B. Notify Architect of conditions that would adversely affect installation or subsequent utilization of wall system and do not proceed until conditions are corrected.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Ensure supports to receive wall system are clean, flat, level, plumb, and square.

C. Aluminum Protection: Where aluminum will contact dissimilar materials, apply a coating of bituminous paint or other neutral material or separate with a nonabsorbent isolator.

3.3 INSTALLATION

A. Install wall systems level, plumb, square, and accurately aligned, and in accordance with manufacturer's instructions at locations indicated on the approved drawings.

B. Do not install wall system components with deficiencies or dimensional errors. Do not proceed with installation until unsatisfactory components are replaced.

C. Anchor wall system securely to supports using attachment methods that permit adjustment for construction tolerances, irregularities, alignment, and expansion and contraction.
D. Install wall system and related components as required for a complete, weatherproof installation.

3.4 FIELD QUALITY CONTROL

A. Water Test: Test wall system according to procedures in AAMA 501.2.
B. Repair or replace work that does comply with specified requirements and retest work.
C. Examine installation of sheet metal flashing and sealants.
D. Examine all face sheets for cracks, deep scratches, and other damage, and inspect protective weathering surface of exterior sheet. Repair in accordance with manufacturer's instructions.

3.5 CLEANING

A. Clean wall system inside and outside, including member connections and inside corners, immediately after installation and after sealants have cured, but not more than 10 days after installation.
B. Follow related cleaning instructions in accordance with manufacturer's recommendations.

3.6 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 08950
SECTION 09250 - GYPSUM DRYWALL

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. Extent of each type of gypsum drywall construction required is indicated on the drawings.

B. This Section includes the following types of gypsum board construction:

1. Gypsum drywall including screw-type metal support system
2. Impact resistance gypsum wallboard
3. Sound Attenuation Insulation
4. Drywall finishing (joint tape and compound treatment)
5. Vinyl trim and accessories.
6. Resilient wall channels.
7. Exterior gypsum core sheathing and accessories.
8. Knee Wall Brace Kit.

C. Related Sections:

1. Section 05450 - Cold-Formed Metal Framing.
2. Section 09900 - Painting.
3. Section 09940 - Wall Corner Protection Guard.

1.3 QUALITY ASSURANCE

A. Manufacturer: Obtain gypsum board products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards.

B. Single Source Responsibility: Obtain each type of gypsum board and related joint treatment materials from a single manufacturer.

C. Fireblocking and Draftstopping: Comply with the International Building Code requirements for installation of fireblocking and / or draftstopping, to prevent the fire passage of flame and product of combustion through concealed spaces or openings in gypsum board systems, in the event of fire.

D. Provide self extinguishing vinyl trim accessories which do not support combustion once flame source is removed.

1.4 REFERENCES

A. ANSI/ASTM C 840 Gypsum Board Standard - Comply with applicable requirements for application and finishing of gypsum board, unless otherwise indicated.
B. ASTM C 1396  Gypsum Wallboard Standard:

C. ASTM C 754  Steel Framing Standard - Comply with applicable requirements for installation of steel framing for gypsum board.

D. ASTM C11:  Gypsum Board Terminology Standard:

E. ASTM C 1278  Impact Resistance Gypsum Wallboard:


1.5  SUBMITTALS

A. Product Data: Submit manufacturer's product specifications and installation instructions for each gypsum drywall component, including other data as may be required to show compliance with these specifications.

1. Provide product data for impact resistance gypsum wallboard system.

B. Shop drawings: Submit shop drawings for wall metal stud framing for structural heavy gauge wall studs supporting other equipment, items, cabinets, etc.

1. Show layout, spacings, sizes, thicknesses, and types of metal framing, fabrication, fastening and anchorage details, including mechanical fasteners.

2. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachments to other units of Work.

3. Indicate manufacturer’s design thickness to meet structural performance requirements for each wall mounted item, equipment, cabinet, etc.

C. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
3. **Product Certificates for Credit MR 5:** For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.
   a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
   b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.

4. **Product Data for Credit IEQ 4.1:** For adhesives used to laminate gypsum board panels to substrates, documentation including printed statement of VOC content.

5. **Laboratory Test Reports for Credit IEQ 4:** For adhesives used to laminate gypsum board panels to substrates, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

6. **For acoustical sealants,** including printed statement of VOC content.

D. **Samples for the following products:**
   1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.6 **DELIVERY, STORAGE, AND HANDLING**

A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.

C. Handle gypsum boards to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

1.7 **PROJECT CONDITIONS**

A. Environmental Conditions, General: Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.
   1. Minimum Room Temperatures: When ambient outdoor temperatures are below 55°F maintain continuous, comfortable building working temperature of not less than 55°F for 48 hours prior to application and continuously thereafter until drying is complete.
2. Ventilate building spaces as required to remove water in excess of that required for
drying joint treatment material immediately after its application. Avoid drafts during
dry, hot weather to prevent materials from drying too rapidly.

3. The gypsum drywall shall be installed only when the exterior walls have been erected,
windows installed and the permanent roof is installed and in watertight condition to
prevent the growth of mold. The contractor shall not install gypsum drywall panels that
are wet, have the indication of mold, including but not limited to: fuzzy or splotchy
surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers
offering products which may be incorporated in the Work include, but are not limited to, the
following:

B. Metal Support Systems:
1. Allied Structural Industries
2. Clark-Dietrich Building Systems
3. National Gypsum Company
4. Marino\WARE; a Div. of WARE Industries, Inc.
5. United States Gypsum Co. (USG)
6. Or approved equal

C. Gypsum Boards and Related Products:
1. CertainTeed Gypsum.
2. Georgia-Pacific Corp.
4. United States Gypsum Co.
5. Continental Building Products
6. Or approved equal

D. Gypsum Core Sheathing:
1. Georgia-Pacific Corp.
2. United States Gypsum Co. (USG)
3. Continental Building Products
5. Or approved equal

E. Impact Resistance Gypsum Wallboard:
1. United States Gypsum Co. (USG)
2. National Gypsum Co.
3. Georgia-Pacific Gypsum, LLC
4. Continental Building Products
5. CertainTeed Gypsum.
6. Or approved equal
F. Vinyl Trim
   1. Trim-Tex,
   2. Or approved equal.

G. Sound Isolation Clip:
   1. PAC International, Inc.
   2. Or approved equal.

2.2 METAL SUPPORT MATERIALS

A. General: Provide components which comply with ASTM C754 for materials and sizes, unless otherwise indicated.

B. Ceiling Support Materials and Systems
   1. General: Size ceiling support components to comply with ASTM C754 unless otherwise indicated.
   2. Main Runners: Steel channels with rust inhibitive paint finish, hot or cold-rolled.
   3. Hanger Wire: ASTM CA641, soft, Class 1 galvanized.
   4. Hanger Anchorage Devices: Devices applicable to the indicated method of structural anchorage for ceiling hangers and whose suitability for use intended has been proven through standard construction practices or by certified test data. Size devices for 3x calculated load supported.
   5. Furring Member: ASTM C645; 0.0179" minimum thickness of base metal, hat-shaped.
   6. Furring Anchorages: 16 gauge galvanized wire ties, manufacturer's standard wire type clips, bolts, nails or screws as recommended by furring manufacturer and complying with C754.
   7. Direct Suspension Systems: Manufacturer's standard zinc coated or painted steel system of furring runners, furring tees, and accessories designed for concealed support of gypsum drywall ceilings, of proper type for use intended.

C. Wall/Partition Support Materials
   1. Studs ASTM C645, 25 gauge unless otherwise indicated. 20 gauge minimum at door jambs and wherever structural or other gauge studs are called for, for use with impact resistant type gypsum wallboard, and to comply with applicable published instructions and recommendations of gypsum board manufacturer or, if not available, of "Gypsum Construction Handbook" published by United States Gypsum Company.
      a. Depth of Section: 3-5/8 inch, unless indicated otherwise.
      b. Runners: Match studs; type recommended by stud manufacturer for floor and ceiling support of studs, and for vertical abutment of drywall work at other work.
c. Provide structural heavy gauge studs and bracing to support loads of wall mounted items, equipment, cabinets, etc. coordinate with other trades for weight requirements and mounting locations.


3. Fasteners for Stud Members: Provide fasteners of type, material, size, recommended by furring manufacturer for the substrate and application indicated.

D. Metal Furring Support Materials

1. Roll-formed, hat-shaped sections made of 20-ga. Corrosion-resistant steel. Designed for screw attachment of gypsum panels. Size 7/8" x 2-9/16"; length 12'; and to comply with applicable published instructions and recommendations of gypsum board manufacturer or, if not available, of "Gypsum Construction Handbook" published by United States Gypsum Company; or approved equal.

E. Knee Wall Brace Kit:

1. Basis of Design: “SKB” Knee Brace Kit as manufactured by Pittcon Softforms® LLC, Tel.# 800.637.7638 / 301.927.1000; or approved equal.

2. The welded steel assembly consists of a 2" x 2" steel tube, 1/8" thick wall and a 3½" x 5" x 1/4" thick steel base plate with four (4) holes of 7/16" diameter. The assembly shall be painted with a flat black primer providing a corrosive resistant surface compatible with plaster, joint compounds and interior finishes.

   a. Manufacturer recommends anchoring the base plate using 3/8" x 3½" masonry fasteners with expanded shields for mounting in concrete floor.

2.3 GYPSUM BOARD

A. General: ASTM C1396, in maximum lengths available to minimize end to end joints.

1. Type: Regular, unless otherwise indicated.
2. Edges: Tapered.
3. Thickness: 5/8 inch, unless otherwise indicated.


1. Basis of Design: “Mold Tough VHI Firecode Core” High-Impact-Resistant Panels with Moisture and Mold Resistance; United States Gypsum Co.; or approved equal.

2. Subject to compliance with requirements of the Contract Documents, manufacturers offering products which may be incorporated in work include the following:
2.4 GYPSUM BOARD CEILING SUSPENSION SYSTEM

A. Heavy-Duty Drywall Furring Tee's: Provide heavy-duty furring system which comply with ASTM C645 and has G40 minimum protective for hot-dipped galvanized process and .0179 steel thickness before application of protective coating.

1. Structural Classification: Comply with ASTM C635 for heavy-duty system.

2. Provide manufacturer's standard suspension system accessories required for each condition indicated on the contract documents.

B. The following system indicated, is the "Basis of Design", other manufacturer's will be considered for substitution, provided they comply with the contract documents and are submitted as per the requirements of AIA A232 and Section 00800;

1. "Perimeter Solutions"; Armstrong World Industries, Inc.; “Drywall Suspension System”; USG Corp.; or approved equal.

2. Main Beam: Double-web steel construction, hot dipped galvanized, 1-1/2" web height with rectangular top bulb, and prefinished 1-1/2" flange; (Item No. HD8906). For fire rated ceilings provide main beam formed to include integral splice for expansion relief. Web is to be formed to receive override cross tee.

3. Primary Furring Cross Tees: Double-web, hot-dipped galvanized steel, 1-1/2" web height with rectangular bulb and hot-dipped 1-1/2" knurled flange.


5. Wall Moldings: Manufacturer’s standard hot-dipped galvanized steel angles or channels as selected by the Architect.

6. Hanger Wire: Hot dipped galvanized steel, 12 gauge, tested to exceed 500 lbs. pull out force.

7. Accessories: Manufacturer’s standard angle clips, direct ceiling clips, acoustical transition clips and other accessories required to allow for use of complete grid system at indicated transitions for walls and ceilings.

2.5 GYPSUM CORE SHEATHING SYSTEM

A. Manufacturer:

1. The following system indicated, is the "Basis of Design", other manufacturer's will be considered, provided they comply with AIA A232 and Section 00800:
a. Basis of Design: "Dens-Glass Gold, Firestop Type X"; Georgia-Pacific Corp.; or approved equal.

b. Subject to compliance with requirements of the Contract Documents, manufacturer offering products which may be incorporated in work include the following:

1) “Securock Glas-Mat Sheathing, Firecode Core Type “X”; by United States Gypsum Co.
2) Exp Sheathing”, by National Gypsum.
3) Or approved equal.

B. Sheathing: Gypsum sheathing, complying with ASTM C1396.

1. Type X, noncombustible gypsum sheathing board core with fiberglass mattes both sides.
   a. Fire resistance: ASTM E136
      1) Flame Spread: 0, as per ASTM E84.
      2) Smoke Developed: 0, as per ASTM E84.

2. Edges and ends: Manufacturer’s standard.


4. Size: 4 feet by 9 feet, or 4 feet by 10 feet, as required for coordination with framing.

5. Fasteners: ASTM C 954; self-drilling, self-tapping, bugle head galvanized or cadmium-plated steel screws.

6. Joint tape: Manufacturer’s approved types, self-adhering fiberglass mesh compatible with sheathing panels.

7. Joint Sealant:
   a. Types approved by manufacturer of sheathing panels, for long term joint protection.
      1) Basis of Design: “Elmer’s Siliconized Acrylic Lates”, Borden, Inc.; or approved equal.
      2) Warranty: Twenty (20) year manufacturer’s standard warranty.

8. Provide miscellaneous materials as produced or recommended by manufacturer of gypsum sheathing products.

9. Warranty: Manufacturer’s standard warranty against material defects.
   a. Warranty period: Five (5) years, start at approved date for substantial completion.
C. Silicone Emulsion Sealant: Product complying with ASTM C834, compatible with sealant tape and gypsum sheathing, recommended by manufacturers of both sheathing and tape for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Product: Subject to compliance with requirements, provide Elmer’s Siliconized Acrylic Latex Caulk; Borden, Inc.; or approved equal.

   a. Warranty: Twenty (20) year manufacturer’s standard warranty.

2.6 TRIM ACCESSORIES

A. General: Provide manufacturer’s standard trim accessories of types indicated for drywall work, formed of galvanized steel unless otherwise indicated, with either knurled and perforated or expanded flanges for nailing or stapling, and beaded for concealment of flanges in joint compound. Provide corner beads, L-type edge trim beads, J-type edge trim beads, special L-kerf type edge trim beads, and one-piece control joint beads.

B. Semi-Finishing Type: Manufacturer’s standard trim units which are not to be finished with joint compound (non-beaded), where indicated.

2.7 JOINT TREATMENT MATERIALS (GYPSUM BOARD APPLICATION)

A. General: Provide materials complying with ASTM C475, ASTM C840, and recommendations of manufacturer of both gypsum board and joint treatment materials for the application indicated.

B. Joint Tape: Manufacturer’s recommended types for indicated applications. Use types compatible with joint compounds.

C. Joint Compounds: Provide manufacturer’s recommended types for indicated applications.

   1. For interior repair and patching work, provide chemical-hardening-type for bedding and filling, ready-mixed vinyl type or vinyl type powder type for topping.

2.8 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum drywall construction which comply with referenced standards and the recommendations of the manufacturer of the gypsum board.

B. Gypsum Board Screws: ASTM C954 or ASTM C1002.

C. Acoustical Sealant: Water base type, non-drying, non-bleeding, non-staining type; permanently elastic, as recommended by gypsum board manufacturer.

   1. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), 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 E90.
2. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

D. Sound Isolation Clip: Provide and install “Model# RSIC-1 Sound Isolation Clip” as manufactured by PAC International Inc., distributed by Sound [Isolation] Co., Tel.# 888.666.5090; or approved equal.

1. The RSIC-1 is designed for use with any wood framed, steel framed, CMU, or concrete wall and ceiling system where noise control is needed.

2. The RSIC-1 assembly decouples and isolates the gypsum board or plywood from the structure increasing the acoustical performance of the system.

3. With an Acoustical design load rating of 36 lbs per isolator, the RSIC-1 clip can support up to two layers of 5/8” gypsum board when spaced at 24” x 48” oc.

   a. For heavier systems increase the number of isolators to support the additional weight of the system.

4. The RSIC-1 clip fastens directly to the framing or structure creating a 1-5/8” cavity between the face of the framing and the back of the gypsum board.

5. The RSIC-1 stops the noise and vibrations that typically would be allowed to transfer through the structure.

6. The RSIC-1 systems have several UL fire resistive design assemblies from ranging one hour to four hours. The UL assemblies can be found at http://pac-intl.com/fire_ratings_list.html, and on UL.comDISTRIBUTOR.

2.9 SOUND ATTENUATION BLANKETS

A. Products shall be in accordance with ASTM C665-84, Type I semi-rigid unfaced mineral fiber blanket, Class 25 flame spread, thickness as indicated, and/or to achieve a minimum of STC 50 rating for indicated assemblies.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which drywall construction attaches or abuts, preset hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of drywall construction. Do not proceed with installation until unsatisfactory conditions have been corrected.
3.2 PREPARATION OF METAL SUPPORT SYSTEMS

A. Ceiling Anchorages: Coordinate installation of ceiling suspension system with installation of overhead structural systems to ensure that inserts and other structural anchorage provisions have been installed to receive ceiling anchors in a manner that will develop their full strength and at spacing required to support ceiling.

1. Furnish concrete inserts and other devices indicated, to other trades for installation well in advance of time needed for coordination with other construction.

3.3 INSTALLATION OF METAL SUPPORT SYSTEMS

A. Do not bridge building expansion and control joints with steel framing or furring members; independently frame both sides of joints with framing or furring members or as indicated.

B. Provide furring and shims as required to install new work over existing substrates so that new work will be installed plumb, level and true.

C. Ceiling Support Suspension Systems

1. Secure hangers to structural support by anchorage devices or fasteners.

2. Space main runners 4'-0" o.c. and space hangers 4'-0" o.c. along runners, except as otherwise shown.

3. Level main runners to a tolerance of 1/4" in 12'-0", measured both lengthwise on each runner and transversely between parallel runners.

4. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

5. Direct-hung Metal Support System: Attach perimeter wall track or angle wherever support system meets vertical surfaces. Mechanically join support members to each other and butt-cut to fit into wall track.

6. Space furring member 16" o.c. except as otherwise indicated.

7. Install auxiliary framing at termination of drywall work, and at openings for light fixtures and similar work, as required for support of both the drywall construction and other work indicated for support thereon.

D. Wall-Partition Support Systems:

1. Install supplementary framing, blocking and bracing at terminations in the work and for support of fixtures, equipment services, heavy trim, furnishings, and similar work to comply with details indicated or, if not otherwise indicated, to comply with applicable published recommendations of gypsum board manufacturer or, if not available, of "Gypsum Construction Handbook" published by United States Gypsum Company.
2. Isolate non-load bearing steel stud system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
   a. Install single deep-leg deflection tracks and anchor to building structure.
   b. Connect drift clips to cold-formed metal framing and anchor to building structure.

3. Install runners tracks at floors, ceilings and structural walls and columns where gypsum drywall stud system abuts other work, except as otherwise indicated. Ramset to precast plank.

4. Extend partition stud system through acoustical ceilings and elsewhere as indicated to the structural support and substrate above the ceiling.

5. Frame door openings with vertical studs securely attached by screws at each jamb either directly to frames or to jamb anchor clips on door frame; install runner track sections (for jack studs) at head and secure to jamb studs.

6. Space studs 16 inches o.c. except as otherwise indicated.

7. Extend vertical jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

8. Frame openings other than door openings in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.

9. Provide runner tracks of same gauge as jamb studs. Space jack studs same as partition studs.

10. Cut studs ½" short of full height to provide perimeter relief.

11. Do not fasten studs to top track to allow independent movement of studs and track.

12. Door jambs:
   a. Install double 20 gauge studs at each jamb for all doors.
   b. Space wall furring members 16 inches o.c. except as otherwise indicated.

3.4 APPLICATION AND FINISHING OF GYPSUM BOARD, GENERAL

A. Pre-Installation Conference: Meet at the project site with the installers of related work and review the coordination and sequencing of work to ensure that everything to be concealed by gypsum drywall has been accomplished, and that chases, access panels, openings, supplementary framing and blocking and similar provisions have been completed.

B. Install sound attenuation blankets at all partitions prior to gypsum board unless readily installed after board has been installed.

C. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 24 inches in alternate courses of board.
D. Install ceiling boards across framing in the manner which minimizes the number of end-butt joints, and which avoids end joints in the central area of each ceiling. Stagger end joints at least 24 inches.

E. Install wall/partition boards in manner which minimizes the number of end-butt joints or avoids them entirely where possible.

F. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place.

G. Locate either edge or end joints over supports, except in horizontal applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field-cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.

H. Attach gypsum board to framing and blocking provided for additional support at openings and cutouts.

I. Cover both faces of steel stud partition framing with gypsum board in concealed spaces (above ceilings, etc.)

J. Form control joints and expansion joints at locations indicated (@ 30'-0" o.c. or 900 sf), with space between edges of boards, prepared to receive trim accessories.

K. Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4 inch to ½ inch space and trim edge with "U" bead edge trim. Seal joints with acoustical sealant.

L. Floating Construction: Where feasible, including where recommended by manufacturer, install gypsum board over wood framing, with "floating" internal corner construction.

M. Space fasteners in gypsum boards in accordance with referenced gypsum board application and finishing standard and manufacturer's recommendations.

3.5 METHODS OF GYPSUM BOARD APPLICATION

A. Single-Layer Application: Install gypsum wallboard as follows:

1. On ceilings apply gypsum board prior to wall/partition board application to the greatest extent possible.

2. On partitions/walls apply gypsum board vertically (parallel to framing), unless otherwise indicated, and provide sheet lengths which will minimize end joints.

3. INSTALLATION OF DRYWALL TRIM ACCESSORIES

A. General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.
B. Install corner beads at external corners.

C. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed, and except where plastic trim is indicated. Provide type with face flange to receive joint compound. Install "L" type trim where drywall construction is tightly abutted to other construction and install special kerfed type where other work is kerfed to receive long leg of "L" type trim. Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).

1. Install J-type semi-finishing trim where indicated, and where exterior gypsum board edges are not covered by applied moldings.

D. Install metal control joint (beaded type) where indicated or required.

3.7 FINISHING OF DRYWALL

A. General: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim, and control joints; penetrations; fastener heads, surface defects and elsewhere as required to prepare work for decoration.

B. Prefill open joints and rounded or beveled edges, if any, using setting-type joint compound.

C. Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.

D. Apply joint compounds in 3 coats (not including prefill of openings in base), and sand between last 2 coats and after last coat.

E. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840 and GA-214-07:

1. Level 1: In plenum areas above the ceiling, attics, areas concealed in the building (does not typically meet fire-resistant assembly requirements.

2. Level 5: Areas that are to receive gloss, semi-gloss, enamel or non-textured flat paints.


3.8 GYPSUM SHEATHING INSTALLATION

A. General: Install gypsum sheathing board according to manufacturer's instructions and GA-253 "Application of Gypsum Sheathing."

B. Install tongue-and-groove gypsum sheathing horizontally with long edges at right angles to studs with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent board without forcing. Abut ends of boards over centers of studs and stagger end joints. Fasten gypsum sheathing board to framing with self-drilling, bugle-head screws, as follows:
C. Install square end and edged sheathing vertically with long edges parallel to, and centered over, studs. Install solid blocking where end joints do not bear against framing sills or track. Fasten gypsum sheathing board to perimeter framing and to each stud with self-drilling, bugle-head screws, located a minimum of 3/8 inch (9.5 mm) from ends and edges of board units, as follows:

1. Space fasteners to comply with manufacturer's recommendations.

D. Sheathing Tape: Apply sheathing tape to joints in sheathing; overlap tape by not less than the tape width at joint intersections.

1. For glass-fiber tape, apply approximately a 3/8-inch (9.5-mm) bead of siliconized emulsion sealant to tapes along joints and embed sealant into tapes along their entire surface with a trowel. In addition, apply sealant with a trowel to each exposed fastener so that fasteners are completely covered.

3.9 IMPACT RESISTANCE GYPSUM WALLBOARD INSTALLATION

A. General: Install fiber reinforced gypsum wallboard according to manufacturer's instructions and GA-216 "Application and Finishing of Gypsum Board."

1. Nails and Screws: Corrosion resistant; ASTM C 840.
2. Adhesives: Manufacturer's approved adhesive types.
3. Accessories: Similar to indicated gypsum wallboard application.

3.10 CLEANING AND PROTECTION

A. Remove temporary coverings used to protect other work.

B. Provide final protection and maintain conditions, in a manner suitable to Installer, which ensures gypsum drywall construction being without damage or deterioration at time of Substantial Completion.

END OF SECTION 09250
SECTION 09300 - TILE

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 DESCRIPTION OF WORK

A. Definition: Tile includes tile surfacing units made from clay or other ceramic materials.

B. Extent of tile work is indicated on the drawings and schedules.

C. Type of tile work in this section includes the following:

   1. Quarry Tile.
   2. Porcelain Paver Tile.
   3. Marble Thresholds.

D. Related Work:

   1. Section 03300 - Concrete Work for concrete slabs and slab depressions.
   2. Section 04200 - Unit Masonry.

1.3 QUALITY ASSURANCE

A. Tile manufacturing standard: ANSI 137.1. Furnish tile complying with Standard Grade requirements unless indicated otherwise.

B. Proprietary Materials: Handle, store, mix and apply proprietary setting and grouting materials in compliance with manufacturer's instructions.

C. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.


1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical information and installation instructions for materials required, except bulk materials.

B. Samples for Initial Selection Purposes: Submit manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures and patterns available for each type of tile indicated. Include samples of grout and accessories involving color selection.
C. Samples for Verification Purposes: Submit the following:

1. Samples for each type of tile and for each color and texture required, not less than 12" square, on plywood or hardboard backing and grouted.

2. Full size samples for each type of trim, accessory and for each color.

3. 6" long samples of stone thresholds.

4. Samples of metal edge strip.

D. Certification: Furnish Master Grade Certificates for each shipment and type of tile, signed by manufacturer.

E. Slip-Resistant Tile:

1. ASTM E303, Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester, and has been endorsed by the Ceramic Tile Institute of America (CTIOA) for all types of flooring since 2001.

2. Submit manufacturer’s test data for slip-resistant tile. Tests shall be in conformance with indicated applicable codes and regulations.

F. LEED Submittals:

1. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, freezing, foreign matter or other causes.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

B. Maintain temperatures at not less than 50°F (10°C) in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

1.7 MAINTENANCE MATERIALS

A. Furnish extra materials that match and are from the same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3% of amount installed for each type, composition, color, pattern and size indicated.
2. Grout: Furnish quantity of grout equal to 3% of amount installed for each type, composition, color indicated.

1.8 WARRANTY

A. Limited Warranty:

1. Manufacturer warrants that manufactured products will be free from defect for a period of one (1) year from date of purchase.

   a. Defect is defined as a shortfall in the product to perform to manufacturer’s specifications as disclosed in product literature, within industry allowable tolerances as set forth in standard, national industry protocols.

   b. Manufacturer provides detailed information in its product literature regarding appropriate tile and stone applications. Failure to comply with recommended applications voids this warranty.

   c. This one-year express warranty is the sole warranty extended and replaces any statutory warranties to the maximum extent allowable by law.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Manufacturers of Unglazed Quarry Tile:
   a. American Olean Tile Co., Inc.
   b. Dal-Tile Corp.
   c. Summitville Tiles, Inc.
   d. Or approved equal.

2. Manufacturers of Porcelain Tile:
   a. Crossville, Inc.
   b. Revigres.
   c. Or approved equal.

2.2 TILE PRODUCTS

A. Quarry Tile: Provide flat tile complying with the following requirements:

1. Wearing Surface: Slip-resistant tile without abrasive content “Quarry Textures”; Dal-Tile Corp., or approved equal.

2. Nominal Facial Dimensions: 6" x 6", 8" x 8" as selected by the Architect. Allow for any pattern, (in any areas other than Kitchen Area), including 45 degree layouts as selected by Architect. A

3. Nominal Thickness: ½".
4. Face: Plain.

5. Base: 6" high.

6. Temporary Wax Coating: Protect exposed surfaces of quarry tile against adherence of mortar and grout where indicated below by precoating with wax to produce a continuous film. Use wax which is approved by manufacturers of both tile and grout as being compatible with their materials and with the cleaning method required to remove wax without damage to tile or grout. Apply wax in manner to avoid coating unexposed tile surfaces and edges; handle tile to prevent waxed surfaces from contacting backs or edges of other units.

B. Porcelain Tile:

1. Basis of Design: Provide “Color Blox and Argent” from the entire line, including 20% Accent Colors, as manufactured by Crossville Inc.; or approved equal, comply with following:

   a. Provide nominal facial dimensions: **Wall and Floor: 6" x 6", 6" x 24" and 12" x 24"** or a combination thereof, or patterns as indicated or selected from manufacturers current publications. Allow for any pattern as selected by the Architect, unless pattern is indicated on the drawings.

   b. Nominal Thickness: 3/8" inch.

   c. Provide 6" high x 12" base, unless otherwise indicated.

   d. Finish/Color: To be selected from all available colors and UPS finish. Allow for three colors to be used from the manufacturer’s lines.

C. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:

1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile.

2. Provide trim shapes at head, jamb and sills of openings of same material and finish as field tile, and as follows:

   a. Base: Sanitary cove units.

   b. Internal Corners: Field-butted square, except use square corner, combination angle and stretcher type cap.

2.3 THRESHOLDS

A. Stone Thresholds: Provide sound Group "A" marble threshold of profile indicated with an abrasive hardness of not less than 10.0 when tested in accordance with ASTM C 241. Maximum height ½" above finished floor. Furnish white marble for thresholds, unless otherwise indicated.
2.4 COLOR AND PATTERN

A. As selected by Architect from manufacturer's full color line (including premium colors - Groups 2 through 5) and patterns of each type tile specified. Patterns shall be defined as using not more than 3 different colors of tile in any given area, applied in stripes, diagonals, checkerboard pattern or 45 degree layouts and other designs as determined by the Architect. All selections shall be made from manufacturer's full product lines (including premium colors).

2.5 SETTING AND GROUTING MATERIALS

A. Portland Cement Mortar Installation Materials: Provide materials to comply with ANSI Standards as required for installation method designated, unless otherwise indicated.

B. Latex-Portland Cement Grout: Proprietary compound composed of portland cement with latex additive for a more flexible and less permeable grout. Color as selected by Architect from manufacturer's standard.
   1. Provide product with latex additive which is compatible with latex additive in latex Portland cement mortar.
   2. Products offered by manufacturers to comply with requirements include the following:
      a. Latex Modified Floor Grout: Mapei Corporation.
      b. Laticrete Dry Bond: Laticrete International, Inc.
      c. Or approved equal.

C. Grout for Quarry Tile: Epoxy grout and mortar conforming with specification ANSI A108.6 and 118.3. For applicable ISO material specifications, see ISO R criteria.

2.6 MISCELLANEOUS MATERIALS

A. Tile Cleaner: Product specifically acceptable to manufacturer of tile and grout manufacturer for application indicated and as recommended by National Tile Promotion Federation, 112 North Alfred St., Alexandria, VA 22134 or Ceramic Tile Institute, 700 N. Virgil Ave., Los Angeles, CA 90029. Provide a neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

B. Grout and Tile Sealer: Manufacturer's standard product for sealing tile and grout joints that does not change color or appearance of grout.
   1. Provide colorless and stain resistant penetrating sealer with Ph factor between 7 and 10, that does not affect color or physical properties of tile surfaces.
   2. Products:
      a. Custom Building Products; Surfaceguard Tile and Grout Sealer.
      c. Or approved equal.
3. Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer’s written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

C. WATERPROOFING MATERIALS:

1. Sheet Membrane: 0.030 inch thick chlorinated polyethylene (CPE) sheet with nonwoven polyester laminated to both sides, 60 inches wide.

2. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:
   a. "Dal-Seal TS"; by Dal-Tile Corporation; or approved equal.

D. Waterproofing / Crack Isolation Membrane at Porcelain Tile installation:


2. Single component self-curing liquid rubber polymer that forms a flexible, seamless waterproofing membrane.
   a. Exceeds ANSI A118.10 and A118.12.
   b. Contains antimicrobial product protection.

E. Leveling and Patching Compounds: Latex types as recommended by flooring manufacturer.

F. Finishing & Edge Protection Profiles:

1. Basis of Design: “Quadec, Q 60 AE” as manufactured by Schluter Systems; or approved equal.
   a. Satin anodized aluminum finishing and edge-protection profile for tiled edges.

PART 3 - EXECUTION

3.1 TILE INSTALLATION STANDARDS


B. TCNA Installation Guidelines: TCNA "Handbook for Ceramic Tile Installation (latest edition)"; comply with TCNA installation methods indicated or, if not otherwise indicated, as applicable to installation conditions shown.

C. Comply with manufacturer's instructions for mixing and installation of proprietary materials.
3.2 INSTALLATION

A. Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.

B. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures and other penetrations so that plates, collars, or covers overlap tile.

C. Set marble thresholds in same type of setting bed as field tile, unless otherwise indicated.

D. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise shown.

E. Expansion Joints: Locate expansion joints and other sealant filled joints, including control, contraction and isolation joints, where indicated or where joints occur in substrate. Do not saw cut joints.

F. Grout tile to comply with the referenced standards, using grout material as indicated.

1. Where pregrouted sheets are used, field-grout perimeter of individual sheets with same elastomeric material as used in factory pregrouted sheets.

3.3 FLOOR INSTALLATION METHODS

A. Quarry Tile and Porcelain Tile: Install tile to comply with requirements indicated below for setting bed method, TCNA installation method related to type of subfloor construction, and grout type and in accordance with applicable ANSI installation specifications:

1. Concrete Subfloor, Interior, slab on grade or above-ground: TCNA F112 (bonded).
   a. Mortar: Latex portland cement; ANSI A118.4 or better or ISO C2 or better.
   b. Grout: Epoxy; ANSI A118.3 or ISO RG.

2. Elevated concrete slabs or where indicated: TCNA F122A, thin set, with membrane.
   a. Mortar: Latex portland cement; ANSI A118.4 or better or ISO C2S1 or better unless ANSI A118.1 or ISO C1 is recommended by membrane manufacturer. Must also be recommended by manufacturer for above-ground use.
   b. Grout: Epoxy; ANSI A118.3 or ISO RG.
   c. Waterproof Membrane: ANSI A108.13 or manufacturer’s directions. Comply with plumbing and building codes.
3.4 WALL TILE INSTALLATION METHODS

A. Install types of tile designated for wall application to comply with requirements indicated below for setting bed methods, TCNA installation methods related to subsurface wall conditions, and grout types and in accordance with applicable ANSI installation specifications:

1. Masonry or Concrete, Interior: TCNA W202I.
   a. Mortar: Latex portland cement; ANSI 118.4 or better or ISO C2 or better.
   b. Grout: Latex portland cement; ANSI 118.6 or better or ISO CG1 or better.

   a. Organic Adhesive; ANSI 136.1 (Type I or II) or ISO D1 or better.
   b. Grout: Latex portland cement; ANSI 118.6 or better or ISO CG1 or better.

3.5 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all tile surfaces so they are free of foreign matter.

1. 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.

B. Remove temporary wax coating from quarry tile, using methods recommended by manufacturers of tile and grout.

1. Apply tile and grout sealer in compliance with sealer manufacturer's directions. Repeat application as necessary to obtain uniform color in appearance of both tile and grout.

C. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile work.

D. Protection: When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage and wear.

1. Prohibit foot and wheel traffic from using tiled floors for at least 7 days after grouting is completed.

2. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 09300
SECTION 09510 - ACOUSTICAL CEILINGS

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. Extent of each type of acoustical ceiling is shown and scheduled on the drawings and schedules.

B. Types of acoustical ceilings specified in this section include the following:

1. Lay in acoustical ceiling board, exposed suspension system.
2. Decorative Ceiling Systems.

1.3 QUALITY ASSURANCE

A. Installer: Firm with a recommended three years of successful experience in installation of acoustical ceilings similar to requirements for this project and which is acceptable to manufacturer of acoustical units, as shown by current written statement from manufacturer.

B. Fire Resistance Ratings: As indicated by reference to design designation in UL "Fire Resistance Directory" for floor, roof or beam assemblies in which acoustical ceilings function as a fire protective membrane; tested per ASTM E 119. Provide protection materials for lighting fixtures and air ducts to comply with requirements indicated for rated assembly.

C. Surface Burning Characteristics: As follows, tested per ASTM E 84.

1. Flame Spread: 25 or less.
2. Smoke Developed: 50 or less.

D. All acoustical ceilings shall be installed to conform to the requirements of International Building Code for Category C and the recommendation of the Ceiling and Interior Systems Construction Association (CISCA) for Zone 2 seismic design and comply with installation requirements for areas subject to light to moderate seismic activity.

E. General Contractor shall provide adequate ventilation and humidity control before, during and after ceiling installation to prevent damage (sagging, etc.) to ceilings prior to Owner's acceptance of building.

F. Warranty:

1. Provide manufacturer’s special project warranty against sagging or warping of acoustic ceiling boards for a minimum period of thirty (30) years which starts on approved date of substantial completion.
2. Decorative Ceiling Systems:

   a. Provide manufacturer’s special project warranty against defects in workmanship, discoloration, or other defects considered undesirable by Architect / Owner for a minimum period of **one (1) year** from date of initial acceptance.

G. Unless otherwise approved by the Architect, all Acoustical Ceiling Board types and Suspended Grid System types shall be by a single manufacturer.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required including certified test reports to show compliance with requirements of these specifications.

1. Include manufacturer's recommendations for cleaning and refinishing acoustical units, including precautions against materials and methods which may be detrimental to finishes and acoustical performance.

B. Samples: Submit manufacturer's standard size samples of acoustical units, but not less than 6” square, and of exposed ceiling suspension members including wall and special moldings. Provide samples showing full range of colors, textures and patterns available for each type of component required.

C. Shop Drawings: Submit shop drawings for acoustical ceilings, including layout of system components and details of connections between elements of system and between system and other building components.

1. **Contractor must provide shop drawings certifying that attachment devices meet specified loads. Contractor must coordinate with all other Prime Contractors / Subcontractors for fixture loads, etc.**

D. Certificates: Submit certificates from manufacturers of acoustical ceiling units and suspension systems attesting that their products comply with specification requirements.

E. Testing Reports: Submit testing reports which indicate compliance with indicated requirements.

F. Deliver extra materials to Owner. Furnish extra materials described below matching products installed, packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish quantity of full size units equal to 2.0% (rounded up to the nearest full carton) of each type of acoustic unit installed.

2. Exposed Suspension System Components: Furnish quantity of each exposed component equal to 2.0% (rounded up to the nearest full carton) of each type suspension component installed.
G. **LEED Submittals:**


1.5 **PROJECT CONDITIONS**

A. Space Enclosure: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

**PART 2 - PRODUCTS**

2.1 **MANUFACTURERS**

A. **Basis of Design:** Provide Acoustical Ceiling Board (ACB and AACB) and Metal Suspension System as manufactured by Armstrong World Industries; United States Gypsum Co.; CertainTeed Ceilings; or approved equal.

B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.

1. Comparable products of the following manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements and other design attributes listed as performance of the “Basis of Design” Systems.

   a. Armstrong World Industries,
   b. USG Corporation,
   c. CertainTeed Ceilings.
   d. Rockfon, LLC,
   e. Or approved equal.

2. The use of one manufacturer's catalog numbers, and the specific requirements set forth in drawings and specifications, are not intended to preclude the use of other manufacturer's products or procedures which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.

C. Substitute products will be considered for substitution only when submitted to the Architect as per the requirements of AIA A232 and Section 00800.

2.2 **ACOUSTICAL CEILING BOARDS**

A. Refer to reflected ceiling plans for sizes and locations.

B. Where ACB-1 is indicated: 24" x 48" x 3/4" thick, reveal edge, NRC .70; CAC 35, light reflectance 90%, sag resistance; Humiguard Plus Performance. Armstrong Ultima (Item# FVHD-5063N 2:09510-3

FVHD-5063N 2:09510-3
1914); USG Mars ClimaPlus (Item #88785); CertainTeed Symphony m 75 (Item #1220BB-75-1); or approved equal.

C. Where ACB-2 is indicated: 24" x 24" x 3/4" thick, reveal edge, NRC .70; CAC 35, light reflectance 90%, sag resistance; Humiguard Plus Performance. Armstrong Ultima (Item# 1911); USG Mars ClimaPlus Planks (Item #86166); CertainTeed Symphony m 75 (item #1222BB-75-1); or approved equal.

D. Where ACB-3 is indicated: 24" x 48" x 1" thick, square dege, NRC .85; CAC 35, light reflectance 86%, sag resistance; Humiguard Plus Performance. Armstrong Calla (Item# 2821), Color: Black; or approved equal.

E. Where AACB is indicated: 24" x 48" x 5/8" thick, square edge, NRC.55; CAC 40; Class 25; Sag Resistance; Humiguard Max Performance, mineral fiber composition with ceramic binders. Armstrong Fine Fissured Ceramaguard (Item# 608) white finish; USG Mars Healthcare Acoustical Panels (Item# 88271), or approved equal.

2.3 DECORATIVE CEILING SYSTEMS

A. Refer to Reflected Ceiling Plans for sizes and locations.

B. Where DSC-1 is indicated: Provide “Soundscapes® Shapes Acoustical Clouds, (Item# 5440)” as manufactured by Armstrong, with required suspension accessory kit(s); or approved equal.

C. Where DSC-2 is indicated: Provide “Serpentina® Waves™ Curved Metal Clouds, 24" x 60" Hills & Valleys, panel perforation - R042 with non-woven black acoustical backer with 15/16" Tegular suspension system, as manufactured by Armstrong; or approved equal.

1. Provide optional aircraft cable with associated hardware as required for a complete system.

D. Where DSC-3 is indicated: Provide “Waveform® Monoradial G, 36" x 72" x 1/8" nom. panels with 2-1/2" standard return edge as manufactured by RPG Acoustical Systems, LLC, with required suspension accessory kit(s); or approved equal.


E. Where DSC-4 is indicated: Provide “Woodworks Accent & Acoustical Canopies, (Item# 5979), S-Curve, 96" x 48" x 7/8" panels in real wood veneers (to be selected by the Architect, as manufactured by Armstrong with required suspension accessory kit(s); or approved equal.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Standard for Metal Suspension Systems: Provide metal suspension systems of type, structural classification and finish indicated which comply with applicable ASTM C 635 requirements.

B. Finishes and Colors: Provide manufacturer's standard factory-applied finish for type of system indicated. For exposed suspension members and accessories with painted finish, provide color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's full range of standard colors.
C. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung.

D. Concrete Inserts: Inserts formed from hot-dipped galvanized sheet steel and designed for attachment to concrete forms and for embedment in concrete, with holes or loops for attachment at hanger wires.

E. Hanger Wire: Galvanized carbon steel wire, ASTM A 641, soft temper, prestretched, Class 1 coating, sized so that stress at 3-times hanger design load (ASTM C 635, Table 1, Direct Hung), will be less than yield stress of wire, but provide not less than 12 gauge (0.106").

F. Type of System: Either direct-hung or indirect-hung suspension system, at Contractor's option.

   1. Carrying Channels: 1-1/2 inch steel channels, hot-rolled or cold-rolled, not less than 0.475 lbs. per lineal foot.

G. Edge Moldings and Trim: Metal types and profiles indicated or, if not indicated, provide manufacturer's standard molding for edges and penetrations of ceiling which fits with type of edge detail and suspension system indicated. Provide 7/8" edge at wall angle and reveal edges.

H. Hold-Down Clips: For interior ceilings composed of lay-in panels weighing less than 1 lb. per sq. ft., or where indicated, provide hold-down clips spaced 2'-0" o.c. on all cross tees.

2.5 EXPOSED METAL SUSPENSION SYSTEMS

A. Double Web Steel Suspension System: For use where ACB ceilings are indicated. Manufacturer's standard system roll-formed from prefinished hot dipped galvanized steel with 15/16" wide exposed faces on flanges of structural members; other characteristics as follows:


   2. Finish: Painted in color as selected by Architect.


B. Double Web Suspension System: For use where AACB ceilings are indicated. Manufacturer's standard system fabricated from roll-formed prefinished hot dipped galvanized steel with 15/16" wide exposed faces of aluminum cap on flanges of structural members cap and other characteristics as follows:


   2. Finish: Painted, in colors as selected from manufacturer's full line of colors. Provide white color unless indicated otherwise.

2.6 MISCELLANEOUS MATERIALS

A. Acoustical Sealant: Resilient, non-staining, non-shrinking, non-hardening, non-skinning, non-drying, non-sag sealant intended for interior sealing of concealed construction joints.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which acoustical ceiling work is to be performed and notify Architect in writing of unsatisfactory conditions. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 PREPARATION

A. Coordination: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.

B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.

3.3 INSTALLATION

A. General: Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire-resistance rating requirements as indicated, and CISCA standards applicable to work.

B. Arrange acoustical units and orient directionally-patterned units (if any) in manner shown by reflected ceiling plans.

1. Install tile with pattern running in one direction, unless otherwise indicated.

C. Install suspension systems to comply with ASTM C 636, with hangers supported only from building structural members. Locate hangers not less than 6" from each end and spaced 4'-0" along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of 1/8" in 12'-0".

1. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperatures.

D. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.

1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.
2. Screw-attach moldings to substrate at intervals not over 16" o.c. and not more than 3" from ends, leveling with ceiling suspension system to tolerance of 1/8" in 12'-0". Miter corners accurately and connect securely.

3. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.

4. Install hold-down clips in areas indicated, and in areas where required by governing regulations or for fire-resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.

E. Cooperate with other trades and Contracts for installation of their materials and equipment, particularly with those installing the ductwork, ceiling diffusers and lighting fixtures so that diffusers, lighting fixtures and other items are located on center lines of tile or on centers of joints as shown on approved shop drawings.

1. Provide additional hanger wires to support cubicle curtain tracks, and other superimposed loads. Locate the supplemental hangers within 6 inches of each corner of the item being supported.

2. Where light fixtures, or other recessed items occur in ceilings, frame acoustical material properly to permit installation of such recessed items and do all necessary cutting and fitting of acoustical materials and suspension systems to accommodate same. Cut neatly around all pipes passing through ceilings. Build in fixture frames and yokes in cooperation with Electrical Contractor.

3.4 CLEANING

A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage. General Contractor is responsible for cleaning or replacement of all damaged tile, regardless of how the damage was caused and regardless of by which Contractor.

END OF SECTION 09510
SECTION 09522 - ACOUSTICAL WALL PANEL SYSTEMS

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. Section Includes: Fabric-Wrapped Acoustical Wall Panels, as indicated on the drawings.

1.3 REFERENCES

A. ASTM C423 - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
B. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials
C. ASTM E119 - Fire Test of Building Construction and Materials
D. ASTM E795 - Practice for Mounting Test Specimens During Sound Absorption Tests
E. ASTM E1264 - Classification for Acoustic Ceiling Products
F. ASTM E1477 - Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating Sphere Reflectometer
G. ISO 4611 - Plastic - Determination of the Effects of Exposure to Damp, Heat, Water Spray and Salt Mist
H. ISO 11654 - Sound Absorbers for Use in Buildings - Rating of Sound Absorption
I. Danish Society of Indoor Climate - Indoor Climate Label
J. Nordic Council of Ministers - Nordic Swan Eco-label
K. Swedish Asthma & Allergy Association
L. Building Information Foundation RTS - Emission Classification of Building Materials
M. California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, installation instructions, and general recommendations. Include data substantiating that products to be furnished comply with requirements of the contract documents.

B. Shop Drawings: Submit complete shop drawings for fabrication and erection, including ALL plans, elevations, and large scale details of typical sections and connections for each panel system types.
1. Provide layout, dimensions, and identification of each type of unit corresponding to sequence of installation and erection procedures.

2. Submit elevations and details drawn to scale prescribed by Architect.
   
   a. Include coordinated penetrations and wall-mounted items
   b. Include any necessary details or drawings from the manufacturer regarding recommended installation

3. Provide location and details of ALL necessary anchorage devices to be embedded in or fastened to other construction. Furnish templates if required for accurate placement.

4. Include schedule and erection procedure for ALL products to insure proper installation.

C. Selection Samples: For initial selection of colors and textures, submit manufacturer's fabric suppliers complete color charts consisting of actual product pieces, showing full range of colors and textures available.

D. Verification Samples: To verify compliance with requirements of contract documents, submit complete sets of samples, illustrating full range of color and texture to be expected in the completed work. Provide samples of minimum size as follows:
   
   1. Submit 3” x 6” samples of each type of acoustical wall panel system required and in each color as selected for facing materials. Include representative samples of installation devices or materials to be used.

E. Certifications: Submit Manufacturer’s certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry Factory Mutual Laboratory classification of NRC.

F. Maintenance Data: Submit manufacturer’s instructions for proper maintenance materials and procedures.
   
   1. Submit data for the following:
      
      a. Provide manufacturers standard routine maintenance instructions for care and treatment of each acoustical wall panel system and accessories.

G. LEED Submittals:
   
   1. Product Data for Credit EQ 4.1: For installation adhesive, including printed statement of VOC content.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain required products from a single manufacturer.

   1. Accessories: Provide accessory items only as produced or recommended by manufacturer of primary products.
B. Installer Qualifications: Installer must be acceptable to or licensed by manufacturer of
products being installed.

C. Surface Burning Hazard: Provide products and materials which have been tested, rated, and
labeled by an agency acceptable to governing authorities for the following ratings:

1. ASTM E 84: Class A
   a. Maximum flame spread: 25 or less.
   b. Maximum smoke developed: 50 or less.

D. Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method:
Provide products and materials which have been tested in accordance with ASTM C 423.

E. Pre-installation Conference: Prior to installation of work of this section, conduct a meeting
at the project site to discuss quality assurance requirements. In addition to the contractor and
the installer, arrange for attendance of the following:

1. Other installers affected by the work of this section.
2. The Owner's representative.
3. The Architect.
4. Installer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Keep all materials dry at all times. Protect against exposure to weather
and against contact with damp or wet surfaces.

B. Delivery and Storage: Protect materials from excessive moisture in shipment, storage, and
handling. Deliver materials in manufacturer's unopened packages, and store in dry place with
adequate air circulation.

C. Storage: Stack products of this section carefully to provide air circulation within stacks.

D. Handling and storage should be in accordance with the manufacturer's Safety Data Sheets
(SDS)

1.6 PROJECT CONDITIONS

A. Environmental Requirements: Do not proceed with installation until areas to receive the work
have been enclosed and until temperature and relative humidity have been stabilized and will
be maintained within values established by the manufacturer for optimum quality control.

B. Existing Conditions:

1. The building shall be properly closed and under approximate occupancy temperature
and humidity conditions.
1.7 SEQUENCING AND SCHEDULING

A. Do not begin installation of acoustical wall panel system until all other interior finishes; especially painting; have been completed and properly cured.

1.8 MAINTENANCE

A. Extra Materials: At time of completing installation, deliver stock of maintenance material to the Owner.

1. Furnish materials matching those actually installed, packaged for storage, and labeled clearly.

2. Furnish quantities as follows:
   a. Full size units equal to not less than 2 percent for each panel type, size and or color installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL WALL PANELS

A. Basis of Design: “Soundsoak 60, FR-701 (FR), Acoustical Wall Panels (AWP), as manufactured by Armstrong World Industries, Tel. # 877.276.7876; or approved equal.

1. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to the following:
   a. CertainTeed Ceilings.
   b. Decoustics, Inc.
   c. G&S Golterman & Sabo, Inc.
   d. Or approved equal.

B. Physical Characteristics

1. Substrate: Mineral fiber.

2. Size(s): 30" w x 72", 96", 108", 120" (length as indicated on the drawings).

3. Thickness: 3/4".

4. Edges: square, wrapped.


6. Finished Surface Color: As selected by the Architect from manufacturer’s standard colors.

7. Recycled Content: Minimum 68%.

8. Fire Performance, Tested to ASTM E84: 25 or less.

C. Performance Criteria

2. Noise Reduction Coefficient (NRC): 0.65 (A-mounting) per ASTM C423.

2.2 ATTACHMENT METHOD

A. Components: Z-Clips.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect substrates and conditions under which the work of this section will be performed, and verify that proper installation may commence. Do not proceed with the work until unsatisfactory conditions have been resolved fully.

3.2 INSTALLATION

A. General: Comply with manufacturer's instructions and installation requirements, except where more stringent requirements are shown or specified, and/or where project conditions may require extra precautions or provisions to ensure satisfactory performance of the work and product installation.

B. Tolerances: Install products of this section to the following tolerances:

1. Install Panel Systems in locations as indicated on the drawings.
   a. For individual panels, maintain patterns, and spacings as shown or indicated, with no more than plus or minus 1/8 inch deviation, maximum.

3.3 ADJUSTING

A. Final Adjustments: Upon achieving substantial completion of the work, adjust all components to ensure that they are properly installed and functioning properly. Replace any component which cannot be adequately adjusted for proper operation or performance. Replace any and all panel(s) which may have been damaged prior to Final Completion.

3.4 CLEANING

A. Upon completion, clean all surfaces which have become soiled or coated as a result of work of this section, using proper methods; as recommended by the panel system manufacturer; which will not harm or otherwise damage finished surfaces.

   1. For cleaning, use only products and techniques acceptable to each system manufacturer for each product being cleaned.
   2. Panels which cannot be cleaned to satisfaction of the Owner must be replaced.
3.5 PROTECTION

A. General: Institute protective procedures and install protective materials as required by the Panel System manufacturers to ensure that work of this section will be without damage or deterioration at substantial completion.
SECTION 09550 - WOOD FLOORING

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.

B. Related Sections:
   2. Section 01455 - Concrete In-situ relative Humidity and pH Testing.
   3. Section 03300 - Concrete Work.
   4. Section 03450 - Self-Drying Finishing Underlayment.
   5. Section 03452 - Cement Based Self-Level Underlayment
   6. Section 09650 - Resilient Flooring for vented rubber base.

1.2 SUMMARY

A. Extent of wood flooring is indicated on drawings and in schedules.

B. Type(s) of wood flooring required include the following:
   1. Wood strip sports flooring system for Gymnasium.
   2. Wood strip flooring system for Dance Studio.
   3. Wood strip flooring system for Stage.

1.3 QUALITY ASSURANCE

A. Moisture vapor emission testing in accordance with ASTM F 1869-11. Test results should not exceed 3 pounds per 1,000 square feet per 24 hours, unless otherwise specified by the flooring or adhesive manufacturer.

   1. ASTM Standard also states that relative humidity inside of the concrete slab should not exceed 75%, per ASTM F2170-11, unless otherwise specified by the flooring or adhesive manufacturer.

B. Installer Qualifications: Specialized wood flooring firm with not less than a recommended five (5) years successful experience in installation of sports flooring types specified.


D. Source Quality Control: Obtain flooring of each type from single manufacturer or source, to ensure match of quality, color, pattern and texture.

E. Coefficient of Friction: The Federal and industry standard for testing coefficient of friction or the slip resistance of a surface is tested to the requirements, as outlined, in ASTM D-2047, which utilizes a friction measurement machine, commonly referred to as the James Machine.
F. Coordination with Other Trades: Coordinate with other trades for preparations and application for wood flooring and associated work.

1. Coordinate required slab depression with approved system(s).
2. Coordinate manufacturer’s installation requirements with other trades and the Owner.

G. Manufacturer of wood floor systems and hardwood flooring surfaces shall be verified as a "Zero Waste" company confirmed through SWCA third-party auditing.

H. LEED: Certification of the Forest Stewardship Council (FSC): All wood materials used for the wood flooring for the work of this Contract must be coming from “well-managed” forests adhering to strict environmental and socioeconomic standards in accordance with the Principles and Criteria of the Forest Stewardship Council (FSC).

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s detailed technical product data and installation instructions for each type of wood flooring. Include instructions for handling, storage, installation, finishing, protection and maintenance.

B. Samples: Submit sets of range samples for each type of wood flooring carrying stamp of certified products. Include finish where factory-finished flooring is required.

1. Include samples of border units where borders of different color, texture or pattern are indicated.

2. Submit samples of clips and channels, underlayment.

C. Replacement Material: After completion of wood flooring work, deliver to project site not less than 2.0% of quantity of each type wood flooring installed on the project. Provide in manufacturer's original, unopened cartons or bundles.

D. Gameline, School Logo and Paint Colors Layout Drawing: Submit layout drawing indicating locations, paint colors, dimensions, etc. of all required gamelines, School Logo and other paint colors or information required by the Architect and the Owner.

1. Obtain Architect/Owner’s approvals prior to proceeding with painting work.

E. Certification of the Forest Stewardship Council (FSC): Submit certification indicating conformance with indicate requirements for certified wood products and including Certification Registration Code Number.

F. Certificates of Conformance: Submit written certification forms signed and notarized by authorized representatives of the Contractor / Installer / Manufacturer of the wood flooring attesting that:

1. The referenced wood has been furnished, inspected, and installed for this project in complete conformance with requirements of the Contract Documents, and

2. The referenced wood flooring, covered under the work of this Contract, meet or exceed the requirements of “Basis of Design” project specification requirements, without any reduction in the quality and performance.
G. Testing of Substrate:

1. Submit test reports of testing the concrete or other floor substrate, indicating compliance with manufacturer’s requirements for moisture and alkalinity percentage of contents. Tests shall be performed in accordance with requirements of Section 01455.

H. LEED Submittals:

1. Product Data for Credit EQ 4.1: For wood flooring installation adhesives, including printed statement of VOC content.

2. Product Data for Credit EQ 4.2: For field-finished wood flooring, manufacturers' product data for transparent finishes, including printed statement of VOC content and chemical components.

3. Certificates for Credit MR 7: Certificates of chain-of-custody certifying that wood products comply with forest certification requirements. Include evidence that mill is certified for chain-of-custody by an FSC-accredited certification body.

1.5 JOB CONDITIONS

A. Delivery of Materials: Materials shall not be delivered or installed until all masonry, painting, plastering, tile work, marble and terrazzo work are completed; all overhead mechanical work, lighting, backstops, scoreboards are installed and room temperature at least 65°F and relative humidity 50% or lower.

1. Area where materials are to be stored to be maintained at 65°F and under 50% relative humidity by the General Contractor.

B. Conditioning: Do not proceed with installation of wood flooring until spaces have been enclosed and are at approximate humidity condition planned for occupancy. Condition wood for 5 days prior to start of installation by placing in spaces to receive flooring and maintaining ambient temperature between 65°F and 70°F, before, during, and after installation. Open packages of wood flooring which are sealed (if any) to permit natural adjustment of moisture content.

1. Humidity Control

a. Since all wood flooring will expand and contract as relative humidity varies, it is important to minimize extremes between low and high. Hardwood flooring is manufactured at moisture content most compatible with a 35%-50% relative humidity range. Geographical regions and available mechanicals determine the typical range of temperature and humidity for each facility. Maintaining a 15% fluctuation between highest and lowest average indoor relative humidity provides limited shrinkage and growth. Facility managers should make use of available HVAC systems to prevent excessive tightening and shrinkage of flooring.
C. Do not install wood flooring over concrete slabs until the latter have been cured and are sufficiently dry and as determined by wood flooring manufacturer for maximum levels of moisture and pH per testing performed under requirements of Section 01455.

1. Commencement of work shall constitute acceptance of conditions. Any necessary remedial work required to correct any unsatisfactory conditions, found after the start of installation, will be provided at no cost to the Owner.

D. After floors are finished, the area is to be kept locked by the General Contractor to allow curing time for the finish. If after required curing time, the General Contractor or Owner require use of gym, he/she shall protect the floor by covering with non-fibered kraft paper or red rosin paper with taped joints, until acceptance by the Owner of the complete gymnasium floor.

1.6 WARRANTY

A. Special Project Warranty: Provide Manufacturer/Installer’s warranty signed and sealed by authorized representatives agreeing to replace wood flooring materials due to deficiency in material and workmanship for a minimum period of three (3) years which will start on approved date of substantial completion of the project. Warranty shall include repair or replace wood flooring due to, but are not limited to, buckling, cupping, warping, and delamination.

PART 2 - PRODUCTS

2.1 WOOD STRIP FLOORING - GYMNASIUM

A. Basis of Design: Provide “Rezill Channel”, as manufactured by Connor Sports Flooring, Tel.# 800.833.7144, www.connorfloor.com; or approved equal.

1. Comparable products from other manufacturers will be considered if it can be clearly shown that their products are tested, equal to or will exceed the construction quality requirements, intended performances and all other design attributes listed above and provided that deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances as judged solely by the Architect.

a. Aacer Flooring, LLC, Tel.# 877.582.1181, www.aacerflooring.com
b. Robbins Sports Surfaces, Tel.# 800.543.1913, www.robinsfloor.com
c. Or approved equal.

B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions and shape.

1. Substitute products will be considered for substitution only when submitted to the Architect as per the requirements of AIA A232 and Section 00800.
C. Wood Flooring:

1. 25/32" x 2-1/4" second and better grade, T&G and EM Northern Hard KD Maple flooring with special locking grooves, graded in accordance with MFMA standards.

2. Hard maple flooring shall be certified as harvested from managed forest in compliance with SmartWood™ program of Rainforest Alliance.

3. Treated flooring shall be treated with Woodlife preservative. Each bundle shall be stamped with the official treating plant number and a certificate attesting to treatment shall be furnished with each shipment.

D. Subfloor:

1. Factory assembled panels, supplied by the manufacturer, of two layers of 15/32" APA rated plywood sheathing, Exposure 1 with ½" x 1-3/4" x 1-3/4" R4 Rezill Pads attached 8" o.c., nominally

E. Channels: 16 gauge zinc plated continuous steel.

F. Vapor Barrier: Manufacturer recommended 6-mil (0.2mm) polyethylene.

G. Fasteners:

1. Channel anchors: 1-1/4" long, or as dictated by site conditions, steel drive pins, to achieve a minimum 900 lbs. Pull-out strength, and for application with an air driven or low velocity power actuated tools.

2. Fasteners: 2" barbed cleats or coated staples.

H. Perimeter Base (Gymnasium): Vent cove base including molded corners, as manufactured by Johnson Rubber Company; or approved equal.

I. Finishing Materials:

1. Sealer: Oil modified VOC compliant high solids polyurethane and approved by the wood flooring system manufacturer.

   a. Urethane Finish System: Complete oil-modified system of compatible components that is recommended by Flooring manufacturer and MFMA approved.

   b. VOC Content for Chemical Components: Comply with following limits When calculated according to 40 CFR 59, Subpart D (EPA Method 24):

      1) Finish Coats and Floor Sealers: Not more than 350 g/L.
      2) Stains: Not more than 250 g/L.
      3) Game-line and Marker Paint: Not more than 150 g/L and shall be as recommended by the finishing materials manufacturer, compatible with the finish.
2.2 WOOD STRIP FLOORING - DANCE STUDIO

A. Basis of Design: “Spotlight Stage and Dance Floor”, as manufactured by Connor Sports Flooring, Tel.# 800.833.7144, www.connorfloor.com; or approved equal.

1. Comparable products from other manufacturers will be considered if it can be clearly shown that their products are tested, equal to or will exceed the construction quality requirements, intended performances and all other design attributes listed above and provided that deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances as judged solely by the Architect.

   c. Or approved equal.

B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions and shape.

1. Substitute products will be considered for substitution only when submitted to the Architect as per the requirements of AIA A232 and Section 00800.

C. Vapor Barrier: Manufacturer recommended 6-mil (0.2mm) polyethylene.

D. Resilient Pads: Connor 7/16" R4 Rezill DIN pads.

E. Sleepers


2. Spotlight Sleeper Channel: 20 gauge coated steel.

F. Subfloor:

1. Subfloor sheathing shall be 15/32" APA rated plywood sheathing Exposure 1.

G. Flooring (Connor Laytite Maple)

1. 25/32" x 2-1/4", Second & Better Grade, Northern Hard Maple Flooring, TGEM, MFMA Grade marked and stamped, as manufactured by Connor Flooring, Amasa, MI.

2. SMARTWOOD™: Hard maple flooring shall be certified as harvested from managed forest in compliance with the SmartWood™ program of the Rainforest Alliance.

H. Fasteners

1. Flooring Fasteners: 1-3/4" barbed cleats or coated staples.

2. Subfloor Fasteners: 1-1/4" subfloor staples or screws, and PL400 adhesive or equal.
3. Spotlight sleepers: 1-1/2" RAWL Spikes or equal (or length as dictated by site conditions-achieving a minimum 900 lbs pullout strength) hammer driven concrete anchors.

I. Finish Materials: Connor oil modified polyurethane seal and finish or equal.

J. Wall Base: 3" x 4", heavy duty, molded, vented cove base with pre-molded outside corners.

2.3 WOOD STRIP FLOORING - STAGE

A. Basis of Design: Provide “Permalock”, as manufactured by Connor Sports Flooring, Tel.# 800.833.7144, www.connorfloor.com; or approved equal.

1. Comparable products from other manufacturers will be considered if it can be clearly shown that their products are tested, equal to or will exceed the construction quality requirements, intended performances and all other design attributes listed above and provided that deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances as judged solely by the Architect.

   c. Or approved equal.

B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions and shape.

1. Substitute products will be considered for substitution only when submitted to the Architect as per the requirements of AIA A232 and Section 00800.

C. Wood Flooring:

1. 25/32" x 2-1/4" second and better, T&G and EM northern hard KD maple flooring with special locking grooves, graded in accordance with MFMA standards.

2. Hard maple flooring shall be certified as harvested from managed forest in compliance with SmartWood program of Rainforest Alliance.

3. Treated flooring shall be treated with Woodlife preservative. Each bundle shall be stamped with the official treating plant number and a certificate attesting to treatment shall be furnished with each shipment.

D. Channels: Channels: 16 gauge zinc plated steel.

E. Clips: 16 gauge zinc plated steel with solid 1" inch wide holddown wings and 3/16" locking spikes.
F. Channel Anchors:

1. Channel anchors: 1-1/4" long, or as dictated by site conditions, steel drive pins, to achieve a minimum 900 lbs. Pull-out strength, and for application with an air driven or low velocity power actuated tools.

G. Perimeter Base (Stage): 1" x 2" maple wood base.

H. Sealer and Finishing Materials:

1. Sealer: Oil modified voc compliant high solids polyurethane and approved by the wood flooring system manufacturer.

   a. Urethane Finish System: Complete oil-modified system of compatible components that is recommended by Flooring manufacturer and MFMA approved.

   b. VOC Content for Chemical Components: Comply with following limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

      1) Finish Coats and Floor Sealers: Not more than 350 g/L.
      2) Stains: Not more than 250 g/L.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine substrates on which wood flooring will be installed and conditions under which work will be performed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

B. In New Concrete: The General Contractor shall furnish and install the concrete subfloor depressing the slab sufficiently to accommodate the floor system. The slab shall be steel troweled and finished smooth to a tolerance of 1/8” in any 10’ (3mm in any 3 meter) radius by the General Contractor. High spots shall be ground level, and low spots filled in with approved leveling compound by the General Contractor to the full approval of the installer (Flooring Subcontractor).

   1. Concrete slab aggregate shall be 3/4” (19mm) screen crushed limestone or similar type material (no river gravel or pea gravel), free of curing agents. Concrete shall develop an average of 3,500 psi (246 Kg/cm) compression after 28 days.

C. Existing Retro-Fit Concrete: The General Contractor shall provide a sound substrate surface free from loose aggregate or soft unsound material remaining from previous floor installation. Holes created by removal of previous anchorage pins or other causes shall be filled soundly and flush with surrounding concrete surface.

D. Perform moisture content testing as required by manufacturer’s instructions to ensure pH readings and moisture transmission are acceptable. Perform testing in accordance with requirements of Section 01455.
1. If values exceed this level, follow manufacturer’s recommendations for moisture transmission mitigation. Do not proceed until unsatisfactory conditions have been corrected. Inspect concrete subfloors for proper tolerance and dryness, and report any discrepancies to the Architect in writing.

2. All work required to put the concrete subfloors in acceptable condition shall be the responsibility of the Contractor.

E. Subfloor should be broom cleaned prior to beginning work.

3.2 INSTALLATION

A. General: Comply with flooring manufacturer's instructions and recommendations, but not less than recommended by NOFMA in "Hardwood Flooring Installation Material" and by recommendations of American Parquet Flooring Association, Inc., as applicable to type flooring required.

B. Gymnasium Floor System:

1. Install vapor barrier, lap joints a minimum of 6" and tape.

2. Fasten first row of channels to concrete slab perpendicular to finish wood flooring, secure with steel anchors driven approximately 14" inches on center along base of channels and within 3" of channel ends.

3. Place pre-assembled subfloor plywood panels parallel to channels, spacing end joints a minimum of 1/4". Capture exposed side edges of subfloor panel with adjacent channel. Offset channels end 4" from adjacent rows.

4. Align each adjacent row of subfloor panels to form continuous 45 degree end joints throughout the subfloor assembly.

5. Provide 1½" expansion voids at perimeter and at all vertical obstructions. Install solid blocking under stacked position of bleachers.

6. Flooring: Install flooring by power nailing or stapling approximately 12" o.c. with end joints properly driven up. Provide 1½" expansion voids at perimeter and at all vertical obstructions.

7. Finishing:
   a. Sand flooring with drum sander, edger, buffer and hand scraper.
   b. Use coarse, medium and fine grade sandpaper.
   c. After sanding with drum sander, buff entire floor using 100 grit screenback or equal grit sandpaper, with a heavy-duty buffing machine.
   d. Vacuum floor before first coat of finish.
e. Floor shall present a smooth surface without drum stop marks, gouges, streaks or
shiners.

f. Apply 2 coats of approved sealer and 2 coats of approved finish in accordance
with manufacturer’s instructions.

g. Screenback or steel wool and vacuum or tack between each coat after it is dry.

h. Gamelines: Apply game lines accurately between first two coats of finish after
buffing and vacuuming. Lay out in accordance with drawings. For game lines, use
current rules of association having jurisdiction. Lines shall be straight with sharp
edges of colors selected by Architect.

i. Install vent cove base anchored to walls with base cement or screws and anchors.
Use premolded outside corners and neatly mitered inside corner.

C. Dance Floor System:

1. Subfloor Installation

   a. Cover concrete with poly, sealing and lapping joints a minimum of 6”.

   b. Spotlight Sleepers

      1) Place Spotlight channels 16" on center at right angle to finished flooring,
staggering end joints by 4’ in adjacent rows. Provide 1-1/2" expansion void
at perimeter and at all vertical obstructions. Install solid blocking at doorways.

      2) Spotlight anchorage - Drill anchor hole in concrete at each designated anchor
pocket location and soundly drive anchorage pin to secure.

   c. Attach plywood subfloor with 8’ edges parallel to and resting on sleepers. Set
plywood in staggered brick pattern with ends offset by 4’ in adjacent rows. Offset
plywood ends by 2’ from sleeper end joints, and space 1/4” at all edges. Fasten
plywood to sleepers using a single ribbon of PL 400 adhesive and 1-1/4” staples
fastened 12” on center (1-1/2” staples when installing 23/32” plywood). Provide
1-1/2” expansion void at perimeter and at all vertical obstructions.

2. Maple Flooring Installation

   a. Install maple flooring by power nailing or stapling approximately 12” on center. Do
not allow flooring fasteners to contact steel channel.

   b. If required, size joints between flooring strips to allow for intermediate expansion
in accordance with local humidity conditions.

   c. Provide 1-1/2” expansion voids at perimeter and at all vertical obstructions.

3. Maple Flooring Finishing

   a. Machine sand with coarse, medium, and fine paper to a smooth, even and
uniform surface.
b. Remove sanding dust from entire surface by tack or vacuum.

c. Inspect entire area of floor to insure that surface is acceptable for finishing, clean and completely free from sanding dust.

d. Apply two (2) coats of approved seal and two (2) coats of approved finish per manufacture's instructions.

e. Buff and clean floor between coats.

D. Stage Floor System:

1. Install flooring at right angle to T-Fasteners, fitting specially milled groves in flooring to T-Fasteners. Secure additional T-Fasteners in grooves at trailing end of flooring and secure T-Fasteners to concrete.

2. Sand flooring with drum sander, edger, buffer and hand scraper.
   a. Use coarse, medium and fine grade sandpaper.
   b. After sanding with drum sander, buff entire floor using 100 grit screenback or equal grit sandpaper, with a heavy-duty buffing machine.
   c. Vacuum floor before first coat of finish.
   d. Floor shall present a smooth surface without drum stop marks, gouges, streaks or shiners.
   e. Apply 1 coat of sealer and 2 coats of finish material in accordance with manufacturer's instructions.
   f. Screenback or steel wool and vacuum or tack between each coat after it is dry.

3. Install base in random length, nail directly to floor using 1" finishing nails 12 o.c.

3.3 PROTECTION AND CLEANING

A. Protect completed wood flooring during remainder of construction period with heavy Kraft paper or other suitable covering, so that flooring and finish will be without damage or deterioration at time of acceptance.

B. Remove all excess and waste materials from the area of the work.

END OF SECTION 09550
SECTION 09650 - RESILIENT FLOORING

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 DESCRIPTION OF WORK

A. Extent of resilient flooring and accessories is shown on drawings and in schedules.

1. Vinyl enhanced tile (VET).
2. Luxury vinyl tile - (LVT), Alternate Bid.
4. Rubber resilient wall base.
5. Vented wall base.
6. Rubber tile floor and stair treads.
7. Stair nosing.
8. Resilient edge strips.

1.3 RELATED SECTIONS

A. Section 01030 - Alternate Bids.
B. Section 01455 - Concrete In-situ Relative Humidity and pH Testing.
C. Section 03300 - Cast in Place Concrete Slabs on Grade.
D. Section 03450 - Self-Drying Finishing Underlayment.
E. Section 07900 - Joint Sealer Assemblies.
F. Section 09550 - Wood Flooring.
G. Section 09685 - Carpet Tile.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:

3. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
4. ASTM F 1861 Type TS, Group 1 Performance Requirements for Resilient Rubber Wall Base.


7. ASTM F 2169 Standard Specification for Resilient Stair Treads, Type TS, Class 1 and 2, Group 1 and 2.

8. ASTM D 2240 Not less than 85 Shore A.

9. ASTM D 3389 Abrasion Resistance: less than 1 gram weight loss.

10. ASTM D 2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring of 0.6 or greater.

11. ASTM E 648 Standard Test Method for Critical Radiant Flux of 0.45 watts/cm² or greater, Class I.

B. Moisture vapor emission testing in accordance with ASTM F 1869-11. Test results should not exceed 3 pounds per 1,000 square feet per 24 hours, unless otherwise specified by the flooring or adhesive manufacturer.

1. ASTM Standard also states that relative humidity inside of the concrete slab should not exceed 75%, per ASTM F2170-11, unless otherwise specified by the flooring or adhesive manufacturer.

C. Manufacturer: Provide each type of resilient flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds.

1. Wherever possible, provide each type of required resilient flooring and accessories produced by a single manufacturer.

D. Fire Test Performance: Provide resilient flooring which complies with the following fire test performance criteria as determined by an independent testing laboratory acceptable to authorities having jurisdiction.


2. ASTM E648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm² or greater, Class 1.

E. Coefficient of Friction: The Federal and industry standard for testing coefficient of friction or the slip resistance of a surface is tested to the requirements, as outlined, in ASTM D-2047, which utilizes a friction measurement machine, commonly referred to as the James Machine.
1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of resilient flooring and accessory.

B. Samples for Verification Purposes: Submit the following samples in triplicate of each type, color, and pattern of resilient flooring required, showing full-range of color and pattern variations.
   1. Full size tile samples.
   2. For initial selection of colors and patterns submit, prior to above, samples in form of actual sections of resilient flooring, including accessories, showing full range of colors and patterns available, for each type of resilient flooring required.

C. Certification for Fire Test Performance: Submit certification from an independent testing laboratory acceptable to authorities having jurisdiction that resilient flooring complies with fire test performance requirements.

D. Testing of Substrate:
   1. Submit test reports of testing the concrete or other floor substrate, indicating compliance with manufacturer’s requirements for moisture and alkalinity percentage of contents. Tests shall be performed in accordance with requirements of Section 01455.

E. Maintenance Instructions: Submit 2 copies of manufacturer's recommended maintenance practices for each type of resilient flooring and accessory required.

F. Replacement Material: After completion of work, deliver to project site replacement materials from same manufactured lot as materials installed, and as follows:
   1. Tile flooring, not less than one box for each 50 boxes or fraction thereof, for each type, size and color installed.

G. LEED Submittals:
   1. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.

1.6 PROJECT CONDITIONS

A. Maintain minimum temperature of 65°F (18°C) or more than 85°F (29°C) in spaces to receive resilient flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation.
   1. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation.

B. Maintain the ambient relative humidity between 40% and 60% during installation.
C. Install resilient flooring and accessories after other finishing operations, including painting, have been completed.

D. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55°F (13°C) or more than 85°F (29°C).

E. Do not install resilient flooring over concrete slabs until the latter have been cured and are sufficiently dry to achieve bond with adhesive as determined by resilient flooring manufacturers and their recommendation for bond and maximum levels of moisture and pH per testing as performed under requirements of Section 01455.

1.7 WARRANTY

A. Vinyl Enhanced Tile Flooring (VET)
   1. Warranty: Manufacturer’s standard for material and labor:
      a. A minimum of two (2) years for labor and three (3) years for material. Warranty periods shall start from approved date of substantial completion.

B. Luxury Vinyl Tile Flooring (LVT)
   1. Warranty: Manufacturer’s standard for material and labor:
      a. A fifteen (15) year Limited Commercial Warranty for labor and material. Warranty period shall start from approved date of substantial completion.

C. Static Dissipative Vinyl Composition Tile Flooring (VCT-NC)
   1. Warranty: Manufacturer’s standard for material and labor:
      a. A minimum of One (1) year for labor and material. Warranty period shall start from approved date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but not limited to the following:

   1. Vinyl Enhanced Tile (VET); provide one of the following:
      a. “Color Essence and Azterra”, as manufactured by Johnsonite (a Tarkett Co., Azrock Collection);
      b. Or approved equal.

   2. Manufacturers of Static Dissipative Vinyl Composition (VCT - NC):
      a. “Summit Series ESD Vinyl Tile” as manufactured by StaticSmart Flooring by Julie Industries;
b. “Static Dissipative Tile SDT” as manufactured by Armstrong World Industries;  
c. “Granit SD”, as manufactured by Johnsonite (a Tarkett Co., Azrock Collection);  
d. “Static Dissipative ESD” as manufactured by Roppe;  
e. Or approved equal.

3. Manufacturers of Luxury Vinyl Tile (LVT):
   
a. Basis of Design: “CMYK” as manufactured by Patcraft; or approved equal.
   
   1) Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to the following:
   
   a) Armstrong Commercial Flooring;  
   b) Interface;  
   c) Mannington;  
   d) Milliken;  
   e) Shaw;  
   f) Tarkett;  
   g) Or approved equal.

3. Rubber Tile:
   
a. Basis of Design: “BMRT” as manufactured by Johnsonite  
b. Equivalent by Roppe Corporation.  
c. Equivalent by Endura Rubber Flooring.  
d. Or approved equal.

4. Rubber Stair Treads with Risers:
   
a. Basis of Design: “BMTR” as manufactured by Johnsonite  
b. Equivalent by Roppe Corporation.  
c. Equivalent by Endura Rubber Flooring.  
d. Or approved equal.

5. Rubber Resilient Wall Base and Accessories:
   
a. “Pinnacle”, as manufactured by Roppe Corporation;  
b. “BaseWorks Thermoset Rubber Wall Base”, as manufactured by Johnsonite,  
c. "RubberMyte" as manufactured by Burke Mercer Flooring Product,  
d. Or approved equal.

B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.

1. The use of one manufacturer's catalog numbers, and the specific requirements set forth in drawings and specifications, are not intended to preclude the use of other products by other manufacturer’s or which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.
C. Comparable products of other manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements, intended performances and all other design attributes listed above and provided that deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances as judged solely by the Architect/Owner.

2.2 VINYL ENHANCED TILE FLOORING (VET)

A. Provide products in compliance with ASTM F 1066, Class 1 as per ASTM E648, through pattern, 16" x 16", with, tested for minimum slip resistance as per ASTM D 2047, and in accordance with the following:

1. Asbestos-free.
2. Gauge: 1/8 inch.
3. Colors: As selected by the Architect from manufacturer’s available full range of colors.
4. Provide manufacturer’s polyurethane reinforced surface treatment application for ease of maintenance and as per manufacturer’s recommendation.
5. Provide manufacturer’s approved adhesive.

2.3 STATIC DISSIPATIVE VINYL COMPOSITION TILE FLOORING (VCT-NC)

A. Provide products in compliance with ASTM F1066 - Class 2 through pattern, Class 1 Flame Spread as per ASTM E648, Static Generation per ANSI/ESD STM 97.2 at 12% R.H., Static Dissipation per ETS Dissipation Method at 12% R.H., 12" x 12" tile with minimum slip resistance as per ASTM D 2047 / UL 410, and as follows:

1. Asbestos-free.
2. Gauge: 1/8 inch.
3. Colors: As selected by the Architect from manufacturer’s available full range of colors.
4. Provide manufacturer’s approved adhesive.

2.4 LUXURY VINYL TILE FLOORING (LVT) - ALTERNATE BID

A. Provide products in compliance with ASTM F 1066, Class 1 as per ASTM E648, through pattern, 12" x 24" plank, with minimum slip resistance as per ASTM D 2047 / UL 410, and as follows:

1. Asbestos-free.
2. Wear Layer: 20 mil (.020 inches / .5 mm).
3. Overall Thickness: 0.098 inches (2.5 mm).
4. Finish: Exoguard+™
5. Color(s) / Pattern(s): As selected by the Architect from manufacturer’s available full range of colors and patterns.
6. Provide manufacturer’s approved adhesive.

2.5 RUBBER TILE FLOORING

A. Textured Surface Rubber Tile: Resilient Rubber Tile Flooring with the following physical characteristics:
1. Complies with requirements for ASTM F 1344 Standard Specification for Rubber Floor Tile, Type 1-A and 1-B.
2. Manufactured from a homogeneous composition of 100% synthetic rubber.
3. Overall thickness: 1/8" [.125" (3.17 mm)].
4. Tile Size: 
   1) Solid Color: 24" x 24" (61 cm x 61 cm).
5. Tile Texture: Bamboo
7. ASTM F 1514 Standard Test Method for Measuring Heat Stability by Color Change: \( \Delta \Sigma \leq 8 \)
10. ASTM F 970, Standard Test Method for Static Load Limit - passes at 250 PSI.
12. ASTM E 648, Standard Test method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source - equal to or greater than 0.45 watts/cm2.
13. Johnsonite offers a RESTART reclamation program for returning job site scrap.
14. SCS FloorScore® Certified and meets California Specifications Section 01350.
15. Phthalate, chlorine and halogen-free
16. NSF-332 Gold Certified
17. C2C Certified Basic
18. Johnsonite facilities are ISO 9001 and ISO 14001 Certified.

### 2.6 ACCESSORIES

A. Wall Base: Provide rubber base complying with ASTM F-1861, Type TS, Group 1. Vulcanized SBR rubber with matching preformed corner units, and as follows:

   1. Height: 4-inches, unless otherwise indicated on the drawings.
   2. Thickness: 1/8 inch gauge.
   4. Finish / Colors: Matte finishes in colors as selected by Architect from manufacturer’s available full range of colors. Allow for more than one color in any given area.
   6. Phthalate, chlorine and halogen free.

B. Vented Wall Base: Provide rubber base complying with ASTM F-1861, Type TS, Group 1, with matching preformed outside corner units, and as follows:

   1. Height: 4-inches.
   2. Thickness: 5/16 inch.
   4. Finish / Colors: Matte finishes in colors as selected by Architect from manufacturer’s available full range of colors.

6. Phthalate free except for recycled materials.

C. Resilient Edge Strips: 1/8" thick, homogeneous vinyl or rubber composition, tapered or bullnose edge, color to match flooring, or as selected by Architect from manufacturer’s available full range of colors; not less than 1" wide.

D. Resilient Stair Treads: Provide treads where shown, consisting of single-piece units for width of stair treads.

1. Units shall comply with Americans with Disabilities Act regulations,
5. Product is PVC free and recyclable.
6. Provide rubber stair tread units shall comply with FS RR-T-650, Type A, sanded backs, chamfered edge raised profile of geometric form, with raised profile surface pattern.
   a. Thickness: Not less than 3/16" nominal and 1/4" at nosing.
   b. Nose Design: Class 1 - square

E. Adhesives (Cements): Water resistant, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions.

1. Adhesives to be used for resilient floor applications shall not generate any odor or unpleasant smell.

F. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

G. Leveling and Patching Compounds: Latex types as recommended by flooring manufacturer.

H. Slip Retardant Polish: Provide slip-retardant polish as recommended by resilient tile manufacturer.

1. POLISH FOR RESILIENT FLOORING
   a. Floor Polish: Contractor shall provide floor polish to achieve the Static Coefficient of Friction; per ASTM D 2047, of 0.5 or better for level surfaces and as per requirements of state and local codes having jurisdictions.

2.7 COLORS, TEXTURES AND PATTERNS

A. Colors, textures and patterns shall be as selected and directed by the Architect. Patterns shall be defined as using not more than five (5) different colors of tile in any given area, applied in boarders, stripes, diagonals, checkerboard patterns and other designs as indicated, or if not indicated, shall be as directed by the Architect.

1. All selections shall be made from manufacturer’s full product lines, for all products and accessories, (including premium textures and colors).
PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Inspect substrates and conditions of installation to verify that work may properly commence. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Concrete Substrates: Perform concrete relative humidity and pH testing and to comply with manufacturer's recommended moisture tests before beginning installation, to verify that concrete surfaces have cured sufficiently to allow adhesive bond to resilient flooring.

1. Commencement of work shall constitute acceptance of conditions. Any necessary remedial work required to correct any unsatisfactory conditions, found after the start of installation, will be provided at no cost to the Owner.

3.2 PREPARATION

A. Perform moisture content testing as required by manufacturer’s instructions to ensure pH readings and moisture transmission are acceptable. Perform testing in accordance with requirements of Section 01455.

1. If values exceed this level, follow manufacturer’s recommendations for moisture transmission mitigation. Do not proceed until unsatisfactory conditions have been corrected.

B. Broom clean or vacuum surfaces to be covered, and inspect subfloor.

1. Use leveling and patching compounds as recommended by resilient flooring manufacturer for filling small cracks, holes and depressions in subfloors.

2. Apply concrete slab primer and/or sealer, as recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

3. Remove paint, curing compounds, and other materials that could interfere with adhesion of resilient products.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Comply with manufacturer's published recommendations for installation in each area, extending resilient flooring into spaces which are partially concealed. Cut and fit tightly to fixtures, pipes, and other obstructions, as well as to walls and partitions.

B. Access Covers: Install resilient flooring tightly to removable access covers in field of flooring, taking care that pattern will match when covers are in closed position.
C. Tightly adhere resilient flooring to substrate with no open joints or cracks, and without raised or blistered areas. Spread adhesive evenly, so that final installation will be without telegraphed markings from adhesive or substrate.

D. Extend resilient flooring into toe spaces, door reveals, and into closets and similar openings.

E. Scribe, cut, and fit resilient flooring to permanent fixtures, built-in furniture and cabinets, pipes, outlets and permanent columns, walls and partitions.

F. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.

G. Install resilient flooring on covers for telephone and electrical ducts, and similar items occurring within finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers. Tightly cement edges to perimeter of floor around covers and to covers.

H. Tightly cement resilient flooring to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Hand roll resilient flooring at perimeter of each covered area to assure adhesion.

### 3.4 INSTALLATION OF TILE FLOORS

A. Lay tile from center marks established with principal walls, discounting minor offsets, so that tile at opposite edges of room area of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis, unless otherwise shown.

B. Match tiles / plank for color and pattern by using tile / plank from cartons in same sequence as manufactured and packaged if so numbered. Cut tile / plank neatly around all fixtures. Broken, cracked, chipped, or deformed tiles / plank are not acceptable.

   1. Lay tile / plank in pattern(s) shown or as directed by the Architect.

C. Adhere tile / plank flooring to substrates using full spread of adhesive applied in compliance with flooring manufacturer's directions.

D. Expansion Joints: Locate expansion joints and other sealant filled joints, including control, contraction and isolation joints, where indicated or where joints occur in substrate. Do not saw cut joints.

### 3.5 INSTALLATION OF ACCESSORIES

A. Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.
1. Job-formed Corners:
   a. Outside Corners: Form by bending without producing discoloration (whitening) at bends.
   b. Inside Corners: Butt one piece to corner, then scribe next piece to fit.

B. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

C. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed.

D. Apply resilient accessories to stairs as indicated and in strict accordance with manufacturer's installation instructions.

3.6 CLEANING AND PROTECTION

A. Perform following operations immediately upon completion of resilient flooring:

1. Sweep or vacuum floor thoroughly.

2. Do not wash floor until time period recommended by resilient flooring manufacturer has elapsed to allow resilient flooring to become well-sealed in adhesive.

3. Damp-mop floor being careful to remove black marks and excessive soil.

4. Remove any excess adhesive or other surface blemishes, using appropriate cleaner recommended by resilient flooring manufacturers.

B. Protect flooring against damage during construction period to comply with resilient flooring manufacturer's directions.

1. Apply protective floor polish to resilient flooring surfaces free from soil, excess adhesive or surface blemishes. Use commercially available metal cross-linked acrylic product acceptable to resilient flooring manufacturer.

2. Protect resilient flooring against damage from rolling loads for initial period following installation by covering with plywood or hardboard. Use dollies to move stationary equipment or furnishings across floors.

3. Cover resilient flooring with undyed, untreated building paper until inspection for substantial completion.

C. Clean resilient flooring not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Clean resilient flooring by method recommended by resilient flooring manufacturer.

D. Strip protective floor polish, which was applied after completion of installation, prior to cleaning.

1. Reapply floor polish after cleaning.
3.7 EXTRA STOCK

A. Deliver stock of maintenance materials to Owner. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.

1. Tile Flooring: Furnish not less than one box for each 50 boxes or fraction thereof, for each type, color, pattern and size selected and installed.

2. Accessories: Furnish not less than 2% of each type, size and color selected and installed.

END OF SECTION 09650
SECTION 09682 - CARPET ENTRY MATS (CEM)

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.

B. Related Sections:
   1. Section 01455 - Concrete In-situ Relative Humidity and pH Testing.
   2. Section 03300 - Concrete Work.
   3. Section 03450 - Self Drying Finishing Underlayment
   4. Section 09650 - Resilient Flooring for rubber base.

1.2 SUMMARY

A. Extent, location and details of carpet entry mat is indicated on the drawings.

B. Work of this section includes furnishing and installation of carpet entry mat, adhesives and accessories.

1.3 DEFINITIONS

A. Commercial Carpet Entry Mat: Carpet intended for use in commercial and public spaces, with construction, fire ratings, static control and appearance appropriate for this use.

1.4 REFERENCES

A. American Association of Textile Chemists and Colorists (AATCC):
   1. AATCC 134 Test Method for Electrostatic Propensity of Carpets.
   2. AATCC 174 Test Method for Antimicrobial Assessment.

B. American Society for Testing and Materials (ASTM):
   2. ASTM E662 Test Method for Specific Optical Density of Smoke Generated by Solid Materials (also referenced as NFPA 258).

1.5 PERFORMANCE REQUIREMENTS

A. Warranty Performance Requirements:

   1. Ten (10) Year Commercial Limited Warranty:
a. Fiber - Abrasive Wear – Manufacturer warrants that, under normal use, carpet using Solution Q SD Nylon will lose no more than 10% of the pile face fiber, by weight, during the warranty period. This warranty does not cover appearance retention, matting and crushing and normal appearance changes in high traffic areas.

b. Fiber - Static Protection - Manufacturer warrants that, under normal use, carpet using Solution Q SD Nylon will not generate static build-up in excess of 3.5 kv, during the warranty period as tested by AATCC Test Method 134.

c. Fiber - Colorfastness to Light and Atmospheric Contaminants Warranty - Manufacturer warrants that, under normal use, carpet utilizing Solution Q® SD Nylon, when installed and maintained as recommended by Manufacturer for indoor use only, will not display a significant change in color due to exposure to light or exposure to atmospheric contaminants (Ozone or Oxides of Nitrogen) during the warranty period.

1.6 SUBMITTALS

A. Manufacturer’s Data: Submit manufacturer's product literature and installation instructions for type of carpeting material and installation accessory required. Include methods of installation for each type of substrate.

1. Submit written data on physical characteristics, durability, resistance to flame resistance characteristics and showing compliance with the contract requirements, including independent laboratory test reports.

2. Include manufacturer's recommended specifications for primer, adhesive an installation instructions.

B. Fiber Requirements: Submit certification from the fiber producer verifying the following:

1. Use of the specified fiber in the submitted carpet product.
2. Must have federally registered Branded trademark.

C. Certificate of Compliance:

1. Submit certified test reports that carpet meets all the performance requirements stated above in paragraph 1.5 - Performance Requirements. Submit certified test reports that carpet meets all performance criteria.

D. Samples:

1. Submit two carpet samples 6" x 8" of each type, color, and pattern of carpet materials required.

2. Substitutions to specified product must be submitted for approval by the Architect.

3. Final Sample Submittal:

   a. Submit two (2) sets of samples for each carpet type.
b. No carpet shipments are permitted until acceptance of final samples is given by the Architect / Owner.

c. Samples submitted are assumed to be the manufacturer’s best obtainable match to the carpet described under Materials Section.

E. Shop Drawings:

1. For carpeted areas, submit shop drawings showing installation of carpeting, pattern direction, necessary installation accessories, and provisions for work of other trades. Show location of different patterns or styles of carpet. Also show locations of any threshold conditions.

2. The Contractor will supply reproducible prints on request, to facilitate shop drawing preparation.

F. Maintenance Manual:

1. Within thirty (30) days of awarding the Contract, submit two (2) copies of carpet manufacturer’s maintenance manual, including their recommendations for the care, cleaning and maintenance programs of each type of carpeting.

G. Recycling, Energy Conservation, and Reclamation Programs:

1. Submit manufacturer’s written certifications that all indicated programs are established and in full effect at the time of bidding.

H. Testing of Substrate:

1. Submit test reports of testing the concrete or other floor substrate, indicating compliance with manufacturer’s requirements for moisture and alkalinity percentage of contents.

I. Warranty: Submit Manufacturer’s Warranty as described in paragraph 1.5 (above).

J. Closeout Submittals:

1. Maintenance Data: Include maintenance procedures, recommended cleaning and stain removal materials, and recommended cleaning schedule. Include product Safety Data Sheets (SDS) for cleaning and stain-removal materials.

2. Installation Instructions: Include detailed installation procedures. Include modular installation procedures, adhesive types, trowel size(s), spread rates, open times, and Safety Data Sheets (SDS) for all modular adhesives.

3. Warranties and Performance Certifications:

   a. Submit written warranties for all products as well as Performance testing results on all items included in Warranty section.
1.7 QUALITY ASSURANCE

A. Moisture vapor emission testing in accordance with ASTM F 1869-11. Test results should not exceed 3 lbs. per 1,000 sq. ft. per 24 hrs., unless otherwise specified by the flooring or adhesive manufacturer.

1. ASTM Standard also states that relative humidity inside of the concrete slab should not exceed 75%, per ASTM F2170-11, unless otherwise specified by the flooring or adhesive manufacturer.

B. Single Source Responsibility: Provide products from a single manufacturer.

C. Warranty must be manufacturer’s standard and not job specific.

D. All styles must come from the same manufacturer.

E. Do not install carpet until areas have been fully enclosed and environmental conditions have reached the levels indicated during occupancy.

F. Maintain ambient temperature and humidity conditions during and after installation of carpet at levels indicated during occupancy.

G. Allow carpet to reach room temperature or minimum temperature recommended by manufacturer before beginning installation.

H. Protect adhesives from freezing. Follow manufacturer’s recommendations for minimum temperatures to which adhesives are exposed.

I. IAQ Requirements, Green Label: All products must be CRI Green Label Plus Certified.

1.8 QUALIFICATIONS

A. Manufacturer:

1. Company specializing in manufacturing Commercial Carpet with a recommended minimum five (5) years of documented experience and has been in continuous operation and using technology that has been in use with a recommended (10) years.

2. The manufacturer must agree to provide on-site supervision during the start up phase of installation without any additional cost to the Owner.

   a. The manufacturer shall provide the Architect with written documentation of locations within the project that were supervised by the manufacturer.

   b. Manufacturer shall notify the Architect and the General Construction Work Contractor if installation instructions are not completely followed.

3. The manufacturer must agree to provide a Reclamation Program. Written documentation, indicating that this program is in effect with proof that the mechanics of the program is available at the time of the bid.
B. Installer:

1. Company specializing in installing carpet with a recommended minimum five (5) years of documented experience approved by the manufacturer, and participation in manufacturer’s installation programs including responsible carpet removal.
   a. The installation of the carpet must be guaranteed by the manufacturer of the carpet.
   b. Installation must be performed by an installer that is pre-approved in writing by the manufacturer of the carpet.
   c. The agreement between the manufacturer and the installer must specifically address all installation procedures and materials to be used with the specified warranties.

2. Installer shall follow all installation procedures recommended by the manufacturer and use only materials supplied by the manufacturer to assure obtaining required warranties offered by the manufacturer.

C. Indoor Air Quality Testing:

1. Submit testing reports furnished by an independent testing laboratory with manufacturers’ certification attesting that all carpet supplied for this project has been tested and passed the Indoor Air Quality Testing requirements established by the Carpet and Rug Institute (CRI), Green Label Plus Program for VOC’s, which do not exceed the established emission levels. Likewise, the adhesives to be used for installation of the carpet have been tested and determined to be in compliance with the CRI Indoor Air Quality Testing Program requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in original factory original wrappings, clearly labeled with identification of manufacturer, brand name, quality or grade, fire hazard classification, and lot number.

B. Store materials in original undamaged packages and containers, inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity; laid flat, blocked off ground to prevent sagging and warping.

C. Comply with instructions and recommendations of manufacturer for special delivery, storage, and handling requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Basis of Design: “Walk Forward”, as manufactured by Patcraft (Shaw - a Berkshire Hathaway Company); or approved equal.
1. Construction - Multi-Level Pattern Loop
2. Gauge- 1/12
3. Stitches Per Inch - 10.3 per inch
4. Tufted Pile Height - 6/32"
5. Tufted Yarn Weight - 26.0
6. Finished Pile Thickness - 0.084"
7. Total Thickness - 0.261"
8. Dye Method - 100% Solution Dyed
10. Fiber - 100% Eco Solution Q Nylon
11. Average Density- 11143
12. Size/Width - 24" x 24"
13. Protective Treatments - SSP® Shaw Soil Protection
14. Installation Method - To be reviewed and approved by the Architect.
15. Performance:
   a. Static - Less than 3.5 kV (AATCC-134)
   b. Flammability - Passes DOCFF-1-70 Methenamine Pill Test
   c. Flooring Radiant Panel Test - Meets NFPA Class 1 tested under ASTM E-648
   d. Smoke Chamber NFPA-258 - Less than 450 Flaming Mode (ASTM-E-662)
   e. CRI Green Label Plus - GLP 9968
16. Patterns and Colors: As selected by Architect from manufacturer’s full range of available patterns and colors. Allow for more than 2 patterns and 3 colors.

B. Subject to compliance with requirements of the Contract Documents, manufacturers offering products which may be incorporated in work include the following:

1. Equivalent by Interface;
2. Equivalent by Tandus Flooring;
3. Equivalent by Mannington Commercial;
4. Equivalent by LEES Carpets;
5. Or approved equal.

2.2 ACCESSORIES

A. Floor Primer: Manufacturer’s approved floor primer applied to all areas that will receive carpeting.

B. Installation: “Lok Dots”, pressure-sensitive adhesive system. Non-toxic and odorless system virtually eliminates VOC emissions; or approved equal.

C. Miscellaneous Materials: As recommended by the manufacturer of the carpet and other carpeting products; selected by Installer to meet project circumstances and requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine and test substrates for moisture content, high alkalinity, levelness and other conditions under which carpeting is to be installed. Notify Contractor in writing of major conditions detrimental to proper completion of the work.
1. Do not proceed until unsatisfactory conditions have been corrected.
   a. Commencement of work shall constitute acceptance of conditions. Any necessary remedial work required to correct any unsatisfactory conditions, found after the start of installation, will be provided at no cost to the Owner.

2. Coordinate with installation of floor leveling underlayment where indicated or required.

3.2 PREPARATION

A. Perform moisture content testing as required by manufacturer’s instructions to ensure pH readings of no more than nine (9). Moisture transmission of 5.0-lbs/sq. ft per 24 hours is acceptable. If values exceed this level, follow manufacturer’s recommendations for moisture transmission mitigation. Do not proceed until unsatisfactory conditions have been corrected.

B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes and other defects with sub-floor filler.

C. Fill, level and make smooth cracks 1/16 inch or more, holes, unevenness, and roughness with compatible latex floor patching compounds. Feather floor filling or level compound a minimum of four (4) ft. Sweep floor of loose granular debris prior to filling. After filling, allow filler to dry. Damp mop floor with warm water and allow to dry. Vacuum after mopping to ensure that loose granular debris is removed and to provide a proper substrate to install carpet. Prohibit traffic until filler is cured.

D. Vacuum floor again immediately before installation of carpeting.

E. Preheat area(s) to receive carpet to a minimum temperature of 68°F for 72 hours prior to installation, with a relative humidity of not more than 65%. Maintain minimum temperature of 50°F thereafter. Carpet must be stored at a minimum temperature of 68°F, for 72 hours prior to installation.

3.3 INSTALLATION

A. Install carpet in accordance with the Technical Bulletins provided by the manufacturer for tufted products which include but not limited to the following:
   1. Conducting Site Testing and conditioning,
   2. Floor Preparation,
   3. Installation of the carpet, including layout (carpet layout and cutting, etc.)

B. Install carpet under open-bottom obstructions and under removable flanges and furnishings, and into alcoves and closets in each space.

C. Provide cut outs where required. Conceal cut edges with protective edge guards or flanges.
D. Install carpet under open-bottom items and install tight against walls, columns, and cabinets so that the entire floor area is covered with carpet. Cover over floor-type door closers.

E. Install edging guards at openings and doors wherever carpet terminates, unless indicated otherwise.

F. Perform cutting in accordance with manufacturer’s recommendation using tools designed for carpet being installed. Verify carpet match before cutting to insure minimal variation between dye lots.

G. Install carpet from same dye lot and run within each continuous carpet area.

H. Use leveling compound where necessary. Feather floor leveling compounds minimum of 4 ft.

I. Do not bridge building expansion joints with continuous carpeting. Provide for movement.

J. Trim carpet neatly at walls, and around interruptions

K. Complete installation of edge strips, concealing exposed edges.

L. Cut carpet at fixtures, architectural elements, and perimeters.

M. Use a fixed metal strip at area transitions adjacent to different flooring material(s).

3.4 CLEANING

A. Remove and discard debris and recycle unusable scraps. Vacuum carpet using commercial machine with face-beater element. Remove spots and replace carpet where spots cannot be removed. Remove any protruding face yarn using sharp scissors.

3.5 CALL BACK

A. Prior to expiration of the ten (10) year warranty, perform all necessary corrections and adjustments.

3.6 ADDITIONAL MATERIAL

A. Deliver to Owner as directed not less than five percent (5%) additional carpet of each type, pattern and color used.

END OF SECTION 09682
SECTION 09685 - CARPET TILE

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.

B. Related Sections:
   1. Section 01455 - Concrete In-situ Relative Humidity and pH Testing.
   2. Section 03300 - Concrete Work.
   3. Section 03450 - Self Drying Finishing Underlayment.
   4. Section 09650 - Resilient Flooring for rubber base.

1.2 SUMMARY

A. Extent, location and details of type of carpeting are indicated on the drawings.

B. Work of this section includes furnishing and installation of carpeting, adhesives and accessories.

1.3 DEFINITIONS

A. Commercial Carpet: Carpet intended for use in commercial and public spaces, with construction, fire ratings, static control and appearance appropriate for this use.

1.4 REFERENCES

A. American Association of Textile Chemists and Colorists (AATCC):
   2. AATCC 174: Antimicrobial Activity Assessment of Carpets.

B. American Society for Testing and Materials (ASTM):

1.5 PERFORMANCE REQUIREMENTS

A. Comply with the following general performance requirements:
   1. Radiant Panel: ASTM E-648: Class 1
   2. Smoke Density: ASTM E-662 ≤450
   3. Static: AATCC - 134, ≤3.5 KV
   4. Indoor Air Quality: CRI Green Label Plus
B. Comply with the following special performance requirements:

1. Carpet must be square, 4 hole cross-section.
2. Carpet must be Eco Solution Q® SDNylon.
3. Carpet must have permanent anti-static fiber.
4. Carpet must have Soil Protection.
5. Carpet must be 100% Solution Dyed.
6. Carpet must have Non-Woven Synthetic Primary and EcoWorx® Tile Backing.
7. Carpet meets ADA Compliance.

C. Warranty Performance Requirements:

1. Manufacturer shall issue a **Lifetime Commercial Limited** warranty from the date of Substantial Completion.

2. **Special Project Warranty:**
   
a. In addition, a written special project warranty, executed by the Contractor and the Installer, agreeing to repair or replace carpet which fails in material or workmanship within a period of **two (2) years**, which starts at the date of substantial completion, without any cost to the Owner, and agreeing to repair or replace other defects beyond Contractor’s/ Installer’s/ Manufacturer’s controls, as judged by the Architect, at Owner’s expense at prevailing rates.

3. Refer to Section 01900 “Warranties and Guarantees”.

1.6 SUBMITTALS

A. **Manufacturer’s Data:** Submit manufacturer's product literature and installation instructions for each type of carpeting material and installation accessory required. Include methods of installation for each type of substrate.

   1. Submit written data on physical characteristics, durability, resistance to fading and flame resistance characteristics and showing compliance with the contract requirements, including independent laboratory test reports.

   2. Include manufacturer's recommended specifications for primer, adhesive and installation instructions.

B. **Fiber Requirements:** Submit certification from the fiber producer verifying the following:

   1. Use of the specified fiber in the submitted carpet product.
   2. Must have federally registered Branded trademark.

C. **Certificate of Compliance:**

   1. Submit certified test reports that carpet meets all the performance requirements stated above in paragraph 1.4 (above) Performance requirements. Submit **certified** test reports that carpet meets all performance criteria.
D. **Samples:**
   1. Submit two carpet samples 6" x 8" of each type, color, and pattern of carpet materials required. Submit two samples, 6" in lengths of edge guard stripping.
   2. Any alternates to specified products must be submitted for approval by the Architect.
   3. **Final Sample Submittal:**
      a. Submit two (2) sets of samples for each carpet type.
      b. No carpet shipments are permitted until acceptance of final samples is given by the Architect / Owner.
      c. Samples submitted are assumed to be the manufacturer’s best obtainable match to the carpet described under Materials Section.

E. **Shop Drawings:**
   1. For carpeted areas submit shop drawings showing installation of carpeting, seam diagram, pattern direction, necessary installation accessories, and provisions for work of other trades. Show location of different patterns or styles of carpet. Also show locations of any threshold conditions.
   2. The Contractor will supply reproducible prints on request, to facilitate shop drawing preparation.

F. **Maintenance Manual:**
   1. Within sixty (60) days of awarding the Contract, submit two (2) copies of carpet manufacturer’s maintenance manual, including his recommendations for the care, cleaning and maintenance programs of each type of carpeting.

G. **Recycling, Energy Conservation, and Reclamation Programs:**
   1. Submit manufacturer’s written certifications that all indicated programs are established and in full effect at the time of bidding.

H. **Testing of Substrate:**
   1. Submit test reports of testing the concrete or other floor substrate, indicating compliance with manufacturer’s requirements for moisture and alkalinity percentage of contents. Tests shall be performed in accordance with requirements of Section 01455.

I. **Closeout Submittals:**
   1. Maintenance Data: Include maintenance procedures, recommended cleaning and stain removal materials, and recommended cleaning schedule. Include product data and Safety Data Sheets (SDS) for cleaning and stain-removal materials.
2. Installation Instructions: Include detailed installation procedures. Include modular installation procedures, adhesive types, trowel sizes, spread rates, open times, and Safety Data Sheets (SDS) for all modular adhesives.

3. Warranties and Performance Certifications:
   a. Submit written warranties for all products as well as Performance testing results on all items included in Warranty section and Performance section of this specification.

1.7 QUALITY ASSURANCE

A. Single Source Responsibility: Provide products from a single manufacturer.

B. Warranties must be manufacturer’s standard and not job specific.

C. All styles must come from the same manufacturer.

D. Do not install carpet until areas have been fully enclosed and environmental conditions have reached the levels indicated during occupancy.

E. Maintain ambient temperature and humidity conditions during and after installation of carpet at levels indicated during occupancy.

F. Allow carpet to reach room temperature or minimum temperature recommended by manufacturer before beginning installation.

G. Protect adhesives from freezing. Follow manufacturer’s recommendations for minimum temperatures to which adhesives are exposed.

H. IAQ Requirements, Green Label: All products must be CRI Green Label Certified.

I. Carpet must be 100% recyclable.

1.8 QUALIFICATIONS

A. Manufacturer:
   1. Company specializing in manufacturing Commercial Carpet with a recommended minimum five (5) years of documented experience and has been in continuous operation and using technology that has been in use for a recommended ten (10) years.

   2. The manufacturer must agree to provide on-site supervision during the start up phase of installation without any additional cost to the Owner.

      a. The manufacturer shall provide the Architect / Construction Manager with written documentation of locations within the project that were supervised by the manufacturer.
b. Manufacturer shall notify the Architect / Construction Manager and the General Construction Work Contractor if installation instructions are not completely followed.

3. The manufacturer must agree to provide a Reclamation Program. Written documentation, indicating that this program is in effect with proof that the mechanics of the program is available at the time of the bid.

B. Installer:

1. Company specializing in installing carpet with a recommended minimum five (5) years of documented experience approved by the manufacturer, and participation in manufacturer’s installation programs including responsible carpet removal.
   
   a. The installation of the carpet must be guaranteed by the manufacturer of the carpet.
   
   b. Installation must be performed by an installer that is pre-approved in writing by the manufacturer of the carpet.
   
   c. The agreement between the manufacturer and the installer must specifically address all installation procedures and materials to be used with the specified warranties.

2. Installer shall follow all installation procedures recommended by the manufacturer and use only materials supplied by the manufacturer to assure obtaining required warranties offered by the manufacturer.

C. Indoor Air Quality Testing:

1. Submit testing reports furnished by an independent testing laboratory with manufacturers’ certification attesting that all carpet supplied for this project have been tested and passed the Indoor Air Quality Testing requirements established by the Carpet and Rug Institute (CRI), Green Label Program for VOC’s, which do not exceed the established emission levels. Likewise, the adhesives to be used for installation of the carpet have been tested and determined to be in compliance with the CRI Indoor Air Quality Testing Program requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in original factory original wrappings, clearly labeled with identification of manufacturer, brand name, quality or grade, fire hazard classification, and lot number.

B. Store materials in original undamaged packages and containers, inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity; laid flat, blocked off ground to prevent sagging and warping.

C. Comply with instructions and recommendations of manufacturer for special delivery, storage, and handling requirements.
PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide “Color Pop” as manufactured by Patcraft; or approved equal.

1. Type: Multi-Level Pattern Loop.
2. Face Yarn: Eco Solution Q® Nylon
3. Color System: 100% Solution Dyed.
4. Yarn Weight: 16.0 ounces per square yard.
5. Average Density: 5,818 ounces per cubic yard
6. Primary Backing: Non-Woven Synthetic
7. Secondary Backing: EcoWorx ® Tile
8. Pile thickness: 0.099”.
9. Total thickness: 0.224”.
10. Stitches: 10.3/in.
11. Size: 24 in x 24 in.
13. Preservative Protection: When used with Shaw 5036 adhesive
14. Environmental Specifications:
   a. Total Recycled Content 45%
   b. Recycled Content (Pre-Consumer) 45%
   c. Recycled Content (Post Consumer) 0%
   d. Other Environmental Claims: MBDC Cradle to Cradle - Silver Certified
      NSF 140 - Gold Certified
      CRI Green Label Plus - Certified glp9968
      USGBC LEED - Contributes
      Building Research Establishment - Certified
15. Traffic Classification: Heavy (TARR).

B. Provide “Linea 2” as manufactured by Patcraft; or approved equal.

1. Type: Pattern Loop.
2. Face Yarn: Eco Solution Q® Nylon
3. Color System: 100% Solution Dyed.
4. Yarn Weight: 16.0 ounces per square yard.
5. Average Density: 5,818 ounces per cubic yard
6. Primary Backing: Non-Woven Synthetic
7. Secondary Backing: EcoWorx ® Tile
8. Pile thickness: 0.099”.
9. Total thickness: 0.250”.
10. Stitches: 10.0/in.
11. Size: 24 in x 24 in.
13. Preservative Protection: When used with Shaw 5036 adhesive
14. Environmental Specifications:
   a. Total Recycled Content 45%
   b. Recycled Content (Pre-Consumer) 45%
   c. Recycled Content (Post Consumer) 0%
d. Other Environmental Claims:  
MBDC Cradle to Cradle - Silver Certified  
NSF 140 - Gold Certified  
CRI Green Label Plus - Certified  
glp9968  
USGBC LEED - Contributes  
Building Research Establishment - Certified

15. Traffic Classification:  Heavy (TARR).

C. Patterns and Colors: Patterns as directed by the Architect; allow for as many colors and patterns including borders and accent colors and shall be as per Architect’s direction. A maximum of three (3) patterns and five (5) colors shall be used in this project and a maximum of two (2) patterns and three (3) colors shall be used in any given area.

D. Comparable products of other manufacturers will be considered if it can be clearly shown that their products are tested, equal to or will exceed the construction quality requirements, intended performances and all other design attributes listed above and provided that deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances as judged solely by the Architect.

1. Approved equal by Interface FLOR.  
2. Approved equal by Bentley.  
3. Approved equal by Bigelow.  
4. Approved equal by Prince Street.  
5. Approved equal by Mannington.  
6. Or approved equal.

2.2 ACCESSORIES

A. Floor Primer: Manufacturer’s approved floor primer applied to all areas that will receive carpeting.

B. Carpet Edge Guard, Non-metallic: Extruded or molded heavy-duty vinyl or rubber carpet edge guard of size and profile indicated; minimum 2" wide anchorage flange; colors selected by Architect from standard colors.

C. Installation Adhesive: Water-resistant, non-staining as recommended by carpet manufacturer, which complies with flammability requirements for installed carpet.

D. Miscellaneous Materials: As recommended by manufacturers of carpet, cushions, and other carpeting products; selected by Installer to meet project circumstances and requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine and test substrates for moisture content, high alkalinity, levelness and other conditions under which carpeting is to be installed. Notify contractor in writing of major conditions detrimental to proper completion of the work.

1. Do not proceed until unsatisfactory conditions have been corrected.
2. Commencement of work shall constitute acceptance of conditions. Any necessary remedial work required to correct any unsatisfactory conditions, found after the start of installation, will be provided at no cost to the Owner.

3. Coordinate with installation of floor leveling underlayment where indicated or required.

### 3.2 PREPARATION

A. Repair minor holes, cracks, depressions, and rough areas using material recommended by carpet or adhesive manufacturer.

B. Clear away debris and scrape up cementitious deposits from surfaces to receive carpeting; vacuum clean immediately before installation. Check concrete surfaces to ensure no dusting through installed carpet; apply sealer where required to prevent dusting.

### 3.3 GENERAL

A. Install work in strict conformance with manufacturer's printed recommendations and as shown on approved seaming layouts.

B. Substrates shall be free from dust, oils, grease or other foreign matter. Cracks, holes and unevenness shall be filled with latex base floor filler.

C. During winter conditions, building shall be preheated to 72°F for at least 24 hours prior to installation. During summer conditions, air conditioning shall be in operation or other provisions shall be made to obtain temperatures and humidity within limits recommended by the manufacturer.

1. Temperatures shall be kept constant night and day during installation.
2. Concrete shall have cured for at least sixty (60) days prior to installation.

### 3.4 CARPET TILE

A. Butt Fitting and Joints: Brush pile back and tip individual tiles into place to avoid catching pile in the joint.

1. Frequently check joints for proper alignment and firm abutment.
2. Avoid excessively tight joints which will cause tile to peak or buckle.
3. Check tightness and establishing gain factor.
4. Cut tile from the back and secure cuts or partial tiles with manufacturer’s standard or approved releasable compatible adhesive or double sided tape.
5. Install all carpet tile with pile orientation in the proper direction, as recommended by the manufacturer for each carpet type, follow manufacturer’s embossed arrows on the back of tiles as guide for the proper direction.
a. If carpet product will be installed in parquet pattern only, arrows should point in the same direction every other tile and diagonally.

6. Center floor trench headers directly under a full tile row.

7. Install tile rows adjacent to walls as per manufacturer’s recommended instructions.

8. In open perimeter designs, use a fixed reducer, an carpet keeper strips to secure the tile area. Use types and sizes recommended by the tile carpet manufacturer.

9. Remove and replace damaged tiles, protect carpet tile until inspection for substantial completion of carpet tile work.

10. Install every tile with releasable adhesive in accordance with manufacturer’s instructions and information for using of appropriate tools and methods of applications.

3.5 CLEANING

A. Remove and dispose of debris and unusable scraps. Vacuum carpet using commercial machine with face-beater element. Remove spots and replace carpet where spots cannot be removed. Remove any protruding face yarn using sharp scissors.

3.6 CALL BACK

A. Prior to expiration of two (2) year warranty, perform all necessary corrections and adjustments.

3.7 ADDITIONAL MATERIAL

A. Deliver to Owner as directed not less than five percent (5%) additional carpet tile of each type, pattern and color used.

END OF SECTION 09685
SECTION 09776 - RESILIENT ATHLETIC SURFACING (RAS)

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 DESCRIPTION OF WORK

A. Extent of resilient athletic surfacing and accessories is shown on the drawings and in the room finish schedules.

1. Resilient athletic surfacing, includes recycled rubber flooring.
   a. Types of recycled rubber resilient flooring includes:
      1) RAS-S:  3/8" thick Recycled rubber resilient roll/sheet flooring.
      2) RAS-T:  1" thick Recycled rubber resilient tile flooring.
   b. Floor level transitions.
   c. Adhesives.

B. Performance Requirements: Provide recycled rubber resilient flooring, which has been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

1.3 RELATED SECTIONS

A. Section 01455 - Concrete In-situ Relative Humidity and pH Testing.

B. Section 03450 - Self-Drying Finishing Underlayment.

1.4 QUALITY ASSURANCE

A. Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. American Society for Testing and Materials (ASTM):


5. ASTM F137 Test Method for Flexibility of Resilient Flooring Materials.

6. ASTM F710 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.


C. California Department of Public Health (CDPH)


D. International Standards Organization

1. Environmental labels and declarations – Self-declared
2. Environmental claims (Type II environmental labeling)

E. Qualifications:

1. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

2. Manufacturer’s Qualifications: Manufacturer capable of providing field service representation during construction and approving application method.
   a. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer’s instructions and manufacturer’s warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

1.5 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit product data, including manufacturer’s guide specifications product sheet, for specified products.

C. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colors, patterns and textures.

D. Samples: Submit selection and verification samples for finishes, colors and textures.

E. Quality Assurance Submittals: Submit the following:
   1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

F. Manufacturer’s Instructions: Manufacturer’s installation instructions.

G. Manufacturer’s Field Reports: Manufacturer’s field reports specified herein. G. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data: Provide operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operational Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

H. Warranty:

1. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

2. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty document executed by authorized company official. Manufacturer’s warranty is in addition to and not a limitation of, other rights Owner may have under Contract Documents.

3. Warranty Period: Two (2) years commencing in Date of Substantial Completion.

I. Testing of Substrate:

1. Submit test reports of testing the concrete or other floor substrate, indicating compliance with manufacturer’s requirements for moisture and alkalinity percentage of contents. Tests shall be performed in accordance with requirements of Section 01455.

1.6 PROJECT CONDITIONS

A. Temperature Requirements: Maintain air temperature in spaces where products will be installed for time period before, during and after installation as recommended by manufacturer.

1.7 LEED INFO FOR RECYCLED RUBBER FLOORING

A. Recycled rubber flooring assists in earning points for New Construction and Major Renovations (LEED-NC) in two ways and can help earn an additional three points in the following ways (*):

FVHD-5063N  2:09650-3

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B. LEED-NC credits impacted by flooring

<table>
<thead>
<tr>
<th>Project</th>
<th>Category</th>
<th>Credit</th>
<th>Points Attainable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor Environmental Quality</td>
<td>Low Emitting Materials*</td>
<td>EQ 4.1</td>
<td>1</td>
</tr>
<tr>
<td>Materials &amp; Resources</td>
<td>Recycled Content</td>
<td>MR 4.1</td>
<td>1</td>
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<tr>
<td></td>
<td>Recycled Content</td>
<td>MR 4.2</td>
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<tr>
<td></td>
<td>Local/Regional Materials*</td>
<td>MR 5.1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Local/Regional Materials*</td>
<td>MR 5.2</td>
<td>1</td>
</tr>
</tbody>
</table>

EQ 4.1 – Adhesives and Sealants must meet or be lower than the current VOC content limits of South Coast Air Quality Management District (SCAQMD) Rule #1169.

MR 4.1 – Use materials with recycled content such that the sum of post-consumer recycled content plus one half (the value of) of the post-industrial content constitutes at least 10% of the total value of the materials in the project.

MR 4.2 – Use materials with recycled content such that the sum of post-consumer recycled content plus one half (the value of) of the post-industrial content constitutes at least 20% of the total value of the materials in the project.

MR 5.1 – Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% (based on cost) of the total materials value. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

1.8 MAINTENANCE

A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals (Maintenance Materials) Section.

1. Quantity: Furnish quantity of recycled rubber 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 materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Locker Rooms & Cardio / Strength Training / Machine Areas Flooring:

1. Basis of Design: “Regupol Aktiv Core Series”, Sports & Fitness Surfaces, Distributed by Thor Performance Products, Inc., Mountainville, NY; Tel.# 800.348.5815; or approved equal.

2. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but not limited to the following:
a. Robbins Sports Surfaces, Tel. # 800.543.1913.
b. Or approved equal.

3. Roll Dimension: 48" (1219 mm) x 3/8" (9 mm) standard.
   a. Roll Weight: 2.0 lb/ft2 (9.77 kg/m²).
   b. Roll Length: Maximum length (minimum seams).
   c. Standard Tolerances:
      1) Roll Width +1/2" -0"
      2) Roll Length +1% -0"
      3) Thickness +.3 mm -.3 mm

4. Colors: As selected from manufacturer’s standard color selection.

5. Product Testing:
   a. Density, (ASTM D3676), 60 pcf.
   b. Hardness, (ASTM D2240 Shore A), 60 +/- 5
   c. Tear Strength, (ASTM D624), 80 pli min.
   d. Elongation, (ASTM D412), >145%
   e. Tensile Strength, (ASTM D412), >220 PSI
   f. Flexibility, 1/4-inch mandrel (ASTM F137): pass.
   g. Chemical Resistance (ASTM F925):
      1) 5% Acetic Acid: No Change
      2) 70% Isopropyl Alcohol: No Change
      3) 5% Sodium Hydroxide: No Change
      4) 5% Hydrochloric Acid: No Change
      5) 5% Ammonia: No Change
      6) Bleach: No Change
      7) 5% Phenol: No Change
      8) Sulfuric Acid: No Change
   h. IAQ Testing, CDPH Std 01350 : Pass
   i. Recycled Content ISO 14021-1999: Minimum 83% (3rd Party Verified)

B. Weight Room Circulation Areas Flooring:

1. Basis of Design: “Regupol Aktiv Strength Series”, Sports & Fitness Surfaces, Distributed by Thor Performance Products, Inc., Mountainville, NY; Tel.# 800.348.5815; or approved equal.

2. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but not limited to the following:
   a. Robbins Sports Surfaces, Tel. # 800.543.1913.
   b. Or approved equal.

3. Roll Dimension [48" (1219 mm) x 3/8" (9 mm) standard]; [48" (1219 mm) x 3/8" (12 mm) custom]
   a. Roll Weight: 2.0 lb/ft2 (9.77 kg/m²).
   b. Roll Length: Maximum length (minimum seams).
   c. Standard Tolerances
      1) Roll Width +1/2" -0"
      2) Roll Length +1% -0"
      3) Thickness +.3 mm -.3 mm
4. Colors: As selected from manufacturer’s standard color selection.

5. Product Testing:
   a. Density, (ASTM D3676), 60 pcf.
   b. Hardness, (ASTM D2240 Shore A), 60 +/- 5
   c. Tear Strength, (ASTM D624), 80 pli min.
   d. Elongation, (ASTM D412), >145%
   e. Tensile Strength, (ASTM D412), >220 PSI
   f. Flexibility, 1/4-inch mandrel (ASTM F137): pass.
   g. Chemical Resistance (ASTM F925):
      1) 5% Acetic Acid: No Change
      2) 70% Isopropyl Alcohol: No Change
      3) 5% Sodium Hydroxide: No Change
      4) 5% Hydrochloric Acid: No Change
      5) 5% Ammonia: No Change
      6) Bleach: No Change
      7) 7.5% Phenol: No Change
      8) Sulfuric Acid: No Change
   h. IAQ Testing, CDPH Std 01350 : Pass
   i. Recycled Content ISO 14021-1999: Minimum 63% (3rd Party Verified)

C. Free-weight Area Flooring:

1. Basis of Design: Regupol AktivPro Tiles, Distributed by Thor Performance Products, Inc., Mountainville, NY; Tel.# 800.348.5815; or approved equal.

2. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but not limited to the following:
   a. Robbins Sports Surfaces, Tel. # 800.543.1913.
   b. Or approved equal.

3. 1” x 24” x 24” Recycled Rubber Molded Tiles.

4. Tiles configurations consist of a high density, wear surface, cylindrical support feet that allow underside cable routing, resiliency, and water drainage, as well as twelve molded perimeter dowel holes that accept specially designed barbed dowel pins to promote ease of installation.

5. Material: Made from 100% recycled SBR (Styrene-Butadiene Rubber) tire rubber and polyurethane binders.

6. Component: Tiles are a factory-molded surface composed of high quality rubber granules bound with a wear and weather resistant polyurethane.

7. Tile Dimension: Tiles products shall be 24” x 24” and an overall thickness of 1”.

8. Tile Weight: 4.0 lb/ft² (19.5 kg/m²)

9. Tile Standard Tolerances: Width: ± 2 mm; Thickness: ± 3 mm
10. Colors: Specify color from manufacturer’s standard colors, custom colors, or special logo/graphic inlays.

11. Wear Surface Density: 65.0 lbs/cu. ft. min.

12. Water Permeation Rate: 0.045 cm./sec.

13. Tear Resistance: 70pli min., (ASTM D624, Die C)

14. Tensile Strength: (ASTM D412) >200 lb/in² min.

15. Static Load Limit: (ASTM F970) 400 lb/in² < 0.005 in.

16. Coefficient of Friction: > 0.9 (ASTM D2047)

17. Chemical Resistance:
   a. 5% Acetic Acid, no change
   b. (ASTM F925) 70% Isopropyl Alcohol: no change
   c. 5% Sodium Hydroxide: no change
   d. 5% Hydrochloric Acid: no change
   e. 5% Ammonia: no change
   f. Bleach; no change.
   g. 5% Phenol: no change
   h. Sulfuric Acid: no change

18. Impact Insulation Class: (ASTM E492) >50

D. Regupol PU350, One-Component Polyurethane Adhesive:

1. Product: The one-part urethane adhesive under this specification shall be Regupol America’s – Regupol PU350 one-component polyurethane adhesive.

2. Material: Regupol PU350 is a trowel grade, one-component moisture cured polyurethane, waterproof structural adhesive with vapor reducing characteristics.
   a. Adhesive Type: one-component polyurethane
   b. Adhesive Cure System: moisture cured
   c. Weight: 5 gallon pail- 55 lbs, 2-1/2 gallon pail- 30 lbs
   d. Color: Light Tan
   e. VOC Content: < 60 g/L
   f. Freeze/Thaw: stable
   g. Application Temperature: 40° F - 100° F
   h. Calcium Chloride Test (ASTM F1869): Maximum 5.5 lbs per 1,000 sq./ft 24Hrs.
   i. Relative Humidity (RH ) Test (ASTM F2170): Maximum Allowable RH 85%
   j. Flashpoint: > 200° F
   k. Shelf Life: 12 months
   l. Working Time: 45-60 minutes
   m. Trowel: 1/16” square notched trowel (indoor installation only)
   n. Coverage Rate: 95 ft² per gallon (1/16” square notched trowel)
   o. SCAQMD Rule #1168: <60g/ltr.
3. Comparable products of other manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements, intended performances and all other design attributes listed above and provided that deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances as judged solely by the Architect/Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Inspect substrates and conditions of installation to verify that work may properly commence. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 MANUFACTURER’S INSTRUCTIONS

A. Compliance: Comply with manufacturer’s product data, including product technical bulletins, product catalog installation instructions and product carton Instructions for installation.

3.3 PREPARATION

A. Vacuum surfaces to be covered.

1. Remove paint, curing compounds, and other materials that could interfere with adhesion of resilient products.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Comply with manufacturer's published recommendations for installation in each area. Cut and fit tightly to fixtures, pipes, and other obstructions, as well as to walls and partitions.

B. Tightly adhere flooring to substrate with no open joints and without raised or blistered areas. Spread adhesive evenly, so that final installation will be without telegraphed markings from adhesive or substrate.

C. Scribe, cut, and fit resilient flooring to permanent fixtures, built-in furniture and cabinets, pipes, outlets and permanent columns, walls and partitions.

D. Tightly cement resilient accessory to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections.

3.5 INSTALLATION OF ACCESSORIES

A. Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.
1. Job-formed Corners:
   a. Outside Corners: Form by bending without producing discoloration (whitening) at bends.
   b. Inside Corners: Butt one piece to corner, then scribe next piece to fit.

B. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

3.6 CLEANING AND PROTECTION

A. Perform following operations immediately upon completion of resilient accessory:

1. Vacuum surfaces thoroughly.

2. Remove any excess adhesive or other surface blemishes, using appropriate cleaner recommended by resilient accessory manufacturer.

B. Protect accessories against damage during construction period to comply with resilient manufacturer's directions.

C. Clean resilient accessory not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Clean resilient accessory by method recommended by resilient manufacturer.

3.7 EXTRA STOCK

A. Deliver stock of maintenance materials to Owner. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.

1. Accessories: Furnish not less than 2% of each type, size and color selected and installed.

END OF SECTION 09650
SECTION 09900 - PAINTING

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.

B. Related Section(s):

1. Section 01030 - Alternate Bids.
2. Section 04200 - Unit Masonry.
3. Section 05120 - Structural Steel.
4. Section 05210 - Steel Joists.
5. Section 05300 - Metal Decking.
6. Section 05400 - Miscellaneous Structural Steel.
7. Section 05500 - Metal Fabrications.
8. Section 08110 - Hollow Metalwork.
10. Section 09250 - Gypsum Drywall.
12. Division 16 - Electrical Work.

1.2 DESCRIPTION OF WORK

A. Extent of painting work is indicated on drawings and schedules, and as herein specified.

B. Work includes painting and finishing of interior and exterior exposed items and surfaces throughout project, except as otherwise indicated.

1. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.

C. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

D. Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors are designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will select these from standard colors or finishes available.

E. Following categories of work are not included as part of field-applied finish work.

1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, steel windows, miscellaneous metal, hollow metal work, and similar items. Also, for fabricated components such as architectural woodwork, wood casework, and shop fabricated or factory built
mechanical and electrical equipment or accessories. This is in addition to the prime coat specified herein.

2. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified for such items as (but not limited to) metal toilet enclosures, prefinished partition systems, acoustic materials, architectural woodwork and casework, and shop fabricated or factory built mechanical and electrical equipment, including light fixtures, switchgear and distribution cabinets.

3. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.

4. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.

5. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting.

6. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment, identification, performance rating, name, or nomenclature plates.

F. Mechanical and Electrical Work: Painting of mechanical and electrical work is specified herein.

1. Painting of mechanical and electrical work is limited to those items exposed to view.

2. Mechanical items to be painted include, but are not limited to, the following:
   a. Piping, pipe hangers and supports.
   b. Ductwork, insulation.
   c. Access doors and service panels.

3. Electrical items to be painted include, but are not limited to, the following:
   a. Conduit and fittings.
   b. Backboxes.
   c. Junction boxes.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.
C. **Coefficient of Friction:** The Federal and industry standard for testing coefficient of friction or the slip resistance of a surface is tested to the requirements, as outlined, in ASTM D-2047, which utilizes a friction measurement machine, commonly referred to as the James Machine.

D. **Industry Standards:** Comply with industry standard established by the Painting and Decorating Contractors of America PDCA for applications, methods and recommendations and use of tools and equipment for paint and stain coatings, primers and block fillers.

E. **Lead and Chromate Contents:**

1. All paint products must be free of any lead or chromate contents.

F. **Volatile Organic Compound Compliant (VOC.):**

1. All paint products must meet the State VOC environmental regulations (OTC Regulation compliant) and the following:

   a. **Chemical Components of Interior Paints and Coatings:** Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions:

      (1) Primer, Sealer and Undercoater: VOC content of not more than 200 g/L.
      (2) Specialty Primer, Sealer and Undercoater: VOC content of not more than 350 g/L.
      (3) Rust Preventative Coating: VOC content of not more than 400 g/L.
      (4) Flat Paints and Coatings: VOC content of not more than 100 g/L.
      (5) Non-Flat Paints and Coatings: VOC content of not more than 150 g/L.
      (6) Nonflat High Gloss Coatings: VOC content of not more than 250 g/L.
      (7) Varnishes and Sanding Sealers: VOC content of not more than 350 g/L.
      (8) Stains: VOC content of not more than 250 g/L.
      (9) Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

2. **LEED - Restricted Components:** Paints and coatings shall not contain any of the following:

   a. Acrolein.
   b. Acrylonitrile.
   c. Antimony.
   d. Benzene.
   e. Butyl benzyl phthalate.
   f. Cadmium.
   g. Di (2-ethylhexyl) phthalate.
   h. Di-n-butyl phthalate.
   i. Di-n-octyl phthalate.
   j. 1,2-dichlorobenzene.
   k. Diethyl phthalate.
   l. Dimethyl phthalate.
m. Ethylbenzene.
n. Formaldehyde.
o. Hexavalent chromium.
p. Isophorone.
q. Lead.
r. Mercury.
s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.
u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

G. Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on characteristics of finish materials proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Architect in writing of any anticipated problems using specified coating systems with substrates primed by others.

1. At galvanized surfaces, primer shall be a zinc dust-zinc oxide coating.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.

B. Samples: Prior to beginning work, Contractor shall furnish color chips (2 fan decks) for surfaces to be painted. Use representative colors when preparing samples for review. Submit samples for Architect's review of color and texture only. Provide a listing of material and application for each coat of each finish sample.

1. On 12" x 12" hardboard, provide two samples of each color and material, with texture to simulate actual conditions. Resubmit samples as requested by Architect until acceptable sheen, color, and texture is achieved.

2. On actual wood surfaces, provide two 4" x 8" samples of natural and stained wood finish. Label and identify each as to location and application.

C. LEED Submittals:

1. Product Data for Credit EQ 2.2: For paints and coatings, including printed statement of VOC content and chemical components.

D. Acknowledgment of Contract Documents: Contractor / Installer shall submit to the Architect certifications signed by each of the Contractor and Installer attesting acknowledgment of requirements of the Contract Documents for specific project requirements indicated in this specifications.
1. Installer shall submit proof of evidence, (this project specification section) with his letter of certificate.

2. Contractor / Installer shall not proceed with painting work of this section until submittal of required certifications are completed.

3. Any work performed prior to completion of this submittal shall be subject to total rejection by the Architect. All rejected work shall be rectified without any additional cost to the Owner.

E. Coating Maintenance Manual: Upon conclusion of the project, the contractor in conjunction with the coating manufacturer shall furnish a coating maintenance manual such as the Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an area summary with finish schedule, area detail designating where each product/color/finish was used, product data pages, SDS pages, care and cleaning instructions, touch up procedures and color samples of each color and finish used.

1.5 DELIVERY AND STORAGE

A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:

Name or title of material.
Fed. Spec. number, if applicable.
Manufacturer's stock number and date of manufacturer.
Manufacturer's name.
Contents by volume, for major pigment and vehicle constituents.
Thinning instructions.
Application instructions.
Color name and number.

1.6 JOB CONDITIONS

A. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45°F (7°C) and 95°F (35°C), unless otherwise permitted by paint manufacturer's printed instructions.

B. Do not apply paint in snow, rain, fog or mist, or when relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions.

C. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

D. Provide sufficient temporary illumination producing overall space/room minimum illumination level of 50 ft. candles while preparing or painting of surfaces and to assure the production of quality finishes.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to the following:

1. M A B
2. Benjamin Moore
3. PPG Architectural Coatings
4. The Sherwin-Williams Company
5. Or approved equal

2.2 COLORS AND FINISHES

A. Prior to beginning work, Contractor shall furnish color chips for surfaces to be painted from manufacturers full line of products. This shall include custom colors.

1. Contractor shall allow for a total of 20 different colors of each type of paint, (excluding graphics and /or art work as indicated) with change of color within a room or space occurring either on a horizontal or vertical line, [allow for multiple (6) colors at each room unless otherwise shown]. Where roof structure is exposed, steel beams, steel joists and metal decking will be painted with different colors, as selected by the Architect.

2. Contractor shall allow for split frames at all new and existing hollow metal door frames to be painted.

3. Final acceptance of colors will be from samples supplied on the job.

B. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.

2.3 MATERIALS

A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

B. Provide undercoat paint recommended and produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only within recommended limits.

2.4 EXTERIOR PAINT SCHEDULE

A. Basis of Design: Provide the following paint systems for the various substrates. Other equal paint products by indicated manufacturers will be acceptable:

B. High-Gloss Enamel (Water-base Polyester Urethane Finish)

1. 1st Coat: Sherwin-Williams, Pro Industrial Pro-Cryl Universal Primer, B66W310.
2. 2nd Coat: Sherwin-Williams, Hydrogloss 1K Water-based Urethane, B65-180.

3. 3rd Coat: Sherwin-Williams, Hydrogloss 1K Water-based Urethane, B65-180.

4. Apply to the following exterior surfaces: Lintels, ferrous metal and other exterior assemblies to receive paint.

5. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

C. Semi-Gloss Enamel (Waterbased Alkyd Urethane Enamel Finish)

1. 1st Coat: Sherwin-Williams, Extreme Bond Exterior Primer, B51W00150.

2. 2nd Coat: Sherwin-Williams, Pro Industrial Waterbased Alkyd Urethane, B53-1150.

3. 3rd Coat: Sherwin-Williams, Pro Industrial Waterbased Alkyd Urethane, B53-1150.

4. Apply to the following exterior surfaces: Lintels, ferrous metal, and other exterior assemblies to receive paint.

5. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

2.5 INTERIOR PAINT SCHEDULE

A. Semi-Gloss (Satin) Enamel:

1. 1st Coat: Sherwin-Williams, Pro Industrial Pro-Cryl Universal Primer, B66W310.

2. 2nd Coat: Acrylic Enamel, Sherwin-Williams, Pro Industrial HP Acrylic, B66-650.

3. 3rd Coat: Acrylic Enamel, Sherwin-Williams, Pro Industrial HP Acrylic, B66-650.

4. Apply to following interior surfaces: Hollow metal work, metal lites for wood doors, miscellaneous steel and ferrous metal fabrications.

5. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

B. Semi-Gloss (Satin) Enamel:

1. 1st Coat: Sherwin-Williams, Pro Industrial Pro-Cryl Universal Primer, B66W310.

2. 2nd Coat: Acrylic Enamel, Sherwin-Williams, Pro Industrial DTM Acrylic.

3. 3rd Coat: Acrylic Enamel, Sherwin-Williams, Pro Industrial DTM Acrylic.

4. Apply to following interior surfaces: Exposed metal ductwork.
5. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

C. Egg-Shell / Satin Enamel - Acrylic Latex:

1. Base Coats: Enamel Undercoat; Primer-Sealer to suit substrate or Loxon Block Surfacer, A24 for Concrete Masonry/CMU Block.

* Block Filler shall be Level 3 - Premium Fill; one or multiple coats for high performance block filler in accordance with PDCA industry standards. Apply mock-up to confirm appearance before application of finish coats.

2. 2nd Coat: Sherwin-Williams, ProMar 200 Zero VOC Eg-Shel, B20-2600 Series.

3. 3rd Coat: Sherwin-Williams, ProMar 200 Zero VOC Eg-Shel, B20-2600 Series.

4. Apply to the following interior surfaces: Concrete masonry units, gypsum drywall and other interior assemblies to receive paint.

5. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

D. Flat - Acrylic Latex:


2. 2nd Coat: Sherwin Williams, ProMar 200 Zero VOC Flat Interior Latex Flat, B30-2600.

3. 3rd Coat: Sherwin Williams, ProMar 200 Zero VOC Flat Interior Latex Flat, B30-2600.

4. Apply to following interior surfaces: Interior surfaces of ducts, where visible through registers or grilles, etc.

5. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

E. Egg-Shell - Dryfall Acrylic Latex:

1. 1st Coat: Galvanized steel or ferrous metal primer to suit substrate.

2. 2nd Coat: Sherwin Williams, Low VOC Waterborne Acrylic Eg-Shel Dryfall Flat, B42-80 Series.

3. 3rd Coat: Sherwin Williams, Low VOC Waterborne Acrylic Eg-Shel Dryfall Flat, B42-80 Series.

4. Apply to following interior surfaces: Overhead exposed structural steel, steel joists, underside of steel deck, basketball backstops, etc.
5. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

F. Water-Based Acrylic Epoxy:

1. Base Coats: Block fillers (Sherwin-Williams Loxon Block Surfacer, A24) and/or Primers recommended by manufacturer.

   * Block Filler shall Level 3 - Premium Fill; one or multiple coats for high performance block filler in accordance with PDCA industry standards. Apply mock-up to confirm appearance and before finish coat applications.

2. 2nd Coat: Sherwin Williams, Pro Industrial Water-based Catalyzed Epoxy, B73-300.

3. 3rd Coat: Sherwin Williams, Pro Industrial Water-based Catalyzed Epoxy, B73-300.

4. Apply to following surfaces: CMU and other surfaces where indicated or required.

5. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

G. Microbial Paint - Egg-Shell Finish:

1. Fill Coat: Steel-Seam (to achieve Pinhole Free surface)

2. 2nd Coat: Loxon Block Surfacer (to achieve Pinhole Free surface)

3. 3rd Coat: Loxon Block Surfacer (to achieve Pinhole Free surface)

4. Final Coats: Two Coats of Paint Shield™ Interior Latex EgShel Microbicidal Paint

5. Apply to the following interior surfaces: Concrete, concrete masonry units, and masonry.

6. Recommended for the following areas: Corridors, Nurse’s Offices, Exam Rooms (Refer to the Room Finish Schedule).

H. Microbial Paint - Egg-Shell Finish:

1. Primer: Harmony Latex Primer

2. 2nd Coat: Paint Shield™ Interior Latex EgShel Microbicidal Paint

3. 3rd Coat: Paint Shield™ Interior Latex EgShel Microbicidal Paint

4. Apply to the following interior surface: Gypsum drywall.

6. Recommended for the following areas: Corridors, Nurse’s Offices, Exam Rooms (Refer to the Room Finish Schedule).
I. Transparent Waterborne Varnish Finish:

1. Stain Coat (if required): Oil base penetrating stain, (Sherwin-Williams - WoodClassics Interior Wood Stain, A49) color as selected by Architect.


4. 3rd Coat: Sherwin Williams, WoodClassics Waterborne Polyurethane Varnish A68 Series.

5. Apply to Architectural woodwork.

6. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

J. Concrete Floor Sealer: Clear Acrylic Waterborne Concrete Sealer; (Non-slip coating for concrete floor sealer finish):

1. 1st Coat: Floor-Tex; Seal Krete Inc., as distributed by Sherwin-Williams or approved equal.

2. 2nd Coat: Floor-Tex; Seal Krete Inc., as distributed by Sherwin-Williams or approved equal.

3. Apply to concrete floors where concrete sealer is indicated on finish schedule.

4. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

K. Concrete Floor Painted: Acrylic Concrete Paint, compatible with sealer coat, and in color as selected by the Architect mixed with clear acrylic non-slip concrete sealer and as per manufacturer’s instructions:

1. 1st Coat: Sherwin-Williams, Armorseal Tread-Plex Primer, B90 Series (and Floor-Tex; Seal Krete Inc. - check compatibility or omit with Tread Plex finishes).

2. 2nd Coat: Sherwin-Williams: Armorseal Tread-Plex Water-based Acrylic Floor Coating, B90 Series.

3. 3rd Coat: Sherwin-Williams: Armorseal Tread-Plex Water-based Acrylic Floor Coating, B90 Series.

4. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

5. Apply to concrete floors where painted concrete is indicated on finish schedule.
2.6 EXTRA STOCK

A. Contractor shall provide one (1) gallon of extra stock for each color/type selected for use on the project. Provide unopened containers clearly marked with manufacturers color number and name.

PART 3 - EXECUTION

3.1 INSPECTION

A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions, included rotted or otherwise defective materials, have been observed by all concerned and corrected in a manner acceptable to Applicator.

B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.2 SURFACE PREPARATION

A. General:

1. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.

2. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.

3. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.

4. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.

5. Painting of materials shall commence only when the moisture content of the materials complies with manufacturer's recommendations as follows:

   a. Concrete and masonry - 22% maximum.
   b. Gypsum drywall - 12% maximum.
   c. Wood (interior) - 8% maximum.
B. Cementitious Materials:

1. Prepare cementitious surfaces of concrete, concrete block, cement plaster and gypsum drywall board to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.

2. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

3. Clean concrete floor surfaces scheduled to be painted with a commercial solution of muriatic acid, or other etching cleaner. Flush floor with clean water to neutralize acid, and allow to dry before painting.

C. Wood:

1. Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.

2. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.

3. When transparent finish is required, use spar varnish for backpriming.

D. Ferrous Metals:

1. Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.

2. Touch-up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications. Clean and touch-up with same type shop primer.

3. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent.

3.3 MATERIALS PREPARATION

A. Mix and prepare painting materials in accordance with manufacturer's directions.

B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

D. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.4 APPLICATION

A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Where finish schedule calls for walls, floors or ceilings to be painted, paint all new and existing surfaces in same area. Paint from corner to corner on walls, floors, or ceilings, or to a major change in direction of surface to be painted. Provide crisp, clean, sharp lines where new painted surfaces abut existing painted surfaces.

C. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

D. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non- specular black paint.

E. Sand lightly between each succeeding enamel or varnish coat.

F. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

G. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

H. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as recommended by coating manufacturer and an acceptable finished appearance in finish, color and appearance as determined by the Architect.

I. Primer Coat: Apply primer coat of material which is required to be painted or finished, and which has not been prime coated by others.

1. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
J. **Block Fillers:** Apply block fillers using manufacturer's recommended application techniques with sufficient material and coats to achieve a pinhole-free, “Level 3 - Premium Fill Surface”, and in accordance with PDCA’s industry standards.

K. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

L. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats, unless otherwise indicated.

M. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

### 3.5 CLEAN-UP AND PROTECTION

A. Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.

B. Upon completion of painting work, clean all paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

C. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

1. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

2. At completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION 09900
SECTION 09940 - WALL CORNER PROTECTION GUARD

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 type of wall protection:

1. Wall Corner Protection Guard.

B. Related Sections:

1. Section 09250 - Gypsum Drywall.
2. Section 09900 - Painting.

C. References

3. Underwriters Laboratories (UL).

1.3 SUBMITTALS

A. Product data:

1. Include technical information, installation instructions for each type of substrate and maintenance instructions.

2. Include data on physical characteristics, durability, fade resistance and flame resistance characteristics.

3. Include manufacturer's recommendations for maximum permissible moisture content of substrates.

B. Shop drawings showing locations, extent and installation details of corner guard products.

C. Samples for verification purposes: Submit the following samples, as proposed for this work, for verification of color, texture, pattern and thickness:

1. Sample of each product specified.

D. Product test reports from a qualified independent testing laboratory showing compliance of each component with requirements indicated.

E. Maintenance data for corner guard protection system components for inclusion in the operating and maintenance manuals specified in Division 1.
1. Include precautions for use of cleaning materials and methods which could be detrimental to finishes and performance or might damage material.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has specialized in the installation of corner guards similar to that required for this project.

B. Manufacturer Qualifications: Provide each type of panel and accessories produced by a single manufacturer with a recommended 5 years production experience, whose published product literature clearly indicates compliance with requirements indicated.

C. Fire Performance Characteristics: Provide materials that have been tested and bear the UL label and marking, indicating the following fire performance characteristics:

   1. Surface Burning Characteristics: As follows, tested in accordance with ASTM E 84 for Class 1 characteristics listed below:
      a. Flame spread: Not more than 25.
      b. Smoke developed: Not more than 450.

D. Code compliance: Assemblies should conform to all applicable codes including IBC, UBC, SBCCI, and Life Safety.

E. Chemical and stain resistance: Provide corner guards with chemical and stain resistance in accordance with ASTM D-1308.

F. Color Match: Provide corner guards that are color matched in accordance with the following: Delta E difference of no greater than 1.5 using the Hunter (Lab) Scale. Components of the wall protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.

G. Single source responsibility: Provide all components of the corner guard protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to project site in original factory packages or containers, clearly labeled to identify manufacturer, brand name, lot number, quality or grade, and fire hazard classification.

B. Store materials inside in original undamaged packaging, in a well-ventilated area protected from weather, moisture, soiling, extreme temperatures and humidity. Do not store goods upright; lay flat, blocked off the ground to prevent sagging and warping. Maintain temperature in storage area between 40 -100°F (4°C).

C. Comply with recommendations of the manufacturer for special delivery, storage and handling requirements.
1.6 PROJECT CONDITIONS
A. Materials must be acclimated in an environment of 65-75°F (18-24°C) for at least 24 hours prior to beginning the installation.
B. Installation areas must be enclosed and weatherproofed before installation commences.

1.7 PROJECT CONDITIONS
A. Maintain a constant minimum temperature of 60°F (16°C) in installation areas for at least 10 days before and 10 days after application of materials.
B. Illuminate installation areas using the building's permanent lighting system; temporary lighting alone will not be acceptable.

1.8 SEQUENCING AND SCHEDULING
A. Schedule installation with other construction activities to minimize the possibility of damage and soiling during the remainder of the construction period.

1.9 WARRANTY
A. Special Project Warranty: Submit a written warranty, executed by the Installer and Manufacturer, agreeing to repair or replace materials which fail in materials or workmanship within the specified warranty period. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

1. Warranty period is one (1) year after the approved date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Subject to compliance with requirements, manufacturers offering products which may be incorporated into the Work include the following:


2. Provide units complete with continuous aluminum retainers, top and bottom end caps, manufacturer’s high impact vinyl acrylic extrusion covers, hardware, fasteners and accessories.

3. Textures and Colors: As selected by the Architect from manufacturer’s available full range of textures and colors.

4. Size: 48” high.
2.2 FABRICATION

A. General: Fabricate corner guards to comply with requirements indicated for design, dimensions, detail, finish and sizes.

2.3 ACCESSORIES

A. Units shall be furnished as complete packaged system with trim, subframing, hardware, fasteners and accessories.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface preparation: Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.

3.3 PROTECTION

A. Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

3.4 INSTALLATION

A. Install the work of this section in strict accordance with the manufacturer's recommendations.

B. Temperature at the time of installation must be between 65-75°F (18-24°C) and be maintained for at least 48 hours after the installation to allow for proper adhesive set up.

C. Relative humidity shall not exceed 80%.

3.5 CLEANING

A. General: Immediately upon completion of installation, clean in accordance with manufacturer's recommended cleaning method.

B. Remove surplus materials, rubbish and debris resulting from installation.

END OF SECTION 09940
SECTION 10100 - DRY MARKERBOARDS AND EXHIBITION BOARDS

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 DESCRIPTION OF WORK
A. Extent of dry markerboards and exhibition boards is indicated on the drawings.
B. Type of dry markerboards and exhibition boards specified in this section includes the following:
   1. Porcelain enamel steel dry marker boards.
   3. Factory applied trim.
   4. Magnetic markerboard tray(s).

1.3 REFERENCES
B. ASTM C540 Gloss for ceramic materials.
C. ASTM C614 for alkali resistance.
D. ASTM D2244 evaluation of color differences.
F. ASTM C208-72 for cellulosic fiberboard.
G. ANSI A208.1-79 for particleboard.
H. ANSI H35.1-82 for aluminum temper and alloy.
I. HNSI A424-80 for steel for porcelain enameling.
J. FS LLL-B-810 for tempered hardboard.
L. BYK-Gardner Surface Distortion.
M. GREENGUARD Indoor Air Quality Certified.
N. GREENGUARD Children and Schools Indoor Air Quality Certified.
1.4 QUALITY ASSURANCE

A. Manufacturer: Furnish all dry markerboards and exhibition boards by a single manufacturer for the entire project.

B. Surface Burning Characteristics: Provide exhibition board surfaces which are identical in composition to those with surface burning characteristics indicated below, as determined by testing in compliance with ASTM E84. Use only exhibition boards which are certified to meet the following standards:

1. Flame Spread: Not more than 25.
2. Smoke Developed: Not more than 40.

C. Uniformity of color, corrosion, temperature, alkali, water, range of gloss test, uniform texture, light reflectance and cleanability are requirements for all groups and have specific ranges for each.

D. Product Certifications: Provide GREENGUARD Indoor Air Quality Certified and GREENGUARD Children and Schools Indoor Air Quality Certificates for markerboards.

E. Reflectivity of LCSII ceramicsteel Markerboard writing surfaces shall not exceed the following:

1. Gloss Range / 60° Gloss meter GU (Gloss Units)
   a. LCSII ceramicsteel for Markerboard 68 -76% (low gloss surface).
   b. LCSII ceramicsteel for writing surfaces - Surface Distortion reduction and the optimum improvement to performance characteristics.

2. Contrast/waviness for Markerboards (light and dark effects) shall be no greater than 15 [Scale 0 – 30] when tested with BYK – Gardner Wave Scan 5+ Measuring device showing visual acuity (contrast sensitivity) to the human eye at distances greater than 3 meters (10’- 0”).

3. Resolution (visual acuity) shall be based on 3 lines per degree and be visibly maintained beyond the current standard of 3 meters. [Byk-Gardner Wave Scan 5+ Measuring device].

4. Surface distortion (“orange peel”/surface peaks and valleys) as tested by the BYK-Gardner Wave Scan 5+ Measuring device [Scale 0 – 60]. Values are established by the difference in the highpoint/low point of the Markerboard test surfaces. P 3 ceramicsteel shall establish the lowest range of distortion from 11.7 – 16.02.

1.5 SUBMITTALS

A. Samples and colors for each:
   1. Face sheet materials
   2. Cork materials
   3. Vinyl materials
   4. Aluminum trim types and profiles.
B. Shop Drawings: Submit shop drawings for each type of drymarker and exhibition board. Include sections of typical trim members and dimensioned elevations. Show anchors, grounds, reinforcement, accessories, layout and installation details.

1. Drawings shall indicate location and actual material lengths of each unit. Room elevations shall indicate joint locations and include dimension from floor and adjacent side walls, cross-sections for trim, backing, face and core materials, fastener spacing and types of units provided.

C. Product Data: Submit manufacturer's technical data and installation instructions for each material and component part, including data substantiating that materials comply with requirements.

D. Certification: Submit the manufacturer's certification that materials furnished for the project comply with the specified requirements.

E. Manufacturer’s Product Warranty: Submit manufacturer’s product and accessories warranty and certificate of authenticity from manufacturer.

F. Product use, regular cleaning, stain removal and precautions information in the operation and maintenance instructions.

1.6 SPECIAL PRODUCT WARRANTY

A. Submit a “Life of Building” warranty, stating that under normal usage and maintenance, and when installed in accordance with manufacturer’s instructions and recommendations, porcelain enamel steel markerboard writing surfaces are guaranteed for the Life of the Building. Guarantee covers replacement of defective boards, but does not include cost of removal or reinstallation.

B. Submit a standard warranty, stating that when installed in accordance with manufacturer’s instructions and recommendations, exhibition boards are guaranteed for one (1) year against defects in materials and workmanship. Guarantee does not cover normal wear and tear, improper handling, any misuse, or any defects caused by vandalism or subsequent abuse. Guarantee covers replacement of defective material, but does not include cost of removal or reinstallation.

C. Writing Surface Warranty Period: Lifetime of the building commencing on the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: “Series 1”, as manufactured by Claridge Products and Equipment, Inc., Tel.# 800.434.4610; or approved equal.

1. Finishes and Colors: Shall be selected by the Architect from manufacturer’s available full range of finishes and colors including painted aluminum colors.
B. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Manufacturers of Porcelain Enamel Dry Markerboards and Exhibition Boards:
   a. Educational Equipment.
   b. Platinum Visual Systems
   c. Or approved equal

2.2 MARKERBOARD MATERIALS

A. Porcelain Enamel: Provide balanced, high pressure laminated porcelain enamel markerboards of 3-ply construction consisting of facing sheet, core material and backing.

1. Face Sheet: LCS-II Porcelain Enamel grade cold rolled steel for markerboard, as indicated on drawings.
   a. Coat the exposed face with a 3-coat process consisting of primer, ground coat and color cover coat, and the concealed face with a 2-coat process consisting of primer and ground coat.
      1) Bottom Ground Coat – 1.5 to 2.2 mils
      2) Top Ground Coat – 2.0 to 2.8 mils
      3) Top Cover (Color) Coat – 3.0 to 4.0 mils
   b. Fuse cover and ground coats to the steel at the manufacturer's firing temperatures, but not less that 1,200 deg.F (649°C).
   c. LCS-II Porcelain Enamel for markerboard with improved writing and erasing surface (3 colors low gloss and 3 colors high gloss)
   d. Facing sheet construction:
      1) 1.7-2.5 mils enameled ground coat on face minimum thickness.
      2) 3.0 – 4.0 mils enameled cover (color) coat for markerboard.
      3) 1.7-2.5 mils enameled minimum ground coat on back of facing.
      4) Firing temperatures shall be a minimum of 1200°F for LCSII markerboard.

2. Writing Surface Core: 7/16” Medium Density Fiberboard (MDF) composed of approximately 90% post-industrial waste.
   a. Units over 12'-0" in length and longer will require H-bar at center.

3. Moisture backer shall be factory laminated to core material. A 0.005” thick aluminum backer shall be provided standard on all markerboards.

4. Perimeter trim shall be as indicated on the architectural drawings.

5. Markerboard tray(s): Provide item #264M satin anodized finish magnetic markerboard tray(s). Size: 2-3/4” deep x 12” long with ¼” radius corners.
6. Maprail: shall be provided on all markerboards and will be either 1" or 2", as indicated on the architectural drawings/details.
   
a. Cork insert to be Claridge Cork, color as selected by Architect.

7. Accessories (1” or 2”):
   
a. Maphooks (minimum two per 4’ maprail).
   
b. Flag holder (one per room).
      1) Provide separate wall mount flagholder, as required. Coordinate locations with locations of projection screens.
   
c. Map roller brackets (one pair per markerboard).
   
d. Maprail end stops (one pair per display rail).

8. Lamination:
   
a. Factory machine type only.
   
b. Specially formulated adhesives.

2.3 EXHIBITION BOARD MATERIALS

A. Fabricork: #1380 Vinyl fabric on natural cork underlay with Duracore backing.

B. Thickness: Total laminated thickness of core and covering is $\frac{1}{2}$". All thicknesses are nominal.

C. Vinyl Fabric: 15 oz/In yd.

D. Lamination: Factory machine type with specially formulated adhesive.

E. Metal Trim and Accessories: Factory fabricated frames and trim of not less than 0.062" thick aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single length units wherever possible; keep joints to a minimum. Miter corners to a neat, hairline closure. Plastic accessories will not be accepted.

2.4 FABRICATION

A. Assembly: Provide factory assembled dry markerboard and exhibition board units, except where field assembled units are required.

B. Make joints only where the total length exceeds the maximum manufactured length. Fabricate with the minimum number of joints, balanced around the center of the board, as acceptable to the Architect.

   1. Provide the manufacturer's standard vertical joint system between abutting sections of dry markerboard.
PART 3 - EXECUTION

3.1 PREPARATION

A. Field Measurements: Take field measurements prior to the preparation of shop drawings and fabrication where possible, to ensure proper fitting of the work. Allow for trimming and fitting wherever taking of field measurements before fabrication might delay work.

B. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.2 INSTALLATION

A. Deliver factory-built dry markerboard and exhibition board units completely assembled in one piece without joints, wherever possible. Where dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to the Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.

B. Install units in locations and at mounting heights indicated and in accordance with the manufacturer's instructions. Keep perimeter lines straight, plumb and level. Provide all grounds, clips, backing materials, adhesives, brackets, anchors, trim and accessories necessary for a complete installation.

1. Anchor all components securely using tamperproof fasteners, where accessible.

2. Install all dry markerboards and exhibition boards with completely concealed continuous hangers.

3. Where wall mount flagholders is required install units where directed by the Architect/Owner.

C. Provide factory-trained installers.

D. Apply manufacturers’ adhesive behind each board using roughly ¼ cup @ 16” on center.

E. Mounting heights from the floor for each room shall be as follows:

Consult with the Architect / Owner before the start of the installation:

1. Fifth and Sixth grades 30”
2. Seventh – ninth grades 33”
3. Tenth and up grades 36”

F. Provide covering for H-moldings to match vinyl-covered boards.

G. Clean boards using manufacturers’ recommended procedures and install cleaning labels for each room.

H. Locate accessories on each board as specified.
I. Provide mitered and wrapped hairline joints for all trims.

J. Provide fasteners at perimeter trims 16” – 24” and 12” – 16” on trays.

3.3 ADJUST AND CLEAN

A. Verify that accessories required for each unit have been properly installed and that operating units function properly.

B. Clean units in accordance with the manufacturer’s instructions. Break-in markerboards only as recommended by the manufacturer.

C. Repair or replace all damaged units and surfaces to the approval of the Architect at no additional cost to Owner.

END OF SECTION 10100
SECTION 10161 - SOLID PLASTIC TOILET COMPARTMENTS

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. Extent of minimum Class “C”, fire-rated solid toilet compartments is indicated on the drawings.

B. Style of toilet compartments includes: Floor-anchored, overhead braced.

C. Style of screens include: Wall-hung.

D. Related Work:

1. Section 10800 - Toilet Accessories.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fastenings, and accessories.

B. Shop Drawings: Submit shop drawings for fabrication and erection of toilet partition assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.

C. Samples: Submit full range of color samples for each type of unit required. Submit 4” square samples of each color and finish on same substrate to be used in work, for color verification after selections have been made.

D. Test Reports: Submit manufacturer’s reports of testing of rigid plastic products indicating compliance with indicated performance requirements.

1.4 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to ensure proper fitting of work. However, allow for adjustments within specified tolerances where ever taking of field measurements before fabrication might delay work.

B. Coordination: Furnish inserts and anchorages which must be built into other work for installation of toilet partitions and related work; coordinate delivery with other work to avoid delay.

C. Manufacturer's Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for a recommended 5 years.
D. Installer's Qualifications: A company regularly engaged in installation of products specified in this section, with a recommended minimum of 5 years of experience.

E. Code Compliance: Privacy partitions (including toilet partitions) shall be tested in accord and comply with NFPA 286 Room-Corner Test.

F. Interior Wall and Ceiling Finish Materials in accordance with IBC, Section 8031.1. shall be classified in accordance with ASTM E84 or UL 723. Interior finishes shall be grouped in the following classes:

1. Class A = Flame spread index 0-25
   Smoke developed 0-450

2. Class B = Flame spread index 26-75
   Smoke developed 0-450

3. Class C = Flame spread index 76-200
   Smoke developed 0-450

   **Exception:** “Room corner test for interior wall or ceiling finish materials”

   a. Interior wall or ceiling finish materials shall be permitted to be tested in accordance with NFPA 286 and shall comply with IBC Section 803.1.2.1.

2. In accordance with IBC 803.9 - High-density polyethylene (HDPE) and polypropylene (PP), when the material is used as an interior finish, it shall comply with IBC Section 803.1.2.


1.5 WARRANTY

A. Manufacturer's Warranties: Provide manufacturer's standard **twenty-five (25) year** warranty for all solid plastic compartments, products and all other assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Provide products as manufactured by Scranton Products, Scranton, PA, Tel.# 800.445.5148, www.scrantonproducts.com, or approved equal, from their full line of standard textures and colors.

1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

   d. Or approved equal.
2.2 MATERIALS

A. General: Provide materials which have been selected for surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.

B. Solid Plastic: One piece seamless, one inch thick solid HDPE plastic with a homogenous color throughout fabricated from polymer resins.

C. Interior Wall and Ceiling Requirements by Occupancy for flame spread index per (IBC, Table 803.11):

<table>
<thead>
<tr>
<th>GROUP</th>
<th>SPRINKLERED</th>
<th>NONSPRINKLERED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interior exit stairways, ramps &amp; passageways</td>
<td>Corridors &amp; enclosure for exit access stairways and ramps</td>
</tr>
<tr>
<td>Interior exit stairways, ramps &amp; passageways</td>
<td>Corridors &amp; enclosure for exit access stairways and ramps</td>
<td>Rooms &amp; enclosed spaces</td>
</tr>
<tr>
<td>A-1, A-2</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>A-3, A-4, A-5</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>B, E, M</td>
<td>B</td>
<td>C</td>
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</tbody>
</table>

Notes:

a. Class C interior finish materials shall be permitted for wainscotting or paneling of not more than 1,000 sf of applied surface area in the grade lobby where applied directly to a noncombustible base or over furring strips applied to a noncombustible base and fireblocked as required by Section 803.13.1.

b. In other than Group I-3 occupancies in buildings less than three stories above grade plane, Class B interior finish for nonsprinklered buildings and Class C interior finish for sprinklered buildings shall be permitted in interior exit stairways and ramps.

c. Requirements for rooms and enclosed spaces shall be based upon spaces enclosed by partitions. Where a fire-resistance rating is required for structural elements, the enclosing partitions shall extend from the floor to the ceiling. Partitions that do not comply with this shall be considered enclosing spaces and the rooms or spaces on both sides shall be considered one. In determining the applicable requirements for rooms and enclosed spaces, the specific occupancy thereof shall be the governing factor regardless of the Group classification of the building or structure.

d. Lobby areas in Group A-1, A-2 and A-3 shall not be less than Class B materials.

e. Class C interior finish materials shall be permitted in places of assembly with an occupant load of 300 persons of less.

f. For places of religious worship, wood used for ornamental purposes, trusses, paneling or chancel furnishing shall be permitted.
2.3 FABRICATION

A. General: Furnish standard doors, panels, screens, and pilasters fabricated for partition system, unless otherwise indicated. Furnish units with cutouts, drilled holes, and internal reinforcement to receive partition-mounted hardware, accessories, and grab bars, as indicated.

B. Overhead-Braced Partitions: Furnish galvanized steel supports and leveling bolts at pilasters, as recommended by manufacturer to suit floor conditions. Make provisions for setting and securing continuous extruded aluminum anti-grip overhead-bracing at top of each pilaster. Furnish shoe at each pilaster to conceal supports and leveling mechanism.

C. Wall-Hung Screen: Furnish panel units in sizes indicated, of same construction and finish as partition system panels.

D. Minimum requirements for partitions are as follows:

1. Doors: 1-inch thick equipped with gravity type hinges and push-pull hardware. Provide out-swinging, over-sized doors at water closet compartments for handicapped users.

2. Pilasters: Adjustable, 1 inch thick; provide overhead headrail bracket.

3. Fasteners: Stainless steel 1/4 inch tamper proof shoulder screws and barrel nuts.

4. #14 Screw: Stainless steel #14 x 1-1/2 inch screw used along with plastic anchors for attachments to floor and building walls.

5. End Cap: Aluminum cap fastened to the ends of headrail bracing.

6. Headrail Bracket: 16 gauge stainless steel used to connect headrail bracing.

7. Door Pull: Heavy duty Zamac chrome-plated used on out-swinging doors only. Provide on inside and outside of door.


10. Bumper/Coat Hook: Heavy Zamac chrome-plated with rubber bumper. All doors are furnished with hook. Bumper functions as a stop on in-swinging doors. Mounting height to be 48” above finish floor.

11. Door Stop: Zamac chrome-plated used on out-swinging doors only as a stop.

12. The Architect selects brackets, hinges and shoes as follows:
   a. Wall Brackets shall be 1½” stirrup type made of heavy-duty aluminum (6463-T5 alloy) with a bright dip anodized finish. Stirrup brackets shall be fastened to pilasters and panels with stainless steel tamper resistant torx head sex bolts.
b. Hinges: Manufacturer’s Stealth™ integral hinge system. Pilaster to be machined to accept door, and chrome plated Stealth™ integral hinge mechanism anchored to the door and pilaster. Door closures to be factory set to accommodate all conditions and allow for a positive opening and closing action free of impediment.

c. Shoes: 20 gauge stainless steel construction to secure the pilaster to the floor.

13. Provide manufacturer’s special hardware and accessories to accommodate all loads and conditions of partitions and screens.

2.4 COLORS AND FINISHES

A. Selection from manufacturer’s full line of standard fire-rated colors and finishes. Allow for two colors per room, with a total of four colors.

1. Stainless steel items shall have a polished finish.
2. Aluminum items shall have a natural color anodized finish.
3. Chrome plated items shall have a polished finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer’s recommended procedures and installation sequence. Install partitions rigid, straight, plumb, and level. Provide clearances of not more than 1/2” between pilasters and panels, and not more than 1” between panels and walls. Secure panels to walls with not less than two stirrup brackets attached near top and bottom of panel. Locate wall brackets so that holes for wall anchorages occur in masonry or tile joints. Secure panels to pilasters with not less than two stirrup brackets located to align with stirrup brackets at wall. Secure panels in position with manufacturer’s recommended anchoring devices.

B. Overhead-Braced Partitions: Secure pilasters to floor and level, plumb, and tighten installation with devices furnished. Secure overhead-brace to each pilaster with not less than two fasteners. Hang doors and adjust so that tops of doors are parallel with overhead-brace when doors are in closed position.

C. Screens: Attach with concealed anchoring devices, as recommended by manufacturer to suit supporting structure. Set units to provide support and to resist lateral impact.

3.2 ADJUST AND CLEAN

A. Hardware Adjustment: Adjust and lubricate hardware for proper operation. Set hinges on inswinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on outswinging doors (and entrance swing doors) to return to fully closed position.

B. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

END OF SECTION 10161

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SECTION 10220 - MECHANICAL SCREEN ENCLOSURE

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.

B. Related Sections:

1. Section 05400 - Miscellaneous Structural Steel,
2. Section 05500 - Metal Fabrications.

1.2 DESCRIPTION OF WORK

A. Extent of mechanical screen enclosure(s) is indicated on the drawings, including indication of approximate size(s) and location(s).

1.3 QUALITY ASSURANCE

A. Performance Requirements: Comply with specific performance requirements, provide units whose performance ratings have been determined in compliance with Air Movement and Control Association (AMCA) Standard 500.

B. AMCA Certification: Where indicated, provide units with AMCA Certified Ratings Seal evidencing that product complies with above requirement.

C. Comply with SMACNA "Architectural Sheet Metal Manual" recommendations for fabrication, construction details and installation procedures, except as otherwise indicated.

D. Field Measurements: Verify size, location and placement of louvered penthouse enclosures units prior to fabrication, wherever possible.

E. Shop Assembly: Coordinate field measurements and shop drawings with fabrication and shop assembly to minimize field adjustments, splicing, mechanical joints and field assembly of units. Preassemble units in shop to greatest extent possible and disassemble, as necessary, for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications; certified test data, where applicable; and installation instructions for required products, including finishes.

B. Shop Drawings: Submit shop drawings for fabrication and erection of louver units and accessories. Include plans, elevations and details of sections and connections to adjoining work. Indicate materials, finishes, fasteners, joinery and other information to determine compliance with specified requirements.
1. Submit shop drawings prepared by a licensed Professional Structural Engineer indicating compliance with wind and other design loading required by applicable State and Local Codes. Drawings shall be signed and sealed by the Engineer.

C. Samples: Submit 6" square samples of each required finish. Prepare samples on metal of same gauge and alloy to be used in work. Where normal color and texture variations are to be expected, include 2 or more units in each sample showing limits of such variations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: "EV211" Horizontal Louver Screen, as manufactured by Ruskin®, Kansas City, MO, Tel.# 816.761.7476, www.ruskin.com; or approved equal.

1. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

   a. Greenheck Fan Corporation, Schofield, WI, Tel.# 715.359.6171, www.greenheck.com;
   b. Nystrom Building Products, Minneapolis, MN, Tel.# 800.547.2635, www.nystrom.com;
   c. Or approved equal.

2. The thinline sight proof louver screen used to hide roof top units.

3. Provide manufacturer’s standard mitered and welded corners and concealed corners.

2.2 STANDARD CONSTRUCTION

A. Blades

1. Inverted 2” deep 6063T6 extruded aluminum with .060” nominal wall thickness.
2. Blades are positioned at 45° angle and are spaced at approximately 3-3/16” centers.
3. Design shall incorporate blade supports required to withstand a wind load of 20 lbs. per sq. ft. (96KPa) (equivalent of a 90 mph wind [145 KPH]).

B. Support: As required per wind load. Consult manufacturer.

C. Finish: 70% PVDF

D. Maximum Factory Assembly Size

1. Shall be 75 sq. ft. (7m²) per section, not to exceed 120" w x 90" h (3048 x 2286) or 90" w x 190" h (2286 x 4826).
2. Louver screens larger than the maximum factory assembly size will require field assembly of smaller sections.
E. Supports

1. Louver screens may be provided with rear mounted blade supports that increase overall screen depth depending on screen size, assembly configuration or windload.

F. Fastenings

1. Anchorage shall be concealed and not visible on the exterior face of the screen.

2. Use same material as items fastened, unless otherwise indicated. Fasteners for exterior applications may be hot-dip galvanized, stainless steel or aluminum. Provide types, gauges and lengths to suit unit installation conditions. Use Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

G. Anchors and Inserts: Use non-ferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

H. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).

I. Features:

1. 42% free area on a 4ft x 4ft section.
2. Architecturally styled, hidden supports for attractive appearance.
3. Inverted thinline blade.
4. All aluminum construction for low maintenance and high resistance to corrosion.
5. Sight proof blocks out obstructions from view

2.3 FABRICATION, GENERAL

A. Provide indicated louvered mechanical screen and accessories of design, materials, sizes, depth, arrangement, and metal thicknesses indicated, or if not indicated, as required for optimum performance with respect to airflow; water penetration; air leakage, where applicable; strength; durability; and uniform appearance.

B. Fabricate framing to suit adjacent construction with tolerances for installation, including application of sealants in joints between units and adjoining work.

C. Include supports, anchorages, and accessories required for complete assembly.

D. Provide vertical Mullions of types indicated and spacings recommended by manufacturer. At horizontal joints between louver units provide horizontal Mullions except where continuous vertical assemblies are indicated.

E. Join frame members to one another and to stationary louver blades by welding, except where indicated otherwise or where field bolted connections between frame members are made necessary by size of louvers. Maintain equal blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

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F. Horizontal Blade Louvers: Size and depth indicated, with blades of profile, slope and spacing indicated, or if not indicated, to meet performance requirements.

G. Continuous Horizontal Blades: Conceal supporting framework from vision on outside face of louver by placing braces, mullions and brackets on inside face; with close fitting, field-made splice joints in blades designed to permit expansion and contraction without deforming blades or framework.

H. Corners: Shop miter and weld blades into prefabricated corner units to align with straight sections. Include concealed bracing.

2.4 METAL FINISH

A. General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated. Apply finishes in factory after products are assembled. Protect finishes on exposed surfaces with protective covering, prior to shipment. Remove scratches and blemishes from exposed surfaces which will be visible after completing finishing process.

1. Fluoropolymer Coating: Full strength 70% "Kynar 500/Hylar 5000" coating baked on for 15 minutes at 450°F in a dry film thickness of 1.0 mil, 30% reflective gloss (ASTM D 523), over minimum 0.2 mil baked on modified epoxy primer.

   a. Color as selected by Architect from manufacturer’s available full range of colors.

2. Durability: Provide coating which has been field tested under normal range of weathering conditions for recommended minimum of 20 years without significant peel, blister, flake, chip, crack or check in finish, and without chalking in excess of 8 (ASTM D 659), and without fading in excess of 5 NBS units.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions and directions for installation of anchorages which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION

A. Locate and place units plumb, level and in proper alignment with adjacent work.

B. Use concealed anchorages wherever possible.

C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers, as indicated.

D. Repair finishes damaged by cutting, welding, soldering and grinding operations require for fitting and jointing. Restore finishes so there is no evidence of corrective work. Return items which cannot be refinished in field to shop, make required alterations, and refinish entire unit, or provide new units, at Contractor's option.

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E. Protect galvanized and non-ferrous metal surfaces from corrosion or galvanic action by application of a heavy coating of bituminous paint on surfaces which will be in contact with concrete, masonry or dissimilar metals.

F. Provide concealed gaskets, flashings, joint fillers, and install as work progresses to make installations weathertight.

G. Refer to Section 07900 for sealants in connection with installations of louvers.

END OF SECTION 10220
SECTION 10350 - FLAGPOLE

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 DESCRIPTION OF WORK

A. Scope of Section: Provide aluminum flagpole(s) as shown on drawing and as specified herein, with components as needed for a complete installation.

1.3 SUBMITTALS

A. The design shall be submitted to the Owner and approved prior to the placing of any concrete.

B. Product Data: For each type of flagpole required, submit manufacturer’s technical data and standard installation instructions.

C. Shop Drawings: Show general layout, jointing, anchorage, support systems, and accessories.

D. Samples: Finish samples for each finished metal used on flagpoles, as may be required.

1.4 PAYMENT

A. The lump sum price bid shall include all materials, equipment and labor necessary to install flag poles.

1.5 JOB CONDITIONS

A. Structural Performance: Provide flagpoles capable of withstanding the effects of wind loads as determined according to NAAMM FP 1001-97, “Guide Specifications for Design of Metal Flagpoles” or to specified wind speed, whichever is more stringent.

B. Base flagpole design on maximum standard size nylon flag suitable for use with pole or flag size indicated, whichever is more stringent.

C. Obtain the flagpole as a complete unit including fittings, accessories, bases and anchorage devices.
D. General: Spiral wrap flagpoles with a heavy Kraft paper or other lightweight wrapping and enclose in a hard fiber tube or other protective means. Store bare flagpoles in a dry location, protected from the weather and moisture, as recommended by the manufacturer.

E. Ship to project site in one piece or as specified. If more than one piece is necessary, provide snug fitting precision joints with self-aligning, internal splicing sleeve arrangements for weather tight, hairline field joints.

0.6 RELATED SECTIONS

A. Section 02241 – Dewatering
B. Section 02248 – Shoring and Bracing
C. Section 02200 – Earthwork
D. Section 02514 – Site Work Concrete
E. Section 03300 – Cast In Place Concrete
F. AIA A201 & Section 00800 - Submittals

PART 2 - PRODUCTS

A. All flagpole products shall be provided and maintained in accordance with NAAMM FP 1001-97, "Guide Specifications for Design of Metal Flagpoles".

PART 3 – EXECUTION

A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.

B. Prepare in-ground flagpoles by painting below-grade portions with a heavy coat of bituminous paint.

C. Excavation: For foundation, excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete.

D. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure forms, foundation tube, fiberglass sleeve, or anchor bolts in position, braced to prevent displacement during concreting.

E. Place concrete immediately after mixing. Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than 7 days or use a non-staining curing compound.

F. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to base perimeter.
G. Foundation-Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric sealant and cover with flashing collar.
SECTION 10440 - SPECIALTY SIGNS

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 DESCRIPTION OF WORK

A. Extent of specialty signs is shown on the drawings.

B. Forms of specialty signs required include the following:

1. Panel signs (Room Identification Signs).
2. Metal Letters and numbers.
3. Cast metal plaques.
4. Exterior signs.
5. Installation of all specialty signs.

1.3 QUALITY ASSURANCE

A. Uniformity of Manufacturer: For each sign form and graphic image process indicated furnish products of a single manufacturer.


1. All signs to permanent rooms and spaces shall include Braille in accordance with N.J.A.C. 5:23-7.11 (j).

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for each type of sign required.

B. Samples: Submit samples of each sign form and material showing finishes, colors, surface textures and qualities of manufacturer and design of each sign component including graphics.

1. Submit full-size sample units, if requested by the Architect. Acceptable units may be installed as part of the work.

C. Shop Drawings: Submit shop drawings for fabrication and erection of specialty signs. Include plans, elevations, and large scale details of sign wording and lettering layout. Show anchorages and accessory items. Furnish location template drawings for items supported or anchored to permanent construction.

1. Furnish full-size spacing templates for individual building-mounted letters / numbers.
2. Furnish full-size rubbings for metal plaque(s).
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Americraft Inc.
3. ASI Sign Systems, Inc.
5. Brandon Signage Co.
6. Designer Sign Company.
7. Gemini
9. Or approved equal.

2.2 MATERIALS

A. GENERAL: Provide manufacturer’s standard plastic signage which comply with the requirements established in the International Building Code and ICC/ANSI 117.1 - 2009 Barrier Free Standards. All signs to permanent rooms and spaces shall include Braille in accordance with N.J.A.C. 5:23-7.11 (j).

1. Acrylic sheet material to be cut to the desired sizes with radius or square corners as indicated, or as per approved shop drawings.

2. Manufacturer’s standard acrylic material, as indicated, for Barrier Free Accessible signage indicating International Symbol of Accessibility.

3. "Helvetica Regular" letter style, Domed Grade II Braille and other pictograms as described herein.

4. Colors: As selected by the Architect from manufacturer’s standards after award of contract, or as specified herein.

B. Aluminum Castings: Provide aluminum castings of alloy and temper recommended by the aluminum producer and finisher for the casting process used and for the use and finish indicated.

C. Fasteners: Unless otherwise indicated, used concealed fasteners fabricated from metals that are non-corrosive to either the sign material or the mounting surface.

D. Anchors and Inserts: Use non-ferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
2.3 FABRICATION

A. Unframed Panel Signs: Fabricate unframed panel signs with edges mechanically and smoothly finished to conform with the following requirements:
   1. Edge Condition: Square cut.
   2. Corner Condition: Provide radius corners for each sign type.

2.4 SIGNAGE

A. GENERAL: ALL signage MUST comply with the requirements established in the International Building Code and ICC/ANSI 117.1 - 2009. All signs to permanent rooms and spaces shall include Braille in accordance with N.J.A.C. 5:23-7.11 (j).

B. INTERIOR SIGNAGE:
   1. Room Names and Numbers Signage:
      a. Provide Room Name and Numbers plastic signs for all rooms with name and room number, as shown on drawings and schedules.
         1) Types “7 & 9” Signs - Classrooms and Offices:
            a) As directed by the Owner / Architect provide 1/4" thick non-combustible, self-extinguishing solid composite plastic sign signs with integral tactile letters, numbers and symbols raised a minimum of 1/32" from sign face. Provide window insert with non-glare clear plastic cover.
            b) Basis of Design; provide “Series 200A Sand Carved process with window insert Series 400 Vinyl Copy” as manufactured by Mohawk Sign Systems Inc., or approved equal, by Brandon Signage Co., Tel.# 717.582.5161.
         2) Type “8” Signs - Multi-Purpose Room, Stage, Cafeteria, Auditorium, Faculty Dining, Main Offices, Media Center, Kitchen, etc.:
            a) Provide sand-carved process, 1/8" thick non-combustible, self-extinguishing solid composite plastic with integral tactile letters, numbers and symbols raised a minimum of 1/32" from sign face.
         3) Informational Signage:
            a) Provide informational plastic signs at selected doors, as shown on drawings and schedules.
               i) Signs - “THIS IS NOT AN EXIT”, “EXIT”, etc.:
                  (1) Provide sand-carved process, 1/8" thick non-combustible, self-extinguishing solid composite plastic with integral tactile letters, numbers and symbols raised a minimum of 1/32" from sign face.
         4) Sizes: As indicated or as directed by the Architect / Owner.
         5) All room signs shall have radius corners.
2. **Room Numbers Signage:**
   
a. Provide Room Numbers plastic signs for all rooms with room number, as shown on drawings and schedules.

   1) **Type “10” Signs - Boiler Room, Elevator Machine, Storage, Janitor, Electrical, Mechanical, etc.:**
      
a) Provide sand-carved process, 1/8" thick non-combustible, self-extinguishing solid composite plastic with integral tactile letters, numbers and symbols raised a minimum of 1/32" from sign face.

3. **Room Occupant Capacity Signs:**
   
a. Provide room occupant capacity signs for room capacity more than 50 persons and as indicated.

   1) Provide sand-carved process, 1/8" thick non-combustible, self-extinguishing solid composite plastic with integral tactile letters, numbers and symbols raised a minimum of 1/32" from sign face.

4. **Barrier Free Accessibility Signs and Directional Signage:**
   
a. Basis of Design; “Vandal-resistant signs” as manufactured by Americraft Inc. Tel.# 800.237.3984.

   1) Provide injection molded process, 1/8" thick acrylic with non-glare clear front surface, graphics and colors on second surface (Back surface), with radius corners and stepped edging. Provide mounting holes with stainless steel screws. Colors to be selected by the Architect from manufacturer’s available full range of colors.

   2) Provide tactile plastic signs displaying international symbol of accessibility in tactile form and accompanied by Grade II Braille.

   3) For Directional Signage indicate the route to the nearest accessible element.

   4) Provide signage at the following locations and as indicated on the Contract Drawings:
      
      a) Accessible toilet units including stalls.
      b) Accessible building entrances.
      c) Accessible areas of refuge.
      d) Accessible means of egress.

5. **Area Refuge Signage:**
   
a. Provide where area refuge is shown on the Contract Drawings. Locate at interior and exterior of doors accessing the area refuge.

   1) Provide sand-carved process, 1/8" thick non-combustible, self-extinguishing solid composite plastic with integral tactile letters, numbers and symbols raised a minimum of 1/32" from sign face.
6. **Signage Locations:**
   a. Along the door on the latch side and shall be mounted as follows:
      
      1) 48" minimum to the lowest tactile character on the sign measured from the finish floor.
      2) 60" maximum to baseline of highest tactile character on the sign measured from the finish floor.

   b. For locations having double doors, mounting shall be to the right of the right hand door.

   c. Where there is no wall space on the latch side of the door, including double leaf doors, signs shall be placed on the nearest adjacent wall.

7. **Graphic Content and Style:** Provide sign copy to comply with the requirements indicated for sizes, styles, spacing, content, positions, materials, finishes and colors of letters, numbers, symbols and other graphic devices.
   a. **Raised Copy Thickness:** Not less than 1/32" from the sign face.
   b. Raised characters shall be in different color and meets the Barrier Free requirements for a 70% contrast ratio of colors. Colors shall be selected from manufacturer’s available full range of colors.
   c. Raised characters and symbols for tactile signs shall be 5/8" high minimum and 2" high maximum. Sign size shall suit the required letters and numbers.

8. **Braille Copy:** Braille Copy shall be Grade II and shall conform to Specification 800, National library Service, Library of Congress. Braille shall be raised integral .0625 diameter.
   a. Braille shall be separated ½" minimum from the corresponding raised characters or symbols.

9. **Mounting:** As directed by the Architect using required fasteners.

C. **EXTERIOR SIGNS:**

1. Accessible parking signs, directional signs to accessible entrances, barrier-free loading zone signs and traffic control signs to be located as shown on drawings or as indicated herein.
   a. Provide silk screened copy, on baked enamel aluminum, colors as indicated or as otherwise required by authorities having jurisdiction, (Manual on Uniform Traffic Control Devices latest edition) with aluminum post embedded in concrete.
   b. **Accessible Entrance Sign:** Provide aluminum entrance signs at each indicated entrance, displaying international symbol of accessibility. Provide silk screened copy, blue on white baked enamel.
2. Fasteners and Anchors: Use manufacturer’s recommended type, size and quantity of fasteners for indicated signs. Provide concealed mounting and predrilled holes for setting wall anchors.

3. Mounting Posts: 2 7/8" diameter, aluminum pipe, finish and color to be selected by the Architect from manufacturer’s standard.
   a. Provide aluminum interlocking brackets and bolt/nut sets.

4. Signage for identifying emblem for Structure with Truss Construction:
   a. Provide emblem signage of bright and reflective backed enamel aluminum color, isoscales triangle shape, 12" horizontally by 6" vertically with the following letters, of size and color to make them conspicuous, printed on the emblem:
      1) “F” to signify a floor with truss construction;
      2) “R” to signify a roof with truss construction; or
      3) “F/R” to signify both a floor and roof with truss construction.
   b. The emblem shall be permanently affixed to the left of the main entrance door at a height between four and six feet above the ground, and as directed by the Architect.

2.5 CAST METAL PLAQUES

A. Provide a rectangular 2'-8" x 1'-10" plaque with raised letter copy. Raised letter copy shall be as directed by the Architect / Owner.

B. Fabricate cast metal plaques to comply with requirements specified for metal, border style, background texture and finish and to comply with requirements shown for thickness, size, shape and copy.

C. Produce castings free from pits, scale, sand holes or other defects.

D. Hand tool and buff borders and raised copy to produce the manufacturer's standard satin polished finish.
   1. Metal: Aluminum casting as selected by the Architect.
   2. Border Style: None (straight), polished edge.
   3. Background Texture: Manufacturer's standard pebble texture.
   4. Background Finish: Provide dark statuary finish to comply with the requirement specified for aluminum finishes, or as selected by the Architect from manufacturer’s available finishes.
2.6 METAL LETTERS AND NUMBERS

A. Provide metal letters and numbers to comply with the requirements of indicated Codes for the manufacturing process, materials, finish, style, size and message content and mounting heights.

B. Form letters and numbers by casting. Produce characters with smooth, flat faces, sharp corners, precisely-formed lines and profiles, free from pits, scale, sand holes or other defects. Cast lugs into the back of the characters and tap to receive threaded mounting studs.

1. Metal: Aluminum.
2. Provide block letters, Helvetica, medium style, unless otherwise indicated.
3. Size: Height (as shown).

2.7 FINISHES

A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's available full range of colors.

B. Metal Finishes: Comply with NAAMM "Metal Finishes Manual" for finish designations and applications recommendations.

1. Aluminum Finishes:

   a. Class II Clear Anodized Medium Satin Finish: Provide AA-M31C22A31 finish (medium satin mechanical finish, with chemical etch, medium matte finish, 0.4 mil thick minimum anodic coating).

   b. Baked Enamel Finish: Provide finish AA-M4xC12C42R1x (manufacturer's standard non-directional mechanical finish including sanding and filing, cleaning with inhibited chemicals, conversion coated with an acid-chromate-fluoride-phosphate treatment and painted with organic coating specified below).

      1) Organic Coating: Provide manufacturer's standard thermosetting enamel system consisting of a prime coat and a finish coat.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Locate sign units and accessories where shown or scheduled, using mounting methods of the type described and in compliance with the applicable Codes and regulation.

B. Install sign units level, plumb and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
C. Wall Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:

1. Silicone Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous or vinyl-covered surfaces.
   
a. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.

b. Fasteners and Anchors: Manufacturer recommended concealed types for indicated signage and substrate materials.

2. Cast Metal Plaques: Mount cast plaques using the standard method recommended by the plaque manufacturer for the type of wall surface indicated.
   
a. Concealed Mounting: Mount the plaques by inserting threaded studs into tapped lugs on the back of the plaque. Set in predrilled holes filled with quick-setting cement.

3.2 CLEANING AND PROTECTION

A. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION 10440
SECTION 10500 - METAL LOCKERS, CORRIDOR

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Standard Duty Knocked Down Lockers.

1.02 REFERENCES

A. ADAAG - Americans with Disabilities Act, Accessibility Guidelines.

1.03 SUBMITTALS

A. Submit under provisions of AIA A201 and Section 00800.

B. Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Show the following:
   1. Dimensioned drawings including plans, elevations, and sections to show
      locker locations and interfaces with adjacent substrates.
   2. Details of assembly, erection, anchorage and clearance requirements.

D. Selection Samples: For each finish product specified, two complete sets of
   color chips representing manufacturer's full range of available colors and
   finishes.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for
   installation.

B. Protect locker finish and adjacent surfaces from damage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: “Guardian” knock-down lockers, as manufactured by Penco
   Products, Inc., Greenville, NC; Tel: 800-562-1000; or approved equal.

B. Subject to compliance with requirements of the “Basis of Design”,
   manufacturers offering products which may be incorporated in the work include
   but not limited to the following:
3. Or approved equal.

C. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.

1. Comparable products of other manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements and other design attributes listed above.
2. The use of one manufacturer's catalog numbers, and the specific requirements set forth in drawings and specifications, are not intended to preclude the use of other manufacturer's products or procedures which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.

D. Substitute products will be considered for substitution only when submitted to the Architect as per the requirements of AIA A201 and Section 00800.

E. Lockers shall be GREENGUARD Gold Certified by UL Environment through the GREENGUARD Certification Program.

2.02 MATERIALS

A. Steel: Prime grade mild cold-rolled sheet steel free from surface imperfection, capable of taking a high-grade enamel finish and in compliance with ASTM A1008.

B. Steel: Sheet steel components shall be fabricated using zinc-coated steel free from surface imperfection, capable of taking a high-grade enamel finish and in compliance with ASTM A879.

C. Bolts and Nuts: Zinc plated truss fin head bolts and hex nuts.

D. Provide only metal lockers fabricated in the United States by a single domestic manufacturer.

2.03 STANDARD DUTY LOCKERS

A. Standard Duty Lockers:
2. Doors over 12 inches (305 mm) wide or 20 inches (760 mm) high: 16 gauge sheet steel.
3. Doors 12 inches or less (305 mm) wide: 18 gauge sheet steel.
4. No legs.
B. Locker Body: Steel specially formed for added strength and rigidity and to ensure tight joints at fastening points.
1. Tops and bottoms with three sides formed 90 degrees, the front offset formed to be flush with horizontal frame member.
2. Shelves with four sides formed to 90 degrees, front edge having a second bend.
3. Hole spacing in locker body construction: Not exceeding 9 inches (225 mm).
4. Form door frame members to a channel shape, not less than 16 gauge steel.
5. Provide vertical door frame members with additional 3/8 inch (9.5 mm) flange as a continuous door strike.
6. Mortise and tenon intermembering parts; electrically weld together in a rigid assembly capable of resisting strains.
7. Securely weld cross frame members of channel shapes to vertical framing members to ensure rigidity.
8. Center partitions: 24 gauge steel vertical partitions, full depth between bottom and shelf.

C. Locker Doors: One-piece sheet steel.
1. Multi-Point Latch Doors: Full channel formation of adequate depth to fully conceal lock bar on lock side, channel formation on hinge side, right angle formations across top and bottom, with holes for attaching number plates.
2. Provide holes for attaching number plates.
3. Doors over 15 inches (380 mm) wide by 60 inches (1.524 m) or 72 inches (1.828 m) high: 3 inch (75 mm) wide 20 gauge full height reinforcing pan welded to inside face of door at 6 inch (150 mm) centers.
4. Ventilation: Flush door front with no exposed louvers and air flow slots located in top and bottom flanges of door.

D. Hinges:
1. Two inch high, 0.074 inch (1.88 mm) thick sheet steel, double spun, full loop, tight pin, projection welded to door frame and securely fastened to the door with two steel rivets.
   a. Doors over 48 inches (1.066 m) high: Three 2 inch (51 mm) high five-knuckle hinges.
2. 16 gauge, 0.0625 inch (1.58 mm) thick sheet steel, continuous type hinge riveted to the frame and welded to the door.

2.04 DOOR HANDLES AND LATCHING

A. Two Person and Duplex Lockers, 1 Tier: Multi-point latching:
1. Classic III Multi-point latching with recessed handles:
   a. Recess finger-lift control handle in door.
   b. Pocket: brushed stainless steel securely fastened to door with two tabs and a positive tamper-resistant decorative fastener; of depth
sufficient to prevent a combination padlock, built-in combination lock, or key lock from protruding beyond door face.

c. Provide lock hole cover plate for use with padlocks.

d. Attach 14 gauge formed steel lifting piece to latching channel with one concealed retaining lug and one rivet, assuring a positive two-point connection.

e. Handle finger lift: Molded, sound-deadening, attached with rivet; padlock eye for use with 9/32 inch (7.1 mm) diameter padlock shackle.

f. Latch Clip: Glass-filled nylon engaging the door frame and holding the door shut.
   1) Doors 60 inches (1.524 m) and 72 inches (1.828 m) high: Three points.

g. Locking Device: Positive, automatic type, whereby locker may be locked when open, then closed without unlocking.

h. Firmly secure rubber silencers in frame as required.

2.05 INTERIOR EQUIPMENT

A. ADA-Compliant Lockers (Recessed Handles with Multi-Point Latch):
   1. Single Tier Lockers: Hat shelf 48 inches (1.219 m) maximum off the floor.
   2. Locker Compartment Bottom: Minimum of 15 inches (230 mm) off the floor, or an extra shelf placed 15 inches (381 mm) off the floor for unobstructed forward and side reach.
   3. Handicapped symbol attached to door.
   4. Hooks and rods, as specified for other lockers.

2.06 ACCESSORIES

A. Number Plates: Provide each locker with a polished aluminum number plate, 2-1/4 inches (57 mm) wide by 1 inch (25 mm) high, with black numerals not less than 3/8 inch (9.5 mm) high; attach to face of door with two aluminum rivets.

B. Locks: Built-in three-number dialing combination locks capable of at least five different combinations changes; provide control key, combination change key, and combination control charts.
   1. Horizontal bolt
   2. Wrap around/rotary bolt

C. Continuous Sloped Hoods: 16 gauge steel, slope rise equal to 1/3 of the locker depth (18.5 degrees), plus a 1 inch (25 mm) vertical rise at front.
   1. Supplied in 72 inch (1829 mm) lengths only.
   2. Slip joints without visible fasteners at splice locations.
   3. Provide necessary end closures.
   4. Finish to match lockers.

D. Finished End Panels: Minimum 16 gauge steel formed to match locker depth and height, 1 inch (25 mm) edge dimension; finish to match lockers; install with concealed fasteners.
E. Front Fillers: 20 gauge steel formed in an angle shape, with 20 gauge slip joint angles formed in an angle shape with double bend on one leg forming a pocket to provide adjustable mating with angle filler.
   1. Attachment by means of concealed fasteners.
   2. Finish to match lockers.

F. Recess Trim: 18 gauge steel, 3 inch (75 mm) face dimension.
   1. Vertical and/or horizontal as required.
   2. Standard lengths as long as practical.
   3. Attach to lockers with concealed clips.
   4. Provide necessary finish caps and splices.
   5. Finish to match lockers.

2.07 FABRICATION

A. Fabricate lockers square, rigid, without warp, with metal faces flat and free of distortion.

B. Knock-Down Lockers: Fabricate lockers on the unit principle, each locker with individual door and frame, individual top, bottom, back, and shelves, with common intermediate divisions separating compartments. Verify dimensions and arrangement before fabrication.

C. Finish: Enamel powder coat paint finish electrostatically applied and properly cured to manufacturer's specifications for optimum performance. Finishes containing volatile organic compounds and subject to out-gassing are not acceptable.
   1. Powder Coat Plus - Dry Thickness: 2 to 2.2 mils (0.05 to 0.055 mm).
   2. Color: As selected from manufacturer's standard colors.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates and bases have been properly prepared.

B. If substrate and bases are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

A. Install metal lockers and accessories at locations shown in accordance with manufacturer's instructions.

B. Install lockers plumb, level, and square.

C. Anchor lockers to floor and wall at 48 inches (1.219 m) or less, as recommended by the manufacturer.
D. Bolt adjoining locker units together to provide rigid installation.

E. Install sloping tops and metal fillers using concealed fasteners. Provide flush hairline joints against adjacent surfaces.

F. Install front bases between legs without overlap or exposed fasteners. Provide end bases on exposed ends.

G. Install benches by fastening bench tops to pedestals and securely anchoring to the floor using appropriate anchors for the floor material.

3.03 ADJUSTING AND CLEANING

A. Adjust doors and latches to operate without binding. Verify that latches are operating satisfactorily.

B. Adjust built-in locks to prevent binding of dial or key and ensure smooth operation prior to substantial completion.

C. Touch-up with factory-supplied paint and repair or replace damaged products before substantial completion.

3.04 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION 10500
SECTION 10505 - METAL LOCKERS, LOCKER ROOMS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Heavy Duty Knocked Down Lockers (Locker Rooms).

B. Locker Room ADA Benches.

1.02 REFERENCES

A. ADAAG - Americans with Disabilities Act, Accessibility Guidelines.

1.03 SUBMITTALS

A. Submit under provisions of AIA A201 and Section 00800.

B. Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings - Show the following:
   1. Product Data: Submit manufacturer's technical data and installation instructions for metal locker units.
   2. Samples: Submit color samples on squares of same metal to be used for fabrication of lockers.
   4. Combination Listing and Master Keys: Submit listings for combination locks and their respective locker numbers. Coordinate with shop drawings submittal, if required. Deliver master keys directly to the Owner’s Representative.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and finishes.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect locker finish and adjacent surfaces from damage.
1.05 RELATED SECTION(S)

A. Section 03300 – Concrete Work for concrete bases.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: “Invincible II”, knock-down lockers, as manufactured by Penco Products, Inc., Greenville, NC, Tel: 800-562-1000; or approved equal.

B. Subject to compliance with requirements of the “Basis of Design”, manufacturers offering products which may be incorporated in the work include but not limited to the following:

3. Or approved equal.

C. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.

1. Comparable products of other manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements and other design attributes listed above.

2. The use of one manufacturer's catalog numbers, and the specific requirements set forth in drawings and specifications, are not intended to preclude the use of other manufacturer's products or procedures which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.

D Substitute products will be considered for substitution only when submitted to the Architect as per the requirements of AIA A232 and Section 00800.

E. Lockers shall be GREENGUARD Gold Certified by UL Environment through the GREENGUARD Certification Program.

2.02 MATERIALS

A. Steel: Prime grade mild cold-rolled sheet steel free from surface imperfection, capable of taking a high-grade enamel finish and in compliance with ASTM A1008.
B. Steel: Sheet steel components shall be fabricated using zinc-coated steel free from surface imperfection, capable of taking a high-grade enamel finish and in compliance with ASTM A879.

C. Bolts and Nuts: Zinc plated truss fin head bolts and hex nuts.

D. Provide only metal lockers fabricated in the United States by a single domestic manufacturer.

2.03 HEAVY DUTY LOCKERS

A. Heavy Duty Lockers: All locker body components made of cold rolled steel specially formed for added strength and rigidity and to ensure tight joints at fastening points.
   1. Lockers with Doors: Knock-down lockers, with no legs.

B. Locker Body Construction: Steel specially formed for added strength and rigidity and to ensure tight joints at fastening points.
   1. Sides, Bottoms, Tops, and Shelves:
      a. 16 gauge steel.
      b. Ventilation: 3/4 inch (19 mm) wide by 1-1/2 inch (38 mm) high diamond-shaped perforations.
      c. Solid sides.
   3. Doors:
      a. 14 gauge steel.
      b. Ventilation: 3/4 inch (19 mm) wide by 1-1/2 inch (38 mm) high diamond-shaped perforations.
   4. Tops and bottoms with three sides formed 90 degrees, the front offset formed to be flush with horizontal frame member.
   5. Shelves with four sides formed to 90 degrees, front edge having a second bend.
   6. Hole spacing in locker body construction: Not exceeding 9 inches (225 mm).

C. Locker Doors: One-piece sheet steel.
   1. Multi-Point Latch Doors: Full channel formation of adequate depth to fully conceal lock bar on lock side, channel formation on hinge side, right angle formations across top and bottom, with holes for attaching number plates.
   2. Box Lockers (4 to 9 Tiers): Channel formations on lock and hinge sides; right angle flanges on top and bottom with friction catch door pull.
   3. Provide holes for attaching number plates.
   4. Ventilation:
      a. Doors 20 inches (508 mm) or higher: 3/4 inch (19 mm) wide by 1-1/2 inch (38 mm) high diamond-shaped perforations.
      b. All other doors: 7/16 inch (11 mm) wide by 15/16 inch (24 mm) high diamond-shaped perforations.
5. Ventilation: Provide louvered doors in manufacturer’s standard louver pattern.

D. Hinges:
1. Hinge: 0.074 inch (1.88 mm) thick sheet steel, double spun, full loop, tight pin, projection welded to door frame and securely fastened to the door.
   a. Doors over 48 inches (1.066 m) high: Three 2 inch (51 mm) high five-knuckle hinges.
   b. All other doors: Two 2 inch (51 mm) high five-knuckle hinges.

2.04 DOOR HANDLES AND LATCHING

A. Single Tier Lockers:
1. Multi-point latching with recessed handles:
   a. Recess finger-lift control handle in door.
   b. Pocket: 22 gauge brushed stainless steel securely fastened to door with two tabs and a positive tamper-resistant decorative fastener; of depth sufficient to prevent a combination padlock, built-in combination lock, or key lock from protruding beyond door face.
   c. Provide lock hole cover plate for use with padlocks.
   d. Attach 14 gauge formed steel lifting piece to latching channel with one concealed retaining lug and one rivet, assuring a positive two-point connection.
   e. Handle Finger Lift: Molded, sound-deadening, attached with rivet; padlock eye for use with 9/32 inch (7.1 mm) diameter padlock shackle.
   f. Latch Clip: Glass-filled nylon engaging the door frame and holding the door shut.
      1) Doors 60 inches (1.524 m) and 72 inches (1.828 m) high: Three points.
   g. Locking Device: Positive, automatic type, whereby locker may be locked when open, then closed without unlocking.
   h. Firmly secure one rubber silencer in frame at each latch hook.

B. Box Lockers (4 to 9 Tier):
1. Punch doors for use with padlocks.
2. Equip doors for use with padlocks with an 18 gauge combination door pull, staple, and lock hole cover plate with integral friction catch.

2.05 INTERIOR EQUIPMENT

A. ADA-Compliant Lockers (Recessed Handles with Multi-Point Latch):
   1. Single Tier Lockers: Hat shelf at maximum 48 inches (1.219 m) off the floor for unobstructed forward and side reach.
   2. Locker Compartment Bottom: Minimum of 15 inches (230 mm) off the floor, or an extra shelf placed 15 inches (381 mm) off the floor for unobstructed forward and side reach.
   3. Handicapped symbol attached to door.
4. Hooks and rods, as specified for other lockers.

B. Athletic Lockers with Doors (Invincible II):
   1. Single-Tier, 48 inches (1.219 m) or Higher: Shelf located approximately 9 inches (228 mm) below top of locker.
   2. Openings up to 18 inches (457 mm) deep: Three single-prong wall hooks and one double-prong ceiling hook.

2.06 ACCESSORIES

A. Number Plates: Provide each locker with a polished aluminum number plate, 2-1/4 inches (57 mm) wide by 1 inch (25 mm) high, with black numerals not less than 3/8 inch (9.5 mm) high; attach to face of door with two aluminum rivets.

B. Padlocks: Control-keyed, three-number dialing combination type padlocks; provide control key. Mechanism must be resistant to “shimming”.

C. Continuous Sloped Hoods: 16 gauge steel, slope rise equal to 1/3 of the locker depth (18.5 degrees), plus a 1 inch (25 mm) vertical rise at front.
   1. Supplied in 72 inch (1829 mm) lengths only.
   2. Slip joints without visible fasteners at splice locations.
   3. Provide necessary end closures.
   4. Finish to match lockers.

D. Finished End Panels: Minimum 16 gauge steel formed to match locker depth and height, 1 inch (25 mm) edge dimension; finish to match lockers; install with concealed fasteners.

E. Recess Trim: 18 gauge steel, 3 inch (75 mm) face dimension.
   1. Vertical and/or horizontal as required.
   2. Standard lengths as long as practical.
   3. Attach to lockers with concealed clips.
   4. Provide necessary finish caps and splices.
   5. Finish to match lockers.

F. Benches: Laminated selected hardwood, 1-1/4 inch (31 mm) full finished thickness, corners rounded and sanded, surfaces finished with two coats of clear lacquer.
   1. Size(s): As shown on the drawings.

G. Heavy-Duty Bench Pedestals: Steel tubing with 11 gauge steel flanges welded to each end, 16-1/4 inches (412 mm) high, finish to match lockers.

2.07 FABRICATION

A. Fabricate lockers square, rigid, without warp, with metal faces flat and free of distortion.
B. Knock-Down Lockers: Fabricate lockers on the unit principle, each locker with individual door and frame, individual top, bottom, back, and shelves, with common intermediate divisions separating compartments. Verify dimensions and arrangement before fabrication.

C. Finish: Enamel powder coat paint finish electrostatically applied and properly cured to manufacturer’s specifications for optimum performance. Finishes containing volatile organic compounds and subject to out-gassing are not acceptable. Locker exterior and interior shall be painted the same color.
   1. Powder Coat Plus - Dry Thickness: 2 to 2.2 mils (0.05 to 0.055 mm).
   2. Color: As selected from manufacturer's standard colors.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates and bases have been properly prepared.

B. If substrate and bases are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

A. Install metal lockers and accessories at locations shown in accordance with manufacturer's instructions.

B. Install lockers plumb, level, and square.

C. Anchor lockers to base and wall at 48 inches (1.219 m) or less, as recommended by the manufacturer.

D. Bolt adjoining locker units together to provide rigid installation.

E. Install sloping tops and metal fillers using concealed fasteners. Provide flush hairline joints against adjacent surfaces.

F. Install benches by fastening bench tops to pedestals and securely anchoring to the floor using appropriate anchors for the floor material.

3.03 ADJUSTING AND CLEANING

A. Adjust doors and latches to operate without binding. Verify that latches are operating satisfactorily.

B. Touch-up with factory-supplied paint and repair or replace damaged products before substantial completion.
3.04 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION 10505
SECTION 10522 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

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 DESCRIPTION OF WORK

A. Extent of fire extinguishers, cabinets and accessories is indicated on the drawings.

B. Definition: "Fire Extinguishers" as used in this section refers to units which can be hand-carried as opposed to those which are equipped with wheels or to fixed fire extinguishing systems.

C. Type of products required include:
   1. Fire extinguishers.
   2. Fire extinguisher cabinets.
   3. Mounting brackets.
   4. Fire Extinguisher and blanket in combination cabinet.
   5. Signs.

D. Related Section(s)

   1. Section 10500 - Metal Lockers.
   2. Section 11011 - Casework and Equipment.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain products in this section from one manufacturer.

B. Coordination: Verify that fire extinguisher cabinets are sized to accommodate fire extinguishers of type and capacity indicated.

C. UL-Listed Products: Provide new portable fire extinguishers which are UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher indicated.

1.4 SUBMITTALS

A. Product Data: Submit product data for each type of product included in this section. For fire extinguisher cabinets include roughing-in dimensions and details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style and door construction, and panel style and materials.
1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
   b. Faulty operation of valves or release levers.

2. Warranty Period: Six (6) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. J.L. Industries.
3. Potter Roemer
4. Or approved equal.

2.2 FIRE EXTINGUISHERS

A. General: Provide fire extinguishers for each extinguisher cabinet and other locations indicated, in colors and finishes selected by Architect from manufacturer's standard which comply with requirements of governing authorities.

B. Fill and service extinguishers to comply with requirements of governing authorities and manufacturer's requirements.

C. Multi-Purpose Dry Chemical Type: UL-rated 2-A:10:B:C, 5 lbs. nominal capacity, in enameled steel container, for Class A, Class B and Class C fires.

2.3 MOUNTING BRACKETS

A. Provide manufacturer's standard brackets designed to prevent accidental dislodgement of extinguisher, of sizes required for type and capacity of extinguisher indicated, in manufacturer's standard plated finish.

B. Provide brackets for extinguishers not located in cabinets or lockers.

2.4 FIRE EXTINGUISHER CABINETS

A. General: Provide fire extinguisher cabinets where indicated, of suitable size for housing fire extinguishers of types and capacities indicated.

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B. Construction: Manufacturer's standard enameled steel box, with trim, frame, door and hardware to suit cabinet type, trim style, and door style indicated. Weld all joints and grind smooth. Miter and weld perimeter door frames.

C. Cabinet Type: Suitable for mounting conditions indicated, of the following types:

1. Recessed: Cabinet box (tub) fully recessed in walls of sufficient depth to suit style of trim indicated.

2. Semi-Recessed: Cabinet box (tub) partially recessed in walls of shallow depth.

3. Provide fire rated UL listed type cabinets.

D. Trim Style: Fabricate trim in one piece with corners mitered, welded and ground smooth.

E. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Square-Edge Trim: Square edges with backbend depths as follows:
   a. 1/4" to 5/16".

2. Trim Metal: Of same metal as door.

F. Door Material and Construction: Manufacturer's standard door construction, of material indicated, coordinated with cabinet types and trim styles selected.

1. Enameled Steel: Manufacturer's standard finish, hollow steel door construction with tubular stiles and rails.

G. Door Glazing: Tempered float glass complying with FS DD-G-1403, grade B, style I, type I, quality q3, class as indicated below:

1. Clear glass, class 1 (transparent).

H. Door Style: Manufacturer's standard design as indicated below and on drawing.


I. Door Hardware: Provide manufacturer's standard door operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam action latch, or door pull, exposed or concealed, and friction latch. Provide concealed or continuous type hinge permitting door to open 180 degrees.

2.5 FACTORY FINISHING OF FIRE EXTINGUISHER CABINETS

A. General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations except as otherwise indicated. Apply finishes in factory after products are assembled. Protect cabinets with plastic or paper covering, prior to shipment.
B. Painted Finishes: Provide painted finish to comply with requirements indicated below for extent, preparation and type:

C. Extent of Painted Finish: Apply painted finish to both concealed and exposed surfaces of cabinet components except where other than a painted finish is indicated.

D. Color: Provide color or color matches indicated, or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.

E. Preparation: Clean surfaces of dirt, grease, and loose rust or mill scale.

F. Baked Enamel Finish: Immediately after cleaning and pretreatment, apply cabinet manufacturer's standard baked enamel finish system to the following surfaces:

1. Interior of cabinet.
2. Exterior of cabinet except for those surfaces indicated to receive another finish.

2.6 COMBINATION FIRE BLANKET/EXTINGUISHER CABINET

A. Fire Blanket: 62" x 84", fabricated of 100% reprocessed wool, treated with fire resistant chemical.

B. Combination Cabinet, Larsen FB 3612 Series, or approved equal, with solid door. "Fire Extinguisher" and "Fire Blanket" lettering, red baked enamel finish.

1. Provide Larsen FB 1016 for surface mount fire blanket cabinets.

2.7 SIGNAGE

A. Identification: Signage complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.


PART 3 - EXECUTION

3.1 INSTALLATION

A. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.

B. Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.

C. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.

D. Where exact location of surface-mounted cabinets and bracket-mounted fire extinguishers is not indicated, locate as directed by Architect.
3.2 IDENTIFICATION

A. Identify existence of fire extinguisher in cabinet with die cut vertical lettering spelling "FIRE EXTINGUISHER" applied to door. Provide lettering to comply with requirements indicated for letter style, color, size, spacing and location or, if not otherwise indicated, as selected by Architect from manufacturer's standard vertical arrangements.

B. Identify bracket-mounted extinguishers with red letter decals spelling "FIRE EXTINGUISHER" applied to wall surface. Letter size, style and location as selected by Architect.

END OF SECTION 10522
SECTION 10550 - POSTAL SPECIALTIES

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 DESCRIPTION OF WORK

A. Extent of postal specialties is indicated on the drawings.

B. Postal specialties vertical mail boxes.

1.3 QUALITY ASSURANCE

A. Manufacturer: Provide products of manufacturers which are fabricated for mail distribution in accordance with requirements of these specification section.

B. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for preparation of substrate, installation of anchors, and application of postal specialties units.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for postal specialties units required.

B. Provide manufacturer's certification that equipment proposed conforms to the contract specifications.

C. Samples: Submit samples, of each color and finish of exposed materials and accessories required for postal specialties.

D. Submit one full-size sample of each type of mail box units. Acceptable samples may be incorporated in work.

E. Shop Drawings: Submit shop drawings for fabrication and erection of postal specialties. Include plans, elevations and large scale details. Show anchorages and accessory items. Provide location template drawings for items supported or anchored to permanent construction.

PART 2 - PRODUCT

2.1 HORIZONTAL STYLE MAIL BOXES

A. General: Provide vertical style mail box units of sizes and styles indicated below and as referenced on the drawings.
B. Basis of Design: Mail sorter units in the following capacity as manufactured by Charnstrom Co.; or approved equal.

1. Charnstrom Part number #P509Y (Quantity 1), 57 pockets total. 60" W x 12-3/4" D x 47-1/8" H, color to be selected by the Architect.

2. Charnstrom Part number #P846Y (Quantity 1), 45 pockets total. 48" W x 12-3/4" D x 47-1/8" H, color to be selected by the Architect.

3. Charnstrom Part number #P846Y (Quantity 1) 48 pockets total. 48" W x 12-3/4" D x 47-1/8" H & #P4103Y (Quantity 1) 3 pockets total. 13-1/4" H x 12" D, color to be selected by the Architect.


5. Each shelf has 3/8" lip for identifying each pocket with shelf labels. Provide shelf labels for each pocket and 100 additional labels.

C. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. American Postal Manufacturing
4. Or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units which comply with manufacturer's instructions and shop drawings.

3.2 CLEANING AND PROTECTION

A. At completion of the installation, clean all surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION 10550
SECTION 10605 - WIRE MESH PARTITIONS

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 heavy-duty wire mesh partitions.
B. Related Section(s): The following Sections contain requirements that relate to this Section:
   1. Division 2 Section "Chain Link Fences and Gates" for chainlink fencing.

1.3 DEFINITIONS
A. The types of weaves for the wire mesh specified in this Section are as illustrated and defined in ASTM E 437 and its Appendix X4.2:
   1. Plain Weave: Wires pass over one and under the next adjacent wire in both directions.
   2. Lock Crimped: Deep crimps at points of intersection to lock the wires securely in place.
   3. Intercrimped: Similar to plain weave with extra crimps between the intersections.

1.4 SUBMITTALS
A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
   1. Product Data for each type of product specified, consisting of manufacturer's specification, technical data, and installation instructions.
   2. Shop Drawings showing fabrication and installation of wire mesh partitions, including plans, elevations, and large-scale details showing anchorage and accessory items. Provide location template drawings for items supported or anchored to permanent construction.
   3. Samples of a 12-by-12-inch (300-by-300-mm) wire mesh panel constructed of specified frame members, wire mesh, and color charts.

1.5 QUALITY ASSURANCE
A. Manufacturer Qualifications: Engage a firm experienced in manufacturing wire mesh partitions similar to those indicated for this Project and that have a record of successful in-service performance.
1.6 PROJECT CONDITIONS

A. Field Measurements: Check actual locations for wire mesh products by accurate field measurements before fabrication and show recorded measurements on Shop Drawings. Coordinate fabrication and delivery schedules with construction progress to avoid delaying the Work.

B. Where field measurements cannot be made without delaying the Work, guarantee location dimensions and proceed with fabricating wire mesh products without field measurements. Coordinate wall, column, floor, and ceiling construction to ensure that actual location dimensions correspond to guaranteed dimensions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acorn Wire and Iron Works, Inc.
2. G-S Company (The).
3. Hoosier Fence Co., Inc. (The).
4. Indiana Wire Products, Inc.
5. Kentucky Metal Products Co.
6. King Wire Partitions, Inc.
7. Lakeside Wire and Iron Co.
8. Miller Wire Works, Inc.
9. SpaceGuard Products.
10. Wire and Iron Products, Inc.
11. Or approved equal.

2.2 MATERIALS

A. Steel Wire: ASTM A 853.

B. Steel Channels, Angles, Plates, and Bars: ASTM A 36 (ASTM A 36M).

C. Steel Sheet: ASTM A 568 (ASTM A 568M).

D. Cold-Rolled Steel Channels: Formed from steel sheet.

E. Square Steel Tubing: Cold-formed structural steel tubing, ASTM A 500.


G. Galvanized Steel Sheet: Commercial-quality, hot-dip-coated steel sheet, ASTM A 653, with G60 or A60 (ASTM A 653M, with Z180 or ZF180) coating.
2.3 **HEAVY-DUTY MESH PARTITIONS**

A. Mesh: 0.192-inch (4.9-mm) diameter, intercrimped steel wire woven into 2-inch (50-mm) diamond mesh, securely clinched to frame members.

B. Frames: Provide cutouts for pipes, ducts, beams, and other items shown or necessary for partition installation. Finish edges of cutouts to provide a neat, protective edge.

C. Frame Members: 1-1/2-by-3/4-inch (38-by-19-mm) cold-rolled steel channels with 3/8-inch (9.5-mm) diameter bolt holes approximately 18 inches (450 mm) o.c.

D. Horizontal Reinforcing Members: 1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3-mm) cold-rolled steel channels with wire woven through or two 1-by-1/2-inch (25-by-13-mm) steel channels bolted or riveted toe to toe through mesh, and secured to vertical members. Provide number of horizontal reinforcing members to suit panel height as recommended by partition manufacturer.

E. Stiffening Bars: Provide flat steel bar stiffener posts between abutting panel frames. Size as recommended by partition manufacturer for partition height required. Increase size of stiffening bars, if required, to maintain partition rigidity.

F. Top Capping Bars: 3-inch (75-mm) by 4.1-lb (1.9-kg) steel channels, secured to top framing member with 1/4-inch (6-mm) diameter "U" bolts spaced not more than 28 inches (700 mm) o.c.

G. Corner Posts: 2-by-2-by-1/8-inch (50-by-50-by-3-mm) steel angles with floor shoe and 3/8-inch (9.5-mm) diameter bolt holes to align with bolt holes in vertical frame members.

H. Line Posts: Where partition runs exceed 20 feet (6 m) without intersecting or connecting to overhead framing, furnish 3-inch (75-mm) by 4.1-lb (1.9-kg) steel channel line posts with 5-by-18-by-1/4-inch (125-by-450-by-6-mm) steel base plates located at recommended intervals to ensure partition rigidity and stability.

I. Intersection Posts: Where 3- or 4-way intersections occur, use 2-by-2-inch (50-by-50-mm) tubular steel posts with floor shoe and 3/8-inch (9.5-mm) diameter bolt holes aligned for bolting to adjacent panels.

   a. For other than 90-degree intersections, use manufacturer's recommended tubular steel corner posts and installation accessories.

J. Floor Shoes: Cast metal, sized to suit vertical framing and to provide approximately 3 inches (75 mm) of clear space between finished floor and bottom horizontal frame members. Furnish units with set screws for leveling adjustment.

K. Sheet Metal Base: Panels of 0.0598-inch (1.5-mm) thick steel sheets, welded or bolted to frames.
2.4 **DOORS**

A. Hinged Door: Door frame of 1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3-mm) steel channels with 1-1/2-by-1/8-inch (38-by-3-mm) flat steel bar cover plates on 3 sides, and 1/8-inch (3-mm) thick strike bar on lock side. Provide 1-1/2 pairs of 3-1/2-by-3-1/2-inch (89-by-89-mm) butt hinges riveted or welded to door and frame, and mortise-type cylinder lock operated by key outside with recessed knob inside. Align bottom of door with bottom of adjacent panels.

B. Provide manufacturer's standard cylinders for lock(s).

2.5 **FABRICATION**

A. Do not use components less than sizes indicated. Use larger-size components as recommended by partition component manufacturer.

B. Provide bolts, hardware, and accessories for complete installation.

C. Finish: Manufacturer's standard, shop-applied enamel finish. Provide manufacturer's standard finish color.

### PART 3 - EXECUTION

3.1 **PREPARATION**

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.2 **INSTALLATION**

A. Erect partitions plumb, rigid, properly aligned, and securely fastened in place, complying with Drawings and manufacturer's recommendations.

B. Provide additional field bracing as shown or necessary for rigid, secure installation. Installer to provide additional clips and bracing as required.

3.3 **ADJUSTING AND CLEANING**

A. Adjust moving components for smooth operation without binding.

B. Touch up damaged finish after completing installation using field-applied paint to match color of shop-applied finish.

**END OF SECTION 10605**
SECTION 10650 - OPERABLE PARTITIONS

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. Extent of operable partitions, including locations and details, are indicated on drawings and in schedules.

B. Type of operable partitions required includes: Manually-operated, flat panel, paired panel operation.

C. Punching of overhead structural support per template provided by operable partition installer is specified elsewhere in a Division-5 Section.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product literature and installation instructions for operable partitions and installation accessory required.

   1. Submit written data on physical characteristics, durability, resistance to fading and flame resistance characteristics.

B. Shop Drawings: Submit shop drawings showing locations and extent of operable partitions. Include plans, elevations, and large scale details of anchorages, and accessory items. Indicate location of each unit with building, conditions at openings, typical and special details, location and installation requirements for hardware and operators.

C. Include methods of installation for type of support structure and fastening condition.

D. Template Drawings Submit location template drawings for items supported or anchored by permanent construction.

E. Samples for Initial Selection Purposes: Manufacturer's standard color charts showing full range of colors and materials for each component exposed to view, available for type of operable partition required.

F. Samples for Verification Purposes: Submit the following:

   1. 6" square samples of each panel facing material selected.
   2. 12" square samples of each finish selected.

G. Prepare samples from same material to be used for the work.

H. Sample of Manufacturer’s / Installer’s Warranty.
1.4  QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm (material producer) with a recommended 5 years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section.

B. Installer Qualifications: Firm specializing in operable partition installation with a recommended 5 years of experience in installation of operable partitions similar to those required for this project.

C. Single Source Responsibility: Provide material produced by a single manufacturer partitions and mounting hardware.

D. Acoustical Performance: Panels have been tested in accordance with ASTM E90 test procedure, and shall have attained an **STC rating of 50**.

1. Test reports by an Independent Acoustical Laboratory shall be available upon request by the Architect. NSSEA “Class” ratings will not be acceptable.

E. Field Sound Performance, (N.I.C. and/or F.S.T.C.): Panels of similar size and model operable wall assemblies have been tested by an Independent Acoustical Consultant in accordance with ASTM E336 and ASTM E413, and achieved an N.I.C. and/or F.S.T.C. rating.

1. Test reports by shall be available upon request by the Architect.

F. Warranty: See Section 01900 for the required special project warranty.

1.5  TESTING

A. Test Reports: Submit certified test reports evidencing compliance with requirements for the following:

1. Fire performance characteristic.
2. Physical properties indicated.

B. Fire Performance Characteristics: Provide vinyl fabric covering that is identical to that tested for the following fire performance requirements, according to test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

1. Surface Burning Characteristics as follows:
   a. Flame Spread: Not more than 25.
   b. Smoke Developed: Not more than 50.
   1) Test Method: ASTM E 84.

1.6  DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in original factory wrappings and containers, clearly labeled with identification of manufacturer, brand name, quality or grade, fire hazard classification, and lot number. Store materials in original undamaged packages and containers, inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures,
humidity; laid flat, blocked off ground to prevent sagging and warping. Comply with instructions and recommendations of manufacturer for special delivery, storage, and handling requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements of the “Basis of Design”, manufacturer offering products which may be incorporated in the work include the following:

1. Basis of Design: “Acousti-Seal #932” Series of paired flat panels hinged together in pairs, manually operated, top-supported with operable floor seals, as manufactured by Modernfold Inc., Greenfield, IN, Tel. 800.869.9685 / www.modernfold.com; or approved equal.

B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.

1. Comparable products of other manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements and other design attributes listed above.

2. The use of one manufacturer's catalog numbers, and the specific requirements set forth in drawings and specifications, are not intended to preclude the use of other manufacturer's products or procedures which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.

C. Subject to compliance with the specification sections contained herein, provide operable partitions from one of the following:

3. Or approved equal.

D. Substitute products will be considered for substitution only when submitted to the Architect as per the requirements of AIA A232 and Section 00800.

2.2 MATERIALS

A. Operation:

1. Series of paired flat panels, 48" w. Refer to Reflected Ceiling Plan and Room Finish Schedule for required panel height.
2. Top supported with operable floor seals.
3. Manually operated.
4. Final Closure: horizontally expanding panel edge with removable crank.
5. Hinged panel closure.
6. Angle jamb.
2.3 Suspension System

A. #17 Suspension System:
   1. Suspension Tracks: Min. 11-gauge, 0.12-inch roll-formed steel track supported by adjustable steel hanger brackets, supporting the load-bearing surface of the track, connected to existing structural beam by pairs of 3/8-inch diameter threaded rods.

B. Carriers:
   1. Right Angle Turn: Two carriers of low-friction polymer, reinforced with steel, that permit panels to traverse L, T and X intersections without mechanical switching, on all panels except hinged closure panels.
   2. “Smart Track”: Two all-steel trolleys with steel tired ball bearing wheels. Non-steel tires are not acceptable. Suspension system shall provide automatic indexing of panels into stack area using preprogrammed switches and trolleys without electric, pneumatic, or mechanical activation.

C. Panel Construction: Provide construction as indicated:
   1. All panel horizontal and vertical framing members fabricated from minimum 18-gauge formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.
   2. Panel Skin: Nominal 21-gauge roll-formed steel wrapping around panel edge. Panel skins shall be lock formed and welded directly to the frame for unitized construction.
   3. Acoustical rating of panels with this construction: 50 STC.
   4. Panel Size: 3" thick x 48" wide. Refer to Reflected Ceiling Plan and Room Finish Schedule for required panel height and (VIF).

2.4 Panel Finish

A. Panel Finish: Factory applied, Class “A” rated material. Reinforced heavy duty vinyl with woven backing weighing not less than 30 ounce per lineal yard.

2.5 Sound Seals

A. Vertical Interlocking Sound Seals between panels: Roll-formed steel astragals, with reversible tongue and groove configuration in each panel edge for universal panel operation. Rigid plastic astragals or astragals in only one panel edge are not acceptable.

B. Horizontal Top Seals: Continuous contact extruded vinyl bulb shape with pairs of non-contacting vinyl fingers to prevent distortion without the need for mechanically operated parts.

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C. Horizontal Bottom Seal: Automatic operable seals providing nominal 2-inch operating clearance with an operating range of +1/2-inch to -1-1/2-inch which automatically drop as panels are positioned, without the need for tools or cranks.

2.6 ACCESSORIES

A. Work Surfaces:

1. Markerboard: White enamel on steel, bonded to the face of the panel with trim (at top and bottom only) without exposed fasteners, where indicated on the drawings.
   a. Recessed Marker Tray(s): Provide in locations indicated.

2. Tackboard: Minimum 1/4-inch natural cork, covered with fabric, with horizontal trim without exposed fasteners. Trim is not acceptable on vertical edges, where indicated on the drawings.

2.7 COLORS AND PATTERNS

A. Provide materials in colors and patterns as selected by Architect from manufacturer’s standard colors and patterns.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine site at which partitions will be installed. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with ASTM E557, operable partition manufacturer’s written installation instructions, drawings and approved shop drawings.

B. Install operable partitions and accessories after other finishing operations, including painting, have been completed.

C. Match operable partitions by installing panels from marked packages in numbered sequence indicated on shop drawings.

D. Broken, cracked, chipped, or deformed partitions are not acceptable.

3.3 CLEANING

A. Clean all operable partition surfaces and clean adjacent surfaces soiled by work of this section according to manufacturer’s written instructions. Avoid use of abrasive cleaners or solutions containing corrosive solvents.

B. Remove debris created by operable partition work from work site.

C. Protect partitions against damage during construction period. Ensure that partitions will be without damage or deterioration at time of substantial completion.
3.4 ADJUSTING

A. Adjust operable partitions to operate smoothly, easily and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.5 EXAMINATION

A. Examine flooring, structural support and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operation of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.6 DEMONSTRATION

A. Demonstrate proper operation and maintenance procedures to Owner's personnel.

B. Provide operation & maintenance manuals to Architect for review

END OF SECTION 10650
SECTION 10670 - METAL SHELVING

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 DESCRIPTION OF WORK
   A. Extent of work included is shown on drawings.
      1. Storage Room shelving.

1.3 QUALITY ASSURANCE
   A. Uniformity: Provide each type of metal shelving as produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.

1.4 SUBMITTALS
   A. Product Data: Submit manufacturer's technical data and installation instructions.
   B. Samples: Submit color samples for Architect's selection.
   C. Shop Drawings: Submit shop drawings verifying dimensions affecting installations. Show in detail, method of installation and accessories.

1.5 JOB CONDITIONS
   A. Protect from damage during delivery, handling, storage and installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Basis of Design: Clip shelving as manufactured by Republic Storage Products, LLC, Uniontown, OH, Tel.# 800.477.1255; or approved equal.
   B. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
      1. Provide “Clipper Conventional Flange Shelving” as manufactured by Penco Products Inc., or approved equal.
         a. Capacity: Provide metal shelving which shall meet or exceed the Basis of Design indicated load capacity Class.
2.2 STORAGE ROOM SHELVING

A. Shelving System:
   1. Single angle end posts, double angle intermediate posts, 7'-3" high.
   2. Number and sizes as shown, 36 inches wide, or as indicated, 18 gauge, with reinforcing bar, front and rear (Class 2B). For shelves 18 inches deep and deeper, provide Class 3 shelves.
   3. Include sway braces at rear and at end uprights. Include also a label holder for each shelf.
   4. Baked enamel finish, colors as selected by Architect from manufacturer's available full range of standard and optional colors.
   5. Provide metal bracket, lead anchor and screws for fastening shelving units to wall. Provide anchors for each shelving unit.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install metal shelving at locations shown in accordance with manufacturer's instructions for plumb, level, rigid, and flush installation.

B. Anchor shelving to walls and floors.

3.2 ADJUST AND CLEAN

A. Touch up marred finishes, but replace units which cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by shelving manufacturer.

END OF SECTION 10670
SECTION 10800 - TOILET AND BATH ACCESSORIES

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 DESCRIPTION OF WORK

A. Extent of each type of toilet accessory is indicated on the drawings and schedules.

B. Type of toilet accessories required includes but are not limited to the following:

1. Mirrors
2. Grab bars
3. Napkin disposals
4. Mop and broom holder/utility shelf
5. Hand dryers
6. ADA Compliant Seat
7. Shower curtains, rods and hooks

C. Refer to the Toilet Room Accessories Schedule which identifies items supplied by the Owner and installed by the General Contractor.

1.3 QUALITY ASSURANCE

A. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay.

B. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.

C. Products: Provide products of same manufacturer for each type of accessory unit and for units exposed in same areas, unless otherwise acceptable to Architect.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for each toilet accessory.

B. Setting Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices and cut-out requirements in other work.

1.5 WARRANTY

A. Washroom Accessories: Warranty is limited to replacing or repairing, at the manufacturer’s option, transportation charges prepaid by the purchaser, any washroom accessory unit or part thereof which their inspection shall show to have been defective within the limitation of the warranty. Period of warranty is measured from the date of their invoice as follows:
1. Complete unit (except mirrors) - **One (1) year**.
2. Stainless Steel Mirror Frames - **Fifteen (15) years** - against corrosion.
3. Tempered Glass Mirrors - **Five (5) years** - against silver spoilage.
4. Polished #8 Architectural Grade Finish on 304 Series Stainless Steel - **One (1) year**
   against corrosion.
5. Bright Annealed Finish on 430 Series Stainless Steel - **One (1) year** against corrosion.

Note: Warranty does not cover installation labor charges and does not apply to any units
which have been damaged by accident, abuse, improper installation, improper maintenance,
or altered in any way.

B. Hand Dryer: Manufacturer’s standard warranty to be free from defects for a period of **ten
(10) years**.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Catalog numbers used herein are Bradley Washroom Accessories, or
approved equal. Refer to drawings for schedule and additional information. Similar products
for other indicated manufacturers will be acceptable.

B. Subject to compliance with requirements, manufacturers offering toilet accessories which
may be incorporated in the work include one of the following:

1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Or approved equal

2.2 MATERIALS, GENERAL

A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gauge (.034") minimum,
unless otherwise indicated.

B. Brass: Leaded and unleaded, flat products, FS QQ-B-613; Rods, shapes, forgings, and flat
products with finished edges, FS QQ-B-626.

C. Sheet Steel: Cold-rolled, commercial quality ASTM A 366, 20-gauge (.040") minimum, unless
otherwise indicated. Surface preparation and metal pretreatment as required for applied
finish.

D. Galvanized Steel Sheet: ASTM A 527, G60.

E. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456,
Type SC 2.

F. Baked Enamel Finish: Factory-applied, gloss white, baked acrylic enamel coating.

G. Mirror Glass: ASTM C-1048, Type I, Class 1, Quality q2, 1/4" thick, with silver coating,
copper protective coating, and non-metallic paint coating complying with FS DD-M-411.
Provide tempered safety glass for all mirrors.

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I. Fasteners: Screws, bolts, and other devices of same material as accessory unit or of galvanized steel where concealed.

2.3 PRODUCT DESCRIPTIONS

A. Mirror Units: #781 Series, Mirror plates shall be of No. 1 quality 1/4" polished safety glass, silvered and electrolytically copper backed.
   1. Frames shall be 3/4" x 3/4", type 304, 18 gauge satin finish stainless steel angle with mitered corners, welded and polished smooth, with 20 gauge angle stiffeners welded to frame, 20 gauge galvanized steel back with formed edges secured to frame with concealed screws and equipped with integral 18 gauge cold rolled steel all welded construction wall hangers.
   2. Mirror units shall guaranteed by the manufacturer for a period of fifteen (15) years which starts on approved date of installation.
   3. Sizes as indicated on drawings and schedules.

B. Grab Bars: (Provide quantity and types indicated)
   1. Stainless Steel Type: Provide grab bars with wall thickness not less than 18 (.050") gauge and as follows:
      a. Mounting: Concealed, manufacturer's standard flanges and anchorages.
      b. Clearance: 1-1/2" clearance between wall surface and inside face of bar.
      c. Gripping Surfaces: Manufacturer's non-slip texture.
      d. Heavy-Duty Size: Outside diameter of 1-1/2".

C. Circular Waste Chute: No. P10-696, 6" diameter, type 304, 22 gauge stainless steel. Unit shall be installed in the countertop.

D. Napkin Disposals: Surface mounted, Model 4722-15, one toilet compartment, fabricated of type 304, 22 gauge stainless steel with exposed surfaces in satin finish. Self-closing push flap door and stainless steel removable receptacle with tumbler lock. Overall dimensions - 10-3/4" w x 15-1/8" h x 4" d.

2.4 MISCELLANEOUS ACCESSORIES

A. Mop and Broom Holder/Utility Shelf: No. 9954, combination unit with 18-gauge (.050") Type 304 stainless steel shelf with 1/2" returns, 16-gauge (.062") support brackets for wall mounting, provide 16-gauge stainless steel hooks for wiping rags on front of shelf, together with spring-loaded rubber cam type mop/broom holders; 1/4" diameter stainless steel drying rod suspended beneath shelf. Provide 36" long unit with 4 mop/broom holders and 3 hooks.

B. Hand Dryer: Model “M06A-UL” Speedflow, as manufactured by Saniflow, a Mediclinics Co.; or approved equal. Surface-mounted ADA-compliant hand dryer, high impact 1/16” thick one-piece steel cover; white epoxy finish. Hand dryer includes a fully adjustable (8500
-11,200 rpm) universal-type brush motor, with a heating element, power of 110 W. Noise level from 58-67 dBA while delivering 43-57 CFM of air at 108°F and 110 mph as maximum air velocity (Max - 9,840 LFM) during user controlled drying cycle. Dryer shall have a total power of 110-1,150 W with a consumption of 1.4 to 9.5 A. Unit shall be UL and CSA approved, according to UL 499, CSA C22.2 standards, and GreenSpec approved.

C. ADA Compliant Seat: “Model 9569" shower seat as manufactured by Bradley; or approved equal.

1. Solid phenolic folding shower seat made of ½” thick phenolic core with white laminate bonded onto Phenolic for color. All exposed edges are machined smooth to a uniform dark finish. 1-1/2" HDPE support bar and 18 gauge 1" diameter stainless steel tubing. 7 gauge satin finish stainless steel mounting flanges with three mounting holes provided in each flange for installation. 16 gauge satin finish stainless steel lower support bracket. Reversible in field to be right or left hand configuration. Designed to support up to 400 lbs. static load.

D. Shower Curtain Rod, Heavy-Duty: No. 9539, 1-1/4" o.d. 18 gauge (.050") stainless steel, satin finish; furnish 3" o.d. minimum 20 gauge stainless steel flanges with satin finish, designed for exposed fasteners.

E Duck Shower Curtain: No. 9537, 42" wide x 72" high, 8 oz. 100% cotton duck material with hemmed edges and corrosion resistant metal grommets on 6" centers through top hem. Furnish in white color unless otherwise indicated.

F Shower Curtain Hooks: No. 9536, Chrome plated or stainless steel spring wire curtain hooks with snap fasteners, sized to accommodate curtain size specified above.

2.5 FABRICATION

A. General: No names or labels are permitted on exposed faces of toilet and bath accessory units. On either the interior surface of the accessory or on the back surface, the manufacturer shall indicate the manufacturer’s information, model number on a printed waterproof label or a stamped nameplate attached to the accessory.

B. 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.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions under which work is to be installed and notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.
3.2 INSTALLATION

A. Install toilet accessory units in accordance with manufacturers' instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations and at heights indicated.

B. Use all metal type fasteners such as anchors, plates, screws, bolts and expansion shields, type as required by the construction to which accessories are to be secured. Exposed hardware shall match finish of the accessory.

3.3 ADJUSTING AND CLEANING

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish all exposed surfaces after removing temporary labels and protective coatings.

END OF SECTION 10800
SECTION 10830 - INFANT CHANGING TABLE

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 DESCRIPTION OF WORK

A. Extent of type of infant changing table(s) are indicated on the drawings and schedule.

B. Type of infant changing tables: Surface mounted horizontal design changing station.

C. Related Work:

   1. Section 04200 - Unit Masonry.

1.3 QUALITY ASSURANCE

A. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry or metal stud framing; coordinate delivery with other work to avoid delay.

B. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.

C. Products: Provide products of same manufacturer for each type of unit and for units exposed in same areas, unless otherwise acceptable to Architect.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s technical data and installation instructions for each infant changing table.

B. Setting Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices and cut-out requirements in other work.

C. Warranty: Submit manufacturer’s standard warranty on all parts and installation.

   1. Unit shall be backed by manufacturer’s five (5) year limited warranty on materials and workmanship and include a provision for replacement caused by vandalism from date of substantial completion.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: “KB200-00", horizontal surface mounted baby changing station, as manufactured by Koala Care Products, Centennial, CO, Tel.# 888.733.3456, www.koalabear.com; or approved equal.

1. Comparable products of other manufacturers will only be considered if it can be clearly shown that the substituted products are equal to or exceed the construction quality requirements stated in the "Basis of Design" manufacturer's standard product data. Substitution shall be in accordance with AIA A201 and Section 00800.

B. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

1. Foundations Children’s Products,
2. Or approved equal.

2.2 MATERIALS, GENERAL

A. FDA approved blow molded high-density polyethylene with Microban® antimicrobial interior. Reinforced full-length steel-on-steel hinge mechanism, with 11-gauge steel mounting plates and mounting hardware included. Molded in graphics and safety messages in four (4) languages. Contoured changing area and comes complete with nylon safety straps and bag hooks.

B. Concealed pneumatic cylinder and metal mounting chassis provides controlled, slow opening and closing of bed.

C. High-density polyethylene is easy to clean and resists odors and bacterial growth.

D. Complies with ASTM static load performance requirements when properly installed.

E. Bed shall have smooth concave changing area with a nylon safety strap and two hooks for bags or purses. Unit shall have a built-in liner dispenser for use with 3-ply chemical free biodegradable bed liners.

F. Unit shall conform to:

1. ICC A117.1-2003, Accessible and Usable Buildings and Facilities,
2. ASTM F 2285-04, Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use,
3. ANSI Z535.4, Product Safety Signs and Labels,
4. EN 12221:2008, ASTM G22 Antibacterial standards or local code if more stringent installation requirements are applicable for Barrier-Free accessibility.
5. Is intended to be compliant with the 2010 ADA Standards for Accessible Design and the 2009 ICC A117.1, Accessible and Usable Buildings and Facilities.

G. Designed to lift door from open position and brake to prevent the trapping of hands or fingers.

H. Unit is engineered to withstand loads of up to 200 pounds.

I. Size: 22-1/4\" high, 35-3/16\" wide, 4\" deep (Closed position).

J. Installation in accordance with manufacturer’s recommendations / instructions.

K. Provide Braille label.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions under which work is to be installed and notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 INSTALLATION

A. Install infant changing table units in accordance with manufacturers' instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations and at heights indicated.

B. Use all metal type fasteners such as anchors, plates, screws, bolts and expansion shields, type as required by the construction to which accessories are to be secured.

3.3 ADJUSTING AND CLEANING

A. Adjust infant changing table units for proper operation and verify that mechanisms function smoothly. Replace damaged or defective units or accessories.

B. Clean and polish all exposed surfaces after removing temporary labels and protective coatings.

END OF SECTION 10830
SECTION 10900 - MISCELLANEOUS EQUIPMENT AND FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Part 1 through Part 6 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

A.Extent of each type of equipment is shown on drawings.

1. Cubicle Curtains
2. Coat Hooks
3. High-Security Key Box
4. Architectural Grillwork
5. Wall Mounted Coat Racks

B. Include installation, except that plumbing and electrical connections will be by Plumbing and Electrical Contractors, respectively.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s specifications, installation instructions, and general recommendations, including data which substantiates that materials comply with requirements.

B. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous metal fabrications and steel support for securing TV/VCR brackets to existing steel or concrete structure above acoustical ceilings. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.

C. Provide roughing-in drawings to Plumbing and Electrical (Sub)Contractors, as required.

PART 2 - PRODUCTS

2.1 CUBICLE CURTAINS

A. Basis of Design: Products as manufactured by Construction Specialties, Inc. Tel.# 800.233.8493, www.c-group.com; or approved equal.

1. Tracks: Suspended extruded aluminum box-channel, ceiling mounted track not less than 3/4" by 1-3/8", aluminum alloy 6063-T4, having smooth internal double raceway designed for uninterrupted operation of curtain carriers on both straight and curved installations.

   a. Finish: Natural anodized.
1) Curtain Carriers: Two wheel nylon, polyethylene or delrin trolleys having center pendant fitted with bright plated - 0.148 diameter wire open hook providing an overall drop of 2” from bottom or rod.

1. Curtains: Provide curtain fabrics as manufactured by Construction Specialties; or approved equal.

   a. Subject to compliance with requirements, manufacturers offering products and accessories which may be incorporated in the work include the following:

      1) Cube Care
      2) Cubicle Curtain Factory
      3) COVOC Corp.
      4) Or approved equal.


      1) Products had been tested to meet or exceeds NFPA, Bulletin 701 and the International Building Code, for smoke developing and flame spread requirements.
      2) Provide polyester reinforced, anti-bacterial vinyl fabric, stain resistant, self sanitizing, and easy to maintain. Fabric is strong, fluid proof, stain resistant lightweight, with resistance to wear, tear and abrasion.

   c. Colors/patterns: As selected by the architect from manufacturer's full range of all available colors, after award of contract.

   d. Top Hem: Triple thickness of cloth, not less than 1" and not more than 1-1/2" wide, reinforced with integral web and double stitched, fitted with machine-set rustproof grommets spaced 6" o.c.

   e. Bottom and Side Hems: Triple thickness of cloth, not less than 1" wide, single stitched.

   f. Seams: Not less than ½" wide double turned and double stitched.

   g. Fullness: Not less than 10 percent.

   h. Nylon Mesh top: Shall have a minimum percent opening of 70 percent and have a minimum height of 20" with ½" holes. Overlap seams and double-lock stitch to body of curtain.

   i. Curtain Tieback: At each termination.

   j. Fiber Content: 100% FR Polyester.

2. Provide separate curtain for each compartment, extending from track to within 12" - 15" of floor.
3. Install track in one continuous "L" shaped length for each cubicle wherever possible, with perfectly formed 12" radius bends at changes in direction.

4. Where splicing is necessary, use special formed splice sleeve at least 8" long and of same material and finish as track. Locate splices at least 12" from radius bends.

5. Secure track to ceiling at intervals of not more than 36". Install end stops at ends of each track, one end stop on each track being removable for replacement of carriers.

2.2 ARCHITECTURAL GRILLWORK

A. Basis of Design: Provide “Item # 16143814, ½" round on3/8" staggered centers (40% open area) perforated carbon steel panels, HRPO, 14 gauge (.0747" thick), as manufactured by McNichols®, New Brunswick, NJ, Tel.# 877.328.1379; or approved equal.

1. Provide and install security fasteners to secure the perforated metal panels to the steel frame, as indicated on the drawings.

2. Finish and Color: Kynar 500, 2 - coat system in color as selected by the Architect from manufacturer’s available full range of colors.

2.3 COAT HOOKS

A. Basis of Design: “Safco Nail Head Coat Hook” six hook coat rack as distributed by School Specialty, Tel.# 888.388.3224; or approved equal.

1. Coat Hook measures 36" w x 2- 3/4" d x 2" h and features 6 hooks with rounded "nail head" design protecting garments from damage keeping them safely in place.

2. Satin aluminum hook with matching back plate easily mounts to wall or behind the door and comes with mounting screws.

3. Greenguard certified.

2.4 HIGH-SECURITY KEY BOX

A. Basis of Design: Provide “Knox-Box® - Series 3200”, recessed, high-security key box as manufactured by Knox Co., Pheonix, AZ, Tel.# 800.552.5669, www.knoxbox.com; or approved equal.

1. Color: As selected by Architect from manufacturer’s standard colors / finishes.

B. Subject to compliance with requirements, manufacturers offering products and accessories which may be incorporated in the work include the following:

1. TRAC-Vault” as manufactured by Supra a United Technologies Co.
2. Or approved equal.
2.5 WALL MOUNTED COAT RACKS

A. Basis of Design: Model “DS-3H and DS-4H” DS Series Wall Mounted Coat Racks as manufactured by Magnuson Group, Woodridge, IL, Tel.# 800.342.5725 / www.magnusongroup.com or approved equal.

B. Powder-coated steel rack with nickel chrome plated 1" hanger bar, color as selected by Architect from manufacturer’s standard colors.

C. Sizes: 6½" H x 36" W x 11½" D and 6½" H x 48" W x 11½" D. Provide quantity of units as required to fit length indicated.

D. Coordinate mounting height, as indicated on the drawings.

E. Color and Finish as selected by the Architect from manufacturer’s available colors and finishes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Demonstrate proper operation of the equipment to Architect's satisfaction. Adjust as required for smooth, efficient operation.

D. Provide instructions for Owner's personnel, with manufacturer's use and maintenance manuals.

E. Protect equipment from damage until acceptance of the entire project by the Owner.

F. Install equipment and materials in accordance with manufacturer’s recommendations and instructions for installation.

END OF SECTION 10900
SECTION 11000 - GENERAL REQUIREMENTS - CASEWORK AND EQUIPMENT WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Part 1 through Part 6 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

A. Casework and Equipment Work includes all items listed on schedules. All general requirements of this section apply to all equipment Contracts.

1.3 QUALITY ASSURANCE

A. Products of individual manufacturers are scheduled to establish type and standard of quality. Products of other manufacturers proposed to be used shall meet the published specifications of the specified product as to materials, finishes, design and fabrication, to the satisfaction of the Architect.

B. Compatibility: Provide each type of equipment by a single manufacturer, including accessories. It is of the utmost importance that a stability of design and interchangeability of parts and pieces be provided, and it shall be specifically understood that a miscellaneous assortment of equipment assembled by dealers or agents will not be considered as meeting requirements of the specification.

C. Casework and/or Equipment Work specified herein and other Division 11 specification sections have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.

1. Comparable products of other manufacturers will be considered only if it can be clearly shown that their products are equal to or will exceed the construction quality requirements and other design attributes listed by manufacturers for indicated model numbers.

2. The General Contractor will not award subcontract for Casework or Equipment supplier unless the Architect has approved that supplier's samples, certificates, individual product drawings, and proof of ability to perform.

1.4 SUBMITTALS

A. Submit manufacturer's technical data, catalog cuts and installation instructions for each type of furniture and equipment.

B. Samples: Submit, for verification purposes, samples of each exposed material from which equipment units and accessories are composed, in each color, finish, pattern and texture indicated. If these qualities are not indicated, submit, for initial selection, manufacturer's color charts or samples of actual materials showing full range of standard colors, finishes, patterns, and textures available. Include samples of the following:
1. Plastic laminate
2. Baked enamel finishes for metal components
3. Wood and plywood materials and finishes
4. Molded plastic and fiberglass
5. Exposed fasteners

C. Submit full-size samples of finished units when complete with hardware, doors, adjustable shelves, etc., when requested by Architect. Acceptable sample units will be used for comparison inspection at project. Unless otherwise directed, acceptable sample units may be incorporated in the work. Notify Architect of their exact locations. If not incorporated in the work, retain acceptable sample units in the building until completion and acceptance of the work. Remove sample units from the premises when directed by Architect.

D. Shop Drawings

1. Submit shop drawings showing plans, elevations, ends cross-sections. Show details and location of anchorages and fitting to floors, walls and base. Include layout of units with relation to surrounding walls, doors, windows, and other building components.

2. Coordinate shop drawings with other work involved.

E. LEED Submittals:

1. Product Data for Credit EQ 4.4:
   a. For each composite wood product used indicating that the bonding agent contains no urea formaldehyde.
   b. For each adhesive used indicating that the adhesive contains no urea formaldehyde.

2. Certificates for Credit MR 7: Certificates of chain-of-custody certifying that wood products comply with forest certification requirements. Include evidence that factory is certified for chain-of-custody by an FSC-accredited certification body.
   a. Include statement indicating costs for products containing certified wood.

1.5 PRODUCT HANDLING

A. Deliver casework only after wet operations in building are complete.

B. Store completed equipment in ventilated place, protected from the weather, with relative humidity therein of 50% or less at 70°F.

C. Protect sanded and finished surfaces from soiling and damage during handling and installation. Keep covered with polyethylene film or other protective coating.

1.6 JOB CONDITIONS

A. Advise Architect of requirements for maintaining heating, cooling and ventilation in installation areas as required to reach relative humidity necessary to maintain optimum moisture content.
B. Examination of Substrate and Conditions

1. Field measurements shall be taken to verify that the equipment will fit into the designated space. Entry ways, corridors and door openings shall be verified to ensure that the equipment be manufactured in a matter to permit it to be moved through properly into place.

2. Examine the substrate and the conditions under which the work under this section is to be performed, including condition of substrate to which equipment is to be attached, and notify the Architect, in writing, of unsatisfactory conditions. Do not proceed with work under this section until satisfactory conditions have been corrected in an acceptable manner.

1.7 QUALIFICATION OF SUPPLIERS OF CASEWORK AND EQUIPMENT

A. That it owns and operates a factory or factories adequate for and devoted to the manufacture of casework, equipment or material which is proposed to furnish and maintains strict inspection and quality control over the various manufacturing operations performed to produce a satisfactory end product of the standard and quality set forth in the detailed specification.

1. That is at the time of submitting products and equipment and had been engaged in the manufacturing of casework or equipment for a recommended 10 consecutive years and has maintained during this time a published catalog of such specialized equipment, including a line similar to the specified.

2. That the manufacturer or his franchised representative shall have a major installation of equipment delivered and installed over a recommended 10 years conforming to the design and quality specified herein.

1.8 VARIATION FROM MATERIALS, PRODUCTS AND EQUIPMENT SPECIFIED

A. The designs, materials, finishes, functions and upholsteries have been selected by the Owner on the advise of the Architect with intention of creating an integrated building design. For this reason, no variations from the plans, specifications and design guide will be permitted except as noted below.

1. Whenever and wherever in any of the contract documents an article, material or equipment is defined by describing a proprietary product or by using the statement, “as manufactured by”, it is the intent that this shall describe by reference the materials desired; craftsmanship and method of manufacture, as well as the size and dimensions rather than detailing all of these requirements herein. It is not the intention to limit the bidding on such items, but merely to indicate that the item must conform to these standards.

2. Any Laboratory Casework manufacturer requesting equivalence must submit test report from a Scientific Equipment and Furniture Association (SEFA) approved independent testing facility showing compliance with SEFA-8 standards. Failure to provide the required information maybe cause for rejection.
PART 2 - PRODUCTS

2.1 See Schedules on Drawings.

2.2 GENERAL REQUIREMENTS (As applicable for each Contract)

A. BASIS OF DESIGN: CATALOG NUMBERS REFER TO CAMPBELL-RHEA CASEWORK CATALOG, ETC.; OR APPROVED EQUAL, UNLESS OTHERWISE SHOWN, SEE PARAGRAPH 1.2 ABOVE.

B. ALL CASEWORK DOORS AND DRAWERS TO HAVE LOCKS KEYED ALIKE PER ROOM AND MASTER KEYED. SCIENCE CLASSROOMS SHALL HAVE LOCKS KEYED INDIVIDUALLY AT STUDENT LAB STATIONS AND MASTERKEYED PER ROOM.

1. THE CONTRACTOR SHALL PACKAGE KEYS FOR EACH ROOM SEPARATELY AND IDENTIFY THE ROOM NUMBER ON THE PACKAGE AND DELIVER TO THE OWNER’S REPRESENTATIVE.

C. ALL TOPS SHALL BE 1-1/2" PLYWOOD WITH SOLID POLYMER FABRICATIONS COVERING ON ALL EXPOSED SURFACES (UNLESS NOTED OTHERWISE).

D. ALL BACKSPLASHES SHALL BE 3/4" PLYWOOD WITH SOLID POLYMER FABRICATIONS COVERING ON ALL EXPOSED SURFACES (UNLESS NOTED OTHERWISE).

E. ALL FURNITURE, CASEWORK AND EQUIPMENT SHOWN DOTTED AND/OR IS INDICATED AS (N.I.C.) IS NOT IN CONTRACT.

F. UNLESS OTHERWISE SHOWN, THE CASEWORK AND EQUIPMENT WORK SUBCONTRACTOR SHALL SUPPLY AND DELIVER ALL SINKS, TAILPIECES, FAUCETS, STRainers AND GAS COCKS, IN CASEWORK TO THE PLUMBING AND DRAINAGE WORK CONTRACTOR.

1. PLUMBING CONTRACTOR SHALL SUPPLY AND INSTALL ALL TRAPS, VALVES ETC AND SHALL MAKE FINAL CONNECTIONS TO ALL WASTE/VENTS, WATER AND GAS LINES, ETC. AS REQUIRED TO MAKE SYSTEMS FULLY FUNCTIONAL.

2. PLUMBING CONTRACTOR, UNLESS OTHERWISE SHOWN, SHALL PROVIDE AND INSTALL CLAY TRAPS ON SINKS IN ART CLASSROOM AND SHALL MAKE FINAL CONNECTIONS TO ALL WASTE/VENTS, WATER LINES, ETC. AS REQUIRED TO MAKE SYSTEM FULLY FUNCTIONAL

3. UNLESS OTHERWISE SHOWN, CASEWORK AND EQUIPMENT SUBCONTRACTOR SHALL MAKE SINK CUT-OUTS.

4. SINK CABINETS TO BE INSTALLED BEFORE THE INSTALLATION OF ADJACENT CABINETS.

G. UNLESS OTHERWISE SHOWN, CASEWORK AND EQUIPMENT WORK SUBCONTRACTOR SHALL SUPPLY AND DELIVER ALL DUPLEX OUTLETS, SWITCHES, AND COVER PLATES ETC. REQUIRED FOR INSTALLATION IN CASEWORK, TABLES,
CARRELS, ETC., TO THE ELECTRICAL WORK CONTRACTOR, READY FOR INSTALLATION AND FINAL CONNECTION BY ELECTRICAL CONTRACTOR.

1. ALL DUPLEX OUTLETS SHALL BE G.F.I.C. UNLESS NOTED OTHERWISE.

H. ALL CONTRACTORS TO FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION AND NOTIFY ARCHITECT IN WRITTEN FORM OF ANY DISCREPANCIES.

I. PROVIDE ALL FILLERS AS REQUIRED. FINISH TO MATCH CASEWORK.

J. UNLESS OTHERWISE SHOWN, RUBBER BASE ON ALL CASEWORK BY G.C.

K. LEED REQUIREMENTS

1. General:
   a. Certified Wood Materials: Provide cabinets made from wood and wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."

2. Adhesives: Do not use adhesives that contain urea formaldehyde.

3. Hardwood Plywood: HPVA HP-1, either veneer core or particle core, unless otherwise indicated, made without urea formaldehyde.


5. Medium-Density Fiberboard: ANSI A208.2, Grade MD.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition casework and furniture to average prevailing humidity conditions in installation areas prior to installing.

3.2 INSTALLATION

A. Deliver, uncrate, set in place and install plumb, level, true and straight with no distortions. Shim as required, using concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Before making cutouts, drill pilot holes in corners.

B. Trim and Moldings: Install in single, unjointed lengths for openings and for runs less than maximum length of lumber available. For longer runs, use only one piece less than maximum length available in any straight run. Stagger joints in adjacent members.

C. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.
D. Adjust shelving, and tables (if applicable), as required and as directed by the Architect/Owner.

E. Inspect for dents, scratches, stains, holes, etc. Replace any items showing damage, loose joints or other defects.

3.3 CLEANING AND PROTECTION

A. Clean and polish all items, remove packing cases and debris from the site.

B. Protection: Perform all procedures and precautions for protection of materials and installed casework from damage by the work of other trades until acceptance of the work by the Owner.

C. Cover casework with 4-mil polyethylene film for protection against soiling and deterioration during remainder of construction period.

END OF SECTION 11000
SECTION 11011 - CASEWORK AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Section Includes: Wood Casework and related equipment.

1. Pre-manufactured wood casework and equipment, covered by this specification and accompanying drawings, are manufactured or supplied by one manufacturer to avoid divided responsibility.

B. Work included in this section:

1. Furnish all items of equipment as listed in the specifications, equipment schedule and/or as shown on the drawings, including delivery to the building, unpacking, setting in place, leveling, and scribing to walls and floors as required.

2. Furnishing: Equipment Subcontractor shall make cutouts, holes and openings in countertops so as to be ready for installation of fixtures by the Plumbing Work Contractor.
   a. The Casework and Equipment Subcontractor(s) shall turn over to the Plumbing Contractor in a package, all sinks, fixtures, faucets, tailpieces, strainers, gas cocks, etc., and nipples and locknuts, etc., for installation and final connection by the Plumbing Contractor.

3. Furnishing: Equipment Subcontractor shall make cutouts, holes and openings in countertops so as to be ready for installation of fixtures by the Electrical Work Contractor.
   a. The Casework and Equipment Subcontractor(s) shall turn over to the Electrical Contractor in a package, all electrical devices, for installation and final connection by the Electrical Contractor.

4. The Casework and Equipment Subcontractor shall provide an itemized lists and a designated site location for the transfer of the above referenced materials to the Plumbing and Electrical Contractors. The list shall have a description of the items and quantity along with a sign-off line for the Plumbing and Electrical Contractor(s).
   a. A copy of the signed list is to be submitted to the Architect/Owner prior to billing for this equipment.

5. All debris, dirt and rubbish accumulated as a result of this installation shall be removed and the premises left clean and orderly.

6. All Contractors shall familiarize themselves with the job conditions and building measurements in order to coordinate the planning, design, connections, delivery and erection of the fixed casework and related equipment furnished under these specifications with other related and associated work during the term of this contract.
C. Work included under the work of other contracts:

1. The connection of sinks, tailpieces, traps, service lines, drainlines, and piping within the equipment and through, under or along the backs of working surfaces as required by the specifications and/or as shown on the drawing shall be by the Plumbing and Drainage Work Contractor in accordance with Part-4 Specifications Sections.

2. The connection of electrical receptacles, shall be by the Electrical Work Contractor in accordance with Part-6 Specifications Sections.

3. The furnishing of any framing or reinforcements for walls, floors, or ceilings to support any equipment, General Construction Work Contractor in accordance with Part-2 Specifications Sections.

1.2 QUALITY ASSURANCE

A. Provide all casework (for integration with tops, sinks and service fixtures, as required) manufactured or furnished by the same company for single responsibility.


C. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.

1. Comparable products of the following manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements and other design attributes listed above.

   a. Wood-Metal Industries.
   b. Diversified Woodcraft.
   d. Or approved equal.

2. The use of one manufacturer's catalog numbers, and the specific requirements set forth in drawings and specifications, are not intended to preclude the use of other manufacturer's products or procedures which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.

3. Substitute products will be considered for substitution only when submitted to the Architect as per the requirements of AIA A232 and Section 00800.

4. Substituted product(s) shall be meet the following minimum requirements:

   a. All four corners of drawer boxes must be dove-tailed together, and the bottom of all drawer boxes must be let in to the sides, front and back, to be “fully captured.” Applied drawer bottoms will not be permitted.
b. All drawer front shall be fabricated from solid red oak lumber.

c. All cabinet doors shall be framed with solid oak rails on four sides. Tall case doors shall include a lightweight core to reduce stress on hinges. Doors constructed of plywood or particleboard, edge-banded with oak will not be permitted. Tall case doors shall be mounted with (4) hinges.

d. All glass in doors shall be tempered safety glass. Float glass will not be permitted.

e. All tall case doors shall be complete with three-point latching mechanism. Single-point latching will not be permitted.

5. The General Contractor will not award subcontract to a wood laboratory casework supplier who is not on the approved list, unless the Architect has approved that supplier’s samples, certificates, individual product drawings, and proof of ability to perform.

1.3 SUBMITTALS

A. Submit two copies of manufacturer's data and installation instructions for each type of equipment.

B. Samples:

   1. Submit samples of available laminated plastic patterns and colors for Architect's selection.

   2. Submit one full size sample of finished base cabinet unit complete with hardware, doors and drawers, without finish top.

   3. Submit one full size sample of finished wall mounted cabinet unit complete with hardware, doors and adjustable shelves.

   4. Acceptable sample units will be used for comparison inspections at project. Unless otherwise directed, acceptable sample units may be incorporated in the work. Notify Architect of their exact locations. If not incorporated in the work, retain acceptable sample units in the building until completion and acceptance of the work.

   5. Remove sample units from the premises when directed by the Architect.

C. Shop Drawings

   1. Submit shop drawings showing plans, elevations, ends, cross-sections, service run spaces, locations and type of service fixtures with lines thereto. Show details and location of anchorages and fitting to floors, walls and base. Include layout of units with relation to surrounding walls, doors, windows, and other building components.

   2. Coordinate shop drawings with other work involved.
D. **Test Reports - Certifications:**

1. Submit the following:
   a. Test reports certifying that the casework finish complies with chemical and other resistance requirements of the specifications.
   b. Performance test reports from an independent testing lab on each specified top material.

E. **LEED Submittals:**

1. **Product Data for Credit EQ 4.4:**
   a. For each composite wood product used indicating that the bonding agent contains no urea formaldehyde.
   b. For each adhesive used indicating that the adhesive contains no urea formaldehyde.

2. **Certificates for Credit MR 7:** Certificates of chain-of-custody certifying that wood products comply with forest certification requirements. Include evidence that factory is certified for chain-of-custody by an FSC-accredited certification body.
   a. Include statement indicating costs for products containing certified wood.

1.4 **PRODUCT HANDLING**

A. Deliver casework only after wet operations in building are complete.

B. Store completed wood furniture in ventilated place, protected from the weather, with relative humidity therein of 50% or less at 70°F.

C. Protect sanded and finished surfaces from soiling and damage during handling and installation. Keep covered with polyethylene film or other protective coating.

1.5 **JOB CONDITIONS**

A. Advise Architect of requirements for maintaining heating, cooling and ventilation in installation areas as required to reach relative humidity necessary to maintain optimum moisture content.

B. Examination of Substrate and Conditions

1. Field measurements shall be taken to verify that the equipment will fit into the designated space. Entry ways, corridors and door openings shall be verified to ensure that the equipment be manufactured in a matter to permit it to be moved through properly into place.

2. Examine the substrate and the conditions under which the work under this section is to be performed, and notify the Architect, in writing, of unsatisfactory conditions. Do not proceed with work under this section until satisfactory conditions have been corrected in an acceptable manner.
1.6 WARRANTY

A. Manufacturer shall warrant the casework to be free from defects in materials and workmanship, under normal use and service, for three (3) years from date of delivery.

1. Within the warranty period, manufacturer shall repair, replace, or refund the purchase price of defective casework.

PART 2 - PRODUCTS

2.1 GENERAL

A. The best cabinet making practices for casework construction shall be followed. All cabinets shall be integral units, each completely enclosed without the use of common partitions unless otherwise specified.

B. LEED REQUIREMENTS

1. Certified Wood Materials: Provide cabinets made from wood and wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."

2. Adhesives: Do not use adhesives that contain urea formaldehyde.

3. Hardwood Plywood: HPVA HP-1, either veneer core or particle core, unless otherwise indicated, made without urea formaldehyde.

4. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.

5. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.

6. Countertops, Shelves, Troughs, and Sinks

   a. Plastic-Laminate Shelves / Solid Polymer Fabrications Countertops:

   1) Plastic-Laminate Shelves: Plastic-laminate sheet complying with NEMA LD 3, shop bonded with waterproof adhesive to both sides and both edges of 3/4-inch- thick particleboard, made with binder containing no urea formaldehyde. Sand surfaces to which plastic laminate is to be bonded.

   2) Countertop Core: Hardwood-faced plywood, medium-density-overlaid plywood, or particleboard complying with ANSI A208.1, Grade M-2, Exterior Glue.

   3) Adhesive for Bonding Plastic Laminates: Do not use adhesives that contain urea formaldehyde. Provide Resorcinol adhesive
2.2 MATERIALS

A. Lumber:

1. Oak lumber is red oak, grade FAS or better, air dried and kiln dried to a 6 percent moisture content, then tempered to 7-8 percent prior to fabrication. Red oak lumber exposed to view, is free of stains, splits, shakes, season checks and other similar defects.

2. Other hardwoods are grade FAS or better, air dried to a 6 percent moisture content, then tempered to 7-8 percent prior to fabrication. Other hardwoods are used in semi-exposed, or unexposed, areas and comply with NHLA grading for FAS or better lumber.

B. Plywood:

1. Oak plywood is red oak, grade A-2, plain sliced, book-matched, crossbanded, and has a solid core.
   a. 3/4 inch is a minimum of 7-ply.
   b. ½ inch is a minimum of 5-ply.
   c. 1/4 inch is a minimum of 3-ply.
   d. 3/32 inch is a minimum of 3-ply.

2. Other hardwood plywood is sound grade, have a solid core and are suitable for semi-exposed or unexposed areas.
   a. 3/4 inch is a minimum of 7-ply.
   b. ½ inch is a minimum of 5-ply.
   c. 1/4 inch is a minimum of 3-ply.
   d. 3/32 inch is a minimum of 3-ply.

C. Hardboard:

1. Hardboard is service tempered and consists of steam-exploded wood fibers, highly compressed into a hard, dense, 1/4 inch thick, homogeneous sheet, using natural resins and other added binders.

2. Physical properties:
   a. Average modulus of rupture is 5,300 lbs./sq. inch
   b. Density is 50 to 60 lbs./cu. foot
   c. Tensile strength of 3,500 lbs./sq. inch.

D. Particleboard:

1. Particleboard is industrial grade.

2. Physical properties:
   a. Density, 46 to 50 lbs./cu. ft.
   b. Modulus of rupture, minimum, 2,200 psi
   c. Modulus of elasticity, minimum, 450,000 psi.
E. Glass:

1. Tempered safety glass: Heat treated glass, 1/4 inch thick with a minimum of 88 percent clarity.

F. Service Fixtures:

1. Water, gas, steam, or other services: Triple chrome plated, have heavy-duty construction and are specifically designed for laboratory use.

   a. Water Faucets - Hot and Cold: Faucets are cast from red brass, and have four-arm type handles with color coded indexes. Faucets have serrated hose nozzles. Faucets have patented REX unit ceramic disc cartridges, and replaceable seats. The stem is brass, with full Acme threads, and has a brass cap nut. Goosenecks are rigid. Fixture outlets are tapped 3/8 inch I.P.S. for aerators, vacuum breakers, hose connections, and or other accessories. Provide vacuum breakers.

   (1) Provide lever handle type faucet control for barrier free applications in accordance with sink notes indicated on drawings.

   b. Gas, Air and Vacuum Cocks: Ground key cocks, made from high grade, brass forgings, have integral ten serration, non-slip hose ends. Wing handle has color-coded index, one piece construction, precision ground, and lapped to fit cock chamber. Handle operates with a 1/4 turn, and is spring-loaded.

   c. Multiple Service Fixtures: Triple chrome plated fixtures have one cold water faucet and two ground key cocks for gas, air, and or vacuum services. Cold water valve has patented REX unit ceramic disc cartridge. Faucet has a rigid gooseneck, one four-arm handle, and serrated hose nozzle. Provide vacuum breakers. Ground key cocks have serrated non-slip hose end and color coded, spring-loaded wing handles.

   d. Vacuum Breakers: Watts NLF-9, or comparable, vacuum breakers are brass with polished chrome plating, screw-in type with stainless steel working parts, and durable rubber diaphragm and disc. Vacuum breaker is for hot or cold faucet and has a primary valve with a soft disc that seats against mating part. The secondary check valve utilizes a soft disc to metal seating. Breaker is tapped 3/8 inch N.P.T.

2. Electrical Fixtures: Receptacles are 3-wire grounded, 20 A, 125V AC, with stainless steel cover plates and cadmium-plated steel boxes. Pedestal boxes are brushed, cast aluminum with conduit nipples and lock nuts.

   a. G.F.I. fixtures: 20 A, 125V AC, with a brown nylon face and a LED indicator light. Conform to UL Standard 943 Class A, have hospital grade high abuse receptacle construction, and certified corrosion resistance with cupro-nickel exposed metal parts. Provide terminal screw wiring connections and a trip time of 0.025 seconds.
3. Sinks and Sink Outlets:

   a. **Epoxy resin** sinks are non-glaring black, specially modified epoxy resins, molded in one solid piece for optimum physical and chemical resistance. Inside corners are coved and the bottom is dished to the outlet. Outlets are epoxy resin, specially compounded and cured for optimum physical and chemical resistance, and 1-1/2 inches in diameter, unless otherwise specified.

   b. **Stainless steel** sinks have a satin finish. They are 18 gauge, type 304, 18-8 stainless steel, with heavily undercoated bottoms and positive pitch drains. Outlets are chrome plated brass. Drain holes are 3-1/2 inch diameter for 4-1/2 inch stainless steel cup strainers. The cup strainer has a neoprene stopper. Provide necessary tail pieces to tie into plumbing roughing, typical.

   NOTE: Coordinate with Plumbing Drawings and Specifications.

G. Tops (See Equipment Schedule):

   1. **Rhearesin**: Top is one inch thick, molded from a modified epoxy resin and has optimum physical and chemical resistance. The specially compounded and cured uniform mixture, throughout the thickness of the top, is not dependent on a surface coating for chemical, or stain, resistance. Exposed edges and corners are radiused, and a drip groove is provided on under surface, when specified. Curb is four inches high.

      a. Colors: Manufacturer's standard Black.

   2. **Solid Polymer Fabrications** (refer to Section 06650).

   3. **Maple**

      a. Natural maple top composed of laminated strips of electronically glued, select hard maple. Top surface is finished with two coats of UV cured, penetrating acrylic sealer; and the bottom surface receives one coat. Standard thickness is 1-3/4" and the curb is 4" high and 3/4" thick.

H. Hardware and Accessories:

   1. Pulls: Shall be selected by the Architect from manufacturer’s available standard and custom units at no additional cost to the Owner.

   2. Handles:

      a. Latching handle LH-1 is die cast zinc alloy, 4-1/4 inches long, has a dull chrome plated finish. Handle operates with 1/4 turn. Double door cases have latching handles on the right door and dummy handles on the left door. The rods are 5/16 inch in diameter and move in nylon guides attached to the back of the door. The middle of the door is secured by a latch plate which engages the side of the case, or latches behind the left door on cases with double doors.
b. Locking handle LK-1 is a latching handle with a lock mechanism incorporated into the handle head. On double door cases, the left door has a dummy handle, and the right door has the locking handle. Lock is laboratory grade with a 5-disc tumbler mechanism and a dull chrome plated face. Tumblers and keys are brass, while the plug and cylinder are die cast zinc alloy. Locks are keyed differently, master keyed and furnished with 2 keys per lock.

3. Locks:
   a. Lock SL-1 is a laboratory grade, cylinder cam lock, with a 5-disc tumbler mechanism, and a dull chrome plated face. Tumblers and keys are brass, while plug and cylinder are die cast zinc alloy. Lock operates with a 180 degree turn of the key. There are 500 key changes standard. Locks are keyed differently, master keyed and furnished with 2 keys per lock.
   b. Locks are to be furnished on all doors and drawers.

4. Hinges:
   a. Hinge CP-1 is heavy duty, institutional type, 5-knuckle hospital tipped, and made from .095 inch thick, chrome plated mild steel. Hinge is wrap around style, and 2-3/4 inches high. The wing for mounting to end panel has 4 holes, two of which are slotted for adjustability; wing for the door has 5 holes, two of which are slotted for adjustability.
   b. Elbow catch is a steel, spring loaded catch that releases with finger pressure. The catch and steel strike plate are mounted with screws. Strike plate screw holes are slotted for adjustability and pin hole is provided to help anchor its position.

6. Drawer Slides:
   a. Drawer slides DS-1 are electrostatically epoxy powder coated, cold rolled steel, heavy-duty, side mounted, and have a 150 lb. load capacity. They are equipped with heavy-duty, ball bearing nylon rollers for smooth effortless operation. Slides have automatic positive stop levers to prevent accidental drawer removal, but allow quick removal without tools.
   b. File drawer slides FD-1 are zinc plated, cold rolled steel, heavy-duty, side mounted, and have a 100 lb. load capacity. They are equipped with heavy-duty, ball bearing nylon rollers. Slides are full extension with a positive stop, and a lift out disconnect.

7. Shelf Clips:
   a. Shelf support clips shall be “seismic” twin pin type for mounting on interior of cabinet work. Clips shall be corrosion resistant and shall retain shelves from accidental removal. Shelves in all cabinets are adjustable on 32mm centers.
      1) Single pin support clips and surface mounted metal support strips and clips subject to corrosion are not acceptable.
8. Leg Shoes:
   a. Leg shoes are closed-bottom style, 2½ inches square, and molded of 1/8 inch black polyethylene.

9. Crossbars and Greenlaw Arms:
   a. Crossbars and Greenlaw Arms are 3/4 inch diameter, anodized aluminum rods, with ends rounded.

10. Upright Rods:
    a. Upright Rods are 3/4 inch diameter, anodized aluminum, 36 inches long with a rounded top and a tapered bottom, to fit rod sockets.

11. Clamps:
    a. Clamps are 1 inch square aluminum stock, with two, 3/4 inch diameter openings, at right angles to each other, bored through sides. Thumb screws are provided at each end of the clamp, tighten against the rods to hold positions.

12. Rod Sockets:
    a. Rod sockets are mushroom type, machined from a solid aluminum rod. Secured to the top by heavy aluminum lock nut and washer.

13. Burette Rods:
    a. Burette rods are ½ inch diameter, anodized aluminum and either 18 or 24 inches long. Rods are furnished with a tapered aluminum adapter to fit rod socket.

2.3 FABRICATION

A. Factory assembly of casework in the largest components possible aids in the installation. Mortise and tenon construction with glued and screwed joints is used for maximum strength; and the use of precision jigs and clamps ensures square corners and plumb vertical surfaces.

B. Fabrication of laboratory casework and equipment is completed to dimensions in the final, approved copy of shop drawings.

C. Base Cabinets:
   1. All base cabinets are rigidly constructed, integral units with the strongest most advanced joinery methods utilized of bored, doweled, dadoed, glued and screwed construction. Each base cabinet is completely enclosed without the use of common partitions, and has flush construction with overlapping doors and drawers, which provides a dust resistant interior. A base cabinet has a full horizontal top frame with bored, doweled and glued joints, intermediate front rails and a 3/4 inch plywood bottom; rear horizontal parting rails and separators are provided as required. Horizontal top frame, intermediate parting rails and the bottom are bored, doweled and glued. Separators where indicated, are let
into routed intermediate rails. Backs are recessed and encapsulated into dadoed end panels and further secured with glue blocks on each side, except where they need to be removable for access to plumbing. Backs are screwed to the top frame and further secured with glue blocks on each side. An enclosed toe space, 2-1/4 inches by 4 inches, is furnished with the toe rail bored, doweled and glued to end panels.

D. Wall and Upper Cases:

1. All wall and upper cases are rigidly constructed, integral units with the strongest most advanced joinery methods utilized of bored, doweled, dadoed, glued and screwed construction. Each case is completely enclosed without the use of common partitions, and has flush construction with overlapping doors, which provides a dust resistant interior. Top panel is bored, doweled and glued into end panels. Bottom panel is bored, doweled and glued into end panels; and glued and screwed to the back. Backs are recessed and encapsulated into dadoed end panels, and further secured with glue blocks on each side. Exterior hanger rails, at the top of the back, are glued to the back and then screwed to the top panel and bored, doweled and glued into end panels. Exterior hanger rails, at the bottom of the back, are glued to the back and then screwed to the bottom panel and bored, doweled and glued into end panels. Adjustable shelves are supported on “seismic” twin pin type shelf clips, which fit into holes drilled 32 mm on centers, in the case end panels.

E. Tall Cases:

1. All tall cases are rigidly constructed, integral units with the strongest most advanced joinery methods utilized of bored, doweled, dadoed, glued and screwed construction. Each case is completely enclosed without the use of common partitions, and has flush construction with overlapping doors, which provides a dust resistant interior. Top panel is bored, doweled and glued into end panels. Bottom panel is bored, doweled and glued into end panels and glued and screwed to the back. An exterior back cross rail is provided at the top of each case, glued to the back, and then screwed to the top panel and bored, doweled and glued into the end panels. Additional back cross rails are provided, as required. Backs are recessed, let into dadoed end panels, and further secured with glue blocks at the sides. An enclosed toe space, 2-1/4 inches by 4 inches high, is furnished with toe rail securely bored, doweled and glued to end panels and bottom panel.

2. Rails:
   a. Interior: 2-1/4 inches by 3/4 inch, solid hardwood
   b. Exterior: 4-1/8 inches by 3/4 inch, solid oak

3. Top panel, bottom panel, dividers, fixed shelf and adjustable shelves:
   a. Cases with exposed interiors: All are 1 inch oak plywood
   b. Cases with unexposed interiors: All are 1 inch hardwood plywood.

4. Backs:
   a. Cases with exposed interiors and exposed exteriors: Back is 1/4 inch oak plywood.
   b. Cases with unexposed interiors and unexposed exteriors: Back is 1/4 inch service tempered hardboard.
5. End panels:
   a. Cases with exposed interiors: End panels are 3/4 inch oak plywood.
   b. Cases with exposed exteriors: End panels are 3/4 inch oak plywood.
   c. Cases with unexposed interiors and one exposed end panel and one unexposed end panel: Exposed end panel is 3/4 inch oak plywood; unexposed end panel is 3/4 inch hardwood plywood.
   d. Cases with unexposed interiors and unexposed exteriors: end panels are 3/4 inch hardwood plywood.

6. Exposed edges of end panels, dividers and shelves are edgebanded with 1/4 inch solid oak.


F. Drawers:

1. Components:
   a. Drawer front: 13/16 inch oak lumber.
   b. Drawer sides and back: ½ inch hardwood lumber.
   c. Drawer bottom: 1/4 inch service tempered hardboard.
   d. Construction: All four corners of the drawer are dovetailed and glued. Edges of the drawer front are machine radiused to form a lip and overlap the opening 1/4 inch on all sides. Drawer fronts are one piece of lumber, providing consistency in color and grain within each drawer front. The back perimeter of the drawer front is routed so drawer front is recessed into the opening and projects 13/32 of an inch. The top edge of drawer sides and back are radiused. The bottom is let into the box on four sides and securely glued underneath with a continuous bead of glue around the perimeter of the drawer bottom. In cabinets 24 inches or less in width, drawers have one, AL-1 aluminum pull which is surface mounted with 2 screws, 4 inches on centers. In cabinets over 24 inches wide, drawers have two AL-1 aluminum pulls. Drawers are supported on DS-1 slides which are side mounted, heavy duty, electrostatically epoxy powder coated, cold rolled steel, and have a 150 lb. load capacity. Slides are equipped with heavy-duty, ball bearing nylon rollers for smooth effortless operation. DS-1 slides have automatic, positive stop levers to prevent drawer’s accidental removal, but allow for quick removal without tools. File drawers are supported on side mounted FD-1 full extension steel slides. File drawers have an interior, screw mounted, metal bottom track and an adjustable metal file follower. Lock SL-1 is furnished when indicated.

G. Doors:

1. Hinged solid doors, 48 inches or less in height:
   a. Core ply: Solid oak rails on four edges framing a particleboard core.
   b. Hardwood plywood crossbands: Four; two laminated on each side of core ply.
   c. Red oak veneer: Face plys; one applied to each side.
d. Construction: Hinged solid doors, 48 inches or less in height, are 13/16 inch thick and have solid oak rails on the four edges. Doors overlap the opening 1/4 inch on all sides and have machined radiused edges. Doors have one aluminum pull which is surface mounted with two screws. Doors have two, CP-1 chrome plated, heavy duty, institutional type, 5-knuckle hospital tipped hinges, each attached with 5 tempered steel screws into solid oak framing of door, and 4 Euro screws into the end panel. Doors are secured by zinc plated steel, friction roller catches, with positive action, spring cushioned, polyethylene roller, and a metal strike plate. Catch and steel strike plate are attached with screws. On lockable double door cabinets, the left door is secured with a steel, spring loaded, elbow catch that releases with finger pressure. The catch and the strike plate are attached with screws. Strike plate screw holes are slotted for adjustability and a pin hole is provided to help anchor plate’s position. Lock SL-1 is furnished when indicated.

2. Hinged solid doors over 48 inches in height:
   a. Core ply: Solid oak rails on four edges framing a particleboard core.
   b. Hardwood plywood crossbands: Four; two laminated on each side of core ply.
   c. Red oak veneer: Face plys; one applied to each side.
   d. Construction: Hinged solid doors over 48 inches in height, are one inch thick and have solid oak rails on the four edges. Doors overlap opening 1/4 inch on all sides, and machined radiused edges. Single doors and right door of double doors have a LH-1 latching handle, which is 4-1/4 inches long, streamline design, with a dull chrome plated finish. Handle operates with 1/4 turn. Left door of double doors has a fixed handle, which is the same size and finish as a LH-1 latching handle. A three point latching system provides single doors and right door of double doors positive engagement at the top and bottom of the door with tapered aluminum rods which engage plastic strike plates and pull the door snug. The rods are 5/16 inch in diameter and move in nylon guides attached to the back of the door. The middle of the door is secured by a latch plate which engages the side of the case, or latches behind the left door on cases with double doors. Right door of double doors lap over the integral machined astragal on left door, securely holding door shut. Doors have three, CP-1 chrome plated, heavy duty, institutional type, 5-knuckle hospital tipped hinges; each attached with 5 tempered steel screws in to solid oak framing of the door, and 4 Euro screws into the end panel. Left door of double doors is additionally secured with two zinc plated steel, friction roller catches, with positive action, spring cushioned, polyethylene roller, and a metal strike plate. Catchs and steel strike plates are attached with screws. Catch screw holes are slotted for adjustability, and the strike plate has two nips to help anchor its position. Locking handle LK-1 is furnished when indicated.

3. Hinged glazed doors, 48 inches or less in height:
   a. Frame: 1-1/16 inch by 3 inches, solid oak.
   b. Glass: 1/4 thick tempered glass.
c. Construction: Hinged glazed doors, 48 inches or less in height, are solid oak frames with joints bored, doweled and glued. The balance of the door is glass. Doors have slightly machine radiused, squared edges which overlap opening 1/4 inch on all sides. The back perimeter of the door is routed so the door is recessed into the opening and projects 13/32 of an inch. Door has one, aluminum pull which is surface mounted with two screws. Doors have two, CP-1 chrome plated, heavy duty, institutional type, 5-knuckle hospital tipped hinges; each attached with 5 tempered steel screws into solid oak framing of the door, and 4 Euro screws into the end panel. All doors are secured by zinc plated steel, friction roller catches, with positive action, spring cushioned, polyethylene roller, and a metal strike plate. Catch and steel strike plate are attached with screws. Catch screw holes are slotted for adjustability. On lockable double door cabinets, the left door is secured with a steel, spring loaded, elbow catch that releases with finger pressure. The catch and the strike plate are attached with screws. Strike plate screw holes are slotted for adjustability and a pin hole is provided to help anchor plate’s position. Lock SL-1 is furnished when indicated.

4. Hinged glazed doors, over 48 inches in height:
   a. Frame: 1-1/16 inch by 3 inches, solid oak.
   b. Center cross frame member: 1-1/16 inch by 3 inches, solid oak.
   c. Glass: 1/4 inch thick tempered glass.
   d. Construction: Hinged glazed doors, over 48 inches in height, are solid oak frames with a center cross frame member. All joints in the frame are bored, doweled and glued. The balance of the door is glass. Doors have slightly machine radiused, and overlap opening 1/4 inch on all sides. The back perimeter of the door is routed so the door is recessed into the opening and projects 13/32 of an inch. Single doors and right door of double doors have a LH-1 latching handle, which is 4-1/4 inches long, streamline design, with a dull chrome plated finish. Handle operates with 1/4 turn. Left door of double doors has a fixed handle, which is the same size and finish as a LH-1 latching handle. A three point latching system provides single doors and right door of double doors positive engagement at the top and bottom of the door with tapered aluminum rods which engage plastic strike plates and pull the door snug. The rods are 5/16 inch in diameter and move in nylon guides attached to the back of the door. The middle of the door is secured by a latch plate which engages the side of the case, or latches behind the left door on cases with double doors. Right door of double doors lap over the integral machined astragal on left door, securely holding door shut. Doors have three, CP-1 chrome plated, heavy duty, institutional type, 5-knuckle hospital tipped hinges; each attached with 5 tempered steel screws into solid oak framing of the door, and 4 Euro screws into the end panel. The left door of double doors is additionally secured with two zinc plated steel, friction roller catches, with positive action, spring cushioned, polyethylene roller, and a metal strike plate. Catches and steel strike plates are attached with screws. Catch screw holes are slotted for adjustability. Locking handle LK-1 is furnished when indicated.
H. Casework Finishes:

1. Surfaces to be Finished: Exposed exterior and exposed interior surfaces of cabinets receive the full finishing process. The unexposed interior surfaces of cupboards, drawers, wall cases, upper cases, and tall cases receive a baked on protective coat of moisture and chemical resistant catalyzed sealer, and a top coat of clear, catalyzed conversion varnish. Other unexposed surfaces are processed through standard finishing steps, and receive a baked on protective coat of moisture and chemical resistant catalyzed sealer.

2. Finishing Process: Prior to assembly lumber for doors, drawers and cabinets, and plywood for cabinets, are machine sanded with 120 grit, 180 grit, and finally, 220 grit sand paper. Flat surfaces receive two additional machine sandings: one in an orbital crossbelt sander with 40 micron and 60 micron grit sanding belts; and, one through a rotary polisher with 150 grit sand paper. Door and drawer front edges are machine sanded to a very smooth surface through a profile edge sander utilizing a 100 grit and a 150 grit paper. After assembly, drawers, doors, and casework are thoroughly examined and fine-finished by hand to provide a consistently smooth surface. Prior to the first application in the finishing process, items are placed in the dust-off booth where compressed air is used to remove loose fibers and dust. Selected surfaces are stained with NGR stain to the desired color and allowed to dry. Next a protective coat of moisture and chemical resistant, catalyzed sealer is applied. After flash drying, items are oven baked at 130°F. Following a cool down period, surfaces that receive the final top coat are carefully hand sanded and wiped clean. A top coat of clear, catalyzed, conversion varnish is applied, allowed to dry, and then oven baked at 130°F. The final top coat provides chemical resistance, toughness, durability, and excellent color stability with a smooth finish and high-gloss lustre.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition casework and furniture to average prevailing humidity conditions in installation areas prior to installing.

3.2 INSTALLATION

A. Install plumb, level, true and straight with no distortions. Shim as required, using concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Before making cutouts, drill pilot holes at corners. Install wall cabinets in accordance with details on drawings.

B. Trim and Moldings: Install in single, unjointed lengths for openings and for runs less than maximum length of lumber available. For longer runs, use only one piece less than maximum length available in any straight run. Stagger joints in adjacent members.

C. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.3 CLEANING AND PROTECTION

A. Repair or remove and replace defective work as directed upon completion of installation.
B. Protection: Perform all procedures and precautions for protection of materials and installed casework from damage by the work of other trades until acceptance of the work by the Owner. Advise HVAC Contractor of the required temperature/humidity conditions which must be maintained during the remainder of the construction period.

C. Cover casework with 4-mil polyethylene film for protection against soiling and deterioration during remainder of construction period.

D. Clean up cut out pieces, sawdust and debris, packing cases, etc. Leave areas in broom clean condition. Remove all debris as a result of work of this Contract.

END OF SECTION 11011
SECTION 11012 - METAL CABINETRY AND ASSOCIATED METAL PRODUCTS (FLUSH INSET DESIGN)

PART 1 — DESCRIPTION OF WORK

1.1 SUMMARY AND SCOPE

A. Section Includes:

1. Furnish all cabinets and casework, including tops, ledges, supporting structures. Include delivery to the building, set in place, level, and scribe to walls and floors, as required. Furnish and install all filler panels, and scribes as shown on the drawings or as required.

2. Removal of all debris, and rubbish accumulated as a result of the installation of the laboratory furniture to an onsite container provided by others, leaving the premises broom clean and orderly.

B. Related Publications:

1. SEFA 3 – Scientific Equipment and Furniture Association
2. SEFA 8M - 2010 - Scientific Equipment and Furniture Association
3. NFPA 30 - National Fire Protection Association
4. NFPA-45 - National Fire Protection Association
5. ASTM D522 - Bending Test
6. ASTM A366 – Steel
7. ASTM A480 – Stainless Steel
8. Scientific American Reference Book

1.2 BASIS OF WORK

A. It is the intent of this specification to use ICI Metal Products Division as the standard of construction for painted steel laboratory cabinetry as indicated on the drawings. The construction standards shall provide the basis for quality and functional installation.

B. Supply all painted steel laboratory cabinetry in accordance with this specification. The offering of a product differing in materials and construction from this specification requires written approval from the Owner/Architect.

1.3 QUALITY ASSURANCE

A. Single source responsibility: Casework, work surfaces, equipment and accessories shall be manufactured or furnished by a single laboratory furniture company.

1. "American Made" - Casework wholly manufactured and assembled in the USA.

B. Manufacturer’s qualifications: Modern plant with proper tools, dies, fixtures and skilled workmen to produce high quality laboratory casework and equipment, and shall meet the following minimum requirements:
1. Recommended five years or more experience in manufacture of laboratory casework and equipment of type specified.
2. Recommended ten installations of equal or larger size and requirements.
3. "American Made" - Casework wholly manufactured and assembled in the USA.

C. Installer's qualifications: Factory trained and/or certified by the manufacturer.

D. Cabinet identification: Cabinets are identified on drawings by manufacturer's catalog numbers. Unless otherwise modified on drawings or in specifications, catalog description constitutes specific requirements for each type of cabinet.

1.4 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's data and installation instructions for the/each type of casework. Provide data indicating compliance with SEFA 8.

B. Samples:

1. Submit one full-size sample of finished cabinet unit, without finish top.

2. Acceptable sample units will be used for comparison inspections at project. Unless otherwise directed acceptable sample units may be incorporated in the work. Notify Architect of their exact location(s). If not incorporated in the work, retain acceptable sample units in the building until completion and acceptance of the work.

3. Remove sample unit(s) from the premises when directed by the Architect.

C. Shop Drawings:

1. Submit shop drawings for showing plans, elevations, ends, and cross-sections.

   a. Coordinate shop drawings with other work involved and existing adjacent windows.

PART 2 — PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Painted metal laboratory casework, as manufactured according to the standards used by ICI Metal Products Division, Jamestown, NY, Tel.# 716.665.5313; or approved equal.

1. Subject to compliance with requirements of the Contract Documents, manufacturers offering products which may be incorporated in work include the following:

   a. Kewaunee Scientific - Casework, Tel.# 704.873.7202;
   b. LOC Scientific, Metal Laboratory Casework, Tel.# 770.932.0202 / 877.527.5775.
   c. Laboratory Design & Supply, Tel.# 770.932.1118;
   d. Or approved equal.
B. All casework covered by the specification shall be the product of one manufacturer and be fabricated at one geographic location to assure shipping continuity.

C. **Warranty**: The selected manufacturer must warrant for a period of **one (1) year** starting (date of acceptance or occupancy, whichever comes first) that all products sold under the contract referenced above shall be free from defects in material and workmanship. Purchaser shall notify the manufacturer's representative immediately of any defective product. The manufacturer shall have a reasonable opportunity to inspect the goods. The purchaser shall return no product until receipt by purchaser of written shipping instructions from the manufacturer.

D. The Architect will retain the above samples of the successful manufacturer or Owner to insure that material delivered to jobsite conforms in every respect to the samples submitted.

### 2.2 METAL LABORATORY CASEWORK AND RELATED ACCESSORIES

A. It is the intent of this specification to use ICI Metal Products Division (Flush Inset) as the standard of construction for painted steel casework. The construction standards of this product line shall provide the basis for product quality and functional installation. All other manufacturers shall submit a notarized letter stating full compliance must be submitted post-bid to be approved. The letter must be signed by an officer of the manufacturer to ensure compliance. Additionally, a notarized copy of he letter must be included in the submittals confirming compliance.

### 2.3 DESIGN REQUIREMENTS

A. Flush inset construction with all front surfaces above the toe space in the same plane. All exposed corners and seams shall be welded closed and ground smooth prior to paint. No open seams, joints, or butt lines will be accepted.

### 2.4 MATERIALS

A. Steel/Recycled Content: All steel shall be US steel that can be documented to contain.

B. Scrap and disposal. All cold rolled steel material scrap or waste generated during production shall recycled.

C. Cold rolled sheet steel:

1. Steel grade must comply with ASTM A366. Components must be properly leveled, treated and conditioned to be free of scale or visible imperfections. Material thickness for all gauges must meet the standards as referenced in the Scientific American Reference Book. Cold rolled sheets shall be prime furniture grade 11,12,14,18, and 20 gauge US Standard.

D. Stainless Steel (if used in assembly parts):

1. All stainless steel grade must comply with ASTM A480 components must be properly leveled, treated and conditioned to be free of scale or visible imperfections. Material thickness for all gauges must meet the standards of the Scientific American Reference Book. A stainless steel shall have a #3 or #4 mill finish.
2.5 CASEWORK FABRICATION

A. Steel Base Cabinet Construction:

1. General: The steel casework shall be of modern design and shall be constructed in accordance with the best practices of the Scientific Laboratory Equipment Industry. First class quality casework shall be insured by the use of proper machinery, tools, dies, fixtures and skilled workmanship to meet the intended quality and quantity for the project.

   a. All cabinet bodies shall be flush front construction with intersection of vertical and horizontal case members, such as end panels, top rails, bottoms and vertical posts in same plane without overlap. Exterior corners shall be spot welded with heavy back up reinforcement at exterior corners. All face joints shall be welded and ground smooth to provide a continuous flat plane.

   b. Each cabinet shall be complete so that units can be relocated at any subsequent time without requiring field application of finished ends or other such parts.

   c. Case openings shall be rabbetted on all four sides for both hinged and sliding doors to provide a dust resistant case.

   d. All cabinets shall have a cleanable smooth interior. Bottom edges shall be formed down on sides and back to create easily cleanable corners with no burrs or sharp edges, and front edge shall be offset to create a seamless drawer and door recess rabbet for dust stop.

B. Base Cabinets all components:

1. Construction Detailing:

   a. Each exterior corner shall be die formed to a clean joint, and welded smooth, filled and polished prior to finish at all exterior corners exposed to view. The resulting finished appearance shall provide a finished product of all components within a single plane from the toe space bottom to top of cabinet. Cabinet interior at face will be smooth opening with no visible holes not used for that specific cabinet design.

   b. All units shall have a cleanable smooth interior. Front and rear posts, reinforcing members or channel uprights shall be enclosed full heights on all cabinet openings.

   c. End panels shall be formed on all four edges.

   d. Vertical uprights shall be properly aligned and securely welded in all four corners of each case body. Uprights shall be each perforated for the support of shelving. Each unit shall be constructed of modular spacing.

   e. A gravity fitting removable upright rear removable back shall be provided in all cupboard units. The back panel shall be formed of 18 gauge material and have a tool less removal capability.

   f. A rear upright center mullion shall be provided for all units 30 inches and over, perforated with shelf adjustment holes which will properly align with front uprights. Mullion will allow for interior divisions within the cabinet for multiple configurations.
(1) Cabinet Base:
   (a) Case structural bottom and bottom rail shall be formed of one piece of metal except in specialty units and shall have both sides and back formed down and shall be offset in front. Bottom of case shall be either integral to offset face rabbet, folded down at sides and spot welded to case and front toe space rail as an integral part of the case.
   (b) Toe Space Rail: shall extend up and forward to engage bottom rail to form a smooth surfaced toe space, 3 inches (75 mm) deep and 4 inches (100 mm) high.
   (c) Cabinet Back, Unexposed: Cabinet back shall consist of a top and bottom rail, channel formed for maximum strength and welded to back and top flange of end uprights, with space between left open for access to plumbing lines. Access panels shall be gravity fitting with upper reverse flange for ease of removal without tools.
   (d) Shelves: shall be full depth (1-3/4"from back of door) formed down 1 inch (25 mm), back 3/4. Shelves 36 inches and over in length shall be additionally reinforced by a flanged 16 gauge channel shaped member welded to underside of shelf. Shelves shall be adjustable in 1" increments to within 4" of top and bottom of cabinet.

(2) Top Horizontal Rail: Provide on base cabinets such that rail shall interlock within the flange at top of end panels for strength, but shall be flush at face of unit. Reinforcements shall be provided at all front corners for additional welded strength between vertical and horizontal case members. At completion of assembly the top and vertical rail intersection shall be ground smooth.

(3) Intermediate Rails: Provide on base cabinets such that rails shall be provided.

(4) Intermediate Vertical Uprights: shall be furnished to enclose cupboards when used in a unit in combination with a half width bank of drawers. However, to allow storage of large or bulky objects, no upright of any type shall be used at the center of double width cupboard units.

(5) Provide filler panels where required between cabinets, at corner intersections of cabinets, between cabinets and walls and wherever else required for a complete finished installation.

2.6 STEEL GAUGES

A. Case body members shall be 18 gauge.

B. Bottom case shall be full width 14 gauge sub bottom, double formed and fabricated to 11 gauge equivalent, welded to case body understructure and reinforced with 3/8-16 threaded weld nuts as level receivers.

C. Cabinet shall be fabricated from a complete formed 14 gauge top frame flanged and welded to case body all four sides. Table aprons and reinforcement gussets shall be 14 gauge.

D. Vertical support uprights shall be 14 gauge.

E. Shelves shall be 16 gauge. A hat channel reinforcement will be added for any unit 36" or over in width.

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2.7 METAL CASEWORK CONSTRUCTION PERFORMANCE

A. Base cabinets shall be constructed to support a uniformly distributed load of 200 lbs. minimum per square foot (1000 kg/m²) of cabinet top area (total maximum of 2000 lbs. (900 kg)), including working surface without objectionable distortion.

B. Base cabinet corners where leveling bolts intersect horizontal gussets shall support 500 lbs. (225 kg) per corner, at 1½ inch (38 mm) projection of the leveling bolt below the gusset.

C. Each adjustable and fixed shelf 4 feet (1219 mm) or shorter in length shall support an evenly distributed load of 40 lbs. per square foot (200 kgf/m²) up to a maximum of 200 lbs. (90 kg), with nominal temporary deflection, but no permanent set.

2.8 METAL FINISH

A. Metal Casework Color: As selected by the Architect from manufacturer's full color line and complying with finish requirements described below:

1. Metal Casework Finish Requirements:

a. Paint finish for steel casework products shall utilize a dry coating process with total reclaim and reuse minimizing waste generation. Liquid-applied coatings shall not be acceptable. Manufacturer shall supply documentation that waste generated during the painting process, is a solid, non-hazardous material. This finish shall be a laboratory grade finished as defined in SEFA 8M -2010 and the minimum rating for the individual chemicals is listed below:

(1) Pretreatment: Shall be a seven stage process to remove scale left from laser cutting, clean and degrease of the metal, surface preparation with iron phosphate and a sealer.

(2) Operator Protection: The painting process shall be accomplished by a combination of robotic and manual painters and all over-spray shall be captured and reclaimed and reused. Painting shall be performed in a climate (temperature and humidity) controlled EV room.

(3) VOC (Volatile Organic Compounds) emissions shall not exist because of the reclaim.

(4) Offgasing: No further emissions or "Offgasing/Decomposition" vapors shall occur at room temperature from installed finished parts.

(5) Preparation: After the units have been completely welded together and before finishing, they shall be given a pre paint treatment to provide excellent adhesion of the finish to the metal and to aid in the prevention of corrosion. The pretreatment shall be a seven stage process That consists of a laser descaler, a cleaner and degreaser, a iron phosphate conversion coating, and a sealer in addition to 3 rinses. The preparation and cleaning of the metal shall be accomplished by washing with a high pressure spray through a conveyorized washer. The strength of each solution shall be digitally monitored to insure consistent quality. All treated parts shall be immediately dried in a heated oven before proceeding to the finish room. Treated metal parts shall be clean and properly prepared to provide optimum adhesion of finish and resistance to corrosion.
6. Application: Electrostatically apply powder coat of selected color and cured in controlled high temperature oven. A combination of infrared and convection heat shall be used to guarantee proper and full curing. The cure ovens should be digitally controlled and a Datapak shall be used daily to insure the required oven profile and temperature has been reached for the correct period of time. Manufacturer to supply profile data for days of project production upon request.

7. Surfaces shall have a chemical resistant, high grade laboratory furniture quality finish of the following thicknesses:
   a. All surfaces, exterior or interior, exposed to view, shall receive sufficient powder coat to achieve an average 1.5 mil (38 µm) film thickness with a minimum 1.2 mil (30 µm) film thickness and shall have smooth satin luster.
   b. Backs of cabinets and other surfaces not exposed to view shall have sufficient powder coat to achieve an average 1.0 mil (25 µm) film thickness.
   c. All drawer bodies to be finished with a white Performance Polymer Alloy Coating that is based on an alloy of acid modified polyolefins providing a highly scratch and chemical resistance.
   d. Concealed interior parts shall receive corrosion resistant treatment.
   e. Finish must be UV stable.

B. Chemical Spot Test Performance Requirements:

1. Chemical resistance: Contractor shall provide verification of metal finish performance. Testing to be performed by independent testing agency.
   a. Test procedure: A clean, dry, test panel shall be laid flat and level on a horizontal surface. Ambient temperature of 70°F to 76°F (20°C to 22°C) and relative humidity of 45% to 55% shall be maintained for 48 hours. After a test period of one hour, chemicals shall be flushed away with cold water and the surface washed with warm water, detergent, and naphtha and rinse with deionized water. Dry with towel and evaluate after 24 hours, maintaining ambient conditions. Test using one of the following methods:
      (1) Place a reagent-saturated cotton ball in the mouth of a one ounce (30 cc) bottle and inverting the bottle on the surface of the panel.
      (2) Chemical spot tests shall be made by applying 5 drops (approximately 0.5 mL) of reagent to the surface to be tested, covered with a 24 mm watchglass, convex side down.

2. Evaluation ratings: Change in surface finish and function shall be described by the following ratings:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No effect - No detectable change in the material surface.</td>
</tr>
<tr>
<td>1</td>
<td>Excellent - Slight detectable change in color or gloss but no change in function or life of the surface.</td>
</tr>
<tr>
<td>2</td>
<td>Fair - Objectionable change in appearance due to discoloration or etch, possibly resulting in deterioration of function over an extended period of time.</td>
</tr>
<tr>
<td>3</td>
<td>Failure - Pitting, cratering, swelling or erosion of the surface. Obvious and significant deterioration.</td>
</tr>
</tbody>
</table>
Acceptance Criteria:
Results will vary from manufacturer to manufacturer. Laboratory grade finishes should result in no more than four Level 3 conditions. Suitability for a given application is dependent upon the chemicals used in a given laboratory. The minimum rating for each chemical is listed below.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Chemical</th>
<th>Method</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acetate, Amyl</td>
<td>A</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Acetate, Ethyl</td>
<td>A</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Acetone</td>
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</tr>
<tr>
<td>6</td>
<td>Alcohol, Butyl</td>
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</tr>
<tr>
<td>7</td>
<td>Alcohol, Ethyl</td>
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</tr>
<tr>
<td>8</td>
<td>Alcohol, Methyl</td>
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<td>11</td>
<td>Carbon Tetrachloride</td>
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<td>12</td>
<td>Chloroform</td>
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<td>18</td>
<td>Ethyl Ether</td>
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<td>19</td>
<td>Formaldehyde, 37%</td>
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<tr>
<td>21</td>
<td>Furfural</td>
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</tr>
<tr>
<td>22</td>
<td>Gasoline</td>
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<tr>
<td>27</td>
<td>Methyl Ethyl Ketone</td>
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<tr>
<td>28</td>
<td>Methylene Chloride</td>
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<td>29</td>
<td>Mono Chlorobenzene</td>
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<td>30</td>
<td>Naphthalene</td>
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<td>34</td>
<td>Phenol, 90%</td>
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<tr>
<td>46</td>
<td>Toluene</td>
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<td>Trichloroethylene</td>
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<td>3</td>
<td>Acetic Acid, 98%</td>
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<td>5</td>
<td>Acid Dichromate, 5%</td>
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<td>9</td>
<td>Ammonium Hydroxide, 28%</td>
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<td>Chromic Acid, 60%</td>
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<td>20</td>
<td>Formic Acid, 90%</td>
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<td>3</td>
</tr>
<tr>
<td>23</td>
<td>Hydrochloric Acid, 37%</td>
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</tr>
<tr>
<td>24</td>
<td>Hydrofluoric Acid, 48%</td>
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</tr>
<tr>
<td>25</td>
<td>Hydrogen Peroxide, 3%</td>
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</tr>
<tr>
<td>26</td>
<td>Iodine, Tincture of</td>
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</tr>
<tr>
<td>31</td>
<td>Nitric Acid, 20%</td>
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<td>1</td>
</tr>
<tr>
<td>32</td>
<td>Nitric Acid, 30%</td>
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<td>Nitric Acid, 70%</td>
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<td>Phosphoric Acid, 85%</td>
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<td>36</td>
<td>Silver Nitrate, Saturated</td>
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<tr>
<td>37</td>
<td>Sodium Hydroxide, 10%</td>
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<td>Sodium Hydroxide, Flake</td>
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<td>Sodium Sulfide, Saturated</td>
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</tr>
<tr>
<td>42</td>
<td>Sulfuric Acid, 33%</td>
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<td>43</td>
<td>Sulfuric Acid, 77%</td>
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<td>44</td>
<td>Sulfuric Acid, 96%</td>
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</tr>
<tr>
<td>45</td>
<td>Sulfuric Acid, (77%) and Nitric Acid (70%), equal parts</td>
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</tr>
<tr>
<td>49</td>
<td>Zinc Chloride, Saturated</td>
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</tbody>
</table>
C. Hot Water Test

1. Test Procedure: 212°F (100°C +/- 3%) hot water shall be allowed to trickle (with a steady stream and at a rate of not less than 6 ounces (177.44 cc) per minute) on the finished surface, which shall be set at an angle of 45°, for a period of 5 minutes.

2. Acceptance Level: After cooling and wiping dry, the finish shall show no visible effect from the hot water.

3. Test results: The finish shows no visible effect due to the hot water.

D. Finish Impact Test:

1. Test procedure: Position the 18 GA CRS test panel with nominal paint thickness of 3 mils on a smooth concrete floor. A one-pound ball (approximately 2" in diameter) shall be dropped from a distance of 12" onto a flat horizontal surface.

2. Acceptance level: There shall be no visual evidence to the naked eye of cracks or checks in the finish due to impact.

3. Test results: There is no visual evidence of any cracks or checks due to impact.

E. Paint Adhesion on Steel Test

1. Test Procedure: Test shall be based on ASTM D3359-02 "Standard Method of Test for Measuring Adhesion by Tape Test 1 - Test Method B." Two sets of six parallel lines 2mm apart shall be cut with a razor blade to intersect at right angles thus forming a grid of 25 squares. The cuts shall be made just deep enough to go through the coating, but not into the substrate. Brush surface lightly with a soft brush, and then place a piece of tape over the grid. Rub the tape firmly with an eraser of a pencil to ensure good contact. Remove the tape by rapidly pulling it back upon itself as close to an angle of 180° as possible.

2. Acceptance Level: A 4B rating or better (ninety-five percent or more of the grid area shall show finish intact).

3. Test results: 100% of the squares remained intact after the test.

F. Paint Hardness on Steel:

1. Test procedure: This test is based on ASTM D3363-01 "Standard Test Method for Film Hardness by Pencil Test". Clip a corner of the sample at 45° exposing a raw metal edge. Place the sample on a raw metal base plate so that the exposed metal edge of the sample makes contact with the turned up side of the base plate. Remove approximately 6mm of wood from a 4H pencil, being careful to leave an undisturbed smooth cylinder of lead. Holding the pencil at an angle of 90° to an abrasive paper, rub the lead against the paper maintaining an exact angle of 90° section until a flat smooth and circular cross section is obtained. On the other end of the pencil remove approximately 13mm of wood from on half of the pencil. Install the pencil into a Sheen model 720N Pencil Scratch Hardness Tester. Follow the manufacturer's instructions for conducting the test.
2. Acceptance level: The paint finish shall withstand the abrasion of a 4H pencil without penetrating through to the substrate and completing a continuous circuit.

3. Test results: The 4H pencil did not penetrate the substrate during the test.

**Note:** Manufacturer must provide independent certified test report on chemical resistance of finish.

### 2.9 TOPS (See Equipment Schedule)

A. Maple

1. Natural maple top composed of laminated strips of electronically glued, select hard maple. Top surface is finished with two coats of UV cured, penetrating acrylic sealer; and the bottom surface receives one coat. Standard thickness is 1-3/4" and the curb is 4" high and 3/4" thick.

### PART 3 – EXECUTION

#### 3.1 SITE CONDITIONS

A. Inspection:

1. The Owner and/or their representative shall assure all building conditions conducive to the installation of a finished goods product; all critical dimensions and conditions previously checked have been adhered to by other contractors (general, mechanical, electrical, etc.) to assure a quality installation.

2. Verify that all work may be installed in complete accordance with the original design, reviewed submittals, and the manufacturer's recommendations.

3. Discrepancy: In the event of discrepancy, immediately notify the Architect.

#### 3.2 INSTALLATION

A. Coordinate work with any Owner furnished and/or installed components indicated on drawings.

B. Casework installation:

1. Set casework components plumb, square, and straight with no distortion and securely anchored to building structure. Shim as necessary using concealed shims.

2. Bolt continuous cabinets together with joints flush, tight and uniform, and with alignment of adjacent units within 1/16" tolerance.

3. Secure wall cabinets to solid supporting material, not to plaster, lath or gypsum board.

4. Abut top edge surfaces in one true plane. Provide flush joints not to exceed 1/8" between top units.
5. Remove and discard shipping clip and associated screws from top of shelf, (thin galvanized angle) install 4 shelf clips into integral standard and set shelf. Check for level and adjust clips as required.

C. Work surface installation:
   1. Where required due to field conditions, scribe to abutting surfaces.
   2. Only factory prepared field joints, located per approved shop drawings, shall be permitted. Secure joints in field, where practicable, in the same manner as in factory, with dowels, splines, adhesive or fasteners recommended by manufacturer.
   3. Secure work surfaces to casework and equipment components with material and procedures recommended by the manufacturer.

D. Accessory installation: Install accessories and fittings in accordance with manufacturer's recommendations. Turn screws to seat flat; do not drive.

3.3 ADJUSTING
   A. Repair or remove and replace defective work, as directed by Architect upon completion of installation.

3.4 CLEANING
   A. Clean shop finished casework, touch up as required.
   B. Clean counter tops with diluted dishwashing liquid and water leaving tops free of all grease and streaks. Use no wax or oils.

3.5 PROTECTION OF FINISHED WORK
   A. Take protective measures to prevent exposure of casework from exposure to other construction activity.
   B. Advise contractor of procedures and precautions for protection of material, installed casework from damage by work of other trades.
   C. Cover tops with kraft paper or polyethylene sheeting after installation for protection against scratching, soiling, and deterioration during remainder of construction period. Remove protection prior to final cleaning.

3.6 DELIVERY, STORAGE AND HANDLING
   A. Schedule delivery of casework so that spaces are sufficiently complete that material can be installed immediately following delivery.
   B. Protect finished surfaces from soiling or damage during handling and installation. Keep covered with polyethylene film or other protective coating.
C. Protect all work surfaces throughout construction period with 1/4" corrugated cardboard completely covering the top and securely taped to edges. Mark cardboard in large lettering "NO STANDING".

3.7 PROJECT CONDITIONS

A. Do not deliver or install equipment until the following conditions have been met: Windows and doors are installed and the building is secure and weather tight.

END OF SECTION 11012
SECTION 11030 - ATHLETIC EQUIPMENT AND ACCESSORIES

PART I - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of athletic equipment is shown on the drawings and specified herein.

B. The type of athletic equipment specified in this section includes the following:

1. Wall padding.
2. Forward folding backstops.
3. Miscellaneous equipment.
4. Walk-draw divider curtain.
5. Score boards.
6. Master equipment control system.

C. Related Work:

1. Concrete slabs: Section 03300.
3. Structural Steel: Part 3 - Sections 05120 and 05210.
4. Miscellaneous Structural Steel: Section 05400.
5. Electrical work: See Part 6 for applicable sections.

1.2 QUALITY ASSURANCE

A. Manufacturer: Obtain products and equipment a single manufacturer, who fulfill the following requirements:

1. Shows a record of continued production of the specified products and equipment for a recommended ten (10) years.
2. Provides a list of executed projects in the State of New Jersey.
3. Provides complete manufacturer's produced printed manuals describing each equipment unit, technical specifications, method of installation, including manufacturer's standard detailed drawings.
4. Furnishes guarantee as hereinafter specified.
5. Provide structural design calculations indicating requirements for supporting loads and seismic restraint of indicated equipment.
   a. Provide locations and capacities of members at points of connections and reactions.
   b. Design Calculations shall be signed and sealed by a professional engineer licensed in the State of New Jersey.
B. Provide each type of athletic equipment as a complete unit produced by a single manufacturer, and including necessary mounting brackets, accessories, fittings and fastenings.

C. Field Measurements: Take field measurements prior to preparation of shop drawings (if any) and fabrication where possible, to ensure proper fitting of the work. However, do not delay job progress; allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work.

D. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for the installation of units. Provide setting drawings, templates, instructions and directions for installation of anchoring devices. Coordinate delivery with other work to avoid delay.

E. Codes and Regulations:

1. Divider Curtain: Materials is tested to meet the following requirements:
   a. Flame Spread: less than 25, Class A Rating, ASTM E 84.
   b. Smoke developed: Less than 450, Class A, ASTM E 84.
   c. ULC S-109 and NFPA-701.

2. Wall Padding: Materials shall be Class A rating, certified fire-retardant in accordance with the following:
   a. Flame spread: less than 25, ASTM E84
   b. Smoke developed: less than 450, ASTM E84

1.3 SUBMITTALS

A. Manufacturer's Data: Submit 2 copies of manufacturer's specifications and installation instructions for all materials required.

B. Shop Drawings: Submit shop drawings for fabrication and erection of athletic equipment. Include plans, elevations, and large scale details. Show anchorages and accessory items.

   1. Provide location template drawings for items supported or anchored to permanent construction.

C. Design Calculations: Submit structural design calculations indicating requirements for supporting loads and seismic restraint of indicated equipment. Provide locations and capacities of members at points of connections and reactions.

   1. Design Calculations shall be signed and sealed by a professional engineer licensed in the State of New Jersey.

D. Equipment Operators: Submit locations, details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangements, mounting, and grounding provisions.
E. Samples for Verification Purposes: Submit the following samples:

1. Curtain material samples for each type of curtain required; include in each set the full range of exposed color and texture to be expected in completed work.

F. Warranty:

1. Submit sample of manufacturer’s unexecuted warranty with manufacturer’s data.
2. Submit manufacturer’s warranties for all equipment.

G. Equipment Maintenance Manuals: Submit manufacturer’s complete equipment maintenance manuals for indicated equipment and operators.

H. Testing Reports: Submit copies of testing reports indicating compliance with testing requirements for indicated fire retardant, smoke developed and flame spread ratings.

1.4 DELIVERY, STORAGE, HANDLING AND PROTECTION

A. Do not deliver athletic equipment until building is enclosed and ready for installation.

B. Protect athletic equipment from damage during delivery, handling, storage and installation.

PART 2 - PRODUCTS

2.1 ATHLETIC EQUIPMENT

A. Basis of Design: Unless otherwise indicated, provide products as manufactured by Porter Equipment Company; or approved equal.

B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.

1. Comparable products of other manufacturers will be considered if it can be clearly shown that their products are tested, equal to or will exceed the construction quality requirements, intended performances and all other design attributes listed above and provided that deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances as judged solely by the Architect.

2. The use of one manufacturer's catalog numbers, and the specific requirements set forth in drawings and specifications, are not intended to preclude the use of other manufacturer's products or procedures which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.

3. Substitutions: Substitute products will be considered for substitution only when submitted to the Architect as per the requirements of the Contract Documents.
C. BASKETBALL BACKSTOPS:

1. Basis of Design: Model No. 90917000 Forward Fold Backstops; or approved equal. Provide manufacturer's available units for the type of mounting, required height or installation requirements for roof framing conditions shown.

   a. Center-Strut vertical front drop frame assembly shall consist of a main, center mast of 6-5/8" O.D. heavy-wall structural steel tube with diagonal side sway braces of 2-1/2" x 1-1/2" rectangular steel tubing.

   b. Ends of diagonal brace tubes shall be precision machine cut to provide maximum weld surface contact to form a unitized, back-to-back triangular type structural design to provide superior lateral stability.

   c. Top horizontal mast hinge spreader to be of a heavy 4" structural channel to support adjustable suspension hangers.

   d. Powr-Flex Goal shall mount directly through backboard and into a heavy structural steel weldment Center-Strut which shall be clamped to the vertical 6-5/8" O.D. center support to eliminate any strain on backboard should a player hang on the front mounted goal (conforms to the NCAA latest rules).

      1) All fittings shall be attached to the 6-5/8" O.D. vertical drop tube by heavy 1/4" thick precision saddle die-cut formed steel fittings secured in place by 5/8" diameter U-Bolt type hardware. The upper backboard extension assembly shall provide the official NCAA and NFHS regulation of 6" (15.24 cm) from the front of the Center-Strut to the face of the backboard.

   e. Center-Strut drop frame shall be suspended by special adjustable hangers (2) to provide for precise plumbing of frame during installation. Support hangers shall be offset 1-1/2" behind centerline of Center-Strut drop frame to properly weight lock unit in playing position without the use of ropes, latches or springs. Back brace assembly shall consist of heavy-wall 1-7/8" O.D. pipe, with internal telescoping tube arrangement to facilitate raising of backstop to overhead storage position. Brace shall be provided with adjustable collar to precisely plumb face of backboard during installation. Backstop shall be supported from 3-1/2" O.D. pipe anchored to roof framing members by means of heavy formed, die-cut steel support fittings.

      1) Each support fitting (supplied by the backstop manufacturer) to the roof framing, must be capable of supporting a load exceeding 10,000 pounds, with sufficient attachment points to acquire a 60:1 safety factor for support of the entire backstop superstructure system. Certified test results shall be furnished upon request. All cap screws shall be rated a minimum SAE Grade 5. Grade 2 cap screws will not be approved as equal. Superstructure pipes to be reinforced with special truss-type bridging or bracing when truss centers exceed spans of 14'-0".

   f. Backstop shall be provided as standard with heavy duty, fully enclosed worm gear type electrically operated winch, designed to hold units at any position when
raising or lowering backstop. Hoist cable shall be 1/4" diameter galvanized aircraft cable with 7,000 lb. ultimate breaking strength. Swivel pulleys shall be furnished with a 4" diameter cast (ductile iron) pulley sheave with a maintenance free, oil-impregnated bearing for proper hoist cable routing to winch. Pulley assembly and attachment to 3-1/2" O.D. support structure shall be rated at a minimum 9,000 pound load rating. Certified test results shall be furnished upon request. All metal parts shall be painted one (1) coat of flat black enamel. Provide flush mounted 3-position key switches wired directly through "up" and "down" limit controls.

g. Provide units equipped with height adjustment units to provide an adjustable, direct-mount (Center-Strut) goal attachment system to eliminate any strain on the backboard should a player hang on the front mounted goal (conforms to the latest NCAA recommendation).

1) Height adjustment units without the prescribed direct-mount goal feature will not be approved as equal.

2) Height adjustment feature will allow goal height settings from 8'-0" to the official 10'-0" for use by all age groups. Unit shall be designed for use with any official size (4' x 6' or 3'-6" x 6') rectangular backboard and companion front mount type goal.

3) Center unitized support frame shall be fabricated by dual, 2-3/16" square heavy-wall zinc plated guide tubes located on 11-3/16" centers. Ends of guide tubes shall be welded to heavy, formed mounting brackets. Heavy formed, die cut steel clamp assemblies (2) shall be provided for securing height adjustment assembly directly to a 6-5/8" O.D. center support structure (No. 900 Center-Strut series basketball backstops). Outer dual slide tubes shall support heavy structural steel angle sections which extend downward to accept a direct-mount (Center-Strut ) goal mounting system. Slide tube assembly shall be provided with a heavy, formed steel section to attach a special upper backboard support assembly to secure the unit to the upper two corners of the rectangular backboard on standard mounting centers.

4) Height adjustment unit shall incorporate a compact 115-volt, gear motor type linear actuator with 600 pound thrust capacity to raise and lower the goal height electrically. Motor shall draw 1.4 amps under full load. Integral limit switches shall provide automatic shut off at 8' and 10' goal heights. The motor shall be controlled by Powertouch 2.5 (E-2555) Gymnasium Control System.

   a) Wiring from junction box on height adjuster frame to relay panel on Powertouch System shall be provided by the Electrical Contractor to meet all local code requirements.

   b) Wiring of all electrical components shall be in accordance with local area codes, and in accordance with manufacturer's instructions. All conduit, wiring, junction boxes and components not specified herein shall be furnished and installed by the Electrical Contractor .

   c) A height setting scale shall be located on the side of the unit to visually determine height settings from 8'-0" to 10'-0" in 3" increments.
d) Height adjustment frame shall be finished with one coat of flat black enamel. Hardware shall be furnished for mounting unit to a 6-5/8" O.D. vertical support tube.

e) Warranty: Provide manufacturer’s lifetime warranty.

h. Provide #797, as applicable, Saf-Strap safety device to protect against the possibility of backstops accidentally falling at any time, including during the raising and lowering cycle.

i. Backboards

1) Pro-Strut Rectangular Glass Backboard with Backboard Padding: Model No. 00204-000 with Model 00326-0XX padding; or approved equal.

   a) Glass backboard shall be official in size, 1/2" thick, 42" x 72". Tempered plate glass in frame with continuous rubber channel. Frames shall be glare-free brushed aluminum. Borders and target area shall be standard white fired in permanently. Safety-edge padding (No.00326-0XX) shall be 2" thick and shall cover bottom of bank and extend up each side 15".
   (1) Colors as selected from manufacturer’s available full range of padding colors.

2) Provide "Pro Strut" attachment for all glass backstops

3) Provide manufacturer’s standard limited lifetime warranty.

2. Warranties:

a. The No. 900 Center-Strut series backstop structure come with a twenty-five (25) year warranty.

b. Limited Lifetime warranty on all Porter backstops when used in conjunction with the No. 900 Center-Strut series backstop.

D. WALL PADDING

1. Basis of Design: SuperSafe FR Wall Pad, Model No. 00570-0XXB, Class A rating, certified fire-retardant wall padding with 1" nailing margin to top and bottom for securing panels to the wall; or approved equal.

   a. Flame spread: less than 25, ASTM E84
   b. Smoke developed: less than 450, ASTM E84
   c. Meets ASTM F2440 Impact Protection.

2. Wall wainscot shall consist of 2'-0" wide panels x 6' high.

   a. Panels shall be constructed of flame retardant, 2" thick open cell neoprene foam filler with a density of 5.5 lb./sq. ft. and an Indentation Force Deflection (IFD) of 25-45 lbs.
1) Interior foam shall be cemented to 7/16" OSB board to minimize warping.

2) Entire face of panel, including the 1" nailing margins, shall be upholstered in heavy 14 oz. fire retardant vinyl laminated, high tensile, polyester base fabric material with leather-like embossed finish.

3. Colors shall be selected by the Architect from manufacturer’s available full range of colors.

4. Provide required cutouts for Plumbing, HVAC, and Electrical wall mounted equipment, panels etc.

E. WALK-DRAW DIVIDER CURTAIN (manually operated)

1. Basis of Design: Model No. 90640-100 Walk-draw Gym Divider Curtain, solid & mesh type curtain, bi-parting curtain; or approved equal.

2. Lower section of curtain shall be 8'-0" high Flexivide® solid vinyl, polyester reinforced 19 oz. vinyl coated fabric (per square yard, containing antibacterial, fungi-resistant and flame-retardant chemicals to meet requirements of ASTM E-84 Class A Rating (25 Flame Spread, 450 Smoke Development), and NFPA-701 large scale, ULC S-109 large and small scale, and State of California test requirements). Upper net section shall be Fleximesh®; see document SMPL00048036 for Fleximesh® specifications.
   a. Top hem of curtain shall have 3/8" I.D. metal spur grommets spaced on 12" centers. Flexivide® material shall be electronically welded. Fleximesh®, including all hems and pockets on curtain shall be electronically welded as well.
   b. Bottom of curtain shall contain a concealed chain weight and shall be affixed at each end of curtain.

3. Curtain track shall be enclosed, formed channel type to protect rollers from collecting dust which could hinder the free operation of the curtain. Track shall be heavy-duty type, 16 gauge galvanized steel suspended from building structure at centers not to exceed 8'-0" centers. At curtain stacking areas, track support spacing shall be 2'-0" on center. Support hardware shall be of heavy-duty high tensile ductile iron, clamp type castings or other heavy-duty supports as prescribed by building conditions and divider locations.
   a. Four wheel ball bearing, swivel type master carriers shall be located at each end of curtain. Intermediate carriers spaced on 12" centers shall be 1" diameter, dual nylon rollers with swivel type hook for attachment of electronically welded and plated, #4 twist line coil chain and S-hooks for attaching to grommets on top hem of curtain with bottom hem hanging approximately 3" above floor.

4. Each end of divider shall be equipped with 3/4" snap swivel and wall mounted screw eye for securing to wall. Vinyl nylon strap with snap swivel shall also be provided to secure curtain against wall when not in use. Curtain shall be supplied with 1/2" of fullness per foot of room size to allow curtain to easily extend from wall to wall without stretching taunt.
5. Curtain stack area: Each foot of length (actual curtain length) requires 1" of stack area. Curtain may be provided in two sections (bi-parting type) allowing one half of the curtain to be stacked on each side of room.

6. Divider curtain vinyl and mesh to be low emitting and certified to meet all the requirements of the GREENGUARD Children & Schools and GREENGUARD certification program. Manufacturer to provide certificate and/or test results upon request.

7. **LEED Submittal Information:**

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<tr>
<td>MRc5-Regional Materials</td>
<td>Raw materials originate from multiple sources so origin point cannot be determined. Final Manufacturing/Assembly in Champaign, IL 61822</td>
</tr>
</tbody>
</table>

8. **WARRANTY:**

   a. 640 curtains come with a **one (1) year limited** warranty.
   b. Other components may be covered by their own extended warranty.

F. **MISCELLANEOUS EQUIPMENT**


   a. Provide manufacturer’s compatible master equipment controller electronic system for controlling basketball backstops, scoreboards, etc.

   b. Coordinate electrical requirements with equipment manufacturer and electrical requirements.

   c. Wall mounted equipment legend allows the user to identify each piece of equipment and it’s corresponding number on the control panel. Legend is securely attached to the wall.

2.2 **SCOREBOARDS**

A. Basis of Design: Model No. BB-1520-4, as manufactured by Fair-Play Scoreboards; or approved equal.

1. Scoreboards, UL listed/ETL listed Certified, remotely operated from one control station. Displays, minutes, seconds, team scores, period, bonus, jump ball "next possession", and changeable captions for volleyball/wrestling multipurpose lower section, using low voltage 100% solid state 2-WIRE cable multiplex system, quartz crystal controlled.
2. Units are constructed of aluminum. Scoreboard color as selected by Architect, polyurethane epoxy finish. Brackets provided for wall mounting. Hanging weight approximately 155 lbs. Shipped assembled with no field assembly required.

3. Control: Provide FCC certified Model MP70 Microprocessor-based wireless operator's control furnished with padded carrying case and battery operation. Provide one controller per each scoreboard.
   a. System shall have a transmission range of at least 300 feet indoors and 1000 feet outdoors.
   b. Unit shall allow for operation of two or more scoreboards from one control operating on the same channel.
   c. System not interfere with wireless LANs and personal computing devices that use 2.4GHz ISM band.
   d. System shall operate in the presence of cell phones, pagers, and their transmission tower.

4. Warranty: Manufacturer’s standard five (5) year warranty for any defected materials and workmanship.
   a. Warranty shall start on approved date of substantial completion.

5. Coordinate with Electrical Work Contractor for required power and wiring.
   a. Power shall be 960 watts maximum 120 VAC, 60 Hz.

6. Colors: As selected by the Architect from manufacturer’s available full range of colors including custom colors.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the substrates and conditions under which the athletic equipment is to be installed.

1. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.

2. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

B. Provide protection for gymnasium floor including plywood coverings and padding under legs of scaffolding.

1. Gym flooring scarred or mutilated as a result of carelessness, during installation of the items specified in this section, shall be repaired to the satisfaction of the Architect at no additional cost to the Owner.

FVHD-5063N 2:11030-9

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3.2 INSTALLATION

A. Install athletic equipment in locations shown in accordance with manufacturer's instructions and approved shop drawings.

1. Where anchorage to building construction is required, provide and install all necessary anchorages, bracings and reinforcements not specifically shown but required for rigid installation.

2. All items shall be installed plumb and true to line.

B. Repair or replace damaged units as directed by the Architect.

C. Provide protection for installed units so that they will be in perfect operating condition, without damage at completion of project.

END OF SECTION 11030
SECTION 11040 - BLEACHERS

PART I - 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. The extent of the bleachers and associated work is shown on the drawings and specified herein.

1. Work to include Installation of electrical connections to the seating equipment at the junction box and control station, installation of motors, housing, and required wiring.

B. The type of bleachers specified in this section include electrically operated folding bleachers.

C. Other Related Work:

1. Electrical power supply, conduit, wiring, and junction box: See electrical documents.

1.3 QUALITY ASSURANCE

A. Provide type of bleachers as complete units produced by a single manufacturer, and including necessary mounting brackets, accessories, fittings and fastenings.

B. Field Measurements: Take field measurements prior to preparation of shop drawings (if any) and fabrication where possible, to ensure proper fitting of the work. However, do not delay job progresses; allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work.

C. Inserts and Anchors: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for the installation of units. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

D. Structural Design: Units shall confirm to all applicable Code, Regulation and industry standards for requirements and structural design and load capacity of bleachers. Reference Standards shall include but are not limited to the following:

1. American Institute of Steel Construction (AISC),
2. American Iron and Steel Institute (AISI),
3. Aluminum Association (AA).

F. Special Project Warranty:

1. Installation Warranty:
   a. Provide two (2) year installation guarantee, signed by the Installer / Contractor. The entire installation will be guaranteed against faulty materials and workmanship for a period of two (2) years starts from approved date of completion the installation of bleachers.

2. Manufacturer’s Warranty: Manufacturer’s Standard Warranty.
   a. The manufacturer shall agree to pay all costs of replacement of faulty materials is required within a period of two (2) years starts from approved date of completion the installation of bleachers.

1.4 SUBMITTALS

A. Manufacturer’s Data: Submit 2 copies of manufacturer's specifications and installation instructions for all materials required.

B. Shop Drawings: Submit shop drawings for fabrication and erection of bleachers. Include plans, elevations, and large scale details. Show anchors and all accessory items. Provide location template drawings for items supported or anchored to permanent construction.

1. Shop drawings shall be prepared, signed, and sealed by a New Jersey licensed professional engineer.


C. Certificate: Submit manufacturer's certification that materials furnished comply with requirements indicated and also in compliance with the International Building Code, ICC/ANSI A117, and all other applicable Federal, State and local codes, and that materials meet or exceed test requirements indicated.

1. NJ Engineer shall provide a certification stating that bleachers be supplied and have been tested by an independent testing facility and meets all applicable code requirements.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

A. Do not deliver bleachers equipment until the addition is enclosed and ready for installation.

B. Protect all athletic equipment from damage during delivery, handling, storage and installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: “ExcelSeat Modules - ESM, Bleachers with electrical friction power”; as manufactured by Interkal Inc., Kalamazoo, MI, Tel.# 616.349.1521, www.interkal.com; or approved equal.
B. The use of one manufacturer's catalog numbers, and the specific requirements set forth in drawings and specifications, are not intended to preclude the use of other manufacturer's products or procedures which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.

C. Subject to compliance with requirements of the “Basis of Design”, comparable products of the following manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements and other design attributes listed in this specifications:

3. Or approved equal.

2.2 ELECTRICALLY OPERATED FOLDING BLEACHERS

A. Seating provided shall incorporate manufacturer's design improvements and materials current at time of shipment.

B. Color Selections: Color selection where applicable shall be selected from manufacturers full range of standard and custom colors.

1. Allow for a minimum of two (2) colors.
2. Allow for “LOGO” as directed by the Owner / Architect.

C. Description of the System

1. The bleacher system shall be comprised of multiple tiered, closed deck seating rows operating in a telescopic manner, incorporating the most economical quantity of sections while still complying with all loading requirements.

2. The first moving row shall be secured with friction or mechanical locks. Other rows shall be mechanically locked, operable only upon unlocking and cycling the first row, quantity to be determined by Interkal engineering.

3. Each bleacher row shall be comprised of risers, seat and deck components, and a complete set of supportive columns and braces.

4. The telescopic bleacher shall incorporate a locking system permitting the use of one, several, or all rows, each locked in the extended position.

2.3 DESIGN CRITERIA AND MATERIALS

A. Telescopic bleacher design and fabrication shall conform to the Federal and State Codes and Regulations for Barrier Free / ADA requirements:
1. Provide a full section truncation with all necessary front rails, closure panels, and portable step assemblies at aisles as required to meet local jurisdiction compliance with ADA.

B. Telescopic gymnasium seating will be designed to support a vertical live load of 100 PSF, but not less than 120 PLF on both seat boards and footboards. Seating shall also be designed to carry a horizontal sway force of 24 PLF parallel to the seating and 10 PLF perpendicular to the seating.

C. Steel components shall be cold-formed from appropriate width strip stock conforming to ASTM A570 - Grade C 30KSI, ASTM A653- Grade 33 and 50, ASTM A500 - Grade B 46 KSI as applicable.

D. Type: Wall attached “ExcelSeat Modules”:
   1. 18-inch wide one-piece individual seating modules shall be constructed of high-density polyethylene. Provide depth indicated or required for every indicated applications.
   2. Each module shall have two longitudinal and five transverse internal ribs to provide additional structural integrity and resistance to impact.
   3. Each module shall have a full ½” interlock to the adjacent module both around the perimeter and along the internal ribs to eliminate pinching hazards and assures proper alignment.
   4. A steel-to-steel attachment of each module to a minimum 14 gauge galvanized steel nosebeam shall be provided for maximum rigidity. All such mounting hardware shall be concealed.
   5. End caps shall be provided at the ends of each bank (section, if manual) of seating as well as at each aisle.
   6. Each module shall have a recessed area for optional seat numbering.
   7. Colors and Logos: Select from manufacturers available full range of solid colors.

E. FRICTION POWER SYSTEM:
   1. Furnish manufacturer’s friction power, integral automatic electro-mechanical propulsion system to open and close telescopic seating system.
      a. Operation shall assure full visual control of the seating bank. The Wide Track System incorporates two friction drive roller assemblies as an integral part of both first row vertical column assemblies. Each section of bleacher shall have a power system that shall consist of two vertical column roller assemblies which shall include two 6” diameter by 2½” wide cast drive wheels for a minimum of four friction roller contact points per section of bleacher. Each roller shall have a specially formulated 45-durometer rubber covering to grip the floor as the units roll in and out. The two friction drive roller assemblies shall be installed a minimum of 7-feet apart per section.
b. The two friction roller assemblies are linked together by a continuous drive shaft driven by a 1/2 HP 208V, 3-phase motor that shall enable the rollers to work simultaneously, resulting in a more efficient operation with allowance for minor variations in the floor surface.

c. All floor friction power systems shall be controlled by a dual directional, removable walk along pendant which plugs into the front of the first row to give the operator proper position for visual control. The pendant control voltage shall be 24 VAC @ less than 50 MA for the safety of all operating personnel. The entire power system shall be U.L. recognized. A 208/220 volt 3-phase power source, including conduit, wiring, and safety disconnect must be provided by others.

d. The Electrical Contractor shall perform the connections to the seating equipment at the safety disconnect. Motors, housing, and wiring shall be installed by certified personnel. Contractor shall coordinate with Electrical Contractor for all work required.

F. ACCESSORIES:

1. Foot Level Aisles: Provide footrest level aisles at locations and sizes as shown on plans and approved shop drawings.

2. Enter Aisle: Provide a permanently attached self-storing aisle rail, which is designed to eliminate all labor associated with set up and storage of the aisle rails.

3. Intermediate Steps: Provide manufacturers standard intermediate step as necessary per applicable code.

4. Rear Closure Board: Provide and install a properly supported, flush mounted board between the last row of the bleacher and the wall.

5. End Railing:

   a. Self-Storing End Rails: Provide steel self-storing 42” high self-storing end guard rails with tubular supports and vertical intermediate members to comply with all code requirements. Rails shall be fitted to each exposed bank end from third row and above with all steel to steel connections. Finish shall be a polyester powder coat.

6. End Panels: Provide manufacturers standard end panels to close off the opening between end rails and the wall when the bleachers are in the stored position.

7. Vinyl Side Curtains: Provide manufacturer’s standard heavy-duty laminated fabric end panels to close off the ends of the bleacher when the bleacher is in the open position. Provide grommets at every hanger location and chain-weight at the bottom hem. Color as selected by the Owner / Architect from manufacturer’s standard colors.

G. FABRICATION

1. Continuous Wheel Channel: Wheel channels shall consist of a one piece formed steel channel welded to the base of a vertical column. Wheel channels accommodate 8 to
12 wheels per row for maximum weight distribution and operating ease. The number of wheels increase as the number of rows increase.

a. Wheels: 3-1/2” diameter with 1-1/8” non-marring soft rubber face with rounded edges designed to protect wood or synthetic floor. Provide 1/2” diameter axle for all wheels

b. Columns: Electrically welded closed rectangular steel tube, 2” x 3” minimum size, 14 gauge steel fitted with a rear welded gusset at the wheel channel.

2. Row Interlocks: Join each row structure front to rear by means of two (2) interacting steel connections, plus automatic gravity row locks where Engineering determines they are required.

a. Lower: Lower track guides shall be an external superslide rod to guarantee positive engagement of vertical supports without binding and assures smooth operation over uneven floor conditions.

b. Upper: Upper track guides shall completely interlock adjacent understructure support. A welded stop to ensure correct extension of bleacher unit on deck support. Use of bolt and nut stops are not acceptable, due to risk of loosening.

3. Diagonal Braces: Structural formed steel truss fitted to rows 4 and beyond. Bracing shall be attached to the rear riser at optimum locations to insure structural integrity. Bracing will be designed and shaped to support a minimum load of 1000 lbs. of both compression and tension forces created when the bleacher is loaded.

4. Deck Supports: Shall be of structural steel, 11 gauge spaced not greater than 60” on center for maximum deck stiffness.

a. Rollers: Every deck support not attached to a vertical post will have an integral nylon roller to avoid steel to steel friction points for more efficient operation.

5. Decking: All deck boards shall consist of 19/32” nominal Douglas Fir CC grade plywood with exterior glue and solid crossbands. An extruded aluminum “H” connector shall be placed between plywood panels. Exposed wear surfaces shall be finished with a layer of high Density polyethylene plastic .025 -.030 thick, Light Gray in color, complimentary to the seat option. Deck finishes, such as clear coat, requiring more than simple touch up to restore it to a new appearance after wear occurs are unacceptable.

a. Welds: All welds shall be made at the factory by welders that are AWS certified on the equipment and process used.

b. Nose Beam: Shall be one-piece 13-gauge galvanized steel. 13-gauge steel is utilized for the necessary structural integrity to accommodate section lengths up to 26’.

6. Rear Riser: Shall be one piece formed 14-gauge, grade 50, galvanized steel, with a continuous access joint to fully encapsulate footrest panel for ease of cleaning and additional structural support. 14-gauge roll formed steel is utilized for the necessary
structural integrity to accommodate section lengths up to 26’.

7. Splice Plates: (For Friction or Non-Friction power only) Each section joint shall be tied together with two structural steel members per row, employing a minimum of four steel to steel through bolt connections at the nose beam and a minimum of eight steel to steel through bolt connections at the lower steel rear riser. Gauge of splice plates to match the gauge of the nose beam and rear riser. Splice plates employing steel to plywood deck board attachments will not be acceptable. Gauge of splice plates to match the gauge of the nose beam and rear riser. In order to minimize deflections and keep rows in alignment during operation, splice connections shall transfer both axial loads (tension/compression) and bending.

8. Fasteners: All structural connections shall be made with S.A.E. grade 5 or better stress rated bolts. The use of self-tapping bolts is not acceptable.

H. FINISH:

1. Steel Understructure abraded, cleaned and finished with russet brown water base acrylic paint. Steel risers and nose beams finished with corrosion resistant silver gray matte finish with galvanized alloy plating.

I. PRODUCTION IMPROVEMENTS

1. Seating provided shall incorporate manufacturer's design improvements an materials current at time of shipment.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the substrates and conditions under which the athletic equipment is to be installed. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

B. Provide protection for gymnasium floor including plywood coverings and paddings under legs of scaffolding. Gym flooring scarred or mutilated as a result of carelessness, during installation of the items specified in this section, shall be repaired to the satisfaction of the Architect at no additional cost to the Owner.

3.2 INSTALLATION

A. Install bleachers in locations shown in accordance with manufacturer's instructions and approved shop drawings. Where anchorage to building construction is required, provide and install all necessary anchors, bracing and reinforcing not specifically shown but required for rigid installation. All items shall be installed plumb and true to line. Repair or replace damaged units as directed by the Architect.

B. Provide protections for installed units so that they will be in perfect operating condition, without damage at completion of the project.

END OF SECTION 11040
SECTION 11050 - LIBRARY EQUIPMENT & FURNITURE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Extent of library equipment and furnishing is indicated on drawings and in the schedules and shall include, but not limited to the following:

B. Type of library equipment and furniture required includes circulation desk components.

1.2 QUALITY ASSURANCE

A. Provide all Library Furnishing and Equipment as manufactured or furnished by the same company for single source responsibility.

1. The design is based on products as manufactured by "Brodart Co., Inc., Williamsport, PA"; or approved equal.

2. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.

3. Comparable products of the following manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements and other design attributes listed above.

   a. Buckstaff.
   b. Worden.
   c. Or approved equal.

B. The use of Brodart’s catalog numbers, and the specific requirements set forth in drawings and specifications, are not intended to preclude the use of other manufacturer's products or procedures which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.

C. In case of awarding the Contract to a General Contractor, the General Contractor will not award subcontract to a Library Furniture and Equipment supplier who is not on the approved list, unless the Architect has approved that supplier’s samples, certificates, individual product drawings, and proof of ability to perform.

D. Test of Enamel Finish: Provide testing of 5 random samples of enamel finish on sheet steel, taken from the work fabricated and finished for project. Arrange tests to be performed by an independent testing laboratory, complying with ASTM D 968, including analysis and report of results.

E. Regulatory Requirements:

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s specifications and installation instructions for each type of library equipment.

B. Samples: Submit 6" x 6" samples of each exposed finish required.

C. Shop Drawings: Submit shop drawings for each type of library equipment, showing details, dimensions, and layout of installation.
   1. Submit catalog cuts of all components to be furnished, together with a floor plan showing locations of all furnishings and verified dimensions and clearances.
   2. Provide roughing layouts within 30 days from notice to proceed, to be distributed to other prime contractors.

D. Delivery, Storage, and Handling
   1. Delivery and Storage: Keep materials dry at all times. Protect against exposure to weather and against contact with damp or wet surfaces.
      a. Protect materials from excessive moisture in shipment, storage, and handling.
      b. Deliver materials in manufacturer’s unopened packages, and store in dry place with adequate air circulation.
      c. Do not deliver plastic materials to site in advance of installation time, and avoid exposure of plastic materials to sunlight; complete installation and concealment as rapidly as possible in each area of work.

E. Project Conditions
   1. Environmental Requirements: Do not proceed with installation until areas to receive the work have been enclosed and until temperature and relative humidity have been stabilized and will be maintained within values established by the manufacturer for optimum quality control.

F. Warranty
   1. Special Project Warranty: Submit a written warranty signed by the manufacturer, the contractor, and the installer, guaranteeing to correct failures in materials and workmanship which occur within the warranty period, including those attributable to abnormal aging, without reducing or otherwise limiting any other rights to correction which the owner may have under the contract documents.

   2. The warranty shall include responsibility for removing and replacing other work as necessary to accomplish repairs or replacement of materials covered by the warranty.

   3. Submit proof of manufacturer’s standard warranty: minimum five (5) years for furniture.
PART 2 - PRODUCTS

2.1 MATERIALS

A. Lumber shall be northern grown hardwood, free of imperfections, kiln dried to a moisture content of 5-7%. Glued up panels will have two surfaces faced and will be uniform in color, using random widths not less than 1” or more than 4”. All exposed wood shall be grade A red oak, selected for uniformity of grain and color.

B. Plywood shall be constructed with an odd number of plies to resist warpage. All inner plies shall be sound and cross-banded. Face veneers shall be selected for uniformity of grain and color, on one or both sides as each component requires.

C. Lumber Core shall be 5-ply of the best grade with tight glue joins and controlled strip width to minimize warpage. Lumber core table and carrel tops shall be 1-3/16” thick, 5 ply construction meeting American National Standards Institute, Inc. standards for “clear grade”.

D. Center Core of Lumber Core Panel shall be constructed of wood strips 1” thick and not less than 2” nor more than 4” wide. Wood strips shall be full length of the panel, with no butt joints, and shall run in the longest dimension of the panel. The wood strips shall be free of knots and other defects. All wood strips shall be glued together on all edges to form “tight joint” construction, creating a solid core panel. Panels shall be made of solid poplar hardwood.

E. Cross Bands of Lumber Core Panel shall be a minimum of 1/10” thick poplar, applied to the top and bottom of the center core, with grain direction running at a 90 degree angle to the grain of the center core.

F. Plastic Laminate shall be .050 thick balanced with a backing sheet not less than .020 on the reverse side to prevent warpage. Low glare or matte finish shall be used to provide a low reflection surface with a gloss meter reading of 4-10 machine direction. All laminate will be bonded to core with hybond #80 contact cement under high pressure.

G. Finishing Procedure: Prior to finishing, all furniture shall be hand sanded, cleaned, and inspected for imperfections. Furniture shall be treated with a pre-stain conditioner to promote surface penetration of special formulated stains designed for maximum penetration and adhesion.

1. Selected stain shall be applied on all visible surfaces in a uniform manner, and allowed to dry. Catalyzed conversion sealer shall then be applied, allowed to dry, and sanded. Furniture will then be inspected for imperfections, prior to application of top coat. A top coat of catalyzed conversion varnish shall then be applied.

2.2 FABRICATION

A. The Matrix Collection Circulation Desk Components

1. DESKTOP

    a. Standard desktops are 1-3/16" thick, 45# density particleboard core, with a top surface of .050" thick, high-pressure laminate, with a backing sheet not less than .020" thick for balanced construction. High-pressure laminate has a lo-glare finish
resistant to scratches, fading, and staining that meets or exceeds NEMA standards. Top receives a 5/8" thick, solid northern-grown white maple edge band on the patron side, and it is of a straight design with a 1/4" radius on the top and bottom edges. The remaining three edges receive a 1/4" solid white maple band with 1/8 radius. All four edges are externally banded being applied after the laminate and backing. The top sits flush with the unit's ends and back side and overhangs 2-1/2" at the front side. (See band variation on adjustable or set in work surfaces).

1) Where the International ADA symbol for handicapped accessibility is indicated on the plans, the countertop height shall not exceed 34”, and shall have a clear space underneath that is not less than 30”.

2. END PANELS

a. Desk module end panels are 1" thick, 45# density particleboard core with grade A-A plain-sliced northern grown white maple veneers, slip-matched on both faces. The four edges are banded with matching maple wood banding. The end panels and front panel are joined together with 3/4" x 3/4" cleats and screws. The bottom of each end receives two adjustable leveling glides. Each end also has a 3" diameter grommet hole for power and data cord passage.

3. DETACHABLE END PANELS

a. Detachable end panels are 1" thick, 45# density particleboard core with grade A-A plain-sliced northern grown white maple veneers, slip-matched on both faces. The four edges are banded with matching maple wood banding. The decorative end panel has four bolting holes to attach at the end of a range of desk units. These detachable end panels are offered as a pair. The outside face on the panels receive a series of black 1/2" design squares, two rows of ten squares and one row of nine squares. The design pattern of squares is centered left to right and begins 3-3/4" down from the top edge of the panel.

4. FRONT PANELS

a. The front panel is 3/4" thick, 45# density particleboard core with Grade A-A plain-sliced, northern-grown white maple veneers, slip-matched on both faces. The edges are banded with matching white maple wood. Connected to the bottom area of the front is a 6"H x 3/4"D recessed, ebonized kick plate. The front panel is positioned over the front edges of the end panels of the desk module, flush with the outside edges of the desk unit. Double-wide units have two front panels to maintain the uniform look of 35"W units for aesthetic purposes. The front panels of all units receive a series of black 1/2" design squares to form a design pattern. Single-wide units receive two rows of 14 squares and one row of 13 squares. Double-wide units receive twice as many squares. The design pattern of squares is centered left to right and begins 3-3/4" down from the top edge of each front. All corner units receive a matching design pattern of 1/2" black squares.

5. ADJUSTABLE WORK SURFACE (Available on limited units)

a. Work surfaces are 1-3/16" thick, 45# density particleboard core, including a top
surface of .050" thick, high-pressure laminate with a backing sheet not less than .020" thick for balanced construction. Plastic laminate has a lo-glare finish resistant to scratches, fading, and staining that meets or exceeds NEMA standards. The exposed edge at the rear of the desk receives a 1/4" thick, maple internal edge band in straight design with a 1/4" radius on the top and bottom edges. Available in standing height unit only and adjustable to 36", 32" and 27"H.

6. SHELVES

   a. Shelves are constructed of plywood with matching wood veneers, the front edge receive a matching maple wood band.

7. DRAWERS

   a. Drawers are constructed of solid hardwood with 1/4" thick plywood bottom panel. Fronts are 3/4" thick with matching maple veneer faces and banded edges. Box drawers have 3/4" full extension metal slides, and file drawers have full extension metal slides; each are 100 lb. load capacity.

8. ELECTRICAL

   a. Electrical accessories shall be supplied at each circulation desk component as indicated on drawings and in schedules. Electrical accessories shall be UL listed, as described elsewhere in this specification.

PART 3 - EXECUTION

3.1 INSTALLATION

   A. Assemble and place all furnishings at locations indicated on furniture plans. Install all furniture items at locations shown on furniture drawing. Unless otherwise noted, shelving shall be assembled in continuous ranges, made up of the number of units indicated, complying with manufacturer’s instructions. All units shall be set level and plumb. Only non-corrosive shims shall be permitted.

   B. Anchor all single-faced ranges to walls, using manufacturers recommended hardware and methods.

   C. Install adjustable shelves at equal spacings unless otherwise indicated.

   D. Install end -panels and canopy tops with concealed fasteners.

   E. Install accessory items in locations indicated.

   F. Verify that all moving parts are operating freely.

3.2 ADJUST AND CLEAN

   A. Verify that moving parts are operating freely. Clean exposed surfaces and touch-up marred finishes to replace components as necessary to eliminate evidence of damage or deterioration.
B. Clean exposed surfaces and touch up marred finishes where required. Remove all cartons, debris, sawdust, scraps, etc., leaving all spaces clean and ready for owner’s use.

END OF SECTION 11050
SECTION 11062 – THEATRICAL RIGGING AND EQUIPMENT

GENERAL

1.1 INTENT
1. The specification section covers the fabrication, furnishing, delivery, installation, coordination, and operation of the Theatrical Rigging and related equipment.
2. The project drawings are to be considered part of these specifications. Drawings are diagrammatic, unless detailed dimensioned drawings are included. Drawings show approximate locations of equipment. Exact locations are subject to the approval of the Architect/Owner's Representative.
3. Typical details are shown for the installation of various devices. The details do not apply to all situations. Installation methods for all work shall be subject to the construction manager’s approval.

1.2 DEFINITIONS
A. For this project, the following entities are referenced:
   1. Owner: West Windsor – Plainsboro Regional School District
   2. Consultant: Starlite
   3. Contractor: General Contractor
   4. Rigging Contractor: Rigging Subcontractor
B. For this project, the following terms are defined as:
   1. Furnish, shall mean that the appropriate Contractor or Rigging Contractor is responsible for acquisition and delivery of equipment and the installation shall be by others.
   2. Install, shall mean that the appropriate Contractor or Rigging Contractor shall install items or equipment furnished by others.
   3. Provide, shall mean that the appropriate Contractor or Rigging Contractor is responsible for furnishing and installing said item or equipment.
   4. By Others, shall mean work that is not part of this contract.
   5. By Owner, shall mean work that will be performed by the Owner or Owner's agents at Owner's cost.
   6. As Required, shall mean as required by regulatory bodies, by referenced standard, by existing conditions, by generally accepted construction practice, or by the contract documents.
   7. Equal, Accepted Equal, Approved Equal, shall mean as accepted in writing, by Architect/Consultant as being of equivalent quality, utility, function, efficiency, and appearance.

1.3 RELATED SECTIONS AND DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions of Division 1, apply to the work of this section.
B. The Contractor and Rigging Contractor shall examine the full set of construction drawings and specifications and ascertain all aspects of the scope of work described within this specification.

1.4 SCOPE
A. Provide all materials, items, engineering, labor, and work necessary for complete,
safe, fully functional professionally installed system as specified, including:
1. Tools, scaffolding, equipment, labor, and supervision, even though they may not be specifically enumerated.
2. Verification of dimensions and conditions at the job site.
3. Coordination of the work with the work of any other trade Contractors who also may be working in the project space in a manner which will avoid conflict or interference and which will ensure proper sequence and avoid delay in the completion of any part or the entire Project.
4. Notification to the Architect/Engineer of any conditions, measurements, quantities, or other data, as required for proper execution, fit and completion of all work, and for safe and proper operating clearances.
5. Shipment of equipment to job site and the secured storage of all non-fixed equipment.
6. Installation and completion, in accordance with these specifications, related drawings, the equipment manufacturer’s recommendations, established trade criteria, and all applicable code requirements.
7. Inspection, demonstration, and necessary adjustment of the completed installation by the Theatrical Contractor’s installation personnel.
8. Preparation and submission of complete submittal drawings, as-built drawings, and operational and maintenance manuals.

B. Work Included: The work of this section shall include, but not be limited to the following:
1. Provide custom rigging safety signage.
2. Provide new curtains, tracks, rigging system, and related hardware.
3. Removal and reinstallation of stage connector strips.
4. Provide all hardware necessary for a complete system.
5. Provide Owner training, manuals, and as-built drawings as described herein.
6. Provide new equipment as listed in bill of materials and/or shown on drawings.
7. This Project requires all incidental or related items necessary to complete the Work as described herein, even though they may not be specifically enumerated. The extent of Work of this section is indicated by the drawings, sketches, specifications and schedules. Contractor shall provide all fixtures, devices, tools, materials, accessories, labor, and other items to deliver a complete job in all aspects.

C. Related Work: Related work which is not included in this section:
1. Structural Steel to support Rigging System
2. Furnishing of new front-of-house connector strips and brackets.

1.5 ERRORS AND OMISSIONS

A. Any errors, omissions, or ambiguities found in these documents does not relieve the Contractor or Rigging Contractor of the responsibility of providing all items necessary for a complete, safe, fully functional system. The Contractor shall provide complete working systems within the intent and meaning of the contract documents. All items of labor, material, and equipment not specifically described herein or detailed on the drawings but incidental to or necessary for the completion of the work shall be considered as included without extra cost. Any errors, omissions, or ambiguities shall be brought to the attention of the Owner and Consultant for clarification.

B. Where discrepancies occur between drawings, specification, and/or bill of materials,
the Contractor shall seek clarification, otherwise, the greater quantity shall prevail.

### 1.6 GENERAL REQUIREMENTS

A. **Field Conditions:** This project consists of work in an existing venue. All bidders are strongly encouraged to survey and inform themselves of the areas where the work is to be performed prior to bid. No additional compensation or time extension will be given for conditions of which bidder could have been fully aware prior to bid.

B. **Safety:** The system shall conform to all applicable code requirements and shall be provided in conformance to the highest industry standards of operation and practices. All materials, arrangements, and procedures shall comply with applicable code requirements, allowing the end user to arrange and operate a safe assembly and working environment for audience and user’s personnel.

C. **Insurance:** In the absence of more stringent requirements, the Contractor and Rigging Contractor shall maintain sufficient injury and property liability insurance coverage throughout the project’s scheduled timetable, including workmen’s compensation coverage for the their employees.

### 1.7 CONTRACTOR QUALIFICATIONS

A. All equipment shall be the responsibility of a single Rigging Contractor who shall own and operate a full-time, staffed shop for the fabrication, assembly, and installation of theatrical equipment. This Rigging Contractor shall assume complete responsibility for the fabrication, transportation, and installation of the work in this section and shall hold the Owner, Architect, and all their employees and Consultants harmless for any costs for errors or omissions associated with the work of this section and any action arising there from.

B. The Rigging Contractor shall have at least ten (10) years’ experience in the installation of similar equipment and systems for professional and educational theaters. The Rigging Contractor shall provide references of at least (3) installations of comparable scope performed by the Rigging Contractor, including location, description, name, address, and telephone numbers of the architects, consultants, and owners with contact persons for each.

C. The contractor shall be located within a fifty (50) mile radius from the project location. Furthermore, the contractor must have a staffed office/warehouse to fully support the project.

D. The Rigging Contractor and all persons performing theatrical rigging system or related work shall be under the direct supervision of an ETCP Certified Theater Rigger (Entertainment Technician Certification Program) in good standing for the duration of the project.

E. The Rigging Contractor is a dealer or authorized agent for the major equipment listed.

F. Subject to the above requirements, work performed under this section shall be by one of the following approved Rigging Contractors:

1. Starlite, Moorestown, NJ 856.780.8000
2. Or Approved Equal
1.8 SUBMITTALS

A. Drawings:
   1. Drawings of the rigging, curtain, and track system shall be submitted to
document the primary elements of the system and to show all information
necessary to fully explain the design features, appearance, function,
fabrication and use of the system.
   2. Drawings of proposed mounting methods for all equipment, including rigging
details, final locations with all focus information, section drawings with
mounting heights and weights for all equipment.
   3. Structural attachment details shall be reviewed and stamped by a New Jersey
State licensed Professional Engineer. This should include attachment details,
rigging details, suspension details, mounting details, pipe splice details, etc.
   4. Drawings shall be approved before any fabrication or installation may begin.
   5. The drawings shall be no less detailed than as provided in the contract
documents.
   6. Reproductions of contract documents are not acceptable as shop drawings
and will be rejected. The contractor must submit his own original drawings.
   Architectural backgrounds will be provided.
   7. System plans, elevations, and sections shall be submitted on minimum D-size
(24” x 36”) sheets, and shall be drawn in no less than ¼” = 1’0” scale.
   8. Submit in quantities as required by the front end documents.

B. Data Sheets: In addition to drawings, the Rigging Contractor shall submit
Manufacturer Data Sheets for all standard equipment.
   1. All data sheets shall contain full information on dimensions, construction,
applications, load ratings, etc.
   2. Data sheets shall be properly identified as to their intended use. Any options
or variations shall be clearly noted.
   3. Submit in quantities as required by the front end documents.

C. Approvals: All submissions must be approved per the requirements of the project's
general conditions prior to the beginning of any fabrication, installation, or erection.
Such approval does not relieve the Contractor nor Rigging Contractor of the
responsibility of providing equipment in accordance with the specifications or of
providing full operational and safe systems.

1.9 WARRANTY & INSPECTIONS

A. Warranty: The Rigging Contractor shall provide a one (1) year written guarantee
against defects in materials and workmanship. Within this period, the Rigging
Contractor shall provide any required replacement within 30 days of written
notification by the Owner, except for safety related items that shall be corrected
within 24 hours of notification. Subsequent to the expiration of the guarantee
period, the Rigging Contractor agrees to furnish repair and maintenance service, at
the Owner’s expense, within 30 days of request for such service.

B. Post Installation Inspection: After installation is complete, the Rigging Contractor
shall fully inspect the system and provide a detailed written report with pictures.
Inspection shall comply with ANSI E1.47.

C. Future Inspections: The Rigging Contractor shall offer the Owner estimated costs of
an annual safety inspection and report.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Quality Statement: While the equipment specifications contained herein may be based upon the standard equipment of particular approved manufacturers, the individual component specifications are provided solely to set a minimum level of quality. Under no circumstances will equipment of lesser quality be accepted for this project.

1. Substitutions: May be permitted after contract award, but only with the written permission of the Architect/Consultant. The proposed substitutes must be equal or exceed the specified products in quality, performance, function, and apply to the system concept in the original manor.
   a. Rigging Contractor substitution request shall include the item to be substituted, the unit price of each item, the advantages, and product data.
   b. If any of the specified equipment is no longer available, the Contractor may make recommendations to the Consultant.
      1) The Light Source, Charlotte, NC 704.504.8399
      2) Rose Brand, Secaucus, NJ 800.223.1624
      3) Automatic Devices Company, Allentown, PA 800.360.2321
      4) Or Equal

C. It is the responsibility of the Contractor and Rigging Contractor to ensure all equipment meets or exceeds specifications and will be reviewed by the Architect/Consultant.

2.2 STANDARDS

A. Installation shall conform to the latest federal, state, and local regulations, codes and industry standards. Where conflicts exist, the most stringent code or regulation shall apply.

1. Standards Organizations include:
   a. ASTM, ANSI, SAE, ASME, AES, EIA, IEEE, IEC, NEC, NEMA, NFPA, SMPTE, TIA, UL, ASTM, OSHA, USITT, PLASA

B. In order to establish minimum standards of safety, the following factors shall be used:
   1. Cables and fittings 10:1 Safety Factor
   2. Cable bending ratio Sheave tread diameter is 30 times cable diameter
   3. Maximum fleet angle 1.5 degrees
   4. Steel 1/5 of yield
   5. Bolts SAE J429 Grade 5 (ISO R898 Class 8.8)
   6. Threaded Rod ASTM A449

C. Components:
   1. Fasteners shall have a minimum SAEJ429 Grade 5 or ISO R898 Class 8.8 or ASTM A449 rating. Fasteners shall be self-locking or secured by alternate means to prevent loosening including lock washers, mousing, and thread locker.
   2. If welding shall be required, it must be performed in accordance with current
AWS standards.

2.3 RIGGING HARDWARE

A. Lift Cables (Wire Rope):
   1. All lift cables shall be 7 x 19 construction, galvanized aircraft cable, sized as required and with ultimate breaking strengths as follows:
      a. 1/8" diameter 2,000 lbs
      b. 3/16" diameter 4,200 lbs
      c. ¼" diameter 7,000 lbs
      d. 5/16" diameter 9,800 lbs
      e. 3/8" diameter 14,400 lbs
   2. Damaged or deformed cable shall not be used. All wire rope rigging shall be installed so as to prevent abrasion of the wire rope against any part of the building construction or other equipment.
   3. Wire rope shall not contact any part of the building structure.
   4. Lift lines shall be fabricated of continuous un-spliced lengths of material.
   5. In applications where reverse bends are incorporated, the wire rope service lift shall be decreased as determined by a qualified person.

B. Cable fittings & Terminations
   1. Swaged sleeve fittings shall be copper Nicopress. Swaged fittings shall be installed per the fitting manufacturer’s instructions, using the appropriate tools, and checked with the appropriate Nicopress Go-No-Go gauge. Tape loose ends of wire rope after swage has been installed. No steel wire rope may be secured with threaded compression type fittings (i.e. Crosby clamps).
   2. All wire rope eyes shall be formed over galvanized metal wire rope thimbles that are sized in accordance with the wire rope diameter.
   3. All termination hardware shall be load rated and sized for the working load limit of the line it is used on. Shackles, wire rope clips, eyebolts, eye nuts, and turnbuckles shall be of forged steel construction only. Screw pin shackles and turnbuckles with screw pin jaws shall be provided with a redundant fixing means after pin insertion. The fixing method shall be performed in accordance with the manufacturer’s recommendations.
   4. All hardware shall be installed and used in accordance with the manufacturer’s recommendations.
   5. All hardware shall have thread locker applied.

C. Other
   1. All suspended items must have a safety cable as a means of secondary support. In the case which an item is suspended by four or more points, additional safety cables are not required.

2.4 OTHER REQUIREMENTS

A. All materials used in this project shall be new, unused, and of the latest design. Refurbished and obsolete materials are not permitted.

B. Fabrication:
   1. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges.
   2. All moving parts shall have specified tolerances. Sheaves shall run plumb
and true and shall not scrape housings.
3. All equipment shall be fabricated to facilitate future maintenance and replacement.

C. Finishes:
1. All finishes are to be black, unless specified otherwise. If the manufacturer offers a choice of color finish, samples/swatches are to be provided to the owner.
2. All turnbuckles, clips, tracks, chains, and other items of incidental hardware shall be furnished plated or painted. Wire rope is not to be painted.
3. All finishes shall be returned to their original finish and condition after any cutting, patching, or other work.
4. Exception 1: where hardware is visible to patrons/audience and/or the general public, it must be painted to blend in with surrounding aesthetics. This includes any rigging or conduit in the house.
5. Exception 2: conduit and boxes mounted to black stage walls, to be painted flat black.

2.5 EQUIPMENT SPECIFICATIONS

A. General
1. Equipment is specified on a basis of system design. It is specified by manufacturer and model number.
   a. The current manufacturer’s data sheet for each referenced piece of equipment in force at the date of issuance of this specification will be the basis for the specifications of the referenced equipment.

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation of this equipment shall only be performed by trained professional Rigging Contractors. Installation shall be performed in a workmanlike manner and shall strictly adhere to the standards of these specifications and manufacturer’s installation requirements. Where necessary, the installer may make adjustments to accommodate unforeseen impediments to installation. The completed work must achieve all functional, electrical, safety and appearance requirements as established in these specifications.

B. Work shall be performed in accordance with OSHA and local codes.

C. On site welding shall only be performed per current AWS D1.1 standards and with advanced approval from the Architect or Owner’s representative.

D. The Contractor and Rigging Contractor shall each be responsible for storage of stage equipment, tools, and its equipment during the period of installation.

E. The Rigging Contractor and all persons performing theatrical rigging system or related work shall be under the direct supervision of an ETCP Certified Theater Rigger (Entertainment Technician Certification Program) in good standing for the duration of the project.

F. The Contractor and Rigging Contractor shall be responsible for all clean up related to
its work, including the removal of packing materials etc. and the protection of existing surfaces or equipment. Repairs to damage caused by the Contractor or Rigging Contractor to any item or surface are the sole responsibility of the Contractor or Rigging Contractor.

G. The equipment described in this section is considered to be finished equipment and is to be protected during and after installation from excessive dirt and damage caused by other work.

H. All equipment and the areas around the equipment shall be cleaned prior to final inspection and acceptance.
   1. In the event that a site condition will not allow for visual inspection at final acceptance, contractor shall thoroughly document by photograph and submit. For example, rigging installed above a gypsum ceiling or wood blocking inside of a wall.

3.2 COMPLETION INSPECTION AND TESTING (FINAL ACCEPTANCE)

A. Upon completing the installation of all equipment specified under this section, the Contractor and Rigging Contractor shall notify the Owner/Architect, who will schedule an inspection.

B. At the time of inspection, the Contractor and Rigging Contractor shall furnish sufficient workers to operate all equipment and to perform such adjustments and tests as may be required by the Architect and/or Owner.
   1. All racks must be open and accessible. Tools must be available to remove any plates, panels, for inspection.
   2. Documentation must be available for reference.
   3. The system must be completely installed, tested, and all equipment fully operational.
   4. Testing to include:
      a. All curtains are properly labeled in a professional manner.
      b. Full operation of all moving equipment including hoists, tracks, and rotodrapers.

3.3 OWNER TRAINING AND MANUALS

A. The contractor will provide a training program at the project location for eight (8) hours of training in four (4) hour increments. This training may be spread out over a six month period. This includes proper use, operation, trouble shooting, and instruction of all equipment and features of the system. Coordinate with the Owner and his staff on scheduling training and topics to be covered.

B. Upon completion of the work, the Rigging Contractor shall submit detailed Operation & Maintenance Manuals including as-built shop drawings, equipment descriptions, any required certificates or warranties, MSDS sheets, and serial numbers. Submit in quantities as required by the front end documents.

C. Provide physical hard copies and electronic copies of Operation & Maintenance Manuals for the Owner and Consultant.

END OF SECTION 11062
SECTION 11070 – MUSIC ROOM CASEWORK AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES
1. Tiered riser platforms.
3. Mobile storage racks.
5. Universal deck and rail cart(s).
6. Chair cart(s)

1.2 RELATED SECTIONS
A. Section 00800 – Supplementary General Conditions.
C. Section 01600 - Product Requirements.
D. Section 01700 – Project Closeout Documents and Procedures.
E. Section 03300 – Concrete Work.
F. Section 04200 – Unit Masonry
G. Section 09250 - Gypsum Drywall.
H. Section 09650 - Resilient Flooring.
I. Section 11011 - Manufactured Plastic-Laminate-Clad Casework.

1.3 REFERENCES
A. American Concrete Institute (ACI):
B. American Hardboard Association (AHA):
   1. AHA A135.4-95: Basic Hardboard.
C. American Laminators Association (ALA):
   1. ALA GP 28.
D. American National Standards Institute (ANSI):
   1. ANSI A208.1 - Particleboard.
   2. ANSI A208.2 - Medium Density Fiberboard.
   3. ANSI B17.1 - Keys and Key seats.
   4. ANSI B18.2.1 - Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws.
   5. ANSI B18.2.2 - Nuts for General Application: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts.
   6. ANSI-BHMA A156.9 - Cabinet Hardware.
E. American Plywood Association (APA):
   1. Performance Standards and Policies for Structural Use Panels.

F. American Society of Civil Engineers (ASCE):

G. Architectural Woodwork Institute (AWI):

H. ASTM International (ASTM):
   4. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
   5. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
   17. ASTM E 413 - Classification for Rating Sound Transmission.

I. Audio Engineering Society (AES): AES-4id - AES information document for room acoustics and sound reinforcement systems – Characterization and measurement of surface scattering uniformity.
J. Builders Hardware Manufacturers Association (BHMA): ANSI/BHMA A156.9 - Cabinet Hardware.


L. Hardwood Plywood and Veneer Association (HPVA): HPVA HP-1 - Hardwood and Decorative Plywood.


O. Laminating Materials Association:


Q. Underwriter's Laboratory (UL):
   1. UL 723 - Test for Surface Burning Characteristics of Building Materials.


1.4 SUBMITTALS

A. Submit under provisions of AIA A232 and Section 00800.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Provide test results by certified independent testing laboratory indicating compliance with performance requirements.
   2. Rated capacities, construction details, material descriptions, dimensions of individual components, profiles, and finishes.
   3. Delivery, storage, handling, and installation instructions and recommendations.
   4. Maintenance instructions and recommendations.

C. LEED Submittals:
   1. Manufacturer's certificate indicating that composite wood products and adhesives contain no added urea formaldehyde.
   2. Manufacturer's certificate indicating percentages by weight of post-consumer and pre-consumer recycled content. Include statement indicating costs for each
product having recycled content.

3. **Credit EQ 4.4**: Manufacturer's Signed Confirmation indicating that composite wood products and adhesives used in acoustical shells contain no urea formaldehyde.

D. **Shop Drawings:**
   1. Submit component and project specific installation drawings, cut sheets, and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation. Submit for approval before beginning any fabrication, installation, or erection.
   2. A copy of the Bill of Material shall be included with the submission for approval.
   3. Include fabrication and installation details. Distinguish between factory and field work.
   4. Include plans, elevations, sections, attachments and work by other trades.
   5. Indicate seismic bracing and fastening requirements as applicable.

E. **Coordination Drawings**: Project-specific Coordination Drawings, indicating the following items drawn and coordinated with each other. Include information required by Installers of each item in order to coordinate the Work. Include the following:
   1. Relationship of items shown on separate Shop Drawings.
   2. Dimensions and required clearances of adjacent or related work.
   3. Order of assembly of separate items.

F. **Product Schedule:**
   1. Use designations indicated on the Drawings.
   2. Include room locations, dimensions, accessories, finishes, and project specific notes.

G. **Verification Samples:**
   1. Exposed Finishes and Finish Materials: Not less than 4 by 4 inches (102 by 102 mm), for each type, color, pattern, surface and material selected.

H. **Closeout Submittals:**
   1. Operation and Maintenance Data: For adjusting, repairing and replacing components and accessories.
   2. Warranty: Submit manufacturer's warranty.

I. **Field Quality Control Reports**: Documenting inspections and demonstrations of installed products and equipment.

1.5 **QUALITY ASSURANCE**

A. **Source Limitations**: Obtain all products from a single manufacturer through one source providing a comprehensive material and installation package:

B. **Manufacturer Qualifications**: Recommended minimum 5 years' experience in manufacture of similar products in use in similar environments, including project size, and complexity, and with the production capacity to meet the construction and installation schedule.
C. Installer Qualifications: Experienced in installation of the work of this section and acceptable to the manufacturer.

D. Regulatory Requirements: Where components are indicated to comply with accessibility requirements, comply with the U.S. Architectural and Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities".

E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and installation workmanship.
   1. Finish areas designated by Architect including shims, sealants, and accessories.
   2. Provide full size units, if accepted, units may remain as part of the completed work.
   3. Do not proceed with remaining work until workmanship is approved by Architect.
   4. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original unopened containers with manufacturer's labels attached. Do not deliver material until spaces to receive them are clean, dry, and ready for their installation. Ship to jobsite only after roughing-in, painting and other finishing work has been completed, installation areas are ready to accept work.

B. Handle and install materials to avoid damage.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install materials until spaces are enclosed and weather tight, wet work in spaces is complete and dry, HVAC system is operating and maintaining ambient temperature at occupancy levels during the remainder of the construction period.

B. Field Measurements: Verify field measurements as indicated on Shop Drawings. Where measurements are not possible, provide control dimensions and templates.
   1. Coordinate installation and location of blocking and supports as requested.
   2. Verify openings, clearances, storage requirements and other dimensions relevant to the installation and final application.

C. Field Measurements: Verify field measurements as indicated on Shop Drawings. Where measurements are not possible, provide control dimensions and templates.

D. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.8 WARRANTY

A. Special Warranty for Specialty Casework: Manufacturer's written warranty indicating manufacturer's intent to repair or replace components of specialty casework that fail in materials or workmanship within ten (10) years from date of Substantial Completion. Failures are defined to include, but are not limited to, the following:
   1. Fracturing or breaking of casework components including doors, panels, shelves, or hardware resulting from normal wear and tear and normal use other than vandalism.
   2. Delamination or other failures of glue bond of components.
3. Warping of casework components not resulting from leaks, flooding, or other uncontrolled moisture or humidity.
4. Failure of operating hardware.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: Wenger Corp.; JR Clancy, Syracuse, NY; Tel: 315. 451.3440; www.jrclancy.com; or approved equal.

B. Requests for substitutions shall be considered in accordance with provisions of AIA A232 and Section 00800.
   1. Manufacturers seeking approval shall submit the following:
      a. Product data, including third-party certified acoustical data and proposed layout for this project.
      b. Project references: Recommended minimum of 5 installations not less than 3 years old, with owner contact information.
      c. Sample warranty.

2.2 STAGE PLATFORMS

A. Basis of Design: “StageTek Seated Risers” portable stage platforms and seated risers.

B. Structural Performance Requirements:
   1. Stage Platforms and Risers: Standard Uniform Load 4 feet by 8 feet (1219 mm by 2438 mm) Deck: 125 lbf/sq ft (6 kN/sq m). Heavy-Duty Uniform Load 4 feet by 8 feet (1219 mm by 2438 mm) Deck with additional 5th leg: 200 lbf/sq ft (9.6 kN sq m).
   2. Stage Platforms and Risers: Dynamic Live Load: Side load of 15 percent of total Uniform Live Load: 600lb (2.7 kN) side load on a 4 feet by 8 feet (1219 mm by 2438 mm) platform under a total Uniform Live Load of 4,000 lbs (17.8 kN).
   3. Stage Platforms and Risers: Point Load: 1,500lb (6.7 kN) applied via 1 inch (2.5 cm) diameter pin.
   4. Stage Platforms and Risers: Fully replaceable components including corners, frame and wood deck. Replaceable in the field with common tools.
   5. Treads of Stairs: Uniform Load: 500 lbs (227 Kg) per 36 inches x 11 inches tread. (91.44 cm X 27.94 cm), and concentrated load: 300 lbs (136 Kg) on area of 12 sq. in. (77.4 sq. cm): Total Uniform Load of 1,000 lbs (454 Kg) per stair assembly.
   6. Guard Rail Concentrated Load: 200 lbf (0.89 kN) applied at any point in any direction.
   7. Guard Rail Uniform Load: 50 lbf/ft. (0.73 kN/m) applied to top rail.
   8. Intermediate Rails, Panels, and Baluster Concentrated Load: 50 lbf (0.22 kN) applied to 1 sq. ft. (0.093 sq. m) area.

C. Materials:
   1. Aluminum: Complies with ASTM Standards listed above in section 1.3 C.
   2. Materials Meeting Sustainable Design Requirements:
      a. Provide stage platforms and risers made with products and adhesives that contain no urea formaldehyde.
5. Hardware and Fasteners: Manufacturer's standard non-corroding type, permanently mounted to units, remaining set or tightened under load and vibration in service, and designed to preclude user contact with sharp edges.

D. Frame: Extruded 6063-T6 aluminum, 4 inches tall (102 mm), with hidden contours to accept attachments. Rounded 1.5 inches (38 mm) hand-hold area open to accept power-grip (closed-grip) around entire perimeter. Frame components are repairable and replaceable.

E. Corners: Cast 380 aluminum corner assembly engages leg 3 inches (76.2 mm) and secures leg with a full-length 2.75 inches (69.85 mm) convex brace driven by a threaded bolt operated with a nylon t-handle. Corner assemblies are repairable and replaceable.

F. Legs: Legs operate individually and are constructed of extruded 6063-T6 aluminum round tube, 2.50 inches diameter (63.5 mm) with a wall thickness of .075 inch (1.905 mm). Standard fixed-height legs available in 8, 16, 24, 32, and 40 inches (200, 410, 610, 810, and 1020 mm) high, as required for layout indicated. Non-marking cap. Legs to store resting on frame rails or in clamping brackets within deck frames.
   1. Custom Length Legs: Provide where required for layout indicated.
   2. Fixed Height Legs: Provide where indicated. Legs constructed of extruded 6063-T6 aluminum round tube, 2.50 inches diameter (63.5 mm) with a wall thickness of .075 inch (1.905 mm). Standard fixed-height legs available in 8, 16, 24, 32, 40, and 48 inches (200, 410, 610, 810, 1020 and 1220 mm) high, as required for layout indicated. Non-marking cap. Legs to store resting on frame rails or in clamping brackets within deck frames.
   3. Adjustable Legs: Provided where indicated. Constructed of extruded 6063-T6 aluminum tube, 2.50 inches diameter (63.5 mm) with a wall thickness of .0750 inch (1.905 mm) with an adjustable threaded foot for infinite adjustability plus or minus 2 inches (51 mm) from nominal length of leg. The foot shall provide a non-marking rubber pad.
   4. Telescoping Legs: Provide where indicated. Standard Telescoping Legs available in 3 configurations adjusting between 16 inches to 28 inches (40.64 cm to 71.12 cm), 24 inches to 40 inches (60.96 cm to 101.60 cm), and 30 inches to 54 inches (76.20 cm to 137.16 cm). Nominal height adjustment in increments of 4 inches (102 mm) secured with spring-loaded quick-release pin. Constructed of extruded 6063-T6 aluminum round outer tube, 2.50 by .075 inch (63.5 by 1.905 mm) telescoping over a 2 inches by .125 inch (50.8 by 3.17 mm) inner tube. With an adjustable threaded foot providing for fine adjustability between beyond nominal set length of leg. The foot shall provide a non-marking rubber pad. Inner and outer Tubes secured with non-rattling bushings and shall not pull apart from each other.

G. Deck Panels: Manufacturer's standard panel construction, 3/4-inch (19-mm) overall thickness, consisting of minimum 1/2-inch (12-mm) thick plywood substrate with finish surfaces consisting of, edged with extruded aluminum:
   1. Finish: Black 0.030 inch (.76-mm) thick Standard Textured polypropylene with black smooth HDPE backer sheet.
   2. Panel Dimensions: Manufacturer's standard sizes, as required for layout indicated.

H. Guards and Railings: Complying with performance requirements, clamp-attached without tools, lower horizontal rail acts as chair stop.
I. Leg Storage Clips: Provide bottom-of-deck panel leg storage clips.

J. Chair Stops: Clamp on leg stop, able to be installed and demounted without tools constructed of tube steel. Semi-permanent Chair Stop constructed of extruded PVC and secured into deck with screws.

K. Storage Cart: Steel tube-framed, folding transport cart with heavy-duty 8 inches (200 mm) casters and clamping safety strap. Provide number of carts required for layout indicated. Cart designed to carry up to 6 decks or 6 guardrails. Combinations of decks and guardrails can be stored on cart.

L. Closure Panels: Closure panels matching Standard textured horizontal surface, not less than 3/4 inch (19 mm) thick plywood, secured with tool-free snap attachment located as follows:
   1. Front of unit.
   2. Sides of unit.
   3. Intermediate risers.

M. Metal Finishes: Aluminum: Mill finish.

N. Opaque Finish for Hardboard: 100 percent acrylic paint, specially formulated for adhesion to impermeable surfaces, 1-coat, satin finish, black.

O. Fabrication: Provide portable stages and risers meeting performance requirements, with the following characteristics:
   1. Portable and storable in space indicated.
   2. Easily set up and disassembled without use of special tools or loose fasteners.
   3. Modular and reconfigurable.
   4. Platform components replaceable with common tools to include corners, frame sections, and platform decking.
   5. Platforms supported by individual legs that are storable inside the platform frame.
   6. Platforms designed for comfortable and secure power-grip (closed-grip) anywhere around entire deck perimeter.
   7. Lightweight leg sets/understructures - 40 inches (101 cm) tall or shorter weigh less than 10 lbs (4.5 kg).

2.3 MUSICAL INSTRUMENT STORAGE CASEWORK

A. Basis of Design: UltraStor Storage Cabinets as manufactured by Wenger Corporation. Modular instrument storage casework with integral bases, adjustable levelers, and through-bolted fastening, enabling owner reconfiguration of unit layout.
   1. Adjustable shelf system integrated into cabinet walls allowing shelf placement at increments common to musical instruments. No loose parts or tools required. Shelf system to include a latch to prevent unintended shelf movement.

B. Seismic Performance: Comply with ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads" based upon seismic design criteria indicated.

C. Storage Casework Component Load Capacities:
   1. Storage Casework Wire-Grille Door Hinge: Each weld capable of resisting 400 lbf (1779 N) pull test without visible damage or permanent deformation.
D. General: Provide through-ventilating instrument storage casework meeting requirements in System Description and Performance Requirements Articles.

E. Side Panels and Divider Panels: Particleboard thermoset panel with no urea formaldehyde added, 3/4 inch (19 mm) thick. Side panels machined to accept unit-to-unit through-bolting.

F. Grille Doors: Bright basic steel wire, 5/16 and 3/16 inch (7.9 and 4.8 mm) diameter, with full 360 degree welds at T-joints.
   1. Provide for instrument storage casework.

G. Panel Edge Banding: 3 mm thick, heat-bonded, with radiused and profiled edges and corners.

H. Shelving: Sized with adequate gap between shelving and casework side panels to allow air movement inside casework.
   1. Up to 27 inches (686 mm) wide: Removable molded polyethylene shelf, with impact-resistant, radiused front edge, mounted to cabinet wall with self-locking clip.
   2. Over 27 inches (686 mm) wide: For large instrument casework: Removable formed polyethylene shelf, ribbed, with high-impact-resistant, radiused front edge, supported by steel tube frame.
   3. Tubular steel supports are included for shelves over 19 inches (483 mm) wide.

I. Casework Panel Color: As selected by Architect from manufacturer's standard colors.

J. Filler Panels and Closure: 3/4 inch (19 mm) thick particleboard thermoset panels with no urea formaldehyde in Oyster color. Provide the following, cut to fit field conditions, where indicated:
   1. Wall filler between cabinet side and wall.
   2. Top filler between cabinet top and wall.
   3. Top of cabinet closure panel between cabinet and finished ceiling or soffits.
   4. Finished back panel for exposed cabinet backs.

K. Butt Hinges: 2-3/4 inches (70 mm), 5-knuckle steel hinges made from 0.090 inch (2.29 mm) thick metal, ANSI/BHMA A156.9, Grade 1, with powder-coated finish, through-bolted to door and side panels and welded to grille door frames. Provide 2 hinges on compartment doors, and 4 hinges on full-height doors.

L. Slide Latch: 0.105 inch (2.67 mm) min. thickness steel, with padlock eye, powder-coat finish, through-bolted to panel door and side panel and welded to grille door frames. Latches securely without padlock. Provide with clear plastic label holder for use with standard size labels; number system available for user to print. Padlocks furnished by Owner.

M. Panel Connectors: 1/4 - 20 by 1.77 inch (45 mm) panel connectors, with steel thread inserts, powder coated to match panels.

N. Cabinet Levelers: Leveling glides with 3/8 inch (9.5 mm) diameter threaded steel rod in steel corner brackets, minimum two each per cabinet side, accessible from within unit, and concealed in completed installation.

O. Carcass joinery includes lag screws powder coated to match substrate.
P. Back panel 7/32 inch (5.6 mm) reinforced with 3/4 inch (19 mm) stretchers panels held in a dado groove and lag screwed in place.

Q. Fasteners: Manufacturer-recommended fasteners as required for casework substrate and project performance requirements, consisting of one or more of the following:
   3. Expansion Anchors in Concrete and Concrete Masonry Units: Carbon-steel, zinc plated.
   4. Hardware supplied to anchor the cabinets to the wall and to adjacent casework.

R. Finish: Steel Sheet, Steel Wire, and Exposed Fasteners. Urethane-based electrostatic powder coating, color as indicated. Refer to Drawings.

S. Materials Meeting Sustainable Design Requirements:
   1. No Added Urea Formaldehyde Products: Provide music education storage casework made with composite products and adhesives with no urea formaldehyde added.
   2. FSC Certified Wood Products: Provide music education storage casework made with wood from certified sources. Also available in Moisture Resistant, Class 1 Fire rated and Plywood cores.

T. Particleboard Thermoset Panels: Particleboard panel with no formaldehyde added 3/4 inch (19 mm) thick finished with thermally-fused polyester surfaceing on both sides meeting performance requirements of NEMA LD 3 for VGS grade, edge-banded, including the following:
   1. Surface Abrasion Resistance: Taber Wheel, 400 cycles, for solid colors.

U. Polyethylene Shelves: High-density, one-piece, blow-molded or polyethylene, with radiused front edge, for abuse-resistant shelves. Same color throughout will not show scratches.

V. PVC Edge Banding: Radiused PVC extrusions, 1/8 inch (3 mm) thick.

2.4 MOBILE STORAGE RACKS

   1. 3/4" (19 mm) industrial grade composite wood with polyester laminate finish in Wenger standard colors
   2. Edging is 1/8" (3 mm) radiused PVC
   3. Racks have four 2-1/2" (64 mm) swivel casters in yellow zinc finish for easy transport. Front casters are locking
   4. Smooth rolling design for easy transport through doorways
   5. Closed ends for extra protection
   6. **Five (5) year warranty**
   7. Assembly required
   8. Bass and Cello Racks:
      a. Lower cross supports are constructed of plywood core, laminated with flexible soft PVC edging to protect instruments
      b. Upper cross supports are plywood core laminated panels with PVC bonded
edging to protect instruments

c. All racks include brass bow hooks
d. Holds instruments 1/4 sized and up

9. Violin/Viola Rack:
a. Double-tiered rack moves and stores up to sixteen cased instruments
b. Cross supports are constructed of plywood core, laminated panels with PVC bonded edging on top and bottom supports
c. Holds cased instruments 1/2 sized and up
d. Spacer pegs are solid wood

2.5 TALL BAND/ORCHESTRA FOLIO CABINET

A. Basis of Design: Model 146M052, as manufactured by Wenger Corp.; or approved equal.
   1. Wall panels and optional lockable doors are 3/4" (19 mm) thick industrial grade composite wood with no added formaldehyde and polyester laminate finish in Wenger standard colors.
   2. Shelves are 1/8" (3 mm) thick tempered hardboard.
   3. Available in 1", 1-1/2", 2", 2-1/2", and 3" (25, 38, 51, 63, and 76 mm) shelf height openings to accommodate various thicknesses of folios.
   4. Shelf support columns are extruded aluminum, black powder-coat paint finish.
   5. Cabinet includes four levelers to level and square cabinet.
   6. Number strips included for all shelf spacing options.
   7. UL GREENGUARD Certified - Product certified for low chemical emissions: ul.com/gg - UL 2818.
   8. Environmental attributes and LEED compliance for this product can be found at www.wengercorp.com/GREEN or by contacting your Wenger representative.
   9. Cabinets are shipped fully assembled.
  10. Wall mounting bracket included.
  11. Ten (10) year warranty.

B. Cabinet only: 230 lbs. (105 kg) (based on 1-1/2" shelf spacing).

C. Cabinet with doors: 281 lbs. (128 kg) (based on 1-1/2" shelf spacing).

D. Cabinet is 32-13/32" wide x 19-1/4" deep x 84-1/4" high (823 x 489 x 2140 mm).

E. Shelf openings are 14-7/16" wide x 13-7/8" deep (367 x 353 mm).

F. Shelf spacing can be adjusted in 1/2" (13 mm) increments from 1" to 3" (25 to 76 mm).

2.6 PERCUSSION WORKSTATION

A. Basis of Design: “Model 147G01” Deluxe Percussion Workstation, as manufactured by Wenger Corp.; or approved equal.
   1. Workstation with all accessories: 251 lbs (113 kg) 230 lbs.
   2. Workstation is 48-1/8" wide x 24-1/2" deep x 35-3/4" high (1222 x 622 x 908 mm).
   3. Workstation construction is 3/4" (19 mm) thick industrial grade composite wood with no added formaldehyde and polyester laminate finish in Wenger standard colors.
   4. Edging is 1/8" (3 mm) radiused PVC.
   5. Workstation top is 3/4" (19 mm) industrial grade composite wood with industrial
grade carpet on top.
7. Plywood bottom is 3/4" (19 mm) with four 4" (102 mm) rubber swivel casters that make it easy to move from room to room.
8. Workstation has four foam-lined 21-1/2" wide x 19-3/4" deep x 3-1/2" high (546 x 502 x 89 mm) drawers constructed of 18 gauge steel with built-in handle.
9. Four 23" wide x 23" deep (584 x 584 mm) compartments, 3-1/2" (89 mm) high and 15-3/4" high (400 mm).
11. Environmental attributes and LEED compliance for this product can be found at www.wengercorp.com/GREEN or by contacting your Wenger representative.
12. Shipped assembled.
13. **Ten (10) year** warranty.
14. Accessories:
   a. Pop-up Music Desk, #147H510, 17.7 lbs. (7.7 kg).
   b. Holds music for three or more people.
   c. Desk is 46-1/8" wide x 1-7/16" deep x 10-3/4" high (1172 x 37 x 273 mm).
   d. Desk construction is 3/4" (19 mm) thick industrial grade composite wood with polyester laminate finish in Wenger standard colors.
   e. Desk permanently attaches to work top and folds flat when not in use.
   f. Suspended Cymbal Holder:
      1) 147H014 2 lbs. (0.9 kg).
      2) Adjustable vinyl-coated holder clamps to cabinet edge.
   g. Cymbal Cradle:
      1) 147H012 7 lbs. (3 kg).
      2) Holds up to 22" (559 mm) cymbals in ready-to-use position.
      3) Vinyl-coated cradle, which protects and holds cymbals quietly, clamps to the cabinet edge.

### 2.7 MEDIA STORAGE

A. **Basis of Design:** Model “2 Column” Fixed Media Storage Cabinet(s), as manufactured by Wenger Corp.; or approved equal.
1. Cabinets are constructed 3/4" (19 mm) thick industrial grade composite wood with no added formaldehyde and polyester laminate finish in Wenger standard colors.
2. Edging is 1/8" (3 mm) radiused PVC.
3. 2 Column - dimension: 42" w x 24"d x 85-5/8" h (1067 x 610 x 2175 mm).
4. Full locking wood doors with 270 degree hinges to swing door open flush with side panel.
5. Rack mount – Steel 7-unit rack mount section with one mounted power strip included and cage nuts to attach electronic components. Unit folds down on hinge for access to cords in back. Additional space can be configured for drawers and shelves (fixed shelf above and below rack mount).
6. Top venting holes allow ventilation.
7. Wire management clips to hold wires.
8. Steel pilaster rail allows for mounting of shelves, slide-outs and drawers with ability to reposition along the length at 1/2" (13 mm) increments.
9. Cabinets have adjustable steel leveling glides for uneven floors.
10. Drawers and slide-outs are preinstalled but can be repositioned. Adjustable shelves are packaged loose for customer preferred installation.
11. Wall and floor mounting brackets included.
12. Four 5-knuckle steel hinges per door with powder-coated paint finish, through-bolted to door and side panels.
13. Keyed lock.
14. Environmental attributes and LEED compliance for this product can be found at www.wengercorp.com/GREEN or by contacting your Wenger representative.
15. Cabinets are shipped assembled.
16. **Ten (10) year** warranty.

2.8 **SELECT LAB WORKSTATION**

A. **Basis of Design:** Model “225D111”, Keyboard Workstation, as manufactured by Wenger Corp.; or approved equal.

1. Adjustable Height 50" model weighs 180 lbs (82 kg), 62" model weighs 195 lbs (88 kg).
2. Workstations: 50" (1270 mm) wide x 30" (762 mm) deep.
3. Desk surface is 48" (1219 mm) wide.
4. Adjustable Height Model desk height can be between 28-1/4" to 32-1/4" (718 to 820 mm).
5. Adjustable Height Model without Casters desk height can be between 28-1/4" to 32-1/4”.
6. Pull-out keyboard tray on 50" models is 35-3/4" wide x 15-3/4" deep (908 x 400 mm)
7. Adjustable spacing in 1/2" (13 mm) increments to fit piano keyboards at 5" (127 mm) height or computer keyboards at 2-1/2" (64 mm) height.
8. Fits through standard 32" (813 mm) doorways.
9. Workstations are constructed of 3/4" (19 mm) thick industrial grade composite wood with no added formaldehyde and polyester laminate finish.
10. Desktop is constructed of 1-1/8" (29 mm) thick industrial grade composite wood with no added formaldehyde. Desktop and shelves are Graphite color laminate finish. Workstation sides and back are available in Wenger standard colors.
11. Bottom shelf is optional in fixed height only, adjustable height always includes a bottom shelf.
12. Legs are constructed of heavy-duty steel tubes. All metal parts finished with black powder-coated paint finish.
13. Four swivel 4" (102 mm) diameter rubber casters, two locking.
14. Edging is 1/8" (3 mm) radiused PVC.
15. Wiring access on top of desk. Flip up compartment allows access to a wireway channel for mounting and organizing cords and powerstrips. Cords are held in place with included clips.
16. Grommets are included in the sides and back (three total) for easier cord management.
17. Includes headphone holder with ability to lock in place with padlock. Accommodates padlock with a 5/16" (8 mm) diameter shackle and up to 3/4" (19 mm) tall. Padlock is not included. Headphone can be mounted on right or left side of keyboard pullout. Accommodates maximum headband size of 2" wide x 1/2" thick (51 x 13 mm).
19. Environmental attributes and LEED compliance for this product can be found at www.wengercorp.com/GREEN or by contacting your Wenger representative.
20. Shipped ready to assemble.
21. Ten (10) year warranty.

2.9 UNIVERSAL DECK AND RAIL CART

A. Basis of Design: Model “113J001” as manufactured by Wenger Corp.; or approved equal.
   1. Stores up to six StageTek decks or six StageTek rails.
   2. Fits through a 32” wide door.
   3. Five (5) year warranty.

2.10 MOVE & STORE CART

A. Basis of Design: Move & Store Chair Cart, as manufactured by Wenger Corp.; or approved equal.
   1. Product is designed to transport and store Wenger Nota™ Chairs.
      a. Chair Capacity: Nota Standard = 18 max.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine installation areas and mounting surfaces with Installer present, for compliance with manufacturer's installation tolerances including required clearances, floor level, location of blocking and anchoring reinforcements, and other existing conditions that may affect installation or performance.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Proceed with installation only after correction of unsatisfactory conditions.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION - GENERAL

A. Install manufactured units in accordance with manufacturer's recommendations, approved submittals, and in proper relationship with adjacent construction.

B. Clean exposed surfaces. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

3.4 INSTALLATION OF SPECIALTY CASEWORK

A. Install plumb, level, and true; using integral levelers. Install in accordance with manufacturer's recommendations and approved submittals.
   1. Install seismic bracing and fastening in accordance with approved shop drawings.
B. Install hardware uniformly and precisely. Set hinges snug and flat. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.

C. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind and close with uniform reveals.

3.5 FIELD QUALITY CONTROL

A. Inspect installed work to verify compliance with requirements.
   1. Perform installation and startup checks as recommended by manufacturer.
   2. Prepare inspection reports and submit to Architect.

3.6 DEMONSTRATION

A. Train Owner's personnel to adjust, operate, and maintain equipment. Turn over keys, tools, and operation and maintenance instructions to Owner.

3.7 CLEANING AND PROTECTION

A. Repair or replace defective work as directed by Architect upon inspection.

B. Clean surfaces. Touch up marred finishes, or replace damaged components that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by manufacturer.

C. Protect installed products from damage, abuse, dust, dirt, stain, or paint until completion of project. Do not permit use during construction.

END OF SECTION 11070
SECTION 11400 – FOOD SERVICE EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. General: The intent of this section is to provide specifications and data with which bidders may analyze the project requirements and submit bids for the food service equipment described in Part 2. The terms and conditions of these instructions shall be deemed an integral part of the specifications and shall be as binding as the specifications.

B. Definitions

1. FSEC (FSEC) shall mean the person, firm or corporation or company designated as such in the contract with the Owner.

2. Jacobs | Doland | Beer (JDB) is the Food Facility Consultant for this contract and represents the Owner in all matters pertaining to the FSEC package, and also acts as a technical advisor to the project team. The FSEC is requested to advise JDB of all modifications proposed by any party to this contract which may affect the performance of this contract.

3. Owner is the person or organization identified as such in the contract whose responsibility in facilitating the execution and of this contract includes:
   a. The designation of a representative who has the ability and authority to render prompt decisions and provide pertinent information.
   b. Informing all parties of critical dates, budget, limitations, outside contracts, or other factors which could affect the performance of this contract.
   c. Issuing all instructions to the FSEC through JDB.

4. Subcontractor shall mean any person, firm, company or corporation furnishing labor, material or both, to the FSEC for the subject project.

5. Written notice shall be deemed as fully served when delivered in person; sent by registered, certified mail or courier service to the last known business address of intended recipient; confirmation of electronic correspondence (e-mail) is returned; or as outlined in the General Conditions for the entire project.

C. Equipment Bids

1. Please quote your best price and furnish all information requested for the items specified. Price quotations must be based on the indicated specifications and plans as to quality, quantity, etc., or as per sample attached.
2. Bids must be accompanied by a separate listing of itemized prices, typed on the bidder's letterhead, for each item listed in the plans and specifications. Failure to submit itemized prices may be cause for rejection of this bid. The itemized price listing is to include the Item Number, Quantity, Description and Name of Manufacturer of each individual item and individual prices for each item. A separate total figure for delivery and set-in-place, and the total bid amount should be included as shown in the form of bid. The bidder is requested to list the applicable sales tax as a separate item at the end of the proposal. See "FORM OF BID" Section 1.10. Note instructions regarding alternates in Section 1.08, Substitutions, AIA Document A232 and Section 00800.

3. Upon award of contract, the FSEC shall immediately take field measurements and proceed to make all necessary drawings as set forth in the specifications. Drawings to be submitted for review and approval within amount of time as agreed in the contract.

4. The Owner reserves the right to reject any and all bids for whatever reason. The option to accept or reject the bid shall remain entirely with the Owner.

5. At the time of receipt of bids, it is presumed that the bidder has visited the job site and is familiar with the premises and conditions that affect his/her work. It is also presumed that the bidder has carefully reviewed and is fully familiar with all of the food service specifications and drawings.

   a. The attention of the bidder is directed to the fact that there may be no loading platforms available, and the elevators for this project, if available, may be of limited size. The bidder is to check the size of the elevators to make certain that every piece of equipment specified for this project will be able to be delivered to the floors, as required. If the equipment must be shipped in sections to facilitate delivery, then the bidder shall include the cost of such special arrangements in his/her bid. Size of outside building hoists or other conveyances which may be available, should be checked as well. Responsibility for verifying all delivery conditions, including temporary wall openings, shall be the obligation of the food service equipment subcontractor.

   b. Related documents such as, but not limited, to architectural and engineering drawings and specifications covering this project shall be reviewed by the bidder so that the bidder is fully cognizant of all conditions affecting this project. The failure of any bidder to receive or examine any document relating to the bid shall not relieve the bidder from any obligations with respect to his/her bid.

6. Addenda, bulletins and clarifications covering changes, corrections and special interpretations of the contract documents may be issued by the Owner / Architect prior to bid submittal, and become part of the contract documents.

7. After acceptance of bid and award of contract, no changes in contract price will be permitted without written permission of the Owner.
8. Change orders covering changes in the contract documents may be issued by the Owner / Architect after contract has been awarded and shall become part of the contract documents.

9. If the Owner, Architect or JDB agree in writing to the subletting of any part of this work, no change of such subcontractor shall be made after the award of this contract.
   a. A list with the name, address and telephone number of all subcontractors shall be furnished to the Construction Manager, after the award to permit review by the Owner and acceptance thereof. No work shall be performed by any subcontractor without approval by the Owner.
   b. The food facility consultant, the Owner and Construction Manager must approve the selection of all subcontractors.
   c. Every subcontractor shall be bound by the terms and provisions of the contract document so far as they are applicable to his / her work. Nothing contained herein shall create any contractual relation between any subcontractor and the Construction Manager.
   d. The Owner, Construction Manager or Architect reserve the right, after due notice, to discharge any subcontractor who in their judgment failed to prosecute the work in strict accordance with the contract documents or the food service equipment subcontractor's directions. This shall in no way release the FSEC from his / her obligations and responsibilities under the contract.

D. Insurance

1. The bidder's attention is called to the insurance requirements of this project which are as follows:
   a. Certificates of liability, casualty and Workmen’s Compensation insurance shall be filed with Owner when required and will be subject to his / her checking both as to amount and adequacy of their protection.
   b. Owner shall be held harmless and be indemnified against all claims, suits, actions, costs, fees, expenses, judgments or decrees associated with the execution of this contract.
c. The FSEC shall assume all liabilities for injuries to or loss of any of the Owner's property, or the property of any other contractor which may be employed by the Owner of said premises or to any adjoining property or the property of any third person which may be caused directly or indirectly by the food service equipment subcontractor, his / her subcontractors and by the employees of each of them, and shall at his / her own cost and expense indemnify the Owner for and make good any such damage, loss or theft. The liability of the FSEC under this covenant is absolute and is not dependent upon the question of negligence on his / her, his / her subcontractors or of their employees, and the failure of the Owner to direct the FSEC to take any particular caution or refrain from doing any particular act, will not excuse the FSEC in any case of any such damage.

d. The FSEC shall purchase and maintain, at his / her own expense, insurance in limits not less than those amounts requested by the Owner in the Request for Proposal.

e. The insurance shall provide for a cancellation notice requiring that the insured be notified by mail not less than 60 days prior to cancellation or termination of the policy for any reason. All certificate holders or named insureds shall be notified.

f. Limits of insurance coverage shall be for this project alone, and shall not be reduced as a result of the settlement of claims on other projects.

2. The insurance provided herein shall survive the expiration date of any insurance policy written which is intended to insure the provisions of the hold harmless agreement as set forth above.

3. Should any claim arising out of this subcontract be made against the Owner, the General Contractor, Construction Manager or any consultant, including the food facility consultant, Jacobs | Doland | Beer, or any member, partner, director, officer, agent or employee thereof, the subcontractor and its sub-tier contractors and materialmen shall diligently render to the person against whom such claim is made any and all assistance in defending such claims that may be requested by such person. This article shall survive the termination of the subcontract.

4. The FSEC shall be solely liable for all items specified herein that are in transit and/or stored in and about the building, installed but not yet approved by the Owner and for which payment has not been made or approved. The FSEC shall carry adequate insurance covering the same from fire damage, vandalism, theft, or any type of hazard or loss which may be sustained.

1.02 WORK INCLUDED

A. Labor, Materials & Equipment: Provide all labor, materials, equipment and services and perform all operations required to complete the installation of all work of this section and related work as indicated on the drawings and specified herein
1. Work as described herein includes all materials, equipment, construction, labor and services necessary for the completion of standard manufactured or custom fabricated food service equipment as prescribed in the contract documents.

2. Material(s) - all materials to be incorporated in the work to be new and best of their respective kind(s).

3. Workmanship to be of highest quality and to the best accepted standard of the various trades and performed by skilled and qualified workers.

4. Supplying and setting in place all new food service equipment and appliances as shown on the drawings and listed in the "Schedule of Equipment" and as shown on the food service drawings, either contractor or Owner furnished.

1.03 RELATED WORK PROVIDED BY SEPARATE TRADES:

A. Division 15 - Plumbing: Plumbing work and connections to food service equipment, including fittings which are not integral part of equipment, floor drains, water lines including their connections, and miscellaneous plumbing work, except as otherwise specified in this Section.

B. Division 15 - HVAC: Heating, ventilating and air conditioning work and connections to food service equipment, except as otherwise specified in this Section.

C. Division 16 - Electrical

1. Electrical service and connection to food service equipment, overload protection requirements wiring between starters, when starters and controls are not integral with equipment.

2. Furnish and install disconnect switches as required.

3. Interconnection of all hood lights and control switches.

4. Interconnecting of control switches and wiring as required on equipment shown (including refrigeration and exhaust systems), and all other components which come as part of any equipment shown on drawings.

5. Furnish and install outlets and covers as noted on plans, unless otherwise specified.

D. Divisions relating to millwork, fabricated metals, tile or other finishes adjoining the work under this section.

E. Related work may be described in a manner other than that listed above, but is nevertheless applicable.

F. Additional Related Work: Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of the Specifications or elsewhere, whether or not specifically listed.
1.04 CONTRACT DOCUMENTS

A. The Contract Documents shall consist of all kitchen equipment and connection plans and details; these general conditions and specifications; and all addenda issued prior to the execution of this contract.

B. Nothing contained in the Contract Documents shall create any contractual relationship between JDB and the FSEC.

C. JDB will furnish any additional assistance which may be reasonably required for the execution of the work. The FSEC should not perform work without drawings and/or written instructions. Drawings and specifications are intended to complement each other, so that neither is complete without the other. The FSEC should not submit bids, enter agreements, or entertain execution of this contract without complete access to all contract documents.

D. FSEC shall accept the contract with the understanding that the contract documents are for assistance and guidance, indicating the arrangement and location of equipment. Checking rough-in drawings, shop drawings, details and equipment drawings by JDB is for design concept only, and does not relieve the FSEC of responsibility for compliance with design drawings, details and specifications, verification of utilities with equipment requirements for conformity and location, and verification of all dimensions of equipment and building conditions or reasonable adjustments due to deviations.

E. All “FS” series drawings issued by JDB are informative only and are not to be used for construction or shop details. FSEC shall carefully review Contract Documents and shall at once report any errors, ambiguities, inconsistencies or omissions he may discover to the Owner and JDB. FSEC shall not do any work without approved Drawings, Specifications and/or Modifications and without receiving prior written authorization from Owner or JDB.

F. All contract documents furnished by JDB are the property of Jacobs | Doland | Beer. and are not to be used on any other project, wholly or in part. These documents are to be returned to JDB at the completion of this work.

1.05 SUBMITTALS

A. Format: All submittals shall be made as indicated below. Electronic submittals are not permitted unless written consent is given by the Owner and JDB. Electronic file formats for submittals shall be PDFs and AutoCAD .DWG files where applicable.

B. Rough-in Drawings
1. Submit 1/4" = 1'-0" scale rough-in drawings for review. Prepare separate electrical and mechanical dimensioned rough-in drawings showing exact point of penetration of floors, walls, and ceilings for all services required to operate the equipment that the contractor shall furnish, including the requirements for contractor or other vendor supplied and installed refrigerant and beverage piping line runs. These dimensions shall be taken from finished walls and columns and include all electrical and plumbing floor "stub up", "out of wall" and "branch to connection (BTC)" notations for use in the field, where additional rough-in drawings are required. These drawings shall also show exact locations of final connections to equipment. Indicate floor drains, floor sinks, receptacles, lights and other special conditions related to the equipment known to the contractor but provided under other sections.

2. Supplementary floor plans showing detailed dimensions and requirements for elevated bases, floor openings or depressions, grease trap locations, special height walls, electric panel locations wall openings, locations of partitions and wall reinforcing as related to equipment supplied under this section, to a scale of ½" equals 1'-0", where additional floor plans are required.

   a. Dimensions for all items specified herein must be verified at job site and revised only to suit building conditions, and after written approval from the Construction Manager. Written dimensions on drawings take precedence over scale.

3. FSEC shall be responsible for the accuracy of all information on his/her drawings.

4. In the event rough-ins have been accomplished before award of this contract, FSEC shall check location of all rough-ins, and if any are improperly placed to permit hook up of the equipment, said problem shall be brought to the attention of JDB for correction at once.

C. Shop Drawings

1. Typically, details for all custom fabricated equipment shall also include fully detailed plan, elevation and section on views of all applicable specified items. Details shall be drawn at a scale sufficient to represent all components for review. Isometric details of Custom Fabricated Equipment will not be acceptable unless they are similar to ones already found on the Food Service Contract Drawings.

2. All shop drawings shall be on sheets measuring 30" x 42", or as requested by Architect. Contractor shall provide a minimum of 4" open space by 30" at the right-hand side of the drawings for Architects, Engineers, Consultants and General Contractors approval stamps or comments. Failure to comply with this requirement may result in rejection of a shop drawing submission.

3. Dimensions - Adhere strictly to dimensions where indicated on the drawings. Where dimensions are not indicated, construct all equipment as specified or drawn to scale, after verification of field conditions and measurements.
4. Field measurements - Verify all measurements at the premises before proceeding with any shop work. Set all free-standing equipment 3" clear of walls, unless otherwise stated or specified. Where required dimensions are not immediately obtainable and the delay in waiting for these dimensions would cause the work to be delayed, refer the matter to JDB or the Owner for a written decision. Consider work requirements of all other trades in obtaining measurements at the premises. Fabricate equipment to provide necessary clearances for all surrounding and adjoining work.

5. The review of shop drawings will be general and shall not relieve the contractor of responsibility for proper fitting, finishing, quantities and erection of work in strict accordance with the contract requirements, nor does it relieve him of the responsibility of furnishing material and workmanship not indicated on approved shop drawings but required for the completion of his / her work.

6. Should discrepancies occur affecting the efficiency of, or the practicability of the operation of the equipment, work of the various trades, or where panel boards, vent ducts or supply lines do not coincide with the drawings, same shall immediately be brought to the attention of Architect / JDB.

7. Additional drawings required for the complete orderly progress of the work for this project shall be prepared by this contractor if directed, without additional cost to the Owner.

8. During the entire life of this project, the FSEC shall maintain a perpetual log, listing every item of equipment on the project and sub-items, if any. Log shall indicate date of submission, date returned, status, date of resubmission, etc., to provide an accurate record of each submission. Said log shall be updated and included with every new submission. Failure to submit said log may be cause for rejection of the submission.

D. Samples: If requested, applicable samples shall be submitted with shop drawings and shall be actual size of equipment consisting of, but not limited to the following:

1. Handles and hardware (hinges, catches, etc.)
2. Access panel to refrigeration equipment.
3. Drawer assembly.
4. Corner of a work table, leg and shelf
5. Door assembly and handle.
7. Sneeze guards and/or display case.
8. Any other samples that are deemed necessary by the Owner or their consultants.
E. Cut Sheets: Three (3) bound sets of manufacturer's specifications sheets with complete information on all items of standard manufacture, shall be submitted. Cut sheets shall include lead sheets indicating utility loads, connection sizes, and all options and accessories.

F. Service Manuals: Two (2) bound sets of service and parts manuals shall be furnished for items of standard manufacture before final acceptance of installation by the Architect or his / her representative.

G. Service Agency Listing: A complete list of local service agencies for all included manufacturers, complete with telephone numbers.

H. Maintenance Schedule: Three (3) copies of a Maintenance Schedule for all appropriate equipment items shall be provided before final acceptance of installation by the Architect or his / her representative.

1.06 QUALITY ASSURANCE

A. Manufacturers' Instructions: In addition to the requirements of these specifications, work shall comply with manufacturer's instructions and recommendations for all phases.

B. Underwriters' Laboratories: Electric equipment and components shall be Underwriter's Laboratories (UL) listed and labelled and shall conform to the latest standards of National Electric Manufacturer's Association (NEMA) Code as well as local standards. The wiring of devices shall also comply with the National Electric Code.

C. National Sanitation Foundation: All applicable items shall conform to latest Standards and Revisions established by the National Sanitation Foundation (NSF), Ann Arbor, Michigan.

D. American Society of Mechanical Engineers: Standard steam heated equipment shall be manufactured in accordance with ASME code requirements and carry the stamp, where required.

E. AGA: Gas heated equipment shall be equipped with automatic ignitors and automatic safety pilots, to conform to AGA standards, and carry the AGA seal.


G. Work and materials shall be in full accord with the latest rules of US Public Health Service, National Board of Fire Underwriters, OSHA, local or state ordinances, State Accident Commission's safety orders, regulations of the State Fire Marshall, and with all prevailing rules and regulations.

H. LEED and Energy Star: Comply with standards of “LEED” Leadership in Energy & Environmental Design to the fullest extent as possible. All electrical equipment to be Energy Star rated where available.
I. Access: Accord to the Architect and/or JDB, or their authorized representatives, access to the factories where all specified food service equipment is fabricated or manufactured for the inspection of materials and of the general construction of the work as it proceeds before completion and shipment.

1.07 QUALIFICATIONS

A. To be considered eligible to work on this project, the Contractor for the work of this Section of the Specifications must:

1. Be a fully recognized FSEC currently engaged in the installation of standard manufactured and custom fabricated commercial Food Service Equipment for a recommended period of ten (10) years prior to submitting bid.

2. The experience, competence, responsibility, quality of personnel and staff of the bidder shall be considered in making the award to the food service equipment subcontractor.

3. The FSEC shall further exhibit upon request, ample financial resources to enable him to execute the work involved on this project in a timely manner, satisfactory to the Owner, and to deliver all equipment and install as required so as not to delay the progress of the work. This applies to all subcontractors as well. Such evidence shall be in a form acceptable to the Owner.

4. The FSEC shall submit a detailed resume of the project manager he / she proposes to utilize for this project. This resume shall include a complete description including the name of the proposed project manager, educational, professional and work experience. Failure to submit such a resume with the bid may be cause for rejection thereof.

5. The FSEC shall provide the services of a full-time project manager to oversee the project.

6. The project manager shall demonstrate experience managing projects similar in size and scope as this one.

7. The project manager shall have experience which shall include, but not be limited to the following:

   a. Coordination with General Contractor for location of walls, ceilings and other architectural details, including assistance with layout thereof in field.

   b. Coordination with plumbing, electrical and HVAC subcontractors for location of rough-ins in the field and checking to ascertain that all rough-ins are properly located

   c. Shall oversee delivery and installation of all equipment through hook-up, testing, demonstration and start-up of the facility.

   d. Review and coordination of shop drawings, rough-in drawings and cuts for compliance with contract requirements and for coordination with job site conditions prior to submission for approval.
e. Liaison with General Contractor and all trades at the job site, as well as other equipment suppliers, fabricators and vendors.

f. Assembly and deployment of composite crews, if any.

8. The project manager shall keep a daily record of all matters of significance and report same to the Owner and the food facility consultant by copy of the log.

9. The project manager shall represent the FSEC at all job meetings.

10. It is the intent of these specifications that the project manager be available full time at the job site on all days when any trade is present working on the food service portion of the project. His / Her presence will not be required on other than regular work days or holidays, except by direction of the Construction Manager / Architect.

11. The decisions of the project manager shall be binding upon the food service equipment subcontractor.

12. The project manager shall begin performance of his / her duties and conclude same when directed by the Owner.

13. It is the intent of these specifications that the project manager provides all information, assistance and data necessary to maintain the progress of the project in compliance with pre-established schedules.

14. Once employed, the project manager shall not be removed from the work, except at the request of the Owner for as long as he / she is in the employ of the food service equipment subcontractor.

1.08 SUBSTITUTIONS

A. Whenever any product is specified in the contract documents by reference to the name, trade name, make or catalog number of any manufacturer or supplier, the intent is not to limit competition but to establish a standard of quality which has been determined is necessary for the project. Therefore, it is the intention of these specifications to obtain all equipment as described in the plans and specifications.

B. If for any reason a substitution is proposed after award of a contract, it is the intention of this specification that JDB and the Owner shall judge as to whether a proposed product is to be approved and the contractor shall have the burden of proving at his / her own cost and expense to the satisfaction of JDB that the proposed product is similar and equal to the named product. In making such determinations, JDB may establish such criteria as is deemed proper that the proposed product must meet in order for it to be approved. If JDB determines that the proposed products are not acceptable, the contractor shall supply the product specified.

C. The contractor shall neither be given nor make a claim for an extension of time or for damages by reason of the time taken by JDB to consider a product proposed by the contractor or because JDB disapproves such a product.
D. Substitutions must be approved in writing by the Architect / JDB. When approved alternate items have different space requirements, utility connections, and/or dimensions from the item specified, the FSEC shall be responsible for fitting items into available space, providing any required directions, and assuming costs for any utility, building, architectural, or engineering changes, unless relief from this obligation is granted, in writing, by JDB or the Owner.

1.09 SPECIAL REQUIREMENTS

A. Equipment listed under "Schedule of Equipment" shall match in every respect all mechanical and electrical requirements as indicated in the Contract Documents. In the case of reused, relocated or new equipment furnished by Owner, this contractor shall verify and coordinate utility requirements with field conditions.

B. The installation and set-in-place of all Food Service Equipment shall be performed under the supervision of a competent representative acceptable to the Food Service Equipment Manufacturer in strict accordance with the specifications and the accepted printed directions of the equipment manufacturer.

C. Dimensions given herein are approximate only, and in all cases, where equipment is intended to occupy fixed locations and spaces, the physical conditions of the building are to control the absolute sizes.

D. Provide locks for all doors, drawers, cabinet doors, etc., as specified.

E. All penetrations in any work table or serving counter tops required to run mechanical services to any equipment items located on same, shall have raised openings, fitted with rubber or plastic grommets to protect these service lines (unless otherwise noted) in the Contract Documents.

F. Deliver all equipment to the job promptly and in such time as not to delay the work of other trades. Do not start making deliveries of equipment until instructed. Cooperate with all trades in the proper installation of equipment. Set all equipment level, plumb and true and anchor to the floor, walls and/or ceiling as required. Leave all equipment ready to receive plumbing, steam, electric, gas and ventilation connections which shall be provided under other contracts.

G. Complete work in all respects and detail, include all necessary bolts, hangers, brackets, screws, etc. Leave all equipment ready for use or mechanical connections.

H. Manufacture items of equipment in strict accordance with the specifications. Materials for construction to the best of their several kinds, free from all defects which would mar their appearance, or render them structurally unsound.

I. Provide competent supervision for installation of all equipment under this contract, which shall include uncrating, assembling, fitting, setting in place and leveling. After completion of installation furnish a qualified person to test all equipment and to instruct the kitchen personnel in the use and care of all items of equipment. Provide two (2) sets of repair and maintenance instructions for each item of mechanically operated equipment, bound in hard cover brochure form. Each item shall be identified by number.
J. All trash, crating, boxes and coverings pertaining to the food service equipment shall be placed in a central location on the floor or in containers furnished by the General Contractor. All excess materials to be removed at the conclusion of the contractor's work.

K. When directed by the Owner or their representative, remove all protective covering from food service equipment, remove labels or other identifying marks, clean all equipment free of dust, soot, etc. ready for final sanitary cleaning by the catering contractor. Clean interior as well as exterior of all equipment.

L. Plumbing, electrical, heating and ventilation rough-ins and final connections of the equipment are by those respective trades. The FSEC shall furnish all required information for the coordination of his / her work with the work of others. He / She shall be responsible for field checking as well as obtaining copies of all related drawings, architectural, mechanical, HVAC and electrical.

M. Valves and traps, electric starters and switches, light receptacles and other trim and fittings, which are not an integral part of the equipment, or are not hereinafter specified will be furnished and installed under other sections of the specifications.

N. Certain items of equipment indicated on the drawings but specifically excluded from the contract will be furnished and installed under other sections of the specifications. Such items may be noted as "BY OTHERS", or "N.I.C." (not in contract) and are considered not the responsibility of this food service equipment subcontractor, except as it affects adjoining work, where coordination is required or as specified hereinbefore.

O. Certain items designated as "BY OTHERS" or "N.I.C." (not in contract) will require coordination and/or the performance of certain services as described hereinafter under those items. In such cases, this contractor will coordinate or provide the services described.

1.10 FORM OF BID

A. All bids shall be submitted in the bid form indicated by the sample attached hereto. Failure to follow the prescribed format may be cause for rejection of the bid.

B. All bids shall bear the signature of an officer duly authorized to enter into contracts.

C. Delivery and set-in-place and taxes and shall be listed separately as outlined in Section 1.01, Summary, Part C.

D. All plans and specifications furnished to bidders remain the property of the Owner and shall be returned to the Owner after submission of bids.

E. The bid shall include number of calendar days necessary for completion of the work in this specification, including separate listing for time required to prepare rough-in and shop drawings and cuts.

F. Bidders shall state on the bid form the length of time bids shall remain in effect.

G. No explanation or interpretation of the plans and specifications or contract documents will be made orally by the Architect, consultant or Owner.
H. The bidder agrees that if the Owner awards a contract to him/her, he/she will immediately enter into a contract in accordance with the conditions and terms of this proposal.

I. Itemized bid shall be submitted with the following:

1. The price for each item, including inland freight, all associated costs, overhead factors, profit, etc.
2. Total of itemized prices
3. Delivery and Set-in-place prices
4. Applicable sales tax
5. Grand total base bid
6. Timeline for production of rough-in drawings
7. Timeline for production of shop drawings
8. Name and contact information of Fabricator for Custom Fabricated Equipment
9. Completed Excel spreadsheet (included with bid package) with itemized pricing as above

1.11 GUARANTEE

A. Equipment furnished under this section of the specifications shall be guaranteed for a period of two (2) years from the date of final acceptance thereof against defective materials, design and workmanship, or longer if specified for a particular item. Upon receipt of notice from the Owner of failure to any part of the guaranteed equipment during the guarantee period, the affected part or parts shall be replaced promptly at the expense of the contractor. Until such time that replacement equipment is installed, the Owner shall have full use of the defective equipment.

B. Any refrigeration equipment provided under this contract, exclusive of existing equipment which is re-used, shall be provided with 24 hour a day, seven days a week refrigeration service for two (2) years from the date of start-up of the new refrigerated equipment. The name, address and telephone number of the refrigeration service company shall be conspicuously posted on each item of equipment covered by the refrigeration service guarantee.

C. All refrigerated equipment shall carry extended warranties for at least five (5) years. Such warranties shall cover all parts.

D. Guarantee shall be provided as outlined without additional cost to the Owner, General Contractor or the Architect.

1.12 ADDITIONAL REQUIREMENTS

A. The following requirements shall apply to all equipment specified hereinafter. If the itemized specifications include the requirements outlined herein, they shall not be redundant. If not specified as part of the itemized specifications, they shall apply.
1. Provide all electric equipment requiring a cord and plug with same if not so specified and not furnished by electrical contractor, where plug in of the appliances is required.

2. Unless otherwise specified, all stainless steel pans or inserts for hot food tables, sandwich refrigerators or other items requiring same, will be furnished by others.

3. Each fire suppressing system shall be provided with a minimum of two micro-switches to interface with electric controls.

4. Any item with a drain outlet shall be provided with an appropriate drain valve, either gate valve or lever waste type, chrome plated, which shall be easily accessible.

5. All custom fabricated equipment, if incorporating an electric appliance, or appliances or components of standard manufacture or custom built, shall include a master switch and pilot light to act as a positive disconnect switch for the specific electric appliance or component. Each master switch and pilot light shall have an engraved self-adhesive name plate affixed thereto. Name plate shall be brushed aluminum with black lettering identifying the item controlled by the switch.

6. Coordinate location of all water filtration devices for ease of access and maintenance.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Stainless steel, sometimes specified as s/s hereinafter, to be corrosion resisting steel with not less than 18% chromium and 8% nickel and not more than 0.12% carbon or nickel alloy, except as noted hereinafter.

B. Where stainless steel is welded other than by a time control spot weld method, steel to contain at least 18% chromium and 8% nickel and not more than 0.07% carbon, unless the sum of chromium and nickel is at least 26.5% in which case 0.08% carbon will be allowed. The stainless steel is to be guaranteed not to cause precipitation of harmful carbides due to welding operation.

C. Stainless steel castings may contain carbon up to 0.10% with 18% chromium and 8% nickel, or carbon up to 0.15% if the sum of chromium and nickel, neither falling below the prescribed minimum of 30%.

D. Finish

1. Polish all stainless steel to #4 finish, grind welds, and polish to match.

2. Grind welds on undersides of counters or tables and "metallize".

3. Weld all field joints on the job, grind unexposed welds smooth and "metallize", grind exposed welds smooth and polish.

4. Continuously weld all joints, spot welds or welded concealed studs must be polished on surface and "metallized" on underside.
5. No bolt heads or screws, etc., to show on exterior surface of any item of equipment.

E. Protection

1. Deliver all stainless steel items of equipment to the job covered with protective coating.

2. Remove coating when directed by the General Contractor and restore scratched or marred surfaces to their original finish and to the approval of the General Contractor.

F. Ferrous metals

1. All galvanizing to be hot dipped.

2. Clean all other metal parts thoroughly and prime with one coat of rust inhibiting primer, except where enamel finish is used, apply one coat of aluminum lacquer over primer.

G. Metallize: Means to spray with hot zinc, or spray or brush welds (minimum 1/64" thickness) with miracle no torch cold solder.

H. Solder: When called for hereinafter to consist of 75% tin and 25% lead.

I. Gauge - for sheet iron and sheet steel to be U.S. standard of thickness indicated below:

<table>
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<th>Gauge</th>
<th>Thickness in Inches</th>
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<tr>
<td>20</td>
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</table>

J. Fastenings

1. Rivets, weld, bolts, screws, nuts and washers to be of steel, except where brass or stainless steel is fastened, in which case they shall be of brass or stainless steel respective.

2. For fastening of dissimilar metals, welds, bolts, rivets, screws and nuts shall be the least corrosive metal.

3. Space and extent of welds, rivets, bolts and screws to be such as to ensure suitable fastening and prevent bulging of metals fastened.

K. Silicone sealant

1. Clear, black, white or aluminum color as required, and as manufactured by Dow Corning; or approved equal. Apply as recommended by manufacturer.

2. To be RTV-732, National Sanitation Foundation and Food & Drug Administration approved type, or approved equal.
L. Insulation: Owens-Corning #PF-382, minimum 1" thick, secured to equipment with Benjamin Foster #81-20 adhesive; or approved equal.

M. Lamps: Within equipment shall be provided with lamp guards, N.S.F. approved, or shall be N.S.F. approved plastic-coated type.

N. Locks: All equipment where specified shall be provided with cylinder locks keyed as specified, and master keyed to level of security control specified.

2.02 WORKMANSHP

A. Welding

1. Shall be done by the electric fusion metal arc method. Carbon arc and gas welding will not be permitted. Welds shall be continuous, strong and ductile, with excess metal ground off joints finished smooth to match adjoining surfaces. All joints in tops of fixtures, tables, drainboards, over shelving, sinks and other equipment shall be welded. Butt welds made by spot welding straps under seams and filling in the voids with solder and finish by grinding, will not be acceptable. Tops of fixtures shall be fabricated in the factory with welded joints to reduce field joints to a minimum. Field joints shall be welded and exposed welds ground smooth and polished to match factory finish of adjacent surfaces. Wherever material has been depressed by a welding operation, such depressions shall be suitably hammered and peened flush with the adjoining surface, and if necessary, be ground again to eliminate low spots. Care shall be exercised in all grinding operations to avoid excessive heating of the metal, causing discoloration. In all cases, the grain of rough grinding shall be removed by successive polishing operations. Wherever such break bends occur, they shall be free of undue extrudence and shall not be flaky, scaly and cracked in appearance. Where such breaks mar the uniform surface appearance of the materials, all such marks shall be removed. Sheared edges shall be free from burrs, fins and irregular projections and shall be finished to obviate all danger of cutting and laceration when the hand is drawn over the edge. Mitres and bull-nosed corners shall be welded.

B. Exposed stainless steel: All surfaces shall have a No. 4 finish as specified hereinbefore, unless otherwise specified. An exposed surface shall be interpreted as meaning outside surfaces exposed to view and inside surfaces exposed to view when a sliding or swinging door is opened. The underside of a shelf may be a No. 80 ground finish. Final finish to be contractor's factory finish and not as furnished by mill. Special finishes shall be as described herein, or on reference details.

C. Underside of tops: All work tops, dish tables and drainboards shall be treated with an approved spray-on sound deadening material with an aluminum spray finish. Sound deadening shall be applied to fixtures after tops have been completely fabricated.

D. Soldering: Shall be done in strict accordance with recommended procedures of the stainless steel manufacturer. In no case shall soldering be relied upon for the stability of seams and joints. The soldering shall serve only as filler to prevent leakage. Soldering shall not at any time be used in and on any surfaces which may come in contact with foods. Soldering shall not at any time be considered as replacing welding or brazing.
E. Equipment: All equipment shall be mechanically fastened to walls, floors or ceiling and assembled together.

F. Protective Coverings: All protective coverings shall be furnished and maintained for the protection of the equipment until ready for inspection and demonstration.

G. Field Conditions: Where mechanical or structural field conditions have direct cause to alter equipment specified in any manner, notify in writing the Owner and Architect for directional purposes before proceeding with that portion of the work.

H. Control Devices: All fittings, control valves, plumbing works, or electrical operating switches, furnished as part of the equipment shall match and equal in every respect those specified under the Divisions 15 and 16 (Mechanical and Electrical Sections) of the Specifications. Each piece of apparatus shall have, in addition to mainline control valves, individual operating valves, so that any piece of apparatus may be removed for repairs without interruption of the remaining apparatus. All such valves, switches and fittings shall be located at a point of greatest convenience for operation and shall be furnished by the Food Service Equipment Subcontractor.

I. Openings and Access Panels: Provide all access panels and other openings which may not be specifically mentioned in the specifications or shown on drawings but which are required for access to and/or the proper functioning of the equipment. This shall also include plumbing or electrical devices which are not normally furnished by the manufacturer of the equipment but are required for proper equipment functioning. Provide access panels to service equipment within the units.

J. Starting Switches: Furnish starting switches including those for remote installation, to the Electrical Contractor who shall install and wire same.

K. Pipes, Fittings and Valves: All pipes, fittings and valves required within the equipment shall be furnished with respective items of equipment. Exposed plumbing, piping, fittings, valves and conduit shall be chrome plated.

2.03 OTHER MATERIALS

A. All other materials not specifically described but required for a complete and proper installation of the work of this Section, and to make the equipment operative, shall be provided by the Contractor and shall be new, first quality of their respective kinds, and subject to approval of the Architect / Engineer.

2.04 FABRICATED EQUIPMENT

A. Sinks and Drainboards: All sinks and drainboards shall be constructed of 14 gauge stainless steel as follows:

1. Joints shall be welded. Front and ends, unless otherwise indicated on drawings, shall be extended 3", measured at sink edge, and rolled on a diameter of 1-1/2", 180 degrees. Raised, rolled rim at front and ends of drainboard shall be leveled with sink rolled rim and continuous therewith and shall not follow the pitch of the drainboard.
2. Drainboards shall be pitched 1/8" per 1'-0" towards sink compartments. Sinks and drainboards adjacent to walls or adjoining equipment, shall have 10" high splash backs, unless otherwise noted, level and continuous, not following the pitch of drainboards. Where drainboards are 24" or less, they shall be supported on one inch outside diameter 16 gauge stainless steel tubular, seamless diagonal braces and secured to sink gussets, welded around entire perimeter. Where drainboards exceed 24" in length, legs shall be provided. All vertical and horizontal corners shall be rounded to a radius of approximately one inch, with intersections meeting all curved surfaces. All sinks having two or more compartment shall have double dividing partitions with fully rounded corners, both vertical and horizontal.

   a. All corners of rolled rim shall be fully rounded outside roll and be concentric with inside roll. The bottom of each sink compartment shall be creased to a sufficient pitch toward waste outlet. Openings for hot and cold faucets shall be cut into splash backs as required. All sinks shall be 16" deep, unless otherwise specified or indicated on the drawings. All divider panels where required shall be a minimum of 3/4" thick double wall stainless steel construction.

3. Each sink compartment shall be provided with a waste outlet. Each waste outlet, except as otherwise specified shall be a two inch lever-handle valve constructed of the best grade chrome plated cast brass or bronze. Model No. 22209 (28967 for overflow assemblies), as manufactured by Fisher; or approved equal. The outlet shall be free flowing, non-clogging type, with a perforated strainer of stainless steel on the interior of the sink bottom and having two inch pipe size thread at the lower end, and shall provide chrome plated locknut washers and chrome plated tailpiece. The outlet shall be a precision machined tee-fitting, protected by a sealed stuffing box which shall eliminate the possibility of leakage from key to exterior of outlet. The outlet shall be set into a die depression and attached without rivets to the sink bottom, and shall be furnished with externally operated stainless steel lever handles. The outer body shall have an opening threaded to receive 2" iron pipe size overflow at the rear. This overflow fitting shall be 1-1/4" brass chrome plated, and shall be provided with a stainless steel strainer on the sink interior and shall be connected to the waste outlet by means of 2" brass pipe tubing which shall be chrome plated, except as otherwise specified.

4. Sinks set into work counters or table tops shall be constructed of same gauge and materials as specified for counter top as follows:

   a. Top perimeter of each sink shall be integrally welded flush to edge of opening in table or counter top. Table or counter top shall be die-punched to receive faucets.

   b. Sinks shall have vertical and horizontal corners rounded on a 1" radius, with bottoms pitched to a 2" waste outlet, depending which is indicated on drawings. Sinks shall be finished the same as table or counter tops.

5. Water inlets shall be located in all instances above the positive water level to prevent siphoning of liquids into the water system.
B. Dish tables shall be constructed same as previously specified for sinks and drainboards unless otherwise indicated on drawings.

1. Stainless Steel Table Tops: All stainless steel table tops shall be 14 gauge polished stainless steel constructed as follows:

2. Edges shall be rounded and free from burrs and any excess material. Tops shall be rolled 180 degrees, 2" in diameter on all exposed sides, or as detailed. Where tables are placed against building walls, they shall be turned up in back approximately six inches, returned at top, one inch diagonally to wall with all exposed ends welded closed. Corners shall be rounded or bullnosed. Top shall be reinforced 1-1/2" x 1-1/2" x 1/8" galvanized iron angle framework reinforcing, full perimeter of underside of top, with cross angles every 30" or less. Reinforcing shall be secured to the underside of the top with stud welds, lock washers and speed nuts.

3. Underbracing shall be provided for drainboards, and dish table tops, and shall be 1" x 4" x 1" channels of 14 gauge stainless steel. Bracing shall be welded to the underside of fixtures in a manner suitable to seal out vermin and also to create a noise deadening top surface. All channels shall extend the full length and depth of fixtures and shall be so positioned that no dimension between channels exceeds 30" in any direction.

C. Legs:

1. Legs shall be constructed of not less than 1-5/8" o.d., 16 gauge stainless steel pipe. Legs shall be in no case spaced more than 6'-0" on centers. Leg cross bracing, where required, shall be constructed of not less than 1-1/4" o.d. x 16 gauge stainless steel tubing. All leg bracing shall run horizontal and level between all legs, approximately 10" above the floor, unless otherwise specified. All joints shall be completely welded around the entire perimeter.

2. Leg Mountings
   a. Units mounted on legs that are 14" or longer shall be provided with underbracing. Legs in such cases are to be provided with not less than 12 gauge stainless steel gussets, extending downward. Gussets shall be die stamped, fully enclosed, drawn cylindrical and cone shaped of not less than 3" in length, 2-1/2" in diameter at top. Gussets shall be welded continuously around entire circumference against the channel reinforcement.
   b. On legs between 8" and 14" in height, gussets shall be provided, but no underbracing need be furnished.
   c. Feet shall be stainless steel bullet type, having an integrally formed shaft with a minimum adjustment of approximately 1-1/2" without the use of threading or adjusting bolts. Feet shall be completely sealed at bottom and shall be close fitting between tubular leg support and foot. Where flange feet are specified, they shall be secured to the finished floor with two stainless steel bolts.
   d. Casters shall be heavy duty as manufactured by "Standard-Keil" diameter of casters and brakes as hereinafter specified.
D. Under shelving:

1. Flat under shelving shall be 16 gauge stainless steel turned down on front and sides approximately 1-1/2" and under ½" to form a channel shape. Rear of shelf to be turned up 2" and hemmed. Under shelves shall be reinforced with 1" x 4" x 1", 14 gauge stainless steel channel, full length of shelf. Shelves shall be notched to fit the contour of legs. Shelves shall be fully welded to legs, crevice free.

2. Slotted under shelving is to be constructed same as above except that die-stamped slots approximately 1-1/4" wide and 3" apart are to be furnished full length of shelf units running front to back.

3. Counter shelves and cabinet shelves shall be constructed of 16 gauge stainless steel. All shelves shall be of the removable type unless otherwise specified on drawings and constructed in sections of not more than 30".

E. Drawers shall be of the telescoping slide type with completely enclosed 16 gauge stainless steel housing. Provide drawers with 20" x 20" x 5" deep inside liner; Model No. S80-2020, 20" x 20" x 10" deep inside liner; Model No. S83-2020, all as manufactured by "Component Hardware", or accepted equal to be removable without untracking, gray in color, smooth finish, all thermoplastic construction with all vertical and horizontal corners on a radius, with the top edges flanged out to set into a 16 gauge stainless steel track and housing combination. The housing combination shall operate on a 16 gauge stainless steel outside locking track. Fronts shall have 16 gauge stainless steel front panel with full grip pull handles; key locks; and heavy duty drawer slides. The drawer front shall be double wall type construction filled with an accepted sound deadener within. Below drawer, if specified, there shall be a 21" x 24" x 1" thick, white thermoplastic carving board. Boards to fit into stainless steel "Z" slides.

F. Wall cabinets shall be of length as shown on plans or hereinafter specified 15" deep x height specified, except as otherwise specified or shown on drawings. All cabinet shall have flat or sloped, dust proof tops, as specified. Exterior bottoms shall be of flush construction. Construct cabinet of 18 gauge stainless steel, of all welded construction. Cabinet interiors shall be provided with a fixed bottom shelf and one removable, adjustable, intermediate shelves. Shelf shall rest on clips, which shall be secured to pilaster strips fastened to interior of cabinet. Door shall be of double wall construction as specified.

G. Counter and Cabinet Doors:
1. Sliding doors shall be constructed of 16 gauge stainless steel exterior and 18 gauge stainless steel interior unless otherwise specified. Door shall be equipped with pull handles and key locks as specified. Doors shall be removable. Doors shall be double pan construction with all corners welded and shall be filled with an accepted ½" thick sound deadener. Doors shall be provided to permit removal for cleaning and adjustment without the use of tools. Bolts and screws shall be kept to a minimum and shall be of corrosion resisting metal. Spacers, where not exposed to view, shall be 14 gauge 3/4" diameter stainless steel tubing. Upper suspension nylon rollers shall be heavy duty to fit stainless steel track so as to minimize wear and noise. Doors shall operate on rollers freely without friction or rubbing between doors, door suspensions and upper sliding framework including hardware. Doors shall be self-closing.

2. Double sliding doors shall be provided with double overhead tracks and carriers for maximum clear door opening. Unit shall be provided with trackless bottom with concealed guide for overhead roller doors. Guides shall be equipped with limit stops to prevent telescoping of doors.

3. Hinged doors shall be constructed of 16 gauge stainless steel exterior and 18 gauge stainless steel interior, with all corners welded and insulated with an accepted sound deadener material within. Hinges, catches, door handles and locking devices shall be provided as hereinafter specified.

H. Wall shelves shall be of length as shown on plans or hereinafter specified. All shelves shall be constructed of 16 gauge stainless steel, turned up 2" at both sides and rear, unless otherwise specified or shown on details. Rear shall be hemmed. Sides shall be fully welded and enclosed above and below shelf, flush with rolled edge as shown on details. Shelves shall be supported on 12 gauge stainless steel brackets spaced no more than 4'-0" o.c. Brackets shall be welded to shelves as hereinbefore specified.

I. The following are basic fabrication standards for all equipment whether designated by model number or generically. See reference details for additional standards.

1. Table, counter tops: 14 gauge stainless steel.

2. Bracing below tops: 1-1/2" x 1-1/2" x 1/8" galvanized angle or stainless steel channels as detailed.

3. Cabinet bodies: 18 gauge stainless steel, "unibody" construction, with flush welded and polished front construction.


10. Undershelf/tubular leg junctions: Fully welded and polished.
13. Approval labels: Affix National Sanitation Foundation and Underwriters Laboratories, where applicable.
14. All custom built refrigerators shall have CFC free foamed-in-place polyurethane insulation.
15. All custom built refrigerator doors shall have full perimeter magnetic gaskets.
16. All custom built refrigerators shall have hot gas condensate evaporators.
17. All electrical wiring of custom built equipment shall have Underwriters Laboratories approval.
18. Unless otherwise specified, all custom fabricated equipment shall be as manufactured by fabricators having the capability of producing the custom built equipment to the quality levels specified and whose qualifications must be submitted in the bid form. The fabricator submitted shall be subject to the Owner’s approval.

2.05 HANDLES, BRACKETS, LOCKING DEVICES AND HARDWARE

A. Wherever equipment is provided with handles, knobs, hinges, brackets, or other miscellaneous hardware, all shall be either satin finish chrome plated or stainless steel. All pull handles to be of the full grip type, unless otherwise specified.

B. All sliding and hinged doors and all drawers in tables, cabinets, refrigerators, storage bins, to be furnished with extra heavy-duty security type locking devices of cylinder type, chrome plated. Owner to verify preferred keying of all locks.

C. All hinged doors shall be provided with stainless steel semi-concealed flush type and adjustable tension type catches. Unless otherwise specified, each shall be fully mortised into doors and corresponding mullions to create a flush, clean appearance. Submit sample of hinge and catch for review.

D. All mobile stands and tables to be provided with heavy duty casters.

2.06 FAUCETS, VALVES, FITTINGS

A. Faucets, valves and fittings shall be as follows:

1. All faucets shall be provided with aerators.

2. Dishwashing machine shall have a pressure regulator valve set for twenty pounds discharge pressure. Valves shall be self-regulating and shall have a manual adjustment range between 15-30 pounds. Valve bodies and working parts shall be of brass.

3. Provide an approved anti-water hammer device for dishwashing machine, consisting of synthetic rubber chamber cased in steel housing. Devices utilizing air chambers or coiled copper tubing shall not be accepted.
B. Faucets: FSEC shall furnish faucets on all sinks, bain maries, water stations, and other applications as specified, to be installed by Plumbing Contractor. All faucets are to be supplied from the same manufacturer. Unless otherwise noted, faucets are to be provided as follows:

1. Type 1D Deck-mounted, 12” swing nozzle
   a. Fisher Model 3313; or approved equal.
   b. T&S Brass Model B-1123; or approved equal.

2. Type 1S - Splash-mounted, 12” swing nozzle
   a. Fisher Model 13269; or approved equal.
   b. T&S Brass Model B-0231; or approved equal.

3. Type 2D- Deck-mounted, 8” swing nozzle
   a. Fisher Model 3511; or approved equal.
   b. T&S Brass Model B-1111; or approved equal.

4. Type 2S - Splash-mounted, 8” swing nozzle
   a. Fisher Model 3611; or approved equal.
   b. T&S Brass Model B-1116; or approved equal.

5. Type 3 Splash-mounted, Pre-rinse w/ spring-action flexible gooseneck and low-flow spray valve
   a. Fisher Model 13390; or approved equal.
   b. T&S Brass Model B-0133-C; or approved equal.

6. Type 4D Deck-mounted, 10” swing nozzle
   a. Fisher Model 3312; or approved equal.
   b. T&S Brass Model B-1122; or approved equal.

7. Type 4S - Splash-mounted, 10” swing nozzle
   a. Fisher Model 3252; or approved equal.
   b. T&S Brass Model B-1127; or approved equal.

8. Type 5 - Service sink faucet
   a. Fisher Model 18031; or approved equal.
   b. T&S Brass Model B-0665-BSTP; or approved equal.

9. Type 6D Deck-mounted, 6” gooseneck swing nozzle
   a. Fisher Model 3515; or approved equal.
b. T&S Brass Model B-0325; or approved equal.

10. Type 7D Deck-mounted, 6” single pantry faucet
   a. Fisher Model 3010; or approved equal.
   b. T&S Brass Model B-0207; or approved equal.

C. Drain valves shall be provided and installed by the FSEC for all heavy-use prep and potwash sinks. Valves shall be provided with overflow tubes and head assemblies as specified hereinafter. Unless otherwise noted, drain valves are to be provided as follows:

1. Drain Valves
   a. T & S Brass Model B-3992; or approved equal.
   b. Fisher Model 22438; or approved equal.

2. Drain Valves with Overflow Assemblies
   a. T & S Brass Model B-3992-01; or approved equal.
   b. Fisher Model 22322; or approved equal.

D. Utility Quick Disconnect Assemblies: Provide, as required for mobile or portable equipment, utility quick-disconnect assemblies to match equipment inlet size, and of a length to permit equipment movement for disconnect access and cleaning. All utility quick-disconnect assemblies to be provided with restraining cables.

1. Gas:
   a. Dormont: BPQ2SR double swivel gas connector hose; or approved equal.
   b. T & S Brass: HG gas connector hose; or approved equal.

2.07 REFRIGERATION EQUIPMENT

A. The FSEC shall provide and install materials and equipment, furnishing all necessary labor, tools, equipment, etc., to install complete systems of refrigeration for items listed.

B. It is the intent of this specification to obtain complete systems with necessary condensing units, control valves, tubing, fittings, insulation, etc. whether or not they have been specifically mentioned herein.

C. The FSEC shall provide and install complete refrigeration systems, charged, started up, and operating properly, including, but not limited to the following, regardless of any other requirements listed hereinafter:
1. Compressors, hermetic or semi-hermetic, compressor racks, blower coils, vibration eliminators, indicating sight glasses, liquid expansion valves, filters, separators, thermostats, defrost timers, controls and control local wiring, liquid line driers, copper piping, hard type refrigeration grade copper fittings and tubing with sweat joints using an approved equal silver solder with minimum number of joints feasible. All lines, both liquid and suction shall be provided with Armoflex insulation, or approved equal. Seams shall be glued and all joints shall be taped.

2. Where specifications call for pre-piped lines (i.e., from a fixture to a valve compartment, etc.) the FSEC shall perform such work in strict conformance with other sections of the specifications which set forth standards for this type of work.

3. Refrigeration specifications are written to provide minimum scope of work. The FSEC shall be responsible for ensuring that all refrigeration equipment shall be installed so as to maintain the following temperatures for equipment types, unless otherwise specified elsewhere.

<table>
<thead>
<tr>
<th>Type</th>
<th>Refrigerators</th>
<th>Freezers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk-in</td>
<td>-10 degrees F.</td>
<td>0</td>
</tr>
<tr>
<td>Reach-in</td>
<td>Must maintain a -10 degrees F.</td>
<td></td>
</tr>
<tr>
<td>Undercounter</td>
<td>food temperature of -10 degrees F.</td>
<td></td>
</tr>
<tr>
<td>Fabricated ) cold pans</td>
<td>40 degrees F., or less -10 degrees F.</td>
<td></td>
</tr>
</tbody>
</table>

or as required by the local Health Department and the National Sanitation Foundation, including NSF Standard No. 7. The above temperatures shall apply to all equipment. If there is a deficiency, the kitchen equipment subcontractor shall modify the refrigeration system(s) to perform as listed above.

4. The FSEC shall furnish all electrical and refrigeration components required for a complete system.

5. An evaporator coil defrost system shall be provided and installed by the FSEC on all refrigeration systems designed to operate at a balanced evaporator coil temperature.

6. The FSEC shall verify the requirements of each item and provide any and all additional components required or recommended by the manufacturer for proper operation and maintenance under the specific operating conditions and location of each system specified. This includes, but is not limited to isolation valves for remote applications on a common rack system.

7. The FSEC shall verify and provide by manufacturer that equipment selection hereinafter specified for each refrigeration system is proper and shall meet the operating requirements set forth for each system, and shall maintain the specified operating temperatures, hours of compressor running time and system pressures and velocities as recommend by the equipment manufacturer for the applicable condition.
D. Condensing units shall be Copleland, Techumseh; or approved equal. Units shall be complete with liquid line drier, shut off valves, oil, sight glass, dual pressure control and regulating valve. Condensing units are to be mounted on galvanized steel rack.

E. The refrigerant piping shall be type L seamless dehydrated copper tubing. All fittings and connections required to the various units shall be of the flare type with heavy forged brass flare nuts. Where elbows, toes or couplings are required, they shall be of the seamless sweat type soldered in with 95/5 solder. All lines shall be of a single length of tubing unless this proves impractical.

F. Connections that may have to be broken at a later date should be made by means of flares and flare nuts. Permanent line connections shall be soldered. Tubing shall be hung by approved hangers at centers of no more than 8'0".

G. Each system shall be provided with a properly sized thermal expansion valve, together with all other control valves, etc., required. Each system shall also include a dehydrator and sight glass.

H. Suction lines shall have 3/4" flexible Armoflex insulation. Thermostatic expansion valves shall be selected to handle evaporator loads specified, and refrigerant lines shall be sized for maximum pressure drop of one PSI.

I. The temperature of each refrigerator shall be controlled by means of a thermostat or pressure valve with the compressor operation controlled by the low pressure cut out switch. Thermostat and low-pressure control shall be adjusted to maintain room temperature specified.

J. Each system shall be cleaned and dehydrated by maintaining a vacuum of 500 microns or lower for a minimum period of five hours. The required operating charge of refrigerant and oil shall then be added and each system shall be tested for performance.

1. All refrigeration work performed under this contract shall comply with the Montreal protocols or current environmental regulations applying to commercial refrigeration equipment.

2. Approved methods for capturing freon or other refrigerants shall be in compliance with local, state and federal environmental requirements regarding depletion of ozone or other environment.

3. All condensing units and evaporator fans shall have high efficiency motors.

4. All United States government requirements for walk-in coolers and freezer effective January 1, 2012 shall apply.

2.08 SAFETY FLOOR – WELDED VINYL

A. TITAN Thermoplastic Safety Flooring, of size and shape as shown on plan as provided and installed by HCH-HPF Flooring, Inc. (973) 300-4551; or approved equal.

B. Thermoplastic sheet material in 58" X 96" dimensions and ¼" thick shall be provided with top surface pattern to be Dark Gray Stipple Finish with backside to be Cloth/Grid Finish.

C. Installation of flooring to include heat welding technique at all seams. Welding rod as supplied by HCH-HPF Flooring, Inc.; or approved equal.
D. Integrated wall base/inside and outside corners will be custom fabricated onsite using the TITAN Thermoplastic Safety Flooring material; or approved equal. Wall base and corners to be a minimum height of six (6) inches.

E. Installation to include .050 gauge aluminum flashing (cove cap) over cove base secured with s/s screws and adhesive, s/s outside corner guards providing cove protection, 14 gauge s/s transition strips at all thresholds and 14/16 gauge s/s lock down rings anchored with lead weights and s/s screws at all drains (when applicable).

F. Walk-In Floor Applications must have minimum 1/2” plywood/OSB wood underlay installed over substrate materials to accept installation of TITAN Thermoplastic Safety Flooring; or approved equal.

G. Flooring Installation to have a **10 year** workmanship warranty for new walk in boxes or **3 year** warranty for retrofit walk in box installation. The appropriate installation warranty to be issued by HCH-HPF Flooring, Inc.; or approved equal.

### 2.09 ITEMIZED SPECIFICATIONS

A. The following specification refers to certain items of equipment as shown on the contract drawings and equipment schedule with the notes thereon shall form an integral part of this specification and shall be binding as written.

B. Install the following items or approved equals per the plan:

C. The approved manufacturer(s) for custom stainless steel fabrication for this project are:
   - EMI Industries
   - Commercial Stainless
   - Eagle Group
   - Or approved equal

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**ITEM 1.00 - ***BACK OF HOUSE***

**ITEM 1.01 - WALK-IN, TWO COMPARTMENT (1)**

*American Panel Corporation Model FAB-WALKIN,* or approved equal.

The walk-in specified shall be prefabricated modular construction. Walk-in shall be designed and constructed as shown on plan, sized per plan and 8'-6" high. All panels shall consist of metal pans formed to precise dimensions, to fit exact job site requirements. Insulation shall be foamed-in-place urethane to bond permanently to complete inner surfaces of both interior and exterior metal pans to form strong rigid unit. Panels shall be covered by a **ten year factory warranty**.

Assembly of walk-in shall be accomplished by cam-action hook arm assembly set in one panel and a self-aligning, self-centering, pin assembly set in the matching panel. All vertical joints must have a minimum of three such assemblies. Rotation of the cam-action hook arm shall pull and lock panels together to form airtight, vapor proof joints. No metal straps or connecting rods shall be used inside the panels. Rotation of the camlocks shall be operated from inside the walk-in through access ports that are sealed with vinyl snap-in closures. Trim matching the walk-in finish and fabricated to fit building conditions shall be supplied to close all joints between walk-in and building walls. Enclosure panels matching the walk-in finish shall be supplied to close off space between top of walk-in and
finished ceiling with self-supporting enclosure panels, louvered if/as required. The walk-ins provided shall be constructed in accordance with National Sanitation Foundation, Standard No. 7. The NSF approval seal shall be affixed to the serial plate of the walk-in.

Walk-in compartment shall be equipped with a 36" wide x 78" high hinged-type, flush-mounted entrance door(s) located as shown on drawing. An adjustable wiper gasket shall be mounted along the bottom edge of the door, and shall be manufactured to accommodate floor construction - KEC to verify. Door and frame shall be listed by Underwriters Laboratories and bear the UL Seal of Approval and be equipped. Hinges shall be cam-lift, self-closing design with door lift off capability. Each door section shall be provided with an operating toggle switch and pilot light mounted on the exterior side of the door frame. A compact fluorescent vapor proof light and face mounted inlet box shall be mounted on the interior side of the door frame for 115 volt, 60 cycle, 1 phase A.C. service. All wiring shall be in concealed rigid conduit. A 2-1/2" diameter chrome face, flush mount, dual reading, adjustable dial thermometer shall be provided on exterior of door section to provide temperature reading of -40 degrees C to +150 degrees C.

Hinged doors to be 36" wide with third hinge. Provide 2" diameter door bumper to protect wall panel at doors opening 180 degrees. All doors to have 14" x 14" vision panel and automatic door closer. Dead bolt lock on all exterior doors.

Door shall have 1/8" aluminum diamond treadplate kick plates 3'-0" high on the interior and exterior. Diamond treadplate kick plates shall be mounted with adhesive and sealed with silicone. No external fasteners such as screws or pop rivets shall be applied as fastening for the diamond treadplate kickplates

36" high kickplate to align with bottom of bumper rail

Removable closure panels with channels, the same finish as exterior panels to ceiling. Closure to be louvered for top mounted condensing unit as required. KEC to field verify ceiling height

48" high x 1/8" aluminum diamond plate corner guards at exposed corners, align with top of adjacent wainscot

Provide each door with hinged Clear Vu PVC Swinging Doors, with stainless steel hinges and hanging hardware

Provide additional 48" Kason LED light fixtures and switches, installed and wired by EC, quantity per the electrical plan

Aluminum hat channel rub rail on exposed exterior

Interior built-in foamed-in-place ramp at entrance door. The interior ramp shall be NSF approved, have a non-skid surface and be equipped with a threshold and heater wire on freezer applications. Interior ramp shall be width of door opening x 24 depth

22 Gauge stainless steel stucco embossed exposed exterior

Embossed aluminum white interior

Unexposed exterior finish to be galvalume

Walk-in floor, fabricated similar to other panels and designed to withstand uniformly distributed stationary loads of 600 lbs. per square foot. Interior surface of floor panels to be foamed-in-place diamond tread aluminum, unless otherwise specified.

Smooth aluminum flooring to accept safety flooring as specified.

**ITEM 1.01A - SAFETY FLOORING (1)**

*ProtectAll Model FAB-WALKIN-SAFETY; or approved equal.*

Protect-All series OFJ slip resistant CK system with Cali Cove, 100% recycled polyvinylchloride, interlaced with stand and embedded nylon mesh reinforcements, 1/4" thick.

To include all custom stainless steel trim rings for all drains, troughs and floor penetrations, stainless steel corner guards as required and 12 gauge Z trim cap at all coved locations.
Flooring Installation Contractors crew must be trained and Certified by the flooring manufacturer, each installing laborer must have a minimum of five years’ experience installing slip resistant welded vinyl flooring. Flooring contractor must be able to show a minimum of five projects of similar size and scope that they have successfully completed with the specified product. References must be produced upon request.

Floor seams to be welded with rapid liquid weld. Aluminum Edge Flashing (Cove Cap) to be mechanically fastened to wall over top of wall board using stainless steel hardware. Stainless Steel Corner Edge Guards to be mechanically fastened with stainless steel hardware on all outside corners. **Five-year labor warranty** on the installation of the product by flooring contractor. **Ten-year manufacturer’s warranty**.

Confirm color with Architect prior to ordering.

**ITEM 1.02 - EVAPORATOR, +35F (1)**
*American Panel Corporation Model REF-EVAP.MT; or approved equal.*
Evaporator to be adequately sized to operate the walk-in refrigerator compartment at 35° F. Refer to general specifications for detail
Electrical hook-up and interconnection of system by the EC

**ITEM 1.03 - CONDENSER, AIR-COOLED (1)**
*American Panel Corporation Model REF-COND.A; or approved equal.*
Custom condenser for Item 1.02
Air-cooled
KEC to provide and install complete refrigeration system including refrigeration lines, thermostats, valves, and all other components necessary to start-up, operate, and maintain a complete refrigeration system. Refer to general specifications for detail
**Five (5) year compressor warranty; one (1) year refrigeration service contract**
Refer to the plan for the general distance from compressor to the item it serves; field verify actual line run length and path
For freezer, provide time clock

**ITEM 1.04 - EVAPORATOR, -10F (1)**
*American Panel Corporation Model REF-EVAP.LT; or approved equal.*
Evaporator to be adequately sized to operate the walk-in freezer compartment at -10° F. Refer to general specifications for detail
Electrical hook-up and interconnection of system by the EC

**ITEM 1.05 - CONDENSER, AIR-COOLED (1)**
*American Panel Corporation Model REF-COND.A; or approved equal.*
Custom condenser for Item 1.04
Air-cooled
KEC to provide and install complete refrigeration system including refrigeration lines, thermostats, valves, and all other components necessary to start-up, operate, and maintain a complete refrigeration system. Refer to general specifications for detail
**Five (5) year compressor warranty; one (1) year refrigeration service contract**
Refer to the plan for the general distance from compressor to the item it serves; field verify actual line run length and path
For freezer, provide time clock
ITEM 1.06 - SHELVING, MOBILE (14)
Metro Model MQ.MBL-SIZE PER PLAN; or approved equal.
MetroMax Q Shelves, open grid Polymer with Microban antimicrobial protection, epoxy coat steel frame, wedge connectors. Size and quantity per the plan with 5 tiers of shelving. Posts to be 63" high with 4 (4) casters, 2 (2) brakes.

ITEM 1.07 - SHELVING (10)
Metro Model MQ-SIZE PER PLAN; or approved equal.
MetroMax Q Shelves, open grid Polymer with Microban antimicrobial protection, epoxy coat steel frame, wedge connectors. Size and quantity per the plan with 5 tiers of shelving. Posts to be 74" high.

ITEM 1.08 - WORKTABLE (2)
Existing Model TO REMAIN
This item is not in the Kitchen Equipment Contract
(1) Equipment to be removed and re-set in place during construction

ITEM 1.09 - WORKTABLE, MOBILE (1)
Custom Model FAB-SS-TABLE.MBL; or approved equal.
Worktable, size and shape per plans, constructed entirely of type 304 stainless steel. Top to be 14 gauge, legs to be 16 gauge with bullet feet. Splashes per plans. Sound deaden top. Refer to the drawings, the general specifications, and detail FAB-DET-1-3 for details
Four (4) heavy duty 6" casters, 2 (2) with brakes
Refer to Section 2.09C for approved manufacturer(s)
(1) Model FAB-EDGE-A Type A, square edge, per detail FAB-DET-1-1
(1) FAB-SPLASH-D Type D, 6" H x 2" D splash, enclosed, per detail FAB-DET-1-2
Model FAB-BASE-USHELF Undershelf, 16 gauge stainless steel with 4" x 1" 14 gauge galvanized hat channel reinforcement, 2" high hemmed turn up at wall, per FAB-DET-1-4

ITEM 1.10 - SPARE NUMBER

ITEM 1.11 - HAND SINK (2)
Eagle Group Model HSA-10-FWLPD-LRS; or approved equal.
Hand Sink, wall mount, 14" wide x 10" front-to-back x 5" deep bowl, 304 stainless steel construction, factory installed side splashes, wrist handle faucet, towel & soap dispensers, lever drain with overflow, inverted "V" edge, NSF
(2) Model 377563 Faucet-mount emergency eyewash unit, "eye-pod" Design, rotate to activate, polished stainless steel

ITEM 1.12 - HYDROVECTION OVEN (1)
Blodgett Oven Model HV-100E DBL; or approved equal.
HydroVection™ Oven, Electric, full size, double stacked, capacity (10) 18" x 26" pans, glass doors, (10) stainless steel racks and (18) rack positions, cavity vent, manual controls, four speed auto-reversing fan motor, core probe, stainless steel front, top, sides & back, 8-1/2" stainless steel legs with casters and stacking kit, 30.0kW, (2) 3/4 hp, cETLus, NSF
(1) 1 year parts and labor warranty
ITEM 1.13 - UNIVERSAL PAN RACK (3)

Channel Manufacturing Model AXD-UTR-20, or approved equal.
Lifetime Tough Bun Pan Rack, Heavy Duty, Universal, mobile, 21"W x 26"D x 70"H, front load, open sides, 3" spacing, (20) pan capacity, holds 18" x 26" bun pans & 12" x 20" steam table pans, 3-1/4"W universal angles, all welded aluminum construction, 5" x 2" heavy duty swivel plate casters with Zerk grease fittings, correction facility approved, NSF, Made in USA (published shipping weight does not reflect 50lb. pallet)

(3) Lifetime warranty against rust and corrosion
(3) Model /009 Pan Stop, aluminum
(3) Model /5B Caster Brakes, heavy duty (set of 2)

ITEM 1.14 - TILTING KETTLE, 40 GALLON (1) – ADD ALTERNATE

Crown Model ELT-40, or approved equal.
Tilting Kettle, electric, 40 gallon capacity, 2/3 jacket, thermostatic control, crank tilt with self-locking positive stop, faucet bracket, 316 stainless steel interior liner, stainless steel exterior, console & tri-leg base, 18.0kW, cCSAus, NSF

(1) Domestic Shipping, inside of North America
(1) Standard one year limited, 10 year hemispheric bottom warranty
(1) 208v/50/60/3-ph, standard
(1) Model TVT-3 3" tangent draw off valve includes perforated strainer (location as per spec)
(1) Model DF-RSH-18 Double pantry faucet with 18" swing spout and 68" spray hose and bracket
(1) Model CH-40 Cover, spring assisted, for 40 gallon kettle
(1) Model KBUK-1 Kettle Cleaning & Utensil Kit, includes (1) 36" cleaning brush & scraping paddle, draw-off valve brush, hand held scrub brush, stainless steel 36" whip & 24 ounce ladle

ITEM 1.15 - EXHAUST HOOD (1)

Existing Model TO REMAIN
This item is not in the Kitchen Equipment Contract

ITEM 1.16 - FIRE SUPPRESSION SYSTEM (1)

Existing Model TO REMAIN
This item is not in the Kitchen Equipment Contract

(1) Unit to be modified as needed for updated cook line

ITEM 1.17 - SPARE NUMBER

ITEM 1.18 - WORKTABLE WITH SINK (1)

Custom Model FAB-SS-TABLE, or approved equal.
Worktable, size and shape per plans, constructed entirely of type 304 stainless steel. Top to be 14 gauge, legs to be 16 gauge with bullet feet. Splashes per plans. Sound deaden top. Refer to the drawings, the general specifications, and detail FAB-DET-1-4 for details
Refer to Section 2.09C for approved manufacturer(s)

(1) Model FAB-SS-SINK Integral sink, size and shape per plans, 12" deep, constructed entirely of 14 gauge type 304 stainless steel. Provide a twist waste valve with support bracket with an overflow assembly. Sound deaden underneath. Refer to the drawings, the general specifications, and detail FAB-DET-3-1.

Provide sink with a deck-mounted faucet with wrist handles per the general specifications

One (1) Deck Mounted Faucet Type 1D, 2D, or 4D, with wrist handles; refer to the general specifications for details. Size faucet so that it aligns over the sink's drain

(1) Model FAB-EDGE-A Type A, square edge, per detail FAB-DET-1-1

(1) Model FAB-SPLASH-E Type E, 6" H x 2" D splash, back-to-back and capped, per detail FAB-DET-1-2

Model FAB-BASE-USHELF Undershelf on left and right side of sink, 16 gauge stainless steel with 4”x1” 14 gauge galvanized hat channel reinforcement, 2” high hemmed turn up at wall, per FAB-DET-1-4

Model FAB-BASE-XBRACE Side and rear crossbracing at sink, 1-1/4" OD, 16 gauge stainless steel, per FAB-DET-1-4

ITEM 1.19 - SPARE NUMBER

ITEM 1.20 - SPARE NUMBER

ITEM 1.21 - WORKTABLE WITH SINK (1)

Custom Model FAB-SS-TABLE; or approved equal.

Worktable, size and shape per plans, constructed entirely of type 304 stainless steel. Top to be 14 gauge, legs to be 16 gauge with bullet feet. Splashes per plans. Sound deaden top. Refer to the drawings, the general specifications, and detail FAB-DET-1-4 for details

Refer to Section 2.09C for approved manufacturer(s)

(1) Model FAB-EDGE-A Type A, square edge, per detail FAB-DET-1-1

(1) Model FAB-SPLASH-E Type E, 6" H x 2" D splash, back-to-back and capped, per detail FAB-DET-1-2

(1) Model FAB-SS-SINK Integral sink, size and shape per plans, 12" deep, constructed entirely of 14 gauge type 304 stainless steel. Provide a twist waste valve with support bracket with an overflow assembly. Sound deaden underneath. Refer to the drawings, the general specifications, and detail FAB-DET-3-1.

Provide sink with a deck-mounted faucet with wrist handles per the general specifications

One (1) Deck Mounted Faucet Type 1D, 2D, or 4D, with wrist handles; refer to the general specifications for details. Size faucet so that it aligns over the sink's drain

Model FAB-BASE-USHELF Undershelf on left and right side of sink, 16 gauge stainless steel with 4”x1” 14 gauge galvanized hat channel reinforcement, 2” high hemmed turn up at wall, per FAB-DET-1-4

Model FAB-BASE-XBRACE Side and rear crossbracing at sink, 1-1/4" OD, 16 gauge stainless steel, per FAB-DET-1-4

ITEM 1.22 - SPARE NUMBER
ITEM 1.23 - CONVECTION STEAMER, DOUBLE (1) – ADD ALTERNATE

*Cleveland Range Model* (2) 22CET66.1; or approved equal.

SteamChef™ 6 Convection Steamer, electric, boilerless, double stacked, on ES26304066E equipment stand, (6) full size pan capacity per compartment, SureCook controls, 60-minute electro-mechanical timer & manual (continuous steaming) bypass switch, left-hand hinged door, controls on right, automatic drain & water level controls, KleanShield™ interior, standard treated & tap water connection, stainless steel exterior, 4" adjustable legs with flanged feet, UL, cUL, NSF, ENERGY STAR®

(1) 1-year parts & labor warranty, standard
(2) 3 year Convection Steamer Door Warranty, standard
(1) Performance start-up included at customer request after equipment is installed (Free Water Quality Check included) (contact Cleveland Sales Representative for details)
(1) (VOS1) (2) 208-240v/60/3-ph, 10.7-14.3 kW, 29.8-34.4 amps, 3-wire, standard

ITEM 1.24 - CONVECTION OVEN, DOUBLE (2)

*Blodgett Oven Model* MARK V-100 DBL; or approved equal.

Convection Oven, electric, double-deck, standard depth, capacity (5) 18" x 26" pans per compartment, (SSD) solid state digital controls, 2-speed fan, interior light, simultaneous operated doors with glass, stainless steel front, sides & top, vent connector, 6" stainless steel legs, vent connector, 11.0 kW each, 1/3 hp, cETLus, CE, NSF, ENERGY STAR®

(2) 3 year parts, 2 year labor and 2 additional year door warranty (parts only), standard
(2) 208v/60/3-ph, 11.0 kW, 31.0 amps, direct (per deck), standard
(2) Model SSD Top Oven: Solid State digital with Pulse Plus® and Cook & Hold, standard
(2) Model SSD Bottom Oven: Solid State digital with Pulse Plus® and Cook & Hold, standard
(2) 6" plate casters (set)
(2) Extra racks (each)

ITEM 1.25 - EXHAUST HOOD (1)

*Existing Model* TO REMAIN

This item is not in the Kitchen Equipment Contract

ITEM 1.26 - WATER FILTRATION SYSTEM (1)

*Everpure Model* EV979722; or approved equal.

KleenSteam II Twin System, 20,000 gallon capacity, 5.0 gpm flow rate, total system for steamers prevents limescale formation, (2) 7CB5 carbon filters, (1) SS-10 scale inhibitor Cartridge, dip tube, (2) 2.2 lbs. canisters ScaleKleen®

(1) Provide (1) set of replacement cartridges

ITEM 1.27 - SPARE NUMBER
ITEM 1.28 - THREE (3) COMPARTMENT SINK (1)  
Existing Model TO REMAIN  
This item is not in the Kitchen Equipment Contract  
(1) Equipment to be removed and re-set in place during construction

ITEM 1.29 - ICE MAKER (1)  
Existing Model RELOCATED  
This item is not in the Kitchen Equipment Contract  
(1) Equipment to be removed and re-set in place during construction

ITEM 1.30 - ICE BIN (1)  
Existing Model RELOCATED  
This item is not in the Kitchen Equipment Contract  
(1) Equipment to be removed and re-set in place during construction

ITEM 1.31 - WATER FILTRATION SYSTEM, FOR ICE MACHINES (1)  
Everpure Model EV932402; or approved equal.  
Insurice® Twin-i2000² System, 18,000 gallon capacity, 3.34 gpm flow rate, 0.5-micron filtration, for cubers up to 1,450 lbs/day or flakers up to 2,200 lbs/day, pressure gauge, flushing valve, NSF, ANSI  
(1) Provide (1) set of replacement cartridges

ITEM 1.32 - SPARE NUMBER

ITEM 1.33 - WORKTABLE (3)  
Existing Model TO REMAIN  
This item is not in the Kitchen Equipment Contract  
(1) Equipment to be removed and re-set in place during construction

ITEM 2.00 - ***SERVERY***

ITEM 2.01 - CASHIER COUNTER (4)  
Vollrath Model 37015; or approved equal.  
Signature Server® with Stainless Steel Countertops, 34" high ADA Cashier Station, 28"W, 28"D, modular, without cashier drawer, operator side open with stainless steel floor, NSF  
(4) 1 year warranty against defects in materials & workmanship  
(4) Model SS4CASTERS Signature Server® Swivel Casters, 4'H, (2) braked, standard  
(4) Model 3669741 Vinyl Graphic Wrap, "Checkerboard", for 28"W x 34"H Signature Server® Cashier Stations, includes stainless steel corner guards  
Verify color with Architect and Owner prior to ordering  
(4) Model 36945 Signature Server® Cash Drawer, locking, drawer bell, steel construction, black powder coated finish, includes: ABS plastic removable money tray, with (5) coins & (5) bills capacity, stainless steel bill clips/hold downs, aluminum coin breaking plate  
(4) Model 36946 Internal Duplex Receptacle, with countertop cutout & grommet, 120v/60/1-ph
ITEM 2.02 - CASHIER STOOL (4)
N.I.C. / BY OWNER
This item is not in the Kitchen Equipment Contract
KEC to coordinate the size and utility requirements of this item

ITEM 2.03 - POS SYSTEM & PRINTER (4)
N.I.C. / BY OWNER
This item is not in the Kitchen Equipment Contract
KEC to coordinate the size and utility requirements of this item

ITEM 2.04 - SERVING COUNTER, IMPULSE (2)
Vollrath Model 37020; or approved equal.
Signature Server® Utility Station with Stainless Steel Countertop, 28"W x 28"D x 34"H, modular, 16/300 series stainless steel top, 18/400 series stainless steel enclosed base clad with black laminate, reinforced stainless steel unibody construction, 4" heavy duty swivel casters with brakes, cULus, NSF
(2) 1 year warranty against defects in materials & workmanship
(2) Model SS4CASTERS Signature Server® Swivel Casters, 4"H, (2) braked, standard
(2) Model 3669741 Vinyl Graphic Wrap, "Checkerboard", for 28"W x 34"H Signature Server® Cashier Stations, includes stainless steel corner guards
Verify color with Architect and Owner prior to ordering
(2) Model 9879502 Upgrade to 14 gauge stainless steel work surface for, 28"W Signature Server® Utility Station
(2) smooth stainless counter, standard
(2) No breath guard

ITEM 2.05 - SELF-SERVICE REFRIGERATED CASE (1)
Structural Concepts Model CO35R; or approved equal.
Oasis® Self-Service Refrigerated Open Air Screen Case, 36-1/4"W, 61-5/8"H, Breeze-E (Type II) with EnergyWise self-contained refrigeration system, Blue Fin coated coil, (2) non-lit adjustable metal shelves, top light, one piece formed ABS plastic tub, black interior, (2) full end panels, 4"D removable wall spacer brackets, casters, cETLus, ETL-Sanitation
(1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
(1) Breeze-E (Type II) with EnergyWise refrigeration - NSF Type II compliant, standard
(1) 110-120v/60/1ph, 14.23 amps, standard
(1) 6 ft straight blade power cord NEMA 5-20P (base exit), standard
(1) Model CLEAN SWEEP Clean Sweep®, automatic condenser coil cleaner; or approved equal.
(1) Base Support: Casters, with levelers, standard
(1) Interior: Stainless steel, in lieu of standard black
(1) Exterior: Wilsonart, Formica; or approved equal, NON-PREMIUM laminate (Color chart available from factory rep or access color selections via www.wilsonart.com, www.formica.com); or other website.
Verify color with Architect and Owner prior to ordering
(1) Lower front panel: Stainless steel
(1) Left end panel: Full with mirrored interior, vinyl edging, standard
(1) Right end panel: Full with mirrored interior, vinyl edging, standard
(1) Back Panel: Rear loading hinged doors, locking
(1) Digital fahrenheit thermometer, standard
(1) Add Lights (LED) to standard shelves (2)
(1) Price tag molding (matches interior color)
(1) Roll-down security cover, locking

ITEM 2.06 - SERVING COUNTER, HOT FOOD (1)
Vollrath Model 37040, or approved equal.
Signature Server® Hot Food Serving Counter, 60"W x 28"D x 34"H, 18/300 stainless steel top with 1" turndown on all sides, (4) 12" x 20" x 6-3/8" deep wells with 625 watt elements, individual Touch-Temp® programmable controls, 18/400 series stainless steel unibody construction, manifold drains, pull-out ball valve drain, 2500 watts, cord, plug, cULus, NSF, Made in USA
(1) 1 year warranty against defects in materials & workmanship
(1) 120v/60/1-ph
(1) Model 3669741 Vinyl Graphic Wrap, "Checkerboard", for 28"W x 34"H Signature Server® Cashier Stations, includes stainless steel corner guards; or approved equal.
Verify color with Architect and Owner prior to ordering
(1) Model N37312 NSF2 (2011) Single Deck Classic Cafeteria Breath Guard for 60" ADA Signature units; or approved equal.
(1) Model 9879204 Upgrade to 14 gauge stainless steel work surface for, (4) well 60"W Signature Server® Hot Food Base; or approved equal.
(1) LED lights - 60" for Signature Server® with Stainless Steel Countertops units, bulbs & lamps not included, Made in USA
KEC to provide bulbs and lamps
(1) Model VOLT120-01 Electrical (01) 120v/60/1-ph
(1) Model 37513-2-C Signature Server® Stainless Steel Countertop Plate Rest, customer side, 60"W x 7"D; or approved equal.
(1) Model 36983 Open Storage, for 60"W Signature Server®, with reinforced bottom shelf (Bag-In-A-Box), 16-1/2"H opening (opening width depends on unit type), stainless steel; or approved equal.
(1) Model SS4CASTERS Signature Server® Swivel Casters, 4"H, (2) braked, standard; or approved equal.

ITEM 2.07 - SPARE NUMBER

ITEM 2.08 - SERVING COUNTER (2)
Vollrath Model 37022, or approved equal.
Signature Server® Utility Serving Counter, 60"W x 28"D x 34"H, 16/300 series stainless steel top with 1" turndown on all sides, enclosed base, 18/400 series stainless steel unibody construction, cULus, NSF, Made in USA
(2) 1 year warranty against defects in materials & workmanship
(2) Model SS4CASTERS Signature Server® Swivel Casters, 4"H, (2) braked, standard; or approved equal.
ITEM 2.09 -  DISPLAY MERCHANDISER, HEATED  (2)
Hatco Model GRSDS-52D; or approved equal.
Glo-Ray® Merchandising Warmer, countertop, 52" long, (20) rods, pass thru design, with (2) shelves, forward-slanted shelves, pre-focused infrared top heat, tempered glass sides, stainless steel & aluminum construction, 4" legs, cULus, UL EPH Classified, Made in USA; or approved equal.
(2) One year on-site parts and labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
(2) 120/208v/60/1-ph, (2) 2725 watts, (2) 11.7 amps, (2) NEMA L14-20P (Domestic voltage)
(2) Model GGRAY Glossy gray, gloss finish, (Available at time of purchase only)
(2) Open Customer Side, upper, standard
(2) Open Customer Side, lower, standard

ITEM 2.10 -  WORKTABLE, MOBILE  (1)
Custom Model FAB-SS-TABLE.MBL; or approved equal.
Worktable, size and shape per plans, constructed entirely of type 304 stainless steel. Top to be 14 gauge, legs to be 16 gauge with bullet feet. Splashes per plans. Sound deaden top. Refer to the drawings, the general specifications, and detail FAB-DET-1-3 for details
Four (4) heavy duty 6" casters, two (2) with brakes
Refer to Section 2.09C for approved manufacturer(s)
Model FAB-EDGE-C Type C, inverted "V" edge, per detail FAB-DET-1-1; or approved equal.
Model FAB-BASE-USHELF Undershelf, 16 gauge stainless steel with 4"x1" 14 gauge galvanized hat channel reinforcement, 2" high hemmed turn up at wall, per FAB-DET-1-4; or approved equal.
(1) Unit to be 30" high

ITEM 2.11 -  DELI SLICER  (1)
Existing Model RELOCATED
KEC to coordinate the size and utility requirements of this item
ITEM 2.12 - SERVING COUNTER, COLD FOOD (2)

Vollrath Model 37066; or approved equal.
Signature Server® Stainless Steel Countertop with NSF7 Cold Station, self contained refrigeration, 60"W x 28"D x 34"H, Bloomington-style recessed well displays pans 3" below work surface, coils surround sidewalls, accommodates 6" deep pans, polyurethane foam insulation, standard well drains, seamless display pan well opening 19-7/8" x 50-1/4" x 6-5/8" deep, 1/4 HP, 5.2amps, NEMA 5-15P, 120v/60/1-ph, cULus, NSF, Made in USA; or approved equal.

(2) 1 year warranty against defects in materials & workmanship
(2) Model SS4CASTERS Signature Server® Swivel Casters, 4"H, (2) braked, standard; or approved equal.
(2) 120v/60/1-ph
(2) Model 3669741 Vinyl Graphic Wrap, "Checkerboard", for 28"W x 34"H Signature Server® Cashier Stations, includes stainless steel corner guards; or approved equal.
Verify color with Architect and Owner prior to ordering
(2) Model N37312 NSF2 (2011) Single Deck Classic Cafeteria Breath Guard for 60" ADA Signature units (when ordered as replacement breath guard crating charges are applied); or approved equal.
(2) Model 9879304 Upgrade to 14 gauge stainless steel work surface for, 60"W Signature Server® Cold Pan; or approved equal.
(2) LED lights - 60" for Signature Server® with Stainless Steel Countertops units, bulbs & lamps not included, Made in USA
KEC to provide bulbs and lamps
(2) Model 37513-2-C Signature Server® Stainless Steel Countertop Plate Rest, customer side, 60"W x 7"D; or approved equal.
(2) Model 36915-2 Perforated False Bottom for Signature Server® with Stainless Steel Countertops 60" Cold Food Pan Station; or approved equal.

ITEM 2.13 - SPARE NUMBER

ITEM 2.14 - SELF-SERVICE REFRIGERATED CASE (1)

Structural Concepts Model CO45R; or approved equal.
Oasis® Self-Service Refrigerated Open Air Screen Case, 47-1/4"W, 61-5/8"H, Breeze-E (Type II) with EnergyWise self-contained refrigeration system, Blue Fin coated coil, (2) non-lit adjustable metal shelves, top light, one piece formed ABS plastic tub, black interior, (2) full end panels, 4"D removable wall spacer brackets, casters, cETLus, ETL-Sanitation; or approved equal.

(1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
(1) Breeze-E (Type II) with EnergyWise refrigeration - NSF Type II compliant, standard
(1) 110-120v/60/1ph, 15.46 amps, standard
(1) 6 ft straight blade power cord NEMA 5-20P (base exit), standard
(1) Model CLEAN SWEEP Clean Sweep®, automatic condenser coil cleaner; or approved equal.
(1) Base Support: Casters, with levelers, standard
(1) Interior: Stainless steel, in lieu of standard black
(1) Exterior: Wilsonart, Formica; or approved equal. NON-PREMIUM laminate (Color chart available from factory rep or access color selections via www.wilsonart.com, www.formica.com); or other mfr’s. website
Verify color with Architect and Owner prior to ordering
(1) Lower front panel: Stainless steel
(1) Left end panel: Full with mirrored interior, vinyl edging, standard
(1) Right end panel: Full with mirrored interior, vinyl edging, standard
(1) Back Panel: Rear loading hinged doors, locking
(1) Digital fahrenheit thermometer, standard
(1) Add Lights (LED) to standard shelves (2)
(1) Price tag molding (matches interior color)
(1) Roll-down security cover, locking

ITEM 2.15 -  ICE CREAM FREEZER  (1)
Existing Model RELOCATED
KEC to coordinate the size and utility requirements of this item

ITEM 2.16 -  SPARE NUMBER

ITEM 2.17 -  CONDIMENT COUNTER  (2)
Vollrath Model 37021; or approved equal.
Signature Server® Utility Serving Counter, 46"W x 28"D x 34"H, 16/300 series stainless steel top with 1" turndown on all sides, enclosed base, 18/400 series stainless steel unibody construction, cULus, NSF, Made in USA; or approved equal.
(2) 1 year warranty against defects in materials & workmanship
(2) Model SS4CASTERS Signature Server® Swivel Casters, 4"H, (2) braked, standard; or approved equal.
(2) Model 3669741 Vinyl Graphic Wrap, "Checkerboard", for 28"W x 34"H Signature Server® Cashier Stations, includes stainless steel corner guards; or approved equal.
Verify color with Architect and Owner prior to ordering
(2) Model 36936-2 Storage Module, for 60"W Signature Server®, with locking sliding doors (doors match base color), 16-1/2"H opening (opening width depends on unit type), stainless steel; or approved equal.
(2) No breath guard

ITEM 2.18 -  HAND SINK  (2)
Eagle Group Model HSA-10-FWLDP-LRS; or approved equal.
Hand Sink, wall mount, 14" wide x 10" front-to-back x 5" deep bowl, 304 stainless steel construction, factory installed side splashes, wrist handle faucet, towel & soap dispensers, lever drain with overflow, inverted "V" edge, NSF
(2) Model 377563 Faucet-mount emergency eyewash unit, "eye-pod" Design, rotate to activate, polished stainless steel; or approved equal.

ITEM 2.19 -  CORNER GUARD  (4)
Custom Model FAB-SS-CORNER; or approved equal.
Stainless steel corner guard, to be constructed entirely of 18 gauge type 304 stainless steel, 2" x 2" x 48" high. Refer to the special conditions plan for locations and fastening details
Refer to Section 2.09C for approved manufacturer(s).
ITEM 3.00 - ***SATELLITE SERVERY***

ITEM 3.01 - WORK COUNTER WITH SINKS (1)

Custom Model FAB-SS-COUNTER, or approved equal.

Work counter, size and shape per plans, constructed entirely of type 304 stainless steel. Top to be 14 gauge, body to be 16 gauge with bullet feet. Splash per plans. Sound deaden top. Provide adjustable stainless steel midshelf. Refer to the drawings, the general specifications, and detail FAB-DET-5-1 for details.

Refer to Section 2.09C for approved manufacturer(s)

(1) Model FAB-EDGE-F Type F, counter square edge, per detail FAB-DET-1-1; or approved equal.

(1) Model FAB-SPLASH-A Type A, 6" H x 1" D splash, per detail FAB-DET-1-2; or approved equal.

(1) Model FAB-SS-SINK Integral sink, size and shape per plans, 12" deep, constructed entirely of 14 gauge type 304 stainless steel. Provide a twist waste valve with support bracket with an overflow assembly. Sound deaden underneath. Refer to the drawings, the general specifications, and detail FAB-DET-3-1; or approved equal.

Provide sink with a deck-mounted faucet with wrist handles per the general specifications

One (1) Deck Mounted Faucet Type 1D, 2D, or 4D, with wrist handles; refer to the general specifications for details. Size faucet so that it aligns over the sink's drain.

(1) Model FAB-SS-HS.RECESS Integral hand sink, size and shape per plans, 10" deep, constructed entirely of 14 gauge type 304 stainless steel. Provide basket waste. Sound deaden under sink. Refer to the drawings, the general specifications, and detail FAB-DET-3-1; or approved equal.

Recess counter around sink 6"

Bobrick model B-822 drop-in soap dispenser; or approved equal.

Bobrick model B-526 drop-in paper towel dispenser; or approved equal.

One (1) Deck Mounted Faucet Type 2D with wrist handles; refer to the general specifications for details

(1) Provide eye wash unit at hand sink

(1) Model FAB-SS-SINK.SSCOVER Removable stainless steel cover, flush top with finger hole; or approved equal.

Sink to have fully welded tubular supports at each corner

Provide stainless steel angle slides next to sink for storage of the sink covers

Model FAB-BASE-OPEN Open to floor for trash per the plans, fully enclosed stainless steel recess; or approved equal.

Model FAB-BASE-SHELF.ADJ Adjustable shelf to left of trash, 16 gauge stainless steel, per FAB-DET-5-2; or approved equal.

Model FAB-CTR-DOOR.H Stainless steel double pan hinged door(s) at sinks, hinged per plans. With integral stainless steel pull, and common-keyed cylinder lock(s), per FAB-DET-5-3; or approved equal.

(2) Eagle Group Model 377563 Faucet-mount emergency eyewash unit, "eye-pod" Design, rotate to activate, polished stainless steel; or approved equal.
ITEM 3.02 - TRASH CONTAINER (1)

_Rubbermaid Commercial Products Model FG354060GRAY_; or approved equal.

Slim Jim® Container, 23 gallon, 22"W x 11"D x 30"H, with venting channels, molded-in handles, general purpose waste, open type without lid, high-impact plastic construction, gray, Made in USA; or approved equal.

(1) Model FG267360GRAY Slim Jim® Swing Lid, for Slim Jim® Container, gray, S.O.S. (Special Order Smallwares) product; see SOS document for details, Made in USA; or approved equal.

ITEM 3.03 - WALL SHELF (2)

_Custom Model FAB-SS-WS_; or approved equal.

Shelf, wall-mounted, size and shape per plans, constructed entirely of type 304 stainless steel. Shelf to be 16 gauge. Brackets to be 16 gauge stainless steel and spaced no more than 5'-0" apart. Provide 2" standoff from wall at rear. Refer to the drawings, the general specifications, and detail FAB-DET-2-1.1 for details

Refer to Section 2.09C for approved manufacturer(s)

(1) Mount first shelf at 1'-6" and second shelf at 2'-6" above work surface

ITEM 3.04 - REACH-IN REFRIGERATOR (1)

_Traulsen Model AHT232WUT-HHS_; or approved equal.

Spec-Line Refrigerator, Reach-in, two-section, 51.6 cu. ft., self-contained refrigeration, StayClear™ Condenser, stainless steel exterior, aluminum interior, standard depth, wide half-height door or doors with Santoprene® EZ-Clean Gaskets, (3) adjustable wire shelves per section, microprocessor controls, 6" adjustable stainless steel legs, 5/8 HP, cULus, NSF; or approved equal.

(1) 115v/60/1-ph, 8.2 amps, with cord & NEMA 5-15P, standard

(1) 3 year service/labor, 5 year compressor warranty, standard

(1) Left door hinged left/right hinged right, standard

(10) EZ-change heavy duty universal trayslide - per pair, with coated shelf to fit Install wire shelves in top section, and tray slides in bottom section

(1) Casters, 6" high (set of 4)

ITEM 3.05 - MOBILE HEATED CABINET (1)

_Alto-Shaam Model 1000-UP_; or approved equal.

Halo Heat® Heated Holding Cabinet, mobile, double-compartment, on/off simple control with adjustable thermostats, insulated, capacity for (8) 18" x 26" x 1" sheet pans in each compartment, heavy-duty stainless steel exterior and interior, 5" heavy-duty casters; 2 rigid, 2 swivel with brake, EcoSmart®, cULus, UL EPH ANSI/NSF 4, CE, IPX4, TUV NORD; or approved equal.

(1) 120v/60/1-ph, 16.0 amps, 1.9kW, 9' cord, NEMA 5-20P

(2) Solid door, hinged on right, standard

ITEM 3.06 - CASHIER COUNTER (1)

_Vollrath Model 37015_; or approved equal.

Signature Server® with Stainless Steel Countertops, 34" high ADA Cashier Station, 28"W, 28"D, modular, without cashier drawer, operator side open with stainless steel floor, NSF; or approved equal.

(1) 1 year warranty against defects in materials & workmanship

(1) Model SS4CASTERS Signature Server® Swivel Casters, 4"H, (2) braked, standard; or approved equal.
ITEM 3.07 - POS SYSTEM & PRINTER (1)
N.I.C. / BY OWNER
This item is not in the Kitchen Equipment Contract
KEC to coordinate the size and utility requirements of this item

ITEM 3.08 - CASHIER CHAIR (1)
N.I.C. / BY OWNER
This item is not in the Kitchen Equipment Contract
KEC to coordinate the size and utility requirements of this item

ITEM 3.09 - CASHIER COUNTER (1)
N.I.C. / BY MILLWORK
This item is not in the Kitchen Equipment Contract
KEC to coordinate any built-in and/or drop-in foodservice equipment

ITEM 3.10 - SERVING COUNTER, IMPULSE (1)
Vollrath Model 37020; or approved equal.
Signature Server® Utility Station with Stainless Steel Countertop, 28"W x 28"D x 34"H, modular, 16/300 series stainless steel top, 18/400 series stainless steel enclosed base clad with black laminate, reinforced stainless steel unibody construction, 4" heavy duty swivel casters with brakes, cULus, NSF; or approved equal.

(1) 1 year warranty against defects in materials & workmanship

(1) Model 3669741 Vinyl Graphic Wrap, "Checkerboard", for 28"W x 34"H Signature Server® Cashier Stations, includes stainless steel corner guards; or approved equal.
Verify color with Architect and Owner prior to ordering

(1) Model 9879502 Upgrade to 14 gauge stainless steel work surface for, 28"W Signature Server® Utility Station; or approved equal.

(1) smooth stainless counter, standard

(1) No breath guard
ITEM 3.11 - SELF-SERVICE REFRIGERATED CASE (1)
Structural Concepts Model CO65R
Oasis® Self-Service Refrigerated Open Air Screen Case, 71-1/4"W, 61-5/8"H, Breeze-E (Type II) with EnergyWise self-contained refrigeration system, Blue Fin coated coil, (2) non-lit adjustable metal shelves, top light, one piece formed ABS plastic tub, black interior, (2) full end panels, 4"D removable wall spacer brackets, casters, cETLus, ETL-Sanitation; or approved equal.

(1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
(1) Breeze-E (Type II) with EnergyWise refrigeration - NSF Type II compliant, standard
(1) 208-240v/60/1ph, 10.27 amps, standard
(1) 6 ft straight blade power cord NEMA 6-20P (base exit), standard
(1) Model CLEAN SWEEP Clean Sweep®, automatic condenser coil cleaner; or approved equal.
(1) Base Support: Casters, with levelers, standard
(1) Interior: Stainless steel, in lieu of standard black
(1) Exterior: Wilsonart, Formica; or approved equal. NON-PREMIUM laminate (Color chart available from factory rep or access color selections via www.wilsonart.com, www.formica.com), or other website
Verify finish with Architect prior to ordering
(1) Lower front panel: Stainless steel
(1) Left end panel: Full with mirrored interior, vinyl edging, standard
(1) Right end panel: Full with mirrored interior, vinyl edging, standard
(1) Back Panel: Rear loading hinged doors, locking
(1) Digital fahrenheit thermometer, standard
(1) Add Lights (LED) to standard shelves (2)
(1) Price tag molding (matches interior color)
(1) Roll-down security cover, locking

ITEM 3.12 - SPARE NUMBER

ITEM 3.13 - SERVING COUNTER, UTILITY (1)
Vollrath Model 37021; or approved equal.
Signature Server® Utility Serving Counter, 46"W x 28"D x 34"H, 16/300 series stainless steel top with 1" turndown on all sides, enclosed base, 18/400 series stainless steel unibody construction, cULus, NSF, Made in USA; or approved equal.

(1) 1 year warranty against defects in materials & workmanship
(1) Model SS4CASTERS Signature Server® Swivel Casters, 4"H, (2) braked, standard; or approved equal.
(1) Model 3669741 Vinyl Graphic Wrap, "Checkerboard", for 28"W x 34"H Signature Server® Cashier Stations, includes stainless steel corner guards; or approved equal.
Verify color with Architect and Owner prior to ordering
(1) Model N37311 NSF2 (2011) Single Deck Classic Cafeteria Breath Guard for 46" ADA Signature units (when ordered as replacement breath guard crating charges are applied); or approved equal.
(1) Model 9879503 Upgrade to 14 gauge stainless steel work surface for, 46"W Signature Server® Utility Station; or approved equal.
(1) smooth stainless counter, standard
(1) LED lights - 46" for Signature Server® with Stainless Steel Countertops units, bulbs & lamps not included, Made in USA
KEC to provide bulbs and lamps
(1) Model VOLT120-01 Electrical (01) 120v/60/1-ph
(1) Model 37512-2-C Signature Server® Stainless Steel Countertop Plate Rest, customer side, 46"W x 7"D; or approved equal.
(1) Plain stainless steel plate rest, standard

ITEM 3.14 - HEAT LAMP, HANGING (2)
Hatco Model DLH-725; or approved equal.
Decorative Heat Lamp, High Wattage, (1) bulb type (not included), 8-1/2" H x 9-1/2" Dia. shade, 375 watt max, CE, cULus, UL EPH Classified, Made in USA; or approved equal.
(2) 120v/60/1-ph, 375 watt, standard
(2) Model WHITE-CTD-120H Lamp Bulb, 375 Watt clear, coated
(2) Model DL-SWITCH-16AMP Lamp Toggle Switch, 16 amp (shipped separately)
(2) Model BNICKEL Bright Nickel plated finish (Available at time of purchase only) special process required and extended lead times
(2) Model BNICKEL Bright Nickel plated finish (Available at time of purchase only) special process required and extended lead times
Verify color with Architect and Owner prior to ordering
(2) Model RT Mounting Style - Retractable mount to track adapter (specify cord and track color) - retractable cord mount to track adapter, adjusts from 33-3/8" to 71-7/8" (Available at time of purchase only); or approved equal.
(2) Model R Switch Location - Remote (Available at time of purchase only)
(2) Model DL-CORD-BK Black Cord, (CL, CU, CT, RL mounts only), (black is standard) (Available at time of purchase only)
(2) Model DL-ADAPT-BK Black Track Adapter (CT, RT, ST mounts only)

ITEM 3.15 - SERVING COUNTER, HOT FOOD (1)
Vollrath Model 37040; or approved equal.
Signature Server® Hot Food Serving Counter, 60"W x 28"D x 34"H, 18/300 stainless steel top with 1" turndown on all sides, (4) 12" x 20" x 6-3/8" deep wells with 625 watt elements, individual Touch-Temp® programmable controls, 18/400 series stainless steel unibody construction, manifold drains, pull-out ball valve drain, 2500 watts, cord, plug, cULus, NSF, Made in USA; or approved equal.
(1) 1 year warranty against defects in materials & workmanship
(1) 120v/60/1-ph
(1) Model 3669741 Vinyl Graphic Wrap, "Checkerboard", for 28"W x 34"H Signature Server® Cashier Stations, includes stainless steel corner guards; or approved equal.
Verify color with Architect and Owner prior to ordering
(1) Model N37312 NSF2 (2011) Single Deck Classic Cafeteria Breath Guard for 60" ADA Signature units (when ordered as replacement breath guard crating charges are applied); or approved equal.
(1) Model 9879204 Upgrade to 14 gauge stainless steel work surface for, (4) well 60"W Signature Server® Hot Food Base; or approved equal.
(1) LED lights - 60" for Signature Server® with Stainless Steel Countertops units, bulbs & lamps not included, Made in USA
KEC to provide bulbs and lamps
(1) Model VOLT120-01 Electrical (01) 120v/60/1-ph
(1) Model 37513-2-C Signature Server® Stainless Steel Countertop Plate Rest, customer side, 60"W x 7"D
(1) Model SS4CASTERS Signature Server® Swivel Casters, 4"H, (2) braked, standard

ITEM 3.16 - SPARE NUMBER

ITEM 3.17 - DISPLAY FREEZER (1)
Master-Bilt Products Model MSF-52AN; or approved equal.
COLDIN-3™ Display Freezer, 13.8 gross cu. ft. (11.0 net cu. ft.), flat tempered glass sliding lids, (4) standard baskets with integrated dividers, external analog thermometer and lock, white zinc-coated enamel steel exterior, painted white steel interior with LED lighting, defrost water drain, temperature range -18° to 10°F (-27° to -12° C), self-contained refrigeration, heavy duty 2" casters, R290 Hydrocarbon refrigerant, 1/3 hp, 115v/60/1-ph, 1.3 amps, 6-1/2' cord, NEMA 5-15P, cETLus, ETL-Sanitation; or approved equal.

(1) 1 year parts and labor warranty
(1) 5 year compressor part warranty

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection: Prior to all work of this section, carefully inspect (the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence

B. Discrepancies

1. In the event of discrepancy, immediately notify the Owner and Architect in writing.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 INSTALLATION

A. The equipment furnished shall be delivered during regular working hours, unloaded, uncrated and set in the positions shown on the plan.

B. Any item of equipment that is impractical for delivery assembled in one piece may be delivered to the job site in sections. However, all working surfaces shall be seamlessly welded and polished at the job site unless otherwise specified, so that upon completion, the finish is smooth, even and true. Soldered joints will not be accepted under any circumstances.

C. Hangers, brackets, supports, etc., requiring installation during early stages of construction shall be furnished and located at such time so as not to delay the progress of this contractor or the work of others.
D. All installation work under this contract shall be performed by labor having jurisdiction at the job site. Any disputes arising as a result of jurisdictional matters, trade agreements, or any other conditions which may exist shall be disposed of in a manner that will not delay the progress of the job. Any expense incurred in settling such disputes shall be borne by the FSEC.

E. All fixed equipment which is shown on the plans and elevations to fit closely to adjoining equipment, walls and ceilings shall be neatly trimmed or sealed, where spaces occur to the adjoining equipment. Stainless steel flat and angle trim of 20 gauge stainless steel shall be utilized and shall be secured to the equipment with stainless steel truss head screws. All trim work shall be done in workmanlike manner. Patchlike work will be rejected. The final decision as to the necessity for trim, sealant or other closure shall rest with JDB and the Health Department. However, this contractor shall provide all necessary trim required as part of this contract without additional cost to the Owner.

F. Any patching or repair work to existing finishes or equipment necessitated by this contractor's work shall be restored to match original in all respects at no cost to the Owner.

G. This contractor shall affix a self-adhesive backed label to each piece of new equipment provided under this contract to identify the item by number. These labels shall be removed when directed by the Owner or his / her representative.

H. This contractor shall provide all necessary dimensions to the other trades so as to facilitate cut outs in parts of his / her work wherein items of equipment covered by this specification will be installed.

I. All items of equipment shall be inspected for concealed damage at the warehouse and repacked for shipment to the job site. Do not ship any items uncrated except for fabricated items shipped by furniture type delivery trucks. Any items found to be damaged shall be returned to the supplier and a replacement obtained immediately.

J. All small components and parts, such as pans, inserts, etc. shall be removed from cartons or boxes at the time of inspection, labeled and held for delivery to the job site when instructed.

K. All equipment shall be fully tested prior to demonstration to determine if it is operating properly. If not operating properly, provide necessary service to make equipment operative.

3.03 PROTECTION OF WORK

A. For the period during which other trades shall be on or near equipment and/or work covered by this Contract, this Contractor shall cover and protect the exposed surfaces of such equipment in a manner that shall preclude injury to the finish by absorption of oil, grease, chemicals, etc., contact from tools and machinery, and from all other causes which may be incidental to operation performed in the area. Should this Contractor fail to protect his / her work in the specified manner, he / she shall replace damaged elements or repair same to the satisfaction of the Owner at no additional cost to the Owner.
3.04 PRODUCT HANDLING

A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.

B. Cleaning: When all the work covered by this Contract, together with the work of other trades has been completed, the equipment contractor shall clean each and every item of equipment so that all traces of grease, stains, protective coatings, abrasive dust, markings, scratches and other foreign matter are completely removed. The cleaning process shall be one which shall eliminate the need for any further cleaning on the part of the Owner prior to its use with the exception of that which would ordinarily be undertaken daily to maintain accepted standards of sanitation and appearance.

3.05 TESTING

A. Tests of all equipment where required shall be performed in the presence of the Owner and authorized representative of the local authorities. All defects disclosed by the tests shall be eliminated to the satisfaction of the Owner and the corrected areas re-tested.

B. Provide necessary technicians, materials and equipment required to conduct these tests. A statement shall be furnished to the Owner showing the schedule of testing, date and results.

C. Upon successful completion of testing, submit written certification to the Architect and Owner that all materials and equipment conform to the requirements of the Contract Documents.

3.06 MAINTENANCE

A. Equipment described herein shall be provided with service at no cost to the Owner, for a period of two years following the date of final acceptance of the project by the Owner. This service shall also include adjustment of all equipment. It shall also include repair or replacement of electrical and mechanical parts of the equipment whenever this is required during maintenance periods, and only genuine standard parts produced by the manufacturer of the equipment shall be used. Renewals and repairs, as necessary, due to ordinary wear and tear, shall be included as part of this maintenance service. All work under this maintenance and call back provision shall be performed by competent personnel under the manufacturer’s supervision. Work shall be done during the regular working hours and days, but local call back emergency service shall be available at all times.

B. For the refrigeration system, this Contractor shall provide local service at no cost to the Owner, on a twenty-four hour per day call basis, for a period of two years from date of final acceptance of this project by Owner. A representative of the local servicing organization shall be present at a start-up and adjustment of the various systems and shall be thoroughly familiar with the requirements and characteristics of each system.

C. In addition to the above, all hermetic compressor units shall be furnished with a warranty for a period of five years from after final acceptances and installation.
D. Provisions shall be made for properly trained personnel to demonstrate to the Owner’s operators the operation of all equipment including refrigeration system. In addition, two (2) complete printed copies of the instructions shall be furnished to the Owner, covering the operation and maintenance of all equipment, in accordance with the requirements of Section 1.05 “Submittals.”

E. A covered, bound booklet containing manufacturer’s current printed Installation/Operation/Maintenance/Parts manuals for all equipment hereinafter specified (including accessories, components, devices, etc.). Each item shall be clearly labeled with their respective item number designation, as specified herein.

F. Booklet shall include a Table of Contents listing each equipment item included within the booklet, complete with corresponding item number, quantity and description as specified herein.

G. Booklet shall also include a Service Agency Listing. This listing shall include the complete name, address and telephone number of the local service agency for all equipment included within the booklet.

3.07 EXISTING CONDITIONS

A. Where items are listed as “Existing”, the contractor shall be responsible to relocate marked items to an area designated by the Owner. Disconnection of existing items is by Trades. The contractor shall clean any existing items and notify the client immediately of any damage or missing pieces, if found. Items shall be set in place ready for final connections by trades once ready.
WORKTABLE DETAILS

16 GA. 1-1/4" O.D. S/S CROSSRAIL FULLY WELDED, GROUNDED & POLISHED AT JUNCTURES

16 GA. 1/4" O.D. 16 GA. S/S LEGS WITH ADJUSTABLE S/S BULLET FEET

14 GA. S/S TOP W/ SOUND DEADENING

S/S GUSSETS FULLY WELDED TO 14 GA. GALV. HAT CHANNELS

4"X1" 14 GA. GALV. HAT CHANNEL REINFORCEMENT

1/4" HIGH HEMMED TURN UP AT WALLS

2" TURN UP AT WALLS OR SPEC. PER SPEC OR DRAWING

1-5/8" O.D. 16 GA. S/S TOP W/ SOUND DEADENING

VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

16 GA. S/S UNDER SHELF WHEN SPECIFIED

S/S GUSSETS FULLY WELDED TO 14 GA. GALV. HAT CHANNELS

6" SEE STANDARD SPLASH DETAILS FAB-DET-1-2

3" OR PER SPEC

WORKTABLE DETAILS

FOODSERVICE CONSULTANTS
192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736
AS PER PLAN AND SPECIFICATIONS

WELD STUDS TO UNDERSIDE OF SHELF; CAP WITH SS ACORN NUTS

STANDOFF AS PER SPECIFICATIONS

AS PER PLAN AND SPECIFICATIONS

ELONGATE STUD HOLES FOR FIELD ADJUSTMENTS

MAXIMUM SPACING BETWEEN BRACKETS NOT TO EXCEED 48"

CAP WITH SS ACORN NUTS

TURN UP AND HEM AT WALLS

SHELF ELEVATION

SHELF SECTION WITH STANDOFF

SHELF SECTION

SLOTTED SHELF

BRACKET

WALL SHELF DETAILS

FOODSERVICE CONSULTANTS
192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736
Rack Shelf Details

- 1/2" Dia. S/S Drain at each end
- 1-9/16"
- Secure to Wall as required
- 14 Ga. S/S Bracket 36" on center
- 16 Ga. S/S Shelf
POT RACK
WALL MOUNTED DETAILS

2" x 3" S/S FLAT BAR CONSTRUCTION
SUPPORT; 48" ON CENTER

FULLY WELDED TO S/S ANGLES AND SECURED TO WALL

PROVIDE WITH S/S SINGLE SERVICE POT HOOKS

SINGLE OR DOUBLE BAR POT RACK AS PER SPECIFICATIONS

2" x 3" S/S FLAT BAR SUPPORT; 48" ON CENTER
2"x3"
S/S FLAT BAR
HANGERS

LENGTH AS PER SPEC

2"x3"
S/S FLAT BAR
CONSTRUCTION

PROVIDE WITH S/S
SINGLE SERVICE
POT HOOKS

SUPPORT 1/4" ON CENTER

2"x3"
S/S FLAT BAR
HANGERS

2 1/16"
S/S FLAT BAR
HANGERS

AS PER SPEC

POT RACK
CEILING MOUNTED
DETAILS

FOODSERVICE CONSULTANTS
192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736
TABLE MOUNTED
FULLY WELDED S/S GUSSET W/ SET SCREW
1-5/8" DIA. S/S TUBING

COUNTER MOUNTED
FULLY WELDED S/S GUSSET W/ SET SCREW
1-5/8" DIA. S/S TUBING

OVER SHELF DETAILS

FOODSERVICE CONSULTANTS
192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736
1-5/8" DIA. S/S TUBING
FULLY WELDED S/S GUSSET W/ SET SCREW
AS PER FIELD CONDITIONS
1"x4"x1" S/S HAT CHANNEL
1/8" DIA. S/S TUBING
AS PER PLAN
OVERSHELF DETAILS
WELD STUDS TO UNDERSIDE OF SHELF; ACORN NUTS
1-5/8" DIA. S/S TUBING

FOR BRACKET DETAIL SEE DRAWING FAB-DET-2-1

18 GA S/S

FIELD VERIFY 16 GA. S/S FOR BRACKET DETAIL

FOODSERVICE CONSULTANTS
192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736
20° WELDED TO UNDERSIDE OF SHELF

1"x1" S/S SQUARE TUBING FRAME

1TH SIZE PAN

OVERSHELF WITH SPICE RAIL

FOODSERVICE CONSULTANTS
192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736

SCALE 3"=1'-0"

DRAWING DETAILS

DRAWN BY E.H.
DRAWING NUMBER FAB-DET-2-8
WELDED TO UNDERSIDE OF SHELF

1" TURN UP @ FRONT & ENDS OVER SHELF

DRAWING NUMBER

SCALE 1-1/2"=1'-0"

DRAWING DETAILS DRAWN BY E.H.

FAB-DET-2-9

TITLE

OVER SHELF WITH POS PRINTER SHELF

FOODSERVICE CONSULTANTS
192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736
Z CLIP FOR WALL MOUNTING

3' OR TO CEILING (VERIFY)

16 GA. S/S ADJUSTABLE SHELF

16 GA. SS BODY

18 GA. SS DOUBLE PAN HINGED DOOR EXTERIOR, 18 GA. INTERIOR AS PER PLAN

ALKCO SUPER INCH T8 FLUORESCENT TASK LIGHT, AS SPECIFIED

CAP BOTTOM

"Z" CLIP FOR WALL MOUNTING

WALL CABINET DETAILS

FOODSERVICE CONSULTANTS
192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736
TYPICAL WALL SHELF
INSTALL HEIGHTS

3'-0" AFF OR SPEC
56"

12" TYP.

14 GA. GALV. HAT CHANNEL REINFORCING
AS PER PLAN AND SPECIFICATIONS

AS PER PLAN AND SPECIFICATIONS

FOODSERVICE CONSULTANTS

192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736
MULTIPLE SINK DETAIL

1" WORK SURFACE

MULTIPLE SINKS WITH SEAMLESS FLUSH FRONT CONSTRUCTION

SEE STANDARD SPLASH DETAILS

FAB-DET-1-1-

SEE STANDARD EDGE DETAILS

FAB-DET-1-2

SINK DIVIDER 1" BELOW WORKTOP AT MULTIPLE SINKS

DIVIDER SECTION DETAIL 1/2=1'-0"

FOODSERVICE CONSULTANTS

JACOBS | DOLAND | BEER

Tel: (212) 206 - 0736
192 Lexington Ave, Suite 804
New York, New York 10016
16 GA. GALV. HAT CHANNEL REINFORCEMENT
14 GA. S/S CROSSRAIL FULLY WELDED, GROUND & POLISHED
16 GA. 1-1/4" O.D. S/S CROSSRAIL
1-5/8" O.D. 16 GA. S/S LEGS WITH ADJUSTABLE SS BULLET FEET
VERIFIED DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1
VERIFY FAUCET REQUIREMENT WITH SPECIFICATIONS
ROTARY WASTE
2" HIGH HEMMED TURN UP AT WALLS
16 GA. S/S UNDER SHELF WHEN SPECIFIED
14 GA. S/S SINK INTEGRAL WITH WORKTOP
VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1
2" 3' OR PER SPEC
SEE STANDARDS SPLASH DETAILS FAB-DET-1-2
DEPTH PER SPEC OR DRAWING
3" 2"
2" 3" 3"
3" 10"

WORKTABLE W/ SINK(S) DETAILS

FOODSERVICE CONSULTANTS
192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736

JACOBS | DOLAND | BEER

DRAWN BY E.H.
DRAWING NUMBER
FAB-DET-3-2
COUNTER W/ SINK(S) DETAILS

- 6" 18 GA. S/S SHELF WELDED TO BODY
- 3" 18 GA. S/S APRON
- 3" DEPTH PER SPEC
- 6" 18 GA. S/S APRON
- 3" 18 GA. S/S APRON
- 14 GA. S/S TOP W/ SOUND DEADENING
- 6" 18 GA. S/S APRON
- 18 GA. S/S S/LEG W/ ADJUSTABLE S/S BULLET FEET
- 2" O.D. 18 GA. S/S LEGS
- CHASEWAY TO ALLOW FOR INDIRECT WASTE PLUMBING
- VALVE BRACKET
- ROTARY WASTE
- VERIFY FAUCET REQUIREMENT WITH SPECIFICATIONS
- SEE FAB-DET-1-1 SPECIFICATIONS
- SEE FAB-DET-1-2 STANDARD DETAILS
- PER SPEC OR DRAWING

FOODSERVICE CONSULTANTS
192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736
S/S ANTI-SPLASH GRATING; FINGER PULL AT ONE END. BOTH ENDS WELDED CLOSED. MAXIMUM LENGTH OF ANY (1) GRATE TO BE 3'. TROUGH TO BE FULLY WELDED AND COVERED CORNERED. PITCHED 1/8" PER FOOT TO DRAIN. PROVIDE FINGER RING AT (1) END. DRIP TROUGH. LOCATION TO BE SHOWN ON PLAN FOR EACH INDIVIDUAL UNIT. DRAIN AND WELDED IN. 1" DIA. S/S DRAIN CUT. OF ANY (1) GRATE TO BE 3'. MAXIMUM LENGTH FINGER PULL AT ONE END. BOTH ENDS S/S ANTI-SPLASH GRATING.
COORDINATE OPENING WITH DISHWASHER SPECIFICATIONS

SEE STANDARD SPLASH DETAILS FAB-DET-1-2

SEE STANDARD EDGE DETAILS FAB-DET-1-1

6" HIGH MAXIMUM COORDINATE WITH DISHWASHER SPECIFICATIONS

COORDINATE OPENING WITH DISHWASHER SPECIFICATIONS
14 GA. SS TOP
W/ SOUND DEADENING
VERIFY EDGE DETAIL
WITH SPECIFICATIONS
SEE FAB-DET-1-1
14 GA. SS TOP
WRAPPED TOWARDS WALLS
14 GA. SS S/ST CLIPS
FULLY WELDED, GROUND & POLISHED
1-1/4" O.D. SS CROSSRAIL
FULLY WELDED TO 14 GA. GALV.
16 GA. SS LEGS
WITH ADJUSTABLE
SS BULLET FEET
1-1/4" O.D. SS CROSSRAIL
FULLY WELDED, GROUND & POLISHED
HAT CHANNELS
16 GA. SS GUSSETS
FULLY WELDED TO 14 GA. GALV.
HAT CHANNELS
16 GA. 1-1/4" O.D. SS CROSSRAIL
FULLY WELDED, GROUND & POLISHED
HAT CHANNELS
2" HIGH HEMMED
TURN UP AT WALLS
HAT CHANNELS
16 GA. 1-1/4" O.D. SS CROSSRAIL
FULLY WELDED, GROUND & POLISHED
HAT CHANNELS
16 GA. SS UNDER SHELF
WHEN SPECIFIED
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16 GA. 1-1/4" O.D. S/S CROSSRAIL
FULLY WELDED, GROUND & POLISHED
AT JUNCTURES

1-5/8" O.D. 16 GA. S/S LEGS
WITH ADJUSTABLE S/S BULLET FEET

2'-10" OR PER SPEC

14 GA. S/S TOP EDGE E
W/ SOUND DEADENING

14 GA. 1-1/4" O.D. S/S CROSSRAIL
FULLY WELDED, GROUND & POLISHED
AT JUNCTURES

14 GA. S/S U N D E R S H E L F
WITH ADJUSTABLE S/S BULLET FEET

1-5/8" O.D. 16 GA. S/S LEGS
FULLY WELDED TO 14 GA. GALV.
HAT CHANNELS

4"x1" 14 GA. GALV. HAT CHANNEL
REINFORCEMENT

14 GA. S/S CANTILEVER BRACKET

1/2" @ 45°

1/2" OR AS PER SPEC

14 GA. 1-1/4" O.D. S/S CROSSRAIL
FULLY WELDED, GROUND & POLISHED
AT JUNCTURES

16 GA. S/S GUSSETS FULLY WELDED TO 14 GA. GALV.
HAT CHANNELS

14 GA. S/S UNDERSHELF
WHEN SPECIFIED

14 GA. S/S CANTILEVER BRACKET

1' TYPICAL
OR AS PER SPEC

1/2" @ 45°
14 GA. S/S TOP W/ SOUND DEADENING

VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

CAP FRONT EDGE

15 8"

14 GA. GALV. HAT CHANNEL REINFORCING

WITH ADJUSTABLE S/S BULLET FEET FULLY WELDED TO CHANNELS

2" O.D. 16 GA. S/S LEGS FULLY WELDED TO CHANNELS

16 GA. S/S SHELF WELDED TO BODY

6"

14 GA. S/S APRON & BODY

ON MAX. 30" CENTERS ALL FULLY WELDED

18 GA. S/S SHELF WELDED TO BODY

1 1/2"

EQUAL

1 1/2"

EQUAL

6"

VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

2' MAX.

COUNTER DETAILS

FOODSERVICE CONSULTANTS
192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736
COUNTER W/ ADJUSTABLE SHELF DETAILS

- 14 GA. S/S TOP WITH SOUND DEADENING
- 16 GA. S/S SHELF WELDED TO BODY
- 16 GA. S/S APRON & BODY FULLY WELDED
- 18 GA. S/S SHELF
- 16 GA. S/S ADJUSTABLE SHELF
- 14 GA. GALV. HAT CHANNEL REINFORCING
- 2" O.D. 16 GA. S/S LEGS WITH ADJUSTABLE S/S BULLET FEET FULLY WELDED TO CHANNELS
- 2" MAX. CHANNELS
- 6" STIFFENING CHANNELS
- 6" PILASTER STRIPS
- 2' MAX. 18 GA. S/S APRON & BODY
- FRONT TO REAR ANGLES ON MAX. 30" CENTERS ALL FULLY WELDED
- 14 GA. SS TOP W/ SOUND DEADENING
- VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1
- SEE STANDARDS SPLASH DETAILS FOR DRAWING

FOODSERVICE CONSULTANTS
192 Lexington Ave, Suite 804
New York, New York 10016
Tel: (212) 206 - 0736

DRAWN BY E.H.
DRAWING NUMBER
FAB-DET-5-2

SCALE 1/2"=1'-0"

DRAWING
COUNTER DETAILS

TITLE
COUNTER W/ HINGED DOORS
DETAILS

VERIFIED EDGE DETAIL
WITH SPECIFICATIONS
SEE FAB-DET-1-1

SEE STANDARD
SPLASH DETAILS
SEE FAB-DET-1-2

14 GA. SST.
Top
WITH SOUND
DEADENING

20 GA. SST.
DOUBLE PAN
HINGED DOOR

FULL LENGTH PULL
ON MAX. 30" CENTERS
ALL FULLY WELDED

18 GA. SST.
APRON & BODY

16 GA. SST.
SHLF
WELDED TO BODY

14 GA. GALV.
HAT
CHANNEL REINFORCING

2" O.D. 16 GA. SST.
LEG W/ ADJUSTABLE SST.
BULLET FEET
FULLY WELDED TO CHANNELS

14 GA. SST.
fixed
CAP FRONT EDGE
FRONT TO REAR ANGLES
ON MAX. 30" CENTERS
ALL FULLY WELDED

16 GA. SST.
SHELF
WELDED TO BODY

18 GA. SST.
HAT CHANNEL
REINFORCING
COUNTER W/ CHANNEL BASE DETAILS

14 GA. S/S CHANNEL BASE
14 GA. GALV. HAT CHANNEL REINFORCING
16 GA. S/S SHELF WELDED TO BODY
18 GA. S/S APRON & BODY
18 GA. S/S TOP W/ SOUND DEADENING

SEE STANDARD SPLASH DETAILS
SEE FAB-DET-1-2
VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

CAP FRONT EDGE FRONT TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

6" 13/2" EQUAL 13/2" CHANNEL

13/2" MAX. 13/2" CHANNEL BASE

14 GA. S/S TOP PER SPEC OR DRAWING

6" CAP FRONT EDGE FROM TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

12" MAX.

13/2" CHANNEL

14 GA. GALV. HAT CHANNEL REINFORCING
16 GA. S/S SHELF WELDED TO BODY
18 GA. S/S APRON & BODY
18 GA. S/S TOP W/ SOUND DEADENING

SEE STANDARD SPLASH DETAILS
SEE FAB-DET-1-2
VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

CAP FRONT EDGE FRONT TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

6" 13/2" EQUAL 13/2" CHANNEL

13/2" MAX. 13/2" CHANNEL BASE

14 GA. S/S TOP PER SPEC OR DRAWING

6" CAP FRONT EDGE FROM TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

12" MAX.

13/2" CHANNEL

14 GA. GALV. HAT CHANNEL REINFORCING
16 GA. S/S SHELF WELDED TO BODY
18 GA. S/S APRON & BODY
18 GA. S/S TOP W/ SOUND DEADENING

SEE STANDARD SPLASH DETAILS
SEE FAB-DET-1-2
VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

CAP FRONT EDGE FRONT TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

6" 13/2" EQUAL 13/2" CHANNEL

13/2" MAX. 13/2" CHANNEL BASE

14 GA. S/S TOP PER SPEC OR DRAWING

6" CAP FRONT EDGE FROM TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

12" MAX.

13/2" CHANNEL

14 GA. GALV. HAT CHANNEL REINFORCING
16 GA. S/S SHELF WELDED TO BODY
18 GA. S/S APRON & BODY
18 GA. S/S TOP W/ SOUND DEADENING

SEE STANDARD SPLASH DETAILS
SEE FAB-DET-1-2
VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

CAP FRONT EDGE FRONT TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

6" 13/2" EQUAL 13/2" CHANNEL

13/2" MAX. 13/2" CHANNEL BASE

14 GA. S/S TOP PER SPEC OR DRAWING

6" CAP FRONT EDGE FROM TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

12" MAX.

13/2" CHANNEL

14 GA. GALV. HAT CHANNEL REINFORCING
16 GA. S/S SHELF WELDED TO BODY
18 GA. S/S APRON & BODY
18 GA. S/S TOP W/ SOUND DEADENING

SEE STANDARD SPLASH DETAILS
SEE FAB-DET-1-2
VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

CAP FRONT EDGE FRONT TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

6" 13/2" EQUAL 13/2" CHANNEL

13/2" MAX. 13/2" CHANNEL BASE

14 GA. S/S TOP PER SPEC OR DRAWING

6" CAP FRONT EDGE FROM TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

12" MAX.

13/2" CHANNEL

14 GA. GALV. HAT CHANNEL REINFORCING
16 GA. S/S SHELF WELDED TO BODY
18 GA. S/S APRON & BODY
18 GA. S/S TOP W/ SOUND DEADENING

SEE STANDARD SPLASH DETAILS
SEE FAB-DET-1-2
VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

CAP FRONT EDGE FRONT TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

6" 13/2" EQUAL 13/2" CHANNEL

13/2" MAX. 13/2" CHANNEL BASE

14 GA. S/S TOP PER SPEC OR DRAWING

6" CAP FRONT EDGE FROM TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

12" MAX.

13/2" CHANNEL

14 GA. GALV. HAT CHANNEL REINFORCING
16 GA. S/S SHELF WELDED TO BODY
18 GA. S/S APRON & BODY
18 GA. S/S TOP W/ SOUND DEADENING

SEE STANDARD SPLASH DETAILS
SEE FAB-DET-1-2
VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

CAP FRONT EDGE FRONT TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

6" 13/2" EQUAL 13/2" CHANNEL

13/2" MAX. 13/2" CHANNEL BASE

14 GA. S/S TOP PER SPEC OR DRAWING

6" CAP FRONT EDGE FROM TO REAR ANGLES ON MAX. 30° CENTERS ALL FULLY WELDED

12" MAX.

13/2" CHANNEL.
CLIP WELDED TO S/S PLATE
18 GA. S/S KICKPLATE WHERE SPECIFIED
OPEN HEM TO ALLOW CLIP TO BE POSITIONED
CLIP WELDED TO S/S PLATE
Fabricator to provide dividers to separate electrical wiring from plumbing/refrigeration lines in chases containing multiple services.

- Flange back, weld corners & seal and secure to utility chase.
- Secure & seal chase to splash or 2" coved turn-up on fixture top.
- 3/4" pan shaped, S/S removable access panel. Access panel not to exceed 18"x48" long.
- 1" S/S angle collar at perimeter.

Utility Chase

Chase Section

Chase Detail

Foodservice Consultants
Jacobs | Doland | Beer

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DOORS OR DRAWERS AS PER SPEC

SEE STANDARDSPLASH DETAILS FAB-DET-1-2

REMOTE UNITS TO HAVE MECHANICAL COMPARTMENT; SELF-CONTAINED UNITS TO HAVE LOUVERED COMPRESSOR HOUSING

EXTERNAL THERMOMETER

VERIFY EDGE DETAILS WITH FAB-DET-1-1

REFRIGERATION, ELECTRICAL AND DRAIN LINES EXTENDED TO MECHANICAL COMPARTMENT/COMPRESSOR HOUSING

REFRIGERATOR DETAILS

FAB-DET-6-1
REFRIGERATOR DETAILS

20 GA. S/S DOUBLE PAN, INSULATED DOORS HEAVY DUTY HINGED WITH CYLINDER LOCKS

VERIFIED DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

6"  WIRE BOTTOM RACK

2" O.D. 16 GA. S/S LEGS WITH ADJUSTABLE S/S BULLET FEET

(1) VAPOR PROOF LIGHT FIXTURE FOR EVERY (2) DOORS

2" THICK URETHANE RIGID BOARD INSULATION FOAM OR FOAMED IN PLACE

EXTEND REFRIGERATION, ELECTRICAL AND DRAIN LINES TO MECHANICAL COMPARTMENT. SEE FAB-DET-8-1.

NOTE: REFRIGERATION TO BE R-404

14 GA. S/S TOP W/ SOUND DEADENING

6" VINYL MAGNETIC GASKET

ENCLOSE RETURN TO BODY

18 GA. S/S OR EPOXY COATED WIRE SHELVES AS PER SPEC

ADJUSTABLE PERFORATED SHELVES

(1) VAPOR PROOF LIGHT FIXTURE FOR EVERY (2) DOORS

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VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

3' OR PER SPEC VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-14 GA. S/S TOP W/ SOUND DEADENING

20 GA. S/S DOUBLE PAN, INSULATED DOORS HEAVY DUTY HINGED WITH CYLINDER LOCKS

VINYL MAGNETIC GASKET ENCLOSE RETURN TO BODY

2" O.D. 16 GA. S/S LEGS WITH ADJUSTABLE S/S BULLET FEET

ADJUSTABLE PERFORATED 18 GA. S/S OR EPOXY COATED WIRE SHELVES AS PER SPEC

(1) VAPOR PROOF LIGHT FIXTURE FOR EVERY (2) DOORS

2" THICK URETHANE RIGID BOARD INSULATION, FOAM OR FOAMED IN PLACE

EXTEND REFRIGERATION, ELECTRICAL AND DRAIN LINES TO MECHANICAL COMPARTMENT. SEE FAB-DET-6-1; NOTE: REFRIGERATION TO BE R-404

6" VINYL MAGNETIC GASKET ENCLOSE RETURN TO BODY

REFRIGERATOR WITH SPLASH DETAILS

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REFRIGERATOR
WITH 19" & 24" WIDE
DRAWERS
DETAILS

20 GA. S/S DOUBLE
PAN, INSULATED
WITH CYLINDER LOCKS

2" O.D. 16 GA. S/S LEGS
WITH ADJUSTABLE
S/S BULLET FEET

3" OR PER
SPEC

MAGNETIC
GASKET

20 GA. S/S TOP
W/ SOUND DEADENING

ENCLOSE RETURN
TO BODY

14 GA. S/S TOP
W/ SOUND DEADENING

SEE STANDARD
SPLASH DETAILS

VERIFY EDGE DETAIL
WITH SPECIFICATIONS
SEE FAB-DET-1-1

EXTEND REFRIGERATION,
ELECTRICAL
AND DRAIN LINES TO MECHANICAL
COMPARTMENT. SEE FAB-DET-6-1;
NOTE: REFRIGERATION TO BE R-404
2" THICK. URETHANE RIGID
BOARD INSULATION, FOAM
OR FOAMED IN PLACE

6" OR PER
SPEC

SEE FAB-DET-1-2

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DRAWING
REFRIGERATOR DETAILS

DRAWN BY E.H.
DRAWING NUMBER
FAB-DET-6-4
PER SPEC OR DRAWING (33" MINIMUM)

SEE STANDARDSPLASH DETAILS

FAB-DET-1-2

14 GA. S/S TOP W/ SOUND DEADENING

6" OR PER SPEC.

EXTEND REFRIGERATION, ELECTRICAL AND DRAIN LINES TO MECHANICAL COMPARTMENT. SEE FAB-DET-6-1; NOTE: REFRIGERATION TO BE R-404 2" THICK. URETHANE RIGID BOARD INSULATION, FOAM OR FOAMED IN PLACE.

2" O.D. 16 GA S/S LEGS WITH ADJUSTABLE S/S BULLET FEET

VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

ENCLOSE RETURN TO BODY

20 GA. S/S DOUBLE PAN INSULATED DRAWERS WITH CYLINDER LOCKS

VINYL MAGNETIC GASKET

2" THICK URETHANE RIGID BOARD INSULATION, FOAM OR FOAMED IN PLACE.

REFRIGERATOR WITH 27" & 32" WIDE DRAWERS DETAILS

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REFRIGERATOR RAISED RAIL DETAILS

20 GA. S/S DOUBLE PAN INSULATED DOORS HEAVY DUTY HINGED WITH CYLINDER LOCKS

MAGNETIC VINYL GASKET ENCLOSE RETURN TO BODY

2" O.D. 16 GA. S/S LEGS WITH ADJUSTABLE S/S BULLET FEET

WIRE BOTTOM RACK ADJUSTABLE PERFORATED 18 GA. S/S OR EPOXY COATED WIRE SHELVES AS PER SPEC

(1) VAPOR PROOF LIGHT FIXTURE FOR EVERY (2) DOORS

2" THICK URETHANE RIGID BOARD INSULATION FOAM OR FOAMED IN PLACE

AND DRAIN LINES TO MECHANICAL COMPARTMENT SEE FAB-DET-6-1

NOTE: REFRIGERATION TO BE R-404

COUNTERSINK ALL SCREWS

EXTRACTOR REFRIGERATION, ELECTRICAL

1'-2" OPENING

2" 1'-0"

6" 8"

6" 6"

2" 2"

2"
2" O.D. 16 GA. S/S LEGS
WITH ADJUSTABLE S/S BULLET FEET

ADJUSTABLE PERFORATED 18 GA. S/S OR EPOXY COATED WIRE SHELVES AS PER SPEC

2" THICK URETHANE RIGID BOARD INSULATION, FOAM OR FOAMED IN PLACE

COUNTERSINK ALL SCREWS

EXTEND REFRIGERATION, ELECTRICAL AND DRAIN LINES TO MECHANICAL COMPARTMENT. SEE FAB-DET-6-1.
NOTE: REFRIGERATION TO BE R-404

(1) VAPOR PROOF LIGHT FIXTURE FOR EVERY (2) DOORS

1'-10" OPENING

20 GA. S/S DOUBLE PAN, INSULATED DOORS HEAVY DUTY HINGED WITH CYLINDER LOCKS

VERIFY EDGE DETAIL WITH SPECIFICATIONS SEE FAB-DET-1-1

3' OR PER SPEC

2" O.D. 16 GA. S/S LEGS
WITH ADJUSTABLE S/S BULLET FEET

WIRE BOTTOM RACK

2" MAGNETIC GASKET

PAN INSULATED DOORS HEAVY DUTY HINGED WITH CYLINDER LOCKS

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REFRIGERATED PREP ROOM DETAILS

3" THICK RIGID INSULATION IN STUD WALL

SANITARY COVED MOLDS

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WALL PANELS WITH LAP JOINT

HEM EDGE AT FINISHED ENDS

20 GA. TYPE 304 STAINLESS STEEL SECURED TO WALL W/ SCREWS & ADHESIVE. ALL SCREW HEADS SHALL BE HIDDEN BY OVERLAPPING PANEL.

SCREW REAR TAB ONLY TO WALL. SCREWHEAD TO BE COVERED BY OVERLAPPING PANEL.

LAP JOINT

TILE COVE BASE

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REFRIGERATED PREP ROOM DETAILS

3" THICK RIGID INSULATION IN STUD WALL

SANITARY COVERED MOLDING

1'-6" A.F.F.

5/8" THICK DUROC

5/8" THICK GREENBOARD

CEILING TO

FINISH GREENBOARD / DUROC / FLASHING WITH QUARRY TILE AND EPOXY GROUT OR 18 GA. S/S PANELS W/ "T" TRIM STRIPS OR FRP W/ "T" TRIM STRIPS

JOINING DETAIL FOR S/S OR FRP SHEETS

"T" TRIM STRIP

DRAWING NUMBER

FAB-DET-7-1

FOODSERVICE CONSULTANTS
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SECTION 12500 - MOTORIZED ROLLER SHADES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electrically operated, blackout roller shades. Include local, group and master motor control systems for shade operation with addressable, encoded, electronic drive units (EDU) including the following:
   1. Network interface (MNI).

1.2 RELATED SECTIONS

A. Division 16 - Electrical: Electric service for motors, motor controls, internal communication, low voltage wiring and data transfer, and connection to Internet.

1.3 REFERENCES

B. NFPA 70 - National Electrical Code.
C. NFPA 701 - Fire Tests for Flame-Resistant Textiles and Films.
D. UL 325 - ANSI/UL Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.4 SUBMITTALS

A. Submit under provisions of AIA A232 and Section 00800 Requirements.
B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
   3. Storage and handling requirements and recommendations.
   4. Mounting details and installation methods.
   5. Typical wiring diagrams including integration of EDU controllers.
C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
   1. Prepare shop drawings on AutoCAD or Microstation format using base sheets provided electronically by the Architect.
   2. Prepare control wiring diagrams based on zones, switching and operational requirements provided by the Architect in electronic format.
   3. Include one-line diagrams, wire counts, coverage patterns, and physical dimensions of each item.
   4. Provide location plan showing all switch and control zones as per the performance requirements of the specifications. All switches must clearly be shown and called out in a bill of materials.
D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

E. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors.

F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

H. Warranty: Provide manufacturer's warranty documents as specified in this Section.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a recommended minimum of ten years' experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section.

B. Installer for Roller Shade System - Qualifications: Installer trained and certified by the manufacturer with a recommended minimum of ten years’ experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.

E. ShadeCloth Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

F. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristics, and perpetual use certification as specified. Initial submittals, which do not include the Environmental Certification will be rejected. Materials that are simply 'PVC free' without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.

G. Third Party Evaluation: Provide documentation stating the shade cloth has undergone third party evaluation for all chemical inputs, down to a scale of 100 parts per million, that have been evaluated for human and environmental safety. Identify any and all inputs, which are known to be carcinogenic, mutagenic,
teratogenic, reproductively toxic, or endocrine disrupting. Also identify items that are toxic to aquatic systems, contain heavy metals, or organohalogenes. The material shall contain no inputs that are known problems to human or environmental health per the above major criteria, except for an input that is required to meet local fire codes.

H. Recycling Characteristics: Provide documentation that the shade cloth can, and is part of a closed loop of perpetual use and not be required to be down cycled, incinerated or otherwise thrown away. Scrap material can be sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new material, without down cycling. Certify that this process is currently underway and will be utilized for this project.

I. Perpetual Use Certification: Certify that at the end of the useful life of the shade cloth, that the material can be sent back to the manufacturer for recapture as part of a closed loop of perpetual use and that the material can and will be reconstituted into new yarn, for weaving into new shade cloth. Provide information on each shade band indicating that the shade band can be sent back to the manufacturer for this purpose.

J. Requirements for Electronic Hardware, Controls, and Switches: Roller shade hardware, shade fabric, EDU, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.

K. Requirements for Roller Shade Installer/Contractor:
   1. Roller Shade Hardware, shade fabric, motor, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.
   2. Roller Shade Installer/Contractor shall include all components and systems included in their bid, including but not limited to, the prime manufacturer of the motor control and automated equipment.

L. Turn-Key Single-Source Responsibility for Wiring Motorized Interior Roller Shades: To control the responsibility for performance of motorized roller shade systems, assign the design, engineering, and installation of motorized roller shade systems, motors, controls, and low voltage electrical control wiring specified in this Section to a single manufacturer and their authorized installer/dealer. The Architect will not produce a set of electrical drawings for the installation of control wiring for the motors, or motor controllers of the motorized roller shades. Power wiring (line voltage), shall be provided by the roller shade installer/dealer, in accordance with the requirements provided by the manufacturer. Coordinate the following with the roller shade installer/dealer:
   1. Contractor shall provide power panels and circuits of sufficient size to accommodate roller shade manufacturer's requirements, as indicated on the mechanical and electrical drawings.
   2. Contractor shall coordinate with requirements of roller shade installer/dealer, before inaccessible areas are constructed.
   3. Roller shade installer/dealer shall run line voltage as dedicated home runs (of sufficient quantity, in sufficient capacity as required) terminating in junction boxes in locations designated by roller shade dealer.
4. Roller shade installer/dealer shall provide and run all line voltage (from the terminating points) to the motor controllers, wire all roller shade motors to the motor controllers, and provide and run low voltage control wiring from motor controllers to switch/control locations designated by the Architect. All above-ceiling and concealed wiring shall be plenum-rated, or installed in conduit, as required by the electrical code having jurisdiction.

5. Contractor shall provide conduit with pull wire in all areas, which might not be accessible to roller shade contractor due to building design, equipment location or schedule.

M. Mock-Up: Provide a mock-up of one roller shade assembly for evaluation of mounting, appearance and accessories.
1. Locate mock-up in window designated by Architect.
2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Power and control wiring shall be complete and certified, fully operational with uninterrupted communication on the lines and minimal noise certified by a commissioning agent specified in other sections.
1. 485, ICON, Lonmark and Dry Contract Network: Noise on the line not to exceed shade manufacturer's limits.

1.8 WARRANTY

A. Roller Shade Hardware Warranty: Manufacturer's standard non-depreciating twenty-five (25) year limited warranty.

B. Standard Shadecloth: Manufacturer's standard twenty-five (25) year warranty.

C. Roller Shade Motors and Motor Control Systems: Manufacturer's standard non-depreciating five (5) year warranty.

D. Roller Shade Installation: One (1) year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas, which are deemed Owner's responsibility.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: Mecho, 42-03 35th St.; Long Island City, NY 11101; Tel.# 718-729-2020; Email: marketing@mechoshade.com; Web: http://www.mechoshade.com; or approved equal.

B. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to the following:

1. Draper Inc.
2. Lutron
3. Or approved equal.

C. Substitutions: In accordance with AIA A232 and Section 00800.

2.2 SHADECLOTH

A. Vinyl Room Darkening Shadecloth (Single-Fabric): MechoSystems, "0700 Series," blackout material, washable and colorfast laminated and embossed vinyl coated fabric, 0.015 inches thick (0.30 mm) blackout material and weighing 0.78 lbs. per sq. yd (0.42 kg per sq. m), with a minimum of 62 threads per square inch:

1. Color: Selected from manufacturer's standard colors.

2.3 SHADE BANDS

A. Shade Bands: Construction of shade band includes the fabric, the enclosed hem weight, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets shall not be acceptable.

1. Concealed Hembar: Shall be continuous extruded aluminum for entire width of shade band and with the following characteristics:
   a. Hembar shall be heat sealed on all sides.
   b. Open ends shall not be accepted.

2. Shade band and Shade Roller Attachment:
   a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection.
   b. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off Spline mounting, without having to remove shade roller from shade brackets or insert shadeband from the side.
   c. Mounting Spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
   d. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets, does not meet the performance requirements of this specification and shall not be accepted.
2.4 ROLLER SHADE COMPONENTS AND REQUIREMENTS

A. Access and Material Requirements:
   1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
   2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.

B. Motorized Shade Hardware and Shade Brackets:
   1. Provide shade hardware constructed of minimum 12 gage, 0.105 inch (2.67 mm) thick plated steel, or heavier, as required to support 200 percent of the motor stall torque plastic components without use of steel angle construction do not meet the intent of this specification and shall not be accepted.
   2. Provide shade hardware system that allows for field adjustment of EDU or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
   3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 16 to 45 degrees from the EDU axis between shade bands (8 to 22.5 degrees) on each side of the radial line, by a single shade EDU (multi-banded shade, subject to manufacturer's design criteria).
   4. All bands within a single EDU group shall be aligned within 1/4 inch (6 mm).

C. Drive Bracket / Brake Assembly:
   1. Mecho Drive Bracket model Mecho5x shall be fully integrated with all Mecho accessories, including, but not limited to: SnapLoc fascia, SnapLoc Zipper channels, room darkening side / sill channels, center supports and connectors for multi-banded shades.
   2. Mecho5x drive sprocket and brake assembly shall rotate and be supported on a welded 5/16 inch (8 mm) steel pin.
   3. The brake shall be an over-running wrapped spring clutch design which disengages during the raising and lowering of a shade. The brake shall withstand a minimum pull force of 50 lbs. (22 kg) in the stopped position.
   4. The braking mechanism shall employ an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes a wrapped spring clutch assembly that ensures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated requiring no maintenance. Products that require externally applied lubrication and/or are not permanently lubricated are not acceptable.
   5. The entire Mecho5x assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
2.5 INTELLIGENT ENCODED ELECTRONIC DRIVE SYSTEM (120VAC)

A. Electronic Drive Unit (EDU):

1. Intelligent Encoded EDU, and Control System: Tubular, asynchronous (non-synchronous) EDU's, with built-in ac motor and reversible capacitor operating at 120VAC/60Hz, (230VAC/50Hz) single phase, temperature Class B, thermally-protected, totally enclosed, maintenance-free and powered by a line voltage power supply connection equipped with locking disconnect plug assembly furnished with each EDU.

2. Quiet, 38 dB (within 3 feet (914 mm) open air depending on motor torque.

3. EDU concealed inside shade roller tube.

4. Maximum current draw for each shade EDU of 0.9Amps at 120VAC for IQ2 6NM; other current draw as applicable if other motors sizes required.

5. Use EDU's rated at the same nominal speed for all shades in the same room.

6. Use EDU's with minimum of 34RPM, that shall not vary due to load / lift capacity.

7. Total hanging weight of shade band shall not exceed 80 percent of the rated lifting capacity of the shade EDU and tube assembly.

8. UL325 Listed solution. UL Recognized solutions without the listing certification shall be unacceptable.

9. UL or ETL listed marking shall be applied on a hang tag off the motor lead so that the inspector can readily verify the certification and rating of the motor. Products that require the shade assembly to be dismounted or partially dismounted for the motor or EDU to be removed from the shade roller tube for inspection shall be unacceptable.

10. EDU shall possess an isolated, low voltage power supply for powering external accessories connected to either the dry contact port or the network port. Products that force accessories to always be powered by a plugin or externally supplied power supply shall not be acceptable.

11. Provide EDU with the ability to upgrade firmware inside the motor from anywhere on the network without touching the motor.

B. EDU System: (software, two-way communication): Specifications and design are based on the Intelligent EDU Control System, WhisperShade IQ2 System as manufactured by MechoSystems. EDU and control systems not in complete compliance with these performance criteria shall not be accepted as equal systems. EDU shall support two methods of control:

1. Local Isolated Dry Contact Control Inputs: EDU shall be equipped with dry contact inputs to support economical motor control as well as integration to third party systems without adding any interface modules. The dry contact inputs shall support moving the EDU/shade to the upper and lower limits as well as to local switch preset positions. They shall also support configuring the EDU under protected sequences so that a typical user would not change the EDU's setup. At a minimum the configuration should include setting limits, setting custom presets and configuring key modes of operation without requiring a PC or other similar microprocessor-driven tool.

2. Network Control: EDU shall be equipped with a bi-directional network communication capability in order to support commanding the operation
of large groups of shades over a common backbone. The network communication card shall be embedded into the tubular EDU assembly. Upper and lower stopping points (operating limits) of shade bands shall be programmed into EDU's using either a hand held removable program module / configurator or a local switch.

C. Alignment Positions: Each EDU shall support a minimum of 133 repeatable and precisely aligned shade positions (including limits and presets):
   1. All shades on the same switch circuit or with the same network group address with the same opening height shall align at each limit or preset (intermediate stopping position) when traveling from any position, up or down.
   2. Shades of differing heights shall have capability for custom, aligned intermediate stop positions when traveling from any position, up or down.
   3. Alignment of standard shade bands mechanically aligned on the same EDU shall not exceed plus or minus 0.125 inch (3 mm) when commanded to the same alignment position.
   4. Alignment of standard shades on adjacent EDU's shall not exceed plus or minus 0.25 inch (6 mm) when commanded to the same alignment position.

D. Local Switch Presets: A minimum of 3 customizable preset positions shall be accessible over the local dry contact control inputs and over the network connection:
   1. Upon setting the limits for the shade EDU these preset positions shall automatically default to 25 percent, 50 percent and 57 percent (75 percent) of the shade travel.
   2. These positions shall be capable of being customized to any position between and including the upper and lower limits of the shade. A removable program module / configurator or local switch shall be capable of customizing the position of these presets.

E. Network Presets: A minimum of 32 customizable preset positions (including the 3 local switch presets) shall be accessible via network commands:
   1. Upon setting the limits for the shade EDU these preset positions shall automatically default to the lower limit unless customized elsewhere.
   2. These positions shall be capable of being customized to any position between and including the upper and lower limits of the shade. A removable program module / configurator shall be capable of customizing the position of these presets.

F. Network Control:
   1. The system shall have the capability of two-way digital communication with the EDU's over a common backbone.
   2. Each EDU shall possess 8 addresses capable of being employed for various levels of group control. These addresses shall be configurable via a handheld configurator and/or a PC controller. A 9th unique address shall enable the EDU(s) to be independently controlled and configured over the network via a handheld configurator and/or a PC controller.
G. Low Voltage Communication Network Implementation:
1. The low voltage network shall employ a bus topology with daisy chained network connections between nodes over a CAT5 cable (4 UTP) or over a 2 UTP cable employing at least 1 pair at 16 AWG for power and 1 pair at 22 AWG for data.
2. The low voltage network (plus or minus 13 VDC) shall be powered by the nodes attached to it. These nodes could be line voltage powered EDU’s attached to 120 VAC or 230 VAC. Alternatively, low voltage nodes shall be powered typically by a centralized low voltage power supply. If a CAT5 network cable is employed and the node draws less than 1 W then the node may be powered by DC power supplied by an associated line voltage EDU.

H. Network Capacity: 4000 ft (1219 m) max, 250 nodes maximum. The number and size of a centralized DC supply shall vary depending upon the network requirements.

I. Uniform or Normal Modes of Operation: Uniform mode shall allow for shades to only move to defined intermediate stop positions to maintain maximum uniformity and organization. Normal Mode shall allow for shades to move to both intermediate stop positions, plus any position desired between the upper and lower limits as set by the installer.

2.6 WALL SWITCHES

A. Wired Wall Switches: Shades shall be operated by 2, 4, 5, 7, or 10 button low voltage standard switches. Standard switch shall be wired to a network interface and be programmed to transmit an address for the local switch. An address that is transmitted by either a switch or central controller shall be responded to by those EDU’s with the same address in their control table. Standard switch may control an individual, sub-group or group of EDU’s in accordance with the address in each EDU.

2.7 MECHONET NETWORK INTERFACE (MNI)

A. MechoNet Network Interface (MNI): Shall provide for 3rd party integration to allow RS232/485 and dry contact inputs and dry contact outputs to support other motor and control systems.
1. Low voltage controller expands window covering control over MechoNet.
2. Four optically-isolated, low voltage Motor / Electronic Drive Unit (EDU) ports control shades, blinds and draperies.
3. Each Motor Port is configurable to support:
   a. WhisperShade IQ roller shades and blinds
   b. Somfy ILT2, FTS, DCT or RTS roller shades and blinds.
   c. WhisperTrac 1000 or 3000 series drapery tracks.
   d. Somfy GlydeaTM DCT or RTS drapery tracks.
4. Two models (MNI-RJ, MNI-TB) simplify motor wiring options.
5. Configurable port personalities enable virtually any company’s User Interface (UI) to operate window coverings.
6. Four optically-isolated Switch Ports expand dry contact control options to keypads, sensors and third-party controls.
7. Each Switch Port and Motor Port supports up to 5 alignment points and 3 customizable presets.
8. Uniform Mode setting maintains an architect's design intent at all times.
9. One IR remote control port supports various wireless IR remotes.
10. One configurable Serial Port for two-way RS232 or RS485 communication facilitates third party integration.
11. Two MechoNet Ports facilitate cost effective daisy chain wiring over MechoNet.
12. MechoNet expands group control options across up to 250 nodes over 4000 ft. of industry standard CAT-5 or CAT-6 cable.
13. Each Motor Port possesses nine (9) MechoNet group control addresses which enables flexible multilevel control options.
14. Flexible power options can eliminate the need for a dedicated 24VDC supply.
15. Five diagnostic LED's aid in troubleshooting configuration and wiring issues.
16. Firmware and port configurations are upgradable from any point on the network without climbing a ladder!
17. Settings are stored in non-volatile memory with a minimum ten-year life which recalls settings even in case of power failure.
18. The MechoNet Network Interface is a listed solution to UL325 and CSA 22.2 No. 427-92.
19. Environmental Specifications:
   a. Temperature Operating: 32 to 131 degrees F (0 to 500 degrees C)
   b. Humidity Operating: Less than 90 percent relative humidity, non-condensing.

2.8 ACCESSORIES
A. Fascia:
   1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
   2. Fascia shall be able to be installed across two or more shade bands in one piece.
   3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
   4. Provide bracket/fascia end caps where mounting conditions expose outside of roller shade brackets.
   5. Fascia shall include a channel for application of flexible material (shlegel) to closing off any light leakage between the fascia and a window frame, mullion, ceiling and/or any other horizontal surface.
   6. Fascia shall attach directly to the roller shade bracket without the need to install additional mounting hardware. Exposed fasteners shall not be allowed.
   7. Fascia shall positively lock in a top-down installation method to help prevent accidental detachment.

B. Room Darkening Side and Sill Channels:
   1. Material: Extruded aluminum with polybond edge seals and SnapLoc mounting base and with concealed fastening. Exposed fasteners are not acceptable. Channels shall accept one-piece exposed blackout hembar
with vinyl seal to assure side light control and sill light control.

2. 

MechoSystems Side Channels: 1-15/16 inch (49 mm) wide by 1-3/16 inch (30 mm) deep, two-band center channels, 2-5/8 inch (67 mm) wide by 1-3/16 inch (30 mm) deep. The 2-5/8 inch (67 mm) double-center channels may be installed at center-support positions of multi-band-shade ElectroShades. MechoSystems side channels 2-5/8 inch (67 mm) may be used as center supports for ElectroShades; shade bands up to 8 high. For shade bands over 8 feet (2438 mm), provide ElectroShade side channels.

3. 

ElectroShade Side Channels: 2-1/2 inch (64 mm) wide by 1-3/16 inch (30 mm) deep; two-band center channels 5 inch (127 mm) wide by 1-3/16 inch (30 mm) deep. The 2-5/8 inch (67 mm) double-center channels may be installed at center-support positions of multi-band-shade ElectroShades. MechoSystems side channels 2-5/8 inch (67 mm) may be used as center supports for ElectroShades. Also, provide for use with manually operated room darkening MechoSystems over 8 feet (2438 mm) in height.

4. 

Channel Color: Selected from manufacturer's standard colors.

C. Room Darkening Shadeloc Channel system: Provides for shade-bands that lock into side channels to eliminate light gaps for room darkening, superior impact resistance and lower maintenance costs.

1. Material: Extruded aluminum SnapLoc channel and mounting base with concealed fastening for face or side mount. Exposed fasteners are not acceptable. Channels shall accept one-piece exposed blackout hem bar with vinyl seal to assure side light control and sill light control.

2. ElectroShade Side Channels:
   a. Single band channel is 2 inch (51 mm) wide by 1-3/4 inch (45 mm) deep.
   b. Multi-band center channel is 2.5 inch (64 mm) wide by 1-3/4 inch (44 mm) deep. The center channels may be installed at center-support positions of multi-band ElectroShades.

3. ElectroShade double Side Channels:
   a. Single band channel is 2 inch (51 mm) wide by 3-7/16 inch (87 mm) deep.
   b. Multi-band center channel is 2.5 inch (64 mm) wide by 3-7/16 inch (87 mm) deep. The center channels may be installed at center-support positions of multi-band ElectroShades.

4. Cover: Provide cover to hide extrusion seams.

5. Zipper guide: White or black plastic inserted to Shadeloc channel to smoothly guide fabric through its ensure full up and full down travel. Furnish with rubber foam cushions to adjust for field conditions.

6. S/L shade brackets:
   a. Single brackets: 5 inch (127 mm) wide by 5 inch (127 mm) deep x 1/8 inch (3 mm) thick plated steel brackets for ceiling, face or side mounting for precise alignment of Shadeloc channel.
   b. Double brackets: 7 inch (179 mm) wide by 7-1/4 inch (184 mm) deep x 1/8 inch (3 mm) thick plated steel brackets for ceiling, face or side mounting for precise alignment of Shadeloc channel.

7. Channel Color: Selected from manufacturer's standard colors.

8. Fabric: Furnished with zipper welded to the full height on both sides of the fabric, as selected by Architect from manufacturer's approved fabric
PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Confirm that blocking for roller shades is installed plumb, level, and fitted to window mullion as per interior architect's design documents and in accordance with industry standard tolerances. The horizontal surface of the shade pocket shall not be out-of-level more than 1/16 inch (1.6 mm) over 20 linear feet (6 m).

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 RESPONSIBILITIES FOR INSTALLATION

A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (51 mm) to interior face of glass. Allow proper clearances for window operation hardware.

B. Turn-Key Single-Source Responsibility for Interior Roller Shades: To control the responsibility for performance of the electric roller shade system; assign the design, engineering, and installation of electronic drive roller shade control system, shades, addressable controls, communication interfaces, and any required sensors, switches and low voltage control wiring specified in this Section to the manufacturer of the shade and control system. The Architect will not produce a set of electrical drawings for the installation of control wiring for the electric roller shade control system.

C. General Contractor Responsibilities:
   1. Provide power panels and circuits of sufficient size to accommodate roller shade manufacturer's requirements, as indicated on the mechanical and electrical drawings and manufacturer's shop drawings.
   2. Coordinate with requirements of Installer for this section before inaccessible areas are constructed.
   3. Coordinate requirements of ALSCS before inaccessible areas are constructed.
   4. Provide conduit with pull wire in all areas, which might not be accessible to ALSCS due to building design, equipment location or schedule.
   5. Coordinate with the main building electrical Installer to provide duplex 120 VAC power receptacle in electric closet for floor/riser communication gateways.
   6. Verify that wiring conditions, which have been previously installed under
other sections or at a previous time, are acceptable for product installation in accordance with manufacturer's instructions.

7. Comply with manufacturer's product data, including shop drawings, technical bulletins, product catalog installation instructions, and product carton instructions for installation.

8. Protect installed product and finished surfaces from damage during all phases of installation including preparation, testing, and cleanup.

9. Be responsible for all other required electrical work including but not limited to roof penetrations, conduits, fireproofing, and similar items.

10. Provide conduit with pull wire in all areas, which might not be accessible to Installer due to building design, equipment location or schedule.

11. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

D. Installer Responsibilities:

1. Furnish and install shade controllers, interfaces, splitters, coupler, sensors, switches, junction boxes, etc. mounted in the ceiling in an accessible location. Locations for all visible devices to be coordinated with Architect.

2. Inspect all material included in this contract prior to installation and notify manufacturer of unacceptable material prior to installation.

E. Line Voltage Wiring: Furnish and install power connection between shade control system and EDU, and shall be capable of providing single line voltage wire pull for each EDU.

F. Shade Power Wiring:

1. Installer shall furnish and install line voltage cable from roller shade motor into line voltage side of control system.

2. Installer shall furnish and install wiring from wire power junction box (provided by General Contractor) to each motor on the shade network.

3. Installer shall furnish and install a disconnect plug at the end of the power wiring run to each EDU. The disconnect plug must mate with a matching disconnect plug on the motor cable. EDU cable disconnect plug must be prefabricated by the manufacturer to meet UL and ETL systems requirements.

G. Integration with Third Party Systems: General Contractor shall coordinate and provide for others to furnish, install or program any interfaces or wiring to integrate 3rd party systems to the roller shade control system as specified herein. Integration to shade control network can be accomplished locally through dry contact closures, or RS-232.

3.4 INSTALLATION OF ROLLER SHADES

A. Install roller shades level, plumb, square, and true in accordance with manufacturer's recommendations, approved submittals, and in proper relationship with adjacent construction.

1. Provide an on-site project manager who will attend all related jobsite scheduling meetings.

2. Supervise the roller shade installation, and setting of intermediate stops of all shades to assure the alignment of the shade bands within a single EDU group, which shall not exceed plus or minus 0.125 inches (3 mm), and to
assure the alignment between EDU groups, which shall not exceed plus or minus 0.25 inches (6 mm).

3. Be responsible for field inspection on an area-by-area basis during construction to confirm proper mounting conditions per approved shop drawings.

4. Provide accurate field measurements to 1/16 inch (1.6 mm) for custom shade fabrication on the roller shades manufacturers input forms.

B. Install shades such that the shade band is not closer than 2 inches (51 mm) to the interior face of the glass. Allow proper clearances for window operation hardware.

C. Adjust, align and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

D. Installer shall set upper, lower and up to 3 intermediate stop positions of all motorized shade bands, and assure alignment in accordance with the above requirements.

E. Test and certify the operation of all motorized shades and turn over each floor for preliminary acceptance.

F. Participate and cooperate with the Electrical Contractor, shade manufacturer and the commissioning agent to verify and certify the installation is in full conformance with the specifications and is fully operational. This work to occur during the commissioning stage and is in addition to preliminary acceptance required for each floor.

3.5 INSTALLATION OF CONTROL SYSTEMS

A. Install control systems in accordance with manufacturer's recommendations and approved submittals.

B. Participate and cooperate with the Electrical Contractor, shade manufacturer and the commissioning agent to verify and certify the installation is in full conformance with the specifications and is fully operational. This work to occur during the commissioning stage and is in addition to preliminary acceptance required for each floor.

3.6 TRAINING

A. Provide a minimum of 4 hours on-site training for Owner's personnel to adjust, operate and maintain roller shade systems.

3.7 CLEANING AND PROTECTION

A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

B. Protect installed products until completion of project.

C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 12500
SECTION 12580 - LIBRARY SECURITY EQUIPMENT

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. Section Includes:
   2. Maintenance Service Agreement.

B. Related Sections:
   1. Electrical Work: Division 16.

1.3 SUBMITTALS

A. Product Data: Manufacturer's specifications describing features, colors, options, accessories,
   for each type of unit.
   1. Include installation instructions and installation methods.

B. Samples: Detection Tags
   1. Ten (10) samples of each detection tag, including printed detection tags with or without
     a Melinex coating.

C. Certificates: For review and approval, submit manufacturer's and installer's written
   certifications stating compliance with requirements of the contract documents.

D. Maintenance Service Agreement: Submit to the Architect / Owner sample of Maintenance
   Service Agreement after initial twelve (12) month warranty-maintenance period.

E. Contract Closeout Submittals: Operation and maintenance data: Include manufacturer's
   written operation and maintenance instructions.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer qualifications: A company manufacturing all components of products
      specified in this section which have performed in a satisfactory manner for a
      recommended 3 years.
   2. Installer qualifications: Company specializing in installation of specified products, with
      a recommended 2 years of experience fabricating and installing similar products.
a. Contractor to provide a list of a recommended 12 similar installations during a minimum of one year, which have utilized same product that is being submitted for review by the Architect / Engineer.

B. Regulatory Requirements: Except for more stringent requirements as indicated or imposed by governing regulations (which must be complied with) comply with the following:

1. ASME/ANSI A17.12 Safety Code
2. NFPA Codes, and specifically with sections relating to electrical work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in factory packages, marked with manufacturer and product name and location of installation.

B. Store materials in dry area maintained at building's operating temperature and humidity.

C. Follow manufacturer's instructions to prevent damage.

1.6 SEQUENCING AND SCHEDULING

A. Do not install until wet and dirty work is complete.

1.7 INITIAL MAINTENANCE AND WARRANTY

A. Maintenance Service: Provide full maintenance service by skilled competent employees, to provide Owner with manufacturer's standard maintenance service plan for period of one (1) year following date of substantial completion. Include manufacturer's periodical preventive maintenance, performed during normal working hours. Including repair and or replacement of worn or defective parts and or components as well as cleaning and adjusting as required for proper lift operation in conformance with specified requirements. Exclude only repair / replacement due to misuse, abuse, accidents or neglect caused by persons other than installer's personnel.

1. The maintenance service period is for one (1) year starting on date of substantial completion of the project.

B. Warranty: Provide special project warranty, signed by Contractor, Installer and Manufacturer, agreeing to replace / repair / restore ALL defective materials and workmanship of the system during warranty period. "Defective" is hereby defined to include, but not be limited to, operation or control system failures, system performances below required minimums, excessive wear, unusual deterioration or aging of material or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected and or unsatisfactory conditions.

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1. The warrantee period is for **one (1) year** starting on date of substantial completion of the project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: “Signature” Series as manufactured by Checkpoint Systems Inc., (a Division of CCL Industries), Thorofare, New Jersey 08086, Tel.# 856.848.1800 / 800.257.5540; or approved equal.

B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.

2.2 PRODUCTS

A. General Requirements:

1. Provide an electronic library security system capable of providing the library with durable, functional and reliable means of stopping unauthorized removal of books, periodicals and AV materials. The Owner reserves the right to waive any informalities and award the contract on compatibility of the proposed system with the Owner's needs and requirements.

2. The Detection System must be adaptable for either BY-PASS or FULL CIRCULATION (ON/OFF) modes of operation.

3. The Detection System, or any of its components, must not be harmful to, or interfere with, the health and well-being of Owners staff, or any prosthetic device they may be using (i.e. hearing aids, cardiac pacemakers, etc.).

4. The Detection System or any of its component parts must have no harmful effects on any of the materials that are part of the library's collection, (i.e. Audio Tapes, Video Tapes, Computer Discs, etc.), or the personal effects of Owner's staff, (i.e. watches).

a. Contractor must submit a letter of certification guaranteeing compliance with indicated stipulations.

5. The Detection System and all of its components must be entirely compatible with, and in no way interfere with, automated circulation systems, their computer terminals or other components. Specifically, the detection system shall not cause a malfunction or malfunction itself as a result of being located near the check-out and check-out terminals of the automated circulation system.

a. In the event that the detection system may be susceptible to such a malfunction, Contractor shall make all modifications necessary to assure that the two systems operate independently without adverse effects on either system.
b. Contractor must submit a letter of certification guaranteeing compliance with indicated stipulations.

B. System Components:

1. Sensing Antenna
   a. Principal: Radio Frequency
   b. Overall Dimensions: 68" high x 12" long x 3" wide.
   c. Two antennas forming a passageway (aisle width 42”).

2. Operating Control Module
   a. An on/off switch key operated on control module without gates/turnstiles.
   b. Power On indicator, indicates "AC".
   c. Power On indicator, indicates "DC".
   d. Primary and secondary circuit breakers.

3. Detection Tags
   a. Books: size will be easily slip into, onto, or under a book pocket and have ability to be custom printed if so desired by the Owner.
   b. Periodicals and Computer Discs: shall be no larger than 1 ½" x 1 ½" and be disguised as a bar code if so desired by the Owner.
   c. Records and Cassettes: shall be no larger than 1½” x 1½". Under no circumstances shall the detection tag be so large that when placed on a cassette, it must be folded over the edge of the cassette.
   d. If the Owner requested a printed detection tag, with or without a Melinex coating, the Owner shall not accept other than one (1) tag. The necessity of applying a detection tag and cover-up label is unacceptable.

4. Checkcards
   a. Provide checkcards which permit properly charged materials to pass freely in and out of the library, without alarming the system.
      1) Size: 2.9” x 4.9", suitable for letter press and/or off-set printing, typewriting, handwriting, machine or hand stamping.

5. Date Due Printer/ Dispenser
   a. Provide light and portable date due printer/dispenser, with ability to dispense a 1½” x 15/16" Date-Due tab. It shall also print the "date-due", month, day and year on the "Date-Due tab".
      1) Two versions must be available to the Owner; a serial version for stand alone printing and parallel version for integrating with most IBM compatible or Macintosh computers.
b. Detection tags to be used with the "Date-Due" Printer/Dispenser Standard detection tag meeting all of indicated specification and shall be printed "date-due" on a melinex surface of the tag so that residue from non-permanent adhesive shall not stay on the tag.

6. Accessories: Provide all components and fittings appropriate for indicated products and as required for complete installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates at locations in which systems will be installed. Do not begin installation until conditions are correct.

B. Commencement of work shall constitute acceptance of all conditions. Any necessary remedial work required to correct any unsatisfactory conditions, found after the start of installation, will be provided at no cost to the Owner.

3.2 INSTALLATION

A. Install systems in accordance with Detection System manufacturer's installation instructions.

B. Set units in correct location, plumb, and level.

C. Fasten securely to substrates.

3.3 TRAINING

A. Contractor shall provide the Owner with public relation program and instruct their key personnel in system operation and use procedures for any time and periods within the first ninety (90) calendar days after date of substantial completion of the system.

3.4 ADJUSTING

A. Adjust systems proper operation.

B. Replace defective and damaged units.

3.5 PROTECTION

A. Protect installed work.

3.6 MAINTENANCE SERVICE AGREEMENT

A. Contractor to provide a form of maintenance service agreement to the Owner, to provide the following:
1. Provide full maintenance service by skilled competent employees, to provide Owner with manufacturer's standard maintenance service plan for additional period of five (5) years following the first twelve month service period.

   a. Include the cost per year for manufacturer's periodical preventive maintenance, performed during normal working hours.

   b. Include the cost per year for repair and or replacement of worn or defective parts and or components as well as cleaning and adjusting as required for proper system operation in conformance with specified requirements. Exclude only repair / replacement due to misuse, abuse, accidents or neglect caused by persons other than installer's personnel.

2. The maintenance service agreement is for one (1) year and can be renewed by the Owner for a period up to five (5) years.

END OF SECTION 12580
SECTION 12710 – AUDITORIUM SEATING

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. Deliver and install fixed padded and upholstered chairs, floor mounted with self-lifting seat which rises to a uniform 3/4 safety fold position and indicated accessories, as specified.

B. ADA accessible seating, as specified.

C. LED aisle lights recessed in the underside of the wood armrests.

1.3 SUBMITTALS

A. Product data for each chair model specified to include construction details, material descriptions and finish options.

B. **LEED:** Product data for MR Credit 4 documenting recycled content.

C. Seating layout (shop drawings) developed from the contract drawings which show aisle widths, chair spacing for each row, row-lettering and chair-numbering scheme, chair dimensions and back pitch. Layout drawings to also include locations for accessories, including electrical devices, accessibility provisions and attachments to other work.

D. Samples for verification and finish selection to include:

1. Initial finish selections to be made from manufacturer’s standard color and fabric guides.

2. Final powder coat selection to be approved from manufacturer’s standard-sized samples not less than 1” x 3”.

3. Final laminate selection to be approved from manufacturer’s standard-sized samples not less than 2” x 2”.

4. Final plastic color selection to be approved from manufacturer’s standard-sized samples not less than 2” x 3”.

5. Final wood finish selection to be approved from manufacturer’s standard-sized samples not less than 4” x 3”.

6. Final upholstery fabric selection to be approved from fabric mill’s standard swatch size if available.
E. Maintenance instructions and inspection guidelines furnished for chair model specified.

F. Manufacturer’s standard warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations:
   1. Obtain each type of fixed seating required, including accessories and mounting components, from a single manufacturer.
   2. Obtain fabric of a single dye lot for each color and pattern of fabric required except when yardage requirement exceeds maximum dye lot. Multiple dye lots shall be color matched for quality assurance.

B. Fire Performance Characteristics of Upholstered Seating:
   1. Fabric shall be Class 1 according to DOC CS 191 and 16 CFR 1610.61, tested according to California Technical Bulletin 117.
   2. Padding shall comply with California Technical Bulletin 117.

1.5 PROJECT CONDITIONS

A. Environmental Limitations:
   1. Do not deliver or install seating until space is enclosed, weather tight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary or permanent HVAC system is operating and maintaining ambient temperature and humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements:
   1. Take field measurements to verify or supplement dimensions indicated on contract drawings prior to manufacturing.

1.6 PROJECT COORDINATION

A. Do not deliver or install seating until space is free of lifts and/or scaffolding used by other trades which may interfere with installation and/or damage seating.

B. Coordinate layout and installation of electrical wiring and devices with Electrical Contractor to ensure that floor junction boxes for electrical devices are accurately located for final connection to the building’s power supply by the Electrical Contractor.

C. Coordinate concrete requirements required for proper installation. Should concrete be found not to meet requirements. It is to be brought to the Owner, Construction Manager and Architect’s immediate attention and be corrected flooring subcontractor.
1.7 WARRANTY

A. Provide a manufacturer's warranty covering the material and workmanship for the specified warranty period from date of final acceptance.

B. Warranty Periods:

1. Structural Components: **Five (5) years.**
2. Operating Mechanisms: **Five (5) years.**
3. Plastic, Wood and Painted Components: **Five (5) years.**
4. Upholstery Fabric: **One (1) year.**

PART 2 - PRODUCTS

2.1 MATERIALS AND FINISHES

A. Steel shall meet requirements for ASTM A 36/A 36M plates, shapes, and bars; ASTM A 513 mechanical tubing; ASTM A 1008/A 1008M cold-rolled sheet; and ASTM A 1011 hot-rolled sheet and strip.

B. Cast Iron shall meet requirements for ASTM A 48/A 48M, Class 25, gray iron castings free of blow holes and hot checks with parting lines ground smooth.

C. Cast Aluminum shall meet requirements for ASTM B 85 aluminum-alloy die castings.

D. All exposed metal parts shall be powder coated with a hybrid thermosetting powder coat finish. The powder coat finish shall be applied by electrostatic means to a thickness of 2 - 5 mils, and shall provide a durable coating having a 2H Pencil hardness. Prior to powder coating, metal parts shall be treated with a three-stage non-acidic, bonderizing process for superior finish adhesion, and after coating shall be oven baked to cause proper flow of the epoxy powder to result in a smooth, durable finish. Manufacturer's standard color range shall be used.

E. Medium-density fiberboard shall meet requirements for ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.

F. Concealed plywood shall meet requirements for HPVA HP-1 hardwood plywood.

G. Exposed plywood shall meet requirements for HPVA HP-1, Face Grade A, hardwood veneer core with color-matched hardwood-veneer faces, made with adhesive containing no urea formaldehyde.

H. Hardwood lumber and veneer faces shall be maple selected to be free of visible defects. Exposed wood shall be sanded smooth and stained to color selected with low-VOC water-based stain and top coat to provide with a high-quality finish. Color to be chosen from manufacturer's standard offering.
I. Plastic Laminate shall meet requirements NEMA LD 3, Grade VGS for vertical surfaces and Grade HGS for horizontal surfaces. Color and pattern to be chosen from manufacturer’s standard offering.

J. Upholstery fabric shall be 100% polyolefin Sherpa or Shire pattern by Absecon Mills, Inc.; or approved equal.

1. Fabric shall have an acrylic backing and have a minimum weight 16 oz. per lineal yard (±1 oz.). Fabric shall meet class 5 specifications for color fastness and light fastness and withstand 250,000 double rubs per ASTM D-4157.

2. Fabric shall meet flammability resistance outlined in California Technical Bulletin 117, section E; CS-191-53, class 1; NFPA 260-1989, Class 1; UFAC, class 1; B.S. 5852 part 1: 1979 Ignition Source 0, smoldering cigarette.

K. Upholstery padding shall be molded polyurethane foam.

L. Molded Plastics:

1. Structural components shall be mar and dent resistant high-density glass-filled polypropylene with UV stabilizers.

2. Decorative components shall be mar and dent resistant high-density polyethylene (HDPE) with UV stabilizers.

3. Plastic components shall be chosen from manufacturer’s standard offering.

2.2 FIXED AUDIENCE SEATING

A. Permanent arrangement of fixed audience seating, as shown on seating layout drawings.

1. Basis-of-Design: “Citation Chair, 90-12-86-4”, as manufactured by Irwin Seating Co., and as distributed by Longo Associates, Ramsey, NJ, Tel. # 800.635.6646; or approved equal.

B. Chair support columns shall be a formed 14 gauge (.0747") steel tube with an integral back wing plate. **Column shall exhibit a 10° rearward incline to help conceal back attachment hardware.** Brackets for seat attachment shall be 7 gauge (.1875") steel for superior strength, formed with an integral support buttress. Floor attachment foot shall be formed from 12 gauge (.105) steel to 7-1/2” x 2-5/8” in size. All steel components shall be robotic welded for precise assembly and exceptional integrity. The standard shall be fabricated to be compatible with the floor incline, and to maintain proper seat and back height and angle.

C. Provide “No. 86” aisle end panels, keystone-shaped, constructed of medium density fiberboard (MDF) and surfaced with one of the standard plastic laminate offered, specified and a lacquered edge to match the dominant color of the laminate. Panels shall be provided with a seat bracket recess for precise location and support of the panel. Panel is secured to a **12 gauge formed** steel bracket bolted to the top of the support
column and directly to the support column with the use of a spacer. Panel bracket assembly is concealed behind a steel shroud attached with a tamper resistant screw.

D. Backs shall be rectangular shaped, padded and upholstered on their face, with a one-piece injection molded polymer rear panel. The foundation of the back component shall be provided by a 7/16" thick, 5-ply hardwood inner panel that shall also serve as the upholstery substrate. The face of the back shall be upholstered over a 2” thick polyurethane foam pad. The polyfoam pad shall be securely cemented to the plywood inner panel and upholstered with a 1-piece cover securely fastened to the hardwood inner panel by means of upholstery staples to facilitate ease of re-upholstering. The rear designer panel shall be injection molded HDPE plastic, high impact-resistant, with textured outer surface, formed to enclose the edges of the inner upholstery panel at the top and both sides of the back, and shall be not less than 25” in length, extending down to the rear of the seat. **There shall be no exposed screws above the armrests.** Wings used for the attachment of the complete back assembly to the standards shall be not less than 14 gauge (.0747”) steel. Wings shall be firmly secured to the inner panel through the use of threaded t-nuts fastened to the inner panel. Assembled chair shall have a nominal back height of 34”. The back assembly shall be certified through routine ISO testing to withstand a 250 lb. static load test applied approximately 16” above the seat assembly and a 100,000 cycle 40 lb. swing impact test.

E. Seats shall be padded and upholstered on their top surface with a structural, injection molded polypropylene seat foundation. Seats shall self-rise to a uniform position when unoccupied. The mechanism shall be certified through routine ISO testing to exceed 300,000 cycles during ASTM Designation F851-87 Test Method for Self-Rising Seat Mechanism. In addition, the seat shall withstand as a 600 lb. static load test applied approximately 3” from the front edge of the seat assembly and a 50,000 cycles 125 lb. vertical drop impact test.

1. Seat foundation shall be engineered glass-filled, injection molded polypropylene, strengthened by deep internal ribs and gussets, completely enclosing the self-rising hinge mechanism. Bottom surface of the foundation shall be textured and feature an attractive molded recess. Bolted attachment of the seat assembly to the chair standard shall be concealed by a color-coordinated plastic cap to present a finished, refined appearance. **Note: Metal seat pan/understructure will not be accepted.**

2. When unoccupied, the seat shall rise automatically to a 3/4 safety fold position, and upon a slight rearward pressure, shall achieve full-fold, allowing the patron additional passing room. The seat shall rotate on two, molded, structural, glass-filled nylon hinge rods in internally molded channels with integral down-stops for exceptional strength. Seat-lift shall be accomplished by compression springs and self-lubricating plastic cams. **Note: Self-rising gravity lift seats are not considered equal and will not be accepted.**

3. The base structure for the cushion assembly shall be five serpentine springs locked to an engineered, glass-filled polypropylene frame. Serpentine springs are covered with 3-1/2” thick molded polyurethane foam. Cushion is molded with an integral chafing barrier to protect the foam from the serpentine springs and a waterfall
leading edge. Cushion assembly is upholstered with a carefully tailored fabric cover secured around the perimeter of the cushion frame by means of a drawstring and staples and securely locked to the seat foundation, preventing unauthorized removal; but facilitating convenient access by trained maintenance personnel. 

Note: Seats without serpentine springs are not considered equal and will not be accepted.

F. Chair width shall vary to accommodate sightlines and row lengths.

G. Back height and pitch shall be fixed, as shown on seating layout drawings.

H. Center standards shall be provided with a glass-filled polypropylene armrest support structure capable of surpassing a 200 lb. vertical static load test applied 3” from the front edge of the armrest. Armrest support shall be attached to the support column with an integral ribbed post that binds into the steel support column and locked in place with a concealed security screw. Support structure is capped with a flat solid wood armrest attached with concealed hardware. Aisle end armrests are to be attached to the 14 gauge aisle panel bracket with concealed hardware.

I. Row-lettering and chair-numbering shall be provided for identification of all chairs, as shown on approved seating layout drawings. Number plates shall be 5/8” x 1-5/8” aluminum with a bronze finish and black sans serif numerals. The seat pans shall be recessed at the center of the front edge for the number plates, and attached by two (2) pop rivets. Letter plates shall be 5/8” x 1-5/8” with a bronze finish and black sans serif numerals attached in recess of aisle standard armrest by two (2) escutcheon pins. Attaching hardware shall have a finish compatible to plates.

J. Aisle Lights to be 12V concealed LED UL listed recessed in the underside of the wood armrests. Provide aisle lights, as indicated on drawings. The transformer and all connections to be by Electrical Contractor.

K. Accessible Seating:

1. Shall be designated on the seating layout drawings and designed to allow an individual to transfer from a wheelchair to the theatre chair. The aisle standard shall be equipped with an armrest capable of lifting to a position parallel with the support column, opening sideways access to the seat. Aisle standards so equipped shall be provided with a label, displaying an easily recognizable "handicapped" symbol. Decorative requirements of aisle standards are waived for the handicapped access standards.

2. Chairs shall be located as shown in the contract drawings and shall be mounted on moveable steel bases. The steel bases shall be available for sections of one (1), two (2), or three (3) chairs. The bases shall be fabricated from 3/16” x 3-1/2” x 15-1/2” steel, with cross members securely fastened to the horizontal base members via Tec screws. Holes shall be provided for the attachment of the chair standards. Moveable bases are secured to the floor when the seating is in use with reverse anchors.
2.3  FABRICATION

A. Manufacture fabric-covered cushions with molded padding beneath fabric and with fabric covering free of welts, creases, stretch lines, and wrinkles. For each upholstered component, install pile and pattern run in a consistent direction.

B. Fabricate floor attachment plates to conform to floor slope, if any, so that standards are plumb and chairs are maintained at same angular relationship to vertical throughout project.

PART 3 - EXECUTION

3.1  EXAMINATION

A. Prior to layout and installation examine floors, risers, and other adjacent work and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the work including, but not limited to, plumb of riser faces and concrete conditions.

B. Examine locations of electrical connections, if applicable.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2  INSTALLATION

A. Install seating in locations indicated and fastened securely to substrates according to manufacturer's written installation instructions.

B. Use installation methods and fasteners that produce fixed audience seating assemblies with individual chairs capable of supporting an evenly distributed 600-lb static load applied 3” from front edge of the seat without failure or other conditions that might impair the chair's usefulness.

C. Install seating with chair end standards aligned from first to last row and with backs and seats varied in width and spacing to optimize sightlines.

D. Install riser-mounted attachments to maintain uniform chair heights above floor, where required.

E. Install chairs in curved rows at a smooth radius.

F. Install seating so moving components operate smoothly and quietly.

3.3  ADJUSTING

A. Adjust chair backs so that they are properly aligned with each other.

B. Adjust self-rising seat mechanisms so seats in each row are aligned when in upright position.
C. Verify that all components and devices are operating properly.

D. Repair minor abrasions and imperfections in finishes with coating that matches factory-applied finish.

E. Replace upholstery fabric damaged during installation.

END OF SECTION 12710
PART 3 - STRUCTURAL & MISCELLANEOUS STEEL AND IRON WORK
SECTION 05120 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections and type of steel required.

B. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" as modified here and as otherwise shown on drawings.

1. Section 2.1 to include “Lintels shown or otherwise enumerated or scheduled.”

2. Section 4.4, The first two sentences of this section are to be replaced with the following, “Shop drawings are to be made by the fabricator, prints thereof are to be submitted to the structural engineer and architect for their examination and approval. These shop drawings are to be submitted in minimum of the following three phases: Anchor bolt plans and advanced shipment pieces; Erection plans and thirdly; Piece details (maximum of 100 sheets per submission). The fabricator is to await the receipt of the previous phase prior to submission of the next phase. The fabricator is to include an allowance of fourteen (14) calendar days in his schedule for the review of these drawings by the structural engineer for the return of shop drawings. These calendar days start from the time the drawings are received by the engineer.”

C. Miscellaneous Metal Fabricators are specified elsewhere in Division 5.

D. Refer to Division 3 for anchor bolt installation in concrete; Division 4 for masonry.

E. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in mill, shop and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

1. Promptly remove and replace materials or fabricated components which do not comply.

F. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.

1. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.
1.02 SUBMITTALS

A. Product Data: Submit producer's or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
2. High-strength bolts (each type), including nuts and washers.
3. Structural steel primer paint.

B. Shop Drawings: Submit shop drawings, including complete details and schedules for fabrication and assembly of structural steel members, procedures and diagrams.

C. Include details of cuts, connections, camber, holes and other pertinent data. Indicate welds by standard AWS A2.1 and A2.4 symbols; and show size, length and type of each weld.

1. Provide setting drawings, templates and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.

D. Test Reports: Submit copies of tests conducted on shop and field bolted and welded connections. Include data on type(s) of tests conducted and test results.

1.03 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:

B. AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings", including "Commentary" and Supplements thereto as issued.

C. AISC "Specifications for Architecturally Exposed Structural Steel".

D. AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.

E. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".

F. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

G. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.

1. If recertification of welders is required, retesting will be Contractor's responsibility.
1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site at such intervals to insure uninterrupted progress of work.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

B. Structural Steel Wide Flange Shapes: ASTM A 992/A572, Grade 50

C. Other Structural Steel Shapes, Plates and Bars: ASTM A 36.

D. Cold-Formed Steel Tubing: ASTM A 500, Grade B.

E. Anchor Bolts: ASTM F 1554, Grade 36, nonheaded type unless otherwise indicated.

F. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts and hardened washers, as follows:
   1. Quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A 325.
   2. Direct tension indicator washers may be used at Contractor's option.


2.02 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

B. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

C. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs and other defects.
D. Connections: Weld or bolt shop connections, as indicated.

E. Bolt field connections, except where welded connections or other connections are indicated.
   1. Provide high-strength threaded fasteners for all bolted connections, except where unfinished bolts are indicated.

F. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" (RCRBS1).

G. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds and methods used in correcting welding work.

H. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.

I. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.

J. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

K. Field drill holes in existing steel members for connection of new steel as noted on the drawings.

2.03 SHOP PAINTING

A. General: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar or to receive fire-proofing. Paint embedded steel which is partially exposed on exposed portions and initial 2" of embedded areas only.

B. Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale and spatter, slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
   1. SP-1 "Solvent Cleaning".
   2. SP-3 "Power Tool Cleaning".

C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with Manufacturer's instructions and at a rate to provide dry film thickness of not less than 1.5 mils. Use painting methods which result in full coverage of joints, corners, edges and exposed surfaces.
PART 3 - EXECUTION

3.01 ERECTION

A. Surveys: Employ a registered professional engineer or land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made, or until compensating adjustment to structural steel work have been agreed upon with Architect.

B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

D. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

E. Level and plumb individual members of structure within specified AISC tolerances.

F. Splice members only where indicated and accepted on shop drawings.

G. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.

H. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment and removal of paint on surfaces adjacent to field welds.

I. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

J. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only as acceptable to Architect.

K. Touch-Up 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.

L. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.
3.02 QUALITY CONTROL

A. Owner to engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.

B. Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.

C. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.

D. Testing agency may inspect structural steel at plant before shipment; however, Architect reserves right, at any time before final acceptance, to reject material not complying with specified requirements.

E. Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any noncompliance of original work, and as may be necessary to show compliance of corrected work.

F. Shop Bolted Connections: Inspect or test in accordance with AISC specifications.

G. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:
   1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
   2. Perform visual inspection of all welds.

H. Field Bolted Connections: Inspect in accordance with AISC specifications.

I. Field Welding: Inspect and test during erection of structural steel as follows:
   1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
   2. Perform visual inspection of all welds.

J. Testing agency shall confirm that the structure is square, plumb and level in accordance with AISC tolerances.

K. 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 Penetration 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. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level “2-2T.”


3.03 STEEL ALLOWANCE

A. Provide and include in this bid a lump sum of $20,000 (4 tons of steel @ $5,000.00 per ton) of fabricated and erected steel. This steel shall be provided at any time until final acceptance of this contract by the Architect. This steel may consist of W. F. Sections, angles, frames or various miscellaneous steel. Include shop drawings, fabrication and erection in this item.

1. Upon completion of the project, any of the allowance work not used, shall be credited to the Owner against the contract price at the rate of two dollars and fifty cents ($2.50) per pound.

END OF SECTION 05120
SECTION 05210 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.01 SCOPE

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this section.

B. The extent of steel joists is shown on the drawings, including basic layout and type of joists required.

1.02 QUALITY ASSURANCE

A. Provide joists fabricated in compliance with the following, and as herein specified.

1. AISC-SJI "Standard Specifications and Load Tables" for:
   a. K-Series Open Web Steel Joists
   b. LH-Series Steel Joists

B. Steel joist manufacturer shall be an approved member of the Steel Joist Institute for the types of joists supplied.

C. Qualification of Welding Work:

1. Qualify welding processes and welding operators in accordance with the AWS "Standard Qualification Procedure".

2. Joists welded in place are subject to inspection and testing. Expense of removing and replacing any portion of the steel joists for testing purposes will be borne by the Owner if welds are found to be satisfactory. Remove and replace any work found to be defective and provide new acceptable work.

D. Workmanship:

1. Steel Inspection and Testing Service: Employ, at Owner's expense, a testing laboratory acceptable to the Architect to inspect welded connections and to perform tests and submit inspection and test reports to the Architect.

1.03 SUBMITTALS

A. Manufacturer's Data, Steel Joists:

1. Submit two (2) copies of manufacturer's specifications and installation instructions for each type of joist and its accessories. Include manufacturer's certification that joists comply with AISC-SJI "Specifications".

B. Shop Drawings, Steel Joists:
1. Submit detailed drawings showing layout of joist units, special connections, jointing and accessories. Include the mark, number, type, location and spacing of joists and bridging.

   Provide templates or location drawings for installation of anchor bolts.

C. Delivery, Storage and Handling:

   1. Deliver, store and handle steel joists as recommended in AISC-SJI "Specifications". Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses.

PART 2 - PRODUCTS

2.01 MATERIALS

   A. Steel: Comply with AISC-SJI "Specifications".

   B. Steel Prime Paint: Comply with SJI "Specifications".

2.02 FABRICATION

   A. General: Fabricate steel joists in accordance with AISC-SJI "Specifications".

   B. Extended Ends: Provide extended ends on joists where shown, complying with the manufacturer's standards and requirements of applicable AISC-SJI "Specifications" and load tables.

   C. Ceiling Extension: Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord. Provide either an extended bottom chord element or a separate unit, to suit manufacturer's standards, of sufficient strength to support the ceiling construction. Extend ends to within 1/2" of the finished wall surface unless otherwise indicated.

   D. Bridging: Provide horizontal or diagonal type bridging for "open web" joists, complying with AISC-SJI "Specifications". Provide bridging anchors for ends of all bridging lines terminating at walls or beams.

   E. End Anchorage: Provide end anchorages to secure joists to adjacent construction, complying with AISC-SJI "Specifications", unless otherwise indicated.

   F. Header Units: Provide header units to support tail joists at openings not framed with steel shapes.

   G. Shop Painting: Shop paint all steel joist work, except contact surfaces which are to be welded or high-strength bolted.

   H. Surface Preparation: After inspection and before shipping, clean steelwork to be painted complying with SJI "Specifications" unless otherwise indicated.
I. Application: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide a uniform dry film thickness of 1.5 mils. Use painting methods which will result in full coverage of joints, corners, edges and all exposed surfaces.

PART 3 - EXECUTION

3.01 ERECTION

A. Place and secure steel joists in accordance with AISC-SJI "Specifications", final shop drawings and as herein specified.

B. Furnish anchor bolts and other devices to be built into the concrete and masonry construction. Furnish templates for the accurate location of anchors in other work.
   1. Furnish unfinished threaded fasteners for anchor bolts, unless otherwise indicated.
   2. Refer to Division 3 sections for installation of anchors set in concrete.
   3. Refer to Division 4 sections for installation of anchors set in masonry.

C. Placing Joists:
   1. Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.
   2. Provide temporary bridging, connections and anchors to ensure lateral stability during construction. Where "open web" joist lengths are 40 feet and longer, install a center row of bolted bridging to provide lateral stability before slackening of hoisting lines.

D. Bridging: Install bridging simultaneously with joist erection, before any construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

E. Fastening Joists: Field weld or high-strength bolt joists to supporting steel framework in accordance with AISC-SJI "Specifications" and as shown on drawings for the type of joists used. Coordinate welding sequence and procedure with the placing of joists.

F. Touch-Up Painting: After joist installation, paint all field bolt heads and nuts, and welded areas, abraded or rusty surfaces on joists and steel supporting members. Wire brush surfaces and clean with solvent before painting. Use the same type of paint as used for shop painting.

3.02 FIELD QUALITY CONTROLS

A. The testing agency shall conduct and interpret the tests and state in each report whether the test specimens comply with the requirements, and specifically state any deviations therefrom.
1. Provide access for the testing agency to places where steel joist work is being fabricated or produced so that required inspection and testing can be accomplished.

2. The testing agency may inspect steel joist work at the plant before shipment; however, the Architect reserves the right, at any time before final acceptance, to reject material not complying with specified requirements.

B. Inspection of Shop Painting:

1. Visually evaluate surface preparation by comparison with pictorial standards in accordance with SSPC-Vis 1.

2. Measure dry film thickness with a magnetic film thickness gage in accordance with SSPC-PA 2.

3. Visually inspect dried film for runs, sags, dry spray, overspray and missed areas.

C. Correct deficiencies in steel joist work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of the original work, and as may be necessary to show compliance of corrected work.

END OF SECTION 05210
SECTION 05300 - STEEL DECKING

PART 1 - GENERAL

1.01 SUMMARY

A. Extent of metal decking is indicated on drawings, including basic layout and type of deck units required.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each type of decking and accessories. Include manufacturer's certification as may be required to show compliance with these specifications.

B. Shop Drawings: Submit detailed drawings showing layout and types of deck panels, anchorage details and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories.

C. Provide acoustical inserts for metal deck for installation by others.

1.03 QUALITY ASSURANCE

A. Code and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated or specified:
   1. AISI "Specification for the Design of Cold-Formed Steel Structural Members".
   2. AWS D1.3 "Structural Welding Code - Sheet Steel".
   3. SDI "Design Manual for Floor Decks and Roof Decks"

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS D1.1.

C. Welded decking in place is subject to inspection and testing. Expense of removing and replacing portions of decking for testing purposes will be borne by Owner if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following or approved equal.
   1. Metal Roof Deck Units:
      a. Roof Deck, Inc.
      b. Canam-United Steel Deck
      c. New Millennium Building Systems
      d. Nucor-Vulcraft Group
      e. Epic Metal Inc.
2. Composite Metal Floor Deck Units:
   a. Canam-United Steel Deck
   b. New Millennium Building Systems
   c. Nucor-Vulcraft Group

2.02 MATERIALS

A. Steel for Galvanized Metal Deck Units: ASTM A 653, Grade 33 or higher – Roof Decking; ASTM A 652, Grade 40 or higher – Floor Decking.

B. Steel for Painted Metal Deck Units: ASTM A 1008, Grade 33 or higher – Roof Decking; ASTM A 652, Grade 40 or higher – Floor Decking

C. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.

D. Galvanizing: ASTM A 653, G60.

E. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Military Specifications MIL-P-21035 (Ships).

F. Flexible Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

2.03 FABRICATION

A. General: Form deck units in lengths to be continuous over three (3) or more spans, with flush, telescoped or nested 2" laps at ends and interlocking or nested side laps, unless otherwise indicated.

B. Roof Deck Units: Provide deck configurations complying with SDI "Roof Deck Specifications" of metal thickness, depth and width as shown.

C. Open-Beam Composite Units: Fabricate deck units with integral embossing or raised pattern to furnish mechanical bond with concrete slabs. Fabricate open-beam units with fluted section having interlocking side laps: of metal thickness, depth and width as shown.

D. Metal Closure Strips: Fabricate metal closure strips, for cell raceways and openings between decking and other construction, of not less than 0.045" min. (18 gage) sheet steel. Form to provide tight-fitting closures at open ends of cells or flutes and sides of decking.

E. Roof Sump Pans: Fabricate from single pieces of .071" min. (14 gage) galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain, unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3" wide. Recess pans not less than 1-1/2" below roof deck surface, unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field.
PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install deck units and accessories in accordance with manufacturer's recommendations and final shop drawings, and as specified herein.

B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.

C. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.

D. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.

E. Do not place deck units on concrete supporting structure until concrete has cured and is dry.

F. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

G. Fastening Deck Units:

1. Fasten roof deck units to steel supporting members by not less than 5/8" diameter fusion welds or elongated welds of equal strength, spaced not more than 12" o.c. In addition, secure deck to each supporting member in ribs where side laps occur.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds and methods used in correcting welding work.

I. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.

J. Mechanically fasten side laps of adjacent deck units between supports, at intervals not exceeding 36" o.c. using self-tapping No. 10 or larger machine screws, unless a closer spacing or a larger screw is called for on the drawing.

K. Uplift Loading: Install and anchor roof deck units to resist gross uplift of 45 lbs. per sq. ft. at eave overhang, building corners and perimeter, and 30 lbs. per sq. ft. for other roof areas.

L. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.

M. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units, except where taped joints are required.

N. Shear Connectors: Weld shear connectors to supports through decking units in accordance with manufacturer's instructions. Do not weld shear connectors through
two layers (lapped ends) of decking units. Weld only on clean, dry deck surfaces.

O. Pour Stops: Weld continuous pour stops to supporting decking units or structural steel supports with a minimum 1" long weld at 12" on center. Install pour stop with a minimum of 2" bearing on supports.

1. Provide pour stops at edge of all slabs, all openings and as indicated on drawings.

P. Roof Sump Pans: Place over openings provided in roof decking and weld to top decking surface. Space welds not more than 12" o.c. with at least one weld at each corner. Cut opening in roof sump bottom to accommodate drain size indicated.

Q. Edge Finish Strips: Provide metal finish strips at edges of roof decking, parallel to flutes. Weld into position to provide a complete deck installation.

R. Touch-Up Painting: After deck installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.

1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.
2. Touch-up painted surface with same type of shop paint used on adjacent surfaces.

S. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

T. Touch-Up Painting: Cleaning and touch-up painting of field welds, abraded areas and rust spots, as required after erection and before proceeding with field painting, is included in Division 9 under Painting.

3.02 QUALITY CONTROL

A. The owner shall employ a testing laboratory satisfactory to the Architect to perform the following tests and to submit testing and inspection reports.

1. Welding: Inspect welding to determine if welds are at proper locations, are proper size and material, and meet AWS standards.
2. Sidelap Connections: Inspect sidelap connections to determine if the connections are in accordance with contract documents.
3. Shear Connectors: All shear connectors shall be visually inspected and tapped with a hammer. All/any studs which do not appear to have a sound weld or which produce a dull sound rather than a ringing sound when tapped shall be further tested as follows:
   a. The stud shall be struck with a hammer and bent approximately 15 degrees off perpendicular towards the nearest end of the beam. Studs meeting this test without coming loose shall remain on the beam. Studs failing this test shall be replaced.

END OF SECTION 05300
SECTION 05400 - MISCELLANEOUS 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 DESCRIPTION OF WORK

A. Definition: Miscellaneous structural steel include items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of Structural Steel or other metal fabrication systems specified elsewhere.

B. Extent of miscellaneous structural steel fabrications is indicated on drawings and schedules.

1. Work of this section shall include miscellaneous structural steel framing and supports for floor, wall and roof openings whether or not shown on structural drawings.

a. Refer to architectural, mechanical and electrical drawings for the following:

   1) Locations and sizes of roof penetrations, roof top supported mechanical and electrical equipment, roof drains, ducts, piping, raceways, etc.
   2) Locations and sizes of wall penetrations, wall chases, louvers, duct penetrations, etc.
   3) Locations and sizes of floor penetrations; ducts, piping, raceways, etc.
   4) Locations of all steel handrails, railings and guardrails.

b. All miscellaneous structural steel supports shall be in accordance with typical structural steel details and schedules shown on structural steel drawings and/or as directed by the Architect.

c. All miscellaneous structural steel supports shall meet indicated load requirements and/or as directed by the Architect.

d. In existing building(s) where alteration and/or renovation work is/are indicated, refer to Division 1 Sections for miscellaneous structural steel framing and supports which may be assigned to be provided and installed by other Trades.

C. Types of work in this section include metal fabrications for:

1. Loose Steel lintels, bearing and leveling plates and miscellaneous steel framing and supports

2. Steel Framed Stairs:
   a. Metal Stairs
   b. Steel wire mesh guardrails

3. Steel railings, handrails, and guardrails at all stair and ramps.
D. Related Sections:

1. Section 01400 - Testing Laboratory Service.
2. Section 03300 - Concrete Work
3. Section 04200 - Unit Masonry
4. Section 05120 - Structural Steel
5. Section 05210 - Steel Joists
6. Section 05300 - Metal Decking
7. Section 05400 - Miscellaneous Structural Steel
8. Section 05500 - Metal Fabrications
9. Section 09900 - Painting
10. Division 15 - Mechanical Work

1.3 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrications might delay work.

B. Shop Assembly: Preassemble items in 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.

C. Delegated Design:

1. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated. Designated Design includes, but is not limited to:

   a. Miscellaneous steel framing, stair stringers, tread pans, platforms, landings and supplemental framing for landings, metal framing, hangers, columns, struts, clips, brackets, bearing plates and other components.

   b. Handrails, guardrails, balusters, newel posts, clips struts, brackets, bearing plates and other components.

2. Professional Engineer Qualifications: A professional engineer legally authorized to practice in the jurisdiction where Project is located, (State of New Jersey), and experienced in providing engineering services of the kind indicated that have resulted in the installation of structural assemblies, similar to this Project in material, design, and extent and that has a record of successful in-service performance. Provide analysis data and signed & sealed documents.

3. Conform to all applicable State and Local Codes for design loads and all other requirements.

4. Refer to paragraph 1.4 - SUBMITTALS (below).

E. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Architectural Class.
   a. Fabricator Qualifications: A firm experienced in producing metal stairs 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.


1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.

B. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous steel fabrications. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.

   1. Submit shop drawings for miscellaneous steel framing and supports, steel stairs and railings. Signed and sealed shop drawings shall be submitted by a qualified professional Structural Engineer, licenced in the state where project is located.

C. Where materials or fabrications are indicated to comply with certain requirements for design loadings, include structural computations, material properties and other information needed for structural analysis.

D. Samples: Submit 2 sets of representative samples of materials and finished products as may be requested by Architect.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of miscellaneous structural steel work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

B. Steel

   1. Steel Plates, Shapes and Bars: ASTM A 36.
2. Steel Tubing: Cold-formed, ASTM A 500; or hot-rolled, ASTM A 501.

3. Structural Steel Sheet: Hot-rolled, ASTM A 570; or cold-rolled ASTM A 611, Class 1; of grade required for design loading.

4. Galvanized Structural Steel Sheet: ASTM A 446, of grade required for design loading. Coating designation as indicated, or if not indicated, G90.

5. Steel Pipe: ASTM A 53; Type and grade (if applicable) as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (schedule 40), unless otherwise indicated.


7. Malleable Iron Castings: ASTM A 47, grade as selected by fabricator.

C. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

D. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A 153.

E. Grout:

1. Metallic Non-Shrink Grout: Pre-mixed, factory-packaged, ferrous aggregate grout complying with CE CRD-C588, Type M.

2. Non-Shrink Non-Metallic Grout: Pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with CE CRD-C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

F. Fasteners:

1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.

2. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.

3. Lag Bolts: Square head type, FS FF-B-561.


5. Wood Screws: Flat head carbon steel, FS FF-S-111.


G. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.

1. Lock Washers: Helical spring type carbon steel, FS FF-W-84.
H. Paint:

2. Primer: Tnemec Series 90-97 Tneme-Zinc, or equal, @ 2.5 - 3.5 mils (dry).
3. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Section 09900.

2.2 FABRICATION, GENERAL

A. Workmanship: Use materials of size and thickness indicated, or if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of work.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

C. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts.

E. Provide for anchorage of type indicated, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

F. Galvanizing:

1. Provide a zinc coating for exterior items and those items indicated or specified to be galvanized, as follows:
   a. ASTM A 153 for galvanizing iron and steel hardware.
   b. ASTM A 123 for galvanized rolled, pressed and forged steel shapes, plates, bars and strip 1/8" thick and heavier.
   c. ASTM A 386 for galvanizing assembled steel products.

G. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

H. Shop Painting

1. Shop paint miscellaneous structural steel, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise indicated.
2. Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-6.

3. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.

4. Apply one shop coat to fabricated metal items, except apply two coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

2.3 MISCELLANEOUS STRUCTURAL STEEL


1. Structural Performances: Provide railing and handrail assemblies which, when installed, shall comply ASCE standards for minimum design loads for handrail assemblies and guardrail systems and capable of withstanding the following loads applied as indicated:

a. To resist a load of 50 pound per linear foot applied in any direction at the top and to transfer this load through the supports to the structure.

b. To resist a single concentrated load of 200 pounds applied in any direction at any point along the top, and have attachment devices and supporting structure to transfer this loading to the building structural assemblies, walls, floors or slabs. This load shall act concurrently with loads indicated in Paragraph “a” above.

c. Intermediate rails (all those except the handrail), balusters and panel fillers shall withstand a horizontally applied normal load of 50 lbs. On an area not to exceed one square foot area including openings and space between rails. Reactions due to this loading are not required to be superimposed with those of paragraphs “a” and “b” above.

d. Guards: Intermediate rails and balusters capable of withstanding a horizontal concentrated load of 200 lbs. applied on a one square foot area at any point in system of gross area of guard, including any open areas, of which they are a part. Load need not be assumed to be acting concurrently with uniform horizontal loads on toprails of railing assembly in determining stress on guard supporting members.

e. Guards shall be designated and constructed for a uniform load of 50 pounds per foot applied horizontally at required guardrail height and a simultaneous uniform load of 100 pounds applied vertically downwards at top of guardrail.
f. In-fill Area:

1) Concentrated Load: 200 pounds, horizontal load, applied on a 1-square-foot area at any point in the system, including intermediate rail or other elements serving this purpose.
2) This loading condition shall not be applied simultaneously with loading conditions indicated above, (a, b, and c).

B. Fabricate pipe railings and handrails to design, dimensions, and details indicated. Provide railings and handrails members formed of pipe of sizes and wall thickness indicated, or if not shown, as required to support indicated design loading. Unless otherwise indicated all shown dimensions for pipes, rails and other round shapes are outside diameter.

1. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.
   a. At tee and cross intersections provide coped joints.
   b. At bends interconnect pipe by means of prefabricated elbow fittings or flush radius bends, as applicable, of radiuses indicated.
   c. Perform welding to comply with applicable AWS specifications, using method appropriate for metal and finish indicated. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

2. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces of pipe.

3. Provide wall returns at ends of wall-mounted handrails, except where otherwise indicated.

4. Close exposed ends of pipe by welding 3/16" thick steel plate in place or by use of prefabricated fittings.

5. Brackets, Flanges, Fittings and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.

2.4 STEEL FRAMED STAIRS

1. General: Construct stairs to conform to sizes and arrangements indicated; join pieces together by welding unless otherwise indicated.
   a. Provide complete stair assemblies including metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates and other components necessary for the support of stairs and platforms and as required to anchor and contain the stairs on the supporting structure.
2. **Stair Framing:** Fabricate stringers of structural steel channels, plates, or a combination of both as indicated.
   
a. Provide closures for exposed ends of stringers.
   
b. Construct platforms of structural steel channel headers and miscellaneous framing members as indicated.
   
c. Bolt or weld headers to strings, newels and framing members to strings and headers; fabricate and join so that bolts, if used, do not appear on exposed finish surfaces.
   
d. Provide continuous steel scriber plates at masonry walls. Match stringer width.

3. Where masonry walls support steel stairs, provide temporary supporting struts designed for erection of steel stair components before installation of masonry.

4. **Metal Pan Risers, Subtreads, and Subplatforms:** Shape metal pans for risers and subtreads to conform to configuration shown. Provide structural steel sheet for metal pans of minimum thickness of 0.0677 inch, unless otherwise indicated, but not less than that required to support total design loading.

5. Form metal pans of cold-rolled carbon steel sheet unless otherwise indicated.

6. Attach risers and subtreads to stringers by means of brackets made of steel angles or bars. Weld brackets to strings and attach metal pans to brackets by welding, riveting or bolting.

7. Coordinate steel stair work with concrete work specified in Section 03300.

2.5 **STEEL STAIRS AND RAILINGS:**

1. **Basis of Design:** Subject to compliance with indicated requirements, provide metal stair and railings as manufactured by American Stair Corp. Inc.; Pacific Stair Corp., EeStairs; or approved equal.

2. Provide subplatforms of configuration and construction indicated, or if not indicated, of same metal as risers and subtreads and in thicknesses required to support design loading. Attach subplatform to platform framing members with welds.

3. **Steel Floor Plate Treads and Platforms:** Provide raised pattern steel floor plate complying with FS QQ-F-461, Class I. Provide pattern indicated or, if not indicated, as selected from manufacturer's standard patterns.

4. Form treads of 1/4" thick steel floor plate with integral nosing and back edge stiffener. Weld steel supporting brackets to strings and treads to brackets.
   
a. Provide stairs capable of supporting a minimum live load of 100 psi and a concentrated load of 300 psi.
5. Provide steel railings, handrails and guardrails as indicated or selected from manufacturer’s available full range of types.

a. Perforated Steel Infill Grille at Stairs:
   1) Fabricate to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including thickness of material, spacings, and anchorage, but not less than that needed to withstand indicated loads.

6. Finishes and Colors: As indicated in Section 09900.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

1. Coordinate work of this section with other work affected by other Trades.

2. Obtain locations, opening sizes, weighs and other required information from affected trades.

3. Comply with coordination requirements indicated in Division 1 Sections.

3.2 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.

B. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plus, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete masonry or similar construction.

C. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

D. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.

E. Set loose lintels weighing more than 200 pounds, leveling and grouting as for plates. Deliver loose lintels weighing less than 200 pounds to the General Construction Contractor, allow sufficient time for scheduling his installations.
3.3 PIPE RAILINGS AND HANDRAILS

A. Adjust railing prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:

1. Anchor posts in concrete by means of sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with non-shrink, non-metallic grout, mixed and placed to comply with grout manufacturer's directions.

2. Leave anchorage joint exposed; wipe off excess grout and leave 1/8 inch build-up, sloped away from post. For installation exposed on exterior or to flow of water, seal grout to comply with grout manufacturer's directions.

3. Anchor rail ends into concrete and masonry with steel round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.

B. Anchor rail ends to steel with steel oval or round flanges welded to rail ends and bolted to structural steel members, unless otherwise indicated.

C. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1-1/2" clearance from inside face of handrail and finished wall surface. Locate brackets as indicated, or if not indicated, at spacing required for design loading. Secure wall brackets and wall return fittings to building construction as follows:

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

2. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.

3. For hollow masonry anchorage, use toggle bolts having square heads.

3.4 ADJUST AND CLEAN

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting.

B. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

C. For galvanize surfaces: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION 05400