CURTIS PARK NEW POOL FACILITY
CITY OF MIAMI, FLORIDA

PROJECT MANUAL (BID SET) - AUGUST 01, 2016

Project No. B-35806

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CURTIS PARK NEW POOL FACILITY
CITY OF MIAMI

TABLE OF CONTENTS

END OF TABLE OF CONTENTS

SECTION 01011
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. The Work of this Contract comprises the abatement of hazardous materials and demolition and removal of the existing Curtis Park Pool and Pool Building. It also includes the construction of the New Curtis Park Pool Facility and related parking lot, and related infrastructure at the City of Miami Curtis Park, located at 1901 NW 24th Avenue, Miami, Florida 33125 and as shown on the Construction Documents prepared by Gili-McGraw Architects LLP and dated: 08-01-2016.

B. In addition, there is Soils Mitigation and Civil Engineering work to be performed on this site in tandem with the building construction. That work is based upon separate Construction Documents prepared by SCS Engineers, Inc., dated: August 01, 2016

1.01 SEQUENCING

A. Work Restrictions:

1. Demolition:

a. Perform demolition in a manner to minimize noise, dust, time of disruption, and safety hazards.
b. Perform demolition during hours agreed to by the Town of Miami Lakes.
c. Drill concrete and masonry to avoid reducing load bearing capacities of structural elements or to avoid mechanical and electrical services that may be concealed or built into these materials.

2. IMPORTANT: Safety: Supply and maintain safety signage, barriers, and construction aids. Conduct work to maintain the safety of the building occupants.

3. IMPORTANT: Safety: The Contractor shall follow all appropriate Life Safety precautions and ensure that power to activate electrical circuits being worked upon be disconnected at the source to prevent accidental shock. Prior to initiating any demolition work, the Contractor verifies that he has reviewed all available record documents and extensively examined the area of work for hidden or concealed conditions.

4. IMPORTANT: Utilities serving adjacent areas must be maintained throughout the construction process (including existing site lighting, landscape irrigation systems, etc.) The Contractor is responsible for locating, re-routing, and maintaining continuous operation of all existing utility systems

impacted by this project scope, at no additional cost to the Owner.

5. **IMPORTANT: There is existing evidence of soils contamination on the site. Proper procedures MUST be followed in all operations that involve the unearthing of existing soils (demolition and removal of existing footings and underground utilities, soil preparation for new foundation(s), new footings and placement of new underground utilities, digging of holes for purposes of planting trees, etc.) Refer to soils mediation report prepared by: SCS Engineers and dated: August 2016 for proper procedures to follow. These procedures are MANDATORY.**

6. **IMPORTANT: Refer to "Pre-Demolition Asbestos Survey, Curtis Park Ballpark and Pool," 1901 NW 24 Avenue, Miami, FL 33125; prepared by URS Corporation, Dated: April 15, 2015 for required asbestos abatement procedures to be carried out by certified abatement professionals as part of the Scope of this project prior to initiating demolition. These procedures are MANDATORY.**

PART 2 NOT USED

PART 3 NOT USED

END OF SECTION

SECTION 02011
SUBSURFACE EXPLORATION AND SURVEY INFORMATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sub-surface Soil Data.

B. Surveys; Boundary and Topographical.

C. Related Sections:

1. 02012 - Asbestos Survey

1.02 RESPONSIBILITY

A. Owner-Supplied Information: Subsurface Explorations and surveys for the building site have been made by independent laboratories and surveyors respectively, under direct contract with the City of Miami.

PART 2 PRODUCTS

2.01 GEOTECHNICAL EXPLORATION AND SEEPAGE TRENCH TESTS

A. Copies of the following information is available for reference on the Owner's web site:

1. Report of Geotechnical Engineering Services; Project: Curtis Park Pool; Prepared by MACTEC Engineering and Consulting, Inc.; Dated: January 26 2010.

2.20 SURVEY INFORMATION

A. Copies of the following Owner-supplied information are available for reference on the Owner's web site:

1. Boundary and Topographical Survey of Curtis Park. Prepared by: Biscayne Engineering; Dated: May 5, 2015.

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 02012
ASBESTOS SURVEY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surveys; Asbestos

C. Related Sections:

1. 02011 - Subsurface Exploration and Survey Information
2. 02200 - Earthwork

1.02 RESPONSIBILITY

A. Supplied Information: Asbestos surveys for the building site have been made by independent laboratories and surveyors respectively.

B. Copies of the Supplied Information are provided by the City of Miami and included separately as a part of the Bid Documents.

C. No responsibility is assumed by the Project Architect / Engineer for information contained in these reports and surveys.

PART 2 PRODUCTS

2.01 Asbestos Survey

A. Copies of the following information are available for reference:

1. **Pre-Demolition Asbestos Survey, Curtis Park Ballpark and Pool**, 1901 NW 24 Avenue, Miami, FL 33125; prepared by URS Corporation, Dated: April 15, 2015.

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 02060
SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Removal of structures by demolition and disposition of debris legally off-site.

1.02 SUBMITTALS

A. Demolition Schedule: Include detailed schedule showing start and completion dates for each area of demolition and for completion of demolition work. Submit method of demolition and plan of removing work.

B. Certification: Submit copy of demolition firm's current license to operate in Miami-Dade County, Florida.

1.03 QUALITY ASSURANCE

A. Organize and perform demolition work to avoid damage to construction intended to remain.

B. The G.C. shall field verify all dimensions and visible existing conditions prior to commencing the work.

C. Demolition and removal operations shall be conducted in an expedient manner, with precautions taken to prevent demolition site from being an "attractive nuisance".

D. Notify the Owner and A/E of any conditions capable of affecting the safety of occupants of adjacent buildings, the normal use of these facilities, or the physical condition of the structures.

1. In case of accidental disruption of utilities or the discovery of previously unknown utilities, stop work immediately and notify the Owner and A/E.
2. Do not continue work until the Owner, A/E, and Contractor agree on a plan to correct the situation or identify utility service line.

1.04 SEQUENCING AND SCHEDULING

A. Scheduling: Areas next to demolition and removal work may be occupied and their activities cannot be interrupted or disturbed during normal working hours. Demolition schedule shall be according to drawings and as accepted by the Owner and A/E.

B. Coordinate with applicable utility companies and the Owner for utility line removal, capping, and utility shutdowns required by removal work. Call (800)432-4770, Sunshine State One Call of Florida, Inc. At least 48 hours prior

to digging.

1.05 PROJECT CONDITIONS

A. Existing work not specified for removal that is temporarily removed, damaged, exposed, or in any way disturbed or altered by removal work shall be repaired, patched, or replaced to the Owner and A/E's satisfaction at no additional cost to the Owner.

B. The G.C. shall provide and maintain all safety barriers throughout the course of demolition and construction. All construction work shall be enclosed by a safety barrier.

C. The G.C. shall follow all appropriate life safety precautions and ensure that power to activate electrical circuits being worked upon be disconnected at the source to prevent accidental shock. Prior to initiating any demolition work, the G.C. verifies that he has reviewed all available record documents and examined the area of work for hidden or concealed conditions.

D. Environmental Protection:

1. Control amount of dust resulting from construction or demolition to prevent spread of dust to other buildings and to avoid creation of a nuisance in surrounding areas. Use of water to control dust will not be allowed when it will result in flooding or other objectionable or hazardous or conditions.
2. Use of explosives is not allowed.
3. Burning of demolished materials is not allowed.

E. Traffic Maintenance:

1. Conduct removal operations to maintain traffic along existing streets and walks.
2. Keep paved streets and walkways free of debris.

3. Remove material and other matter tracked or fallen onto traffic surfaces.

F. Disposition of Materials:

1. Title and responsibility to materials and equipment to be removed, excepting salvageable equipment to be retained by the Owner, is vested in the Contractor upon receipt of Notice to Proceed.
2. The Owner will not be responsible for the condition, loss, or damage to such materials and equipment after the Notice to Proceed.

PART 2 NOT USED

PART 3 EXECUTION

3.01 DEMOLITION

A. Structures:

1. Demolish existing indicated structures according to accepted schedule, including foundation.

B. Perform removal and demolition according to Demolition Schedule and take necessary precautions to protect existing adjacent buildings, furnishings, and equipment. The G.C. shall shore up any walls affected by the selective demolition process as required to maintain proper structural stability throughout the course of construction. The G.C. is responsible for the design and engineering of all structural shoring.

C. Existing Utilities: Perform utility related work according to these specifications for the type of utility service involved. If necessary, the G.C. shall re-route utilities or make other arrangements to ensure continuous and uninterrupted services to all operational areas of the facility impacted by the work. All sod, plant material, concrete walkways, driveways, concrete floor slabs, and irrigation disturbed by the routing of utilities shall be restored to their original condition unless noted otherwise. Existing power to maintenance building, restroom building, and ballfield and walkway lighting shall be maintained throughout the construction period.

D. Removal:

1. Remove demolished construction materials and related debris from the site on a regular basis.
2. Accumulation of debris on the site will not be allowed.

3.02 CLEAN UP

A. Remove materials, including debris and dust, and dispose of legally off site. Use methods approved by A/E before beginning cleanup operations. Use of blowers to distribute dust is not allowed.

END OF SECTION

SECTION 02072
REMOVALS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Removal work as required on drawings and as specified in this section and repair of damage to existing facilities to remain.

B. Related Sections:

1. 02200 - Earthwork.

1.02 SUBMITTALS

A. Removal Procedure for Site Work: If requested by A/E, submit proposed procedure of removal work.

1. Procedure shall provide:

a. Means for safe conduct of work, careful removal, and disposition of materials specified to be salvaged for the City of Miami.
b. Protection of property to remain undisturbed.
c. Timely disconnection of utility services.

2. Procedure shall include a detailed description of methods and equipment to be used for each operation, and sequence of each operation.

1.03 PROJECT/SITE CONDITIONS

A. Existing sidewalks, curbs, paving, landscaping, or other existing work not specified for removal that is temporarily removed, damaged, exposed, or disturbed or altered by removal work shall be repaired, patched, or replaced at no cost to the Owner.

B. Existing Trees:

1. Do not damage trees within project site specified to be left in place.
2. Protect trees indicated to remain as required with acceptable barricades or temporary fencing during construction.

C. Environmental Protection:

1. Dust Control:

a. Control dust resulting from demolition to prevent spread of dust to occupied portions of buildings and to avoid creation of a nuisance in surrounding areas.
b. Do not use water to control dust when it will

result in flooding or pollution or other hazardous or objectionable conditions.

2. Fire: Do not dispose of demolished materials or trees, etc., by burning.
3. Explosives: The use of explosives is not allowed.

D. Site Inspection: Inspect entire project area to determine extent of removal, salvage, and patching work.

1.04 SCHEDULING

A. Activities in areas next to removal areas cannot be interrupted or disturbed during normal facility hours.

1. Consult with the Owner and A/E to schedule work. See Section 01310 - Construction Schedule.

B. Utility Companies:

1. Coordinate with applicable utility companies and the Owner for utility line removal, if any, and related capping and utility shutdowns required by such removal work.

C. Removals:

1. Assign removals to appropriate trades under respective sections, best suited for this type of work to avoid unnecessary damage due to the efforts of unskilled workers.

PART 2 PRODUCTS

2.01 DISPOSITION OF MATERIALS NOT INDICATED OR SPECIFIED TO BE SALVAGED

A. Title to Materials:

1. Title to materials and equipment to be removed, except salvageable equipment to be retained by the Owner, is vested in the Contractor upon receipt of Notice to Proceed.

a. The Owner will not be responsible for condition, loss of, or damage to such materials and equipment after receipt by Contractor of Notice to Proceed.

B. Remove excess materials and equipment not specified to be salvaged from site and premises upon completion of removal operations.

PART 3 EXECUTION

3.01 REMOVAL WORK

A. Perform removal work indicated on drawings or as specified in an orderly manner according to accepted construction schedule.

1. Protect work specified to remain.
2. Protect adjacent areas from damage or undue dirt and dust.
3. Wet down debris or rubbish, if necessary, to minimize flying dust.

3.02 EXISTING UTILITIES

A. Utility work shall be performed according to these specifications for the particular type of utility service involved.

3.03 EXISTING WORK

A. Existing work may be cut, altered, removed, or temporarily removed and replaced as necessary for the performance of work required.

1. Exception: Unless otherwise indicated on drawings, do not cut or alter structural members without authorization by the A/E.

B. Filling: Holes and other hazardous openings created by removal work shall be filled following procedures specified in Section 02200 - Earthwork.

C. Restore damaged or defaced areas or items, remaining in place, of work performed under this Contract to comparable conditions existing before the work.

END OF SECTION

SECTION 02280
SOIL TREATMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Termiticide application to soil under new buildings as indicated on drawings and specified in this section.

B. Use of chlordane, heptachlor, aldrin, dieldrin and chlorpyrifos class of chemicals are not allowed.

C. Related Sections:

1. 02200 - Earthwork.
2. 03300 - Cast-In-Place Concrete.
3. 07190 - Vapor/Radon Barrier.

1.02 SUBMITTALS

A. Submit the following for review before starting work:

1. Product data, including manufacturers specifications, chemical analysis, with recommended dilution, application directions, and safety precautions.

2. Sample copy of applicator's warranty for review.

3. Applicator's experience evidence with copies of current local and state licenses and current Certified Operator-in-Charge certificate.

1.03 QUALITY ASSURANCE

A. Work shall be done by a bonded Contractor whose principal business is pest control and termite treatment and can show evidence of at least 5 years of successful operation in this field.

B. Field Samples:

1. Test samples of the mixture of the concentrate and water will be taken by the Owner contracted Testing Laboratory.
2. If sample solution indicates noncompliance with the manufacturer's application requirements, the Contractor shall pay for the initial test performed by the Owner, any subsequent retesting required by the Owner, and re-application of soil treatment solution.

1.04 PROTECTION

A. To avoid surface flow or overspray of toxicant from application site, do not apply soil poisons when soil or

fill is excessively wet or after heavy rains.

B. Unless treated areas are to be immediately covered, take precautions to prevent disturbance of treatment by human or animal contact.

C. Comply with applicable laws, codes, ordinances of Federal, State, and local regulatory agencies having jurisdiction over use of soil poisons.

D. Provide warning signs and instruct workers to use protective measures for their safety.

1.05 WARRANTY

A. Upon completion of soil treatment and as a condition of substantial completion, furnish the Owner with a written warranty, from the applicator, which shall provide that:

1. Application was made at concentration, rates, and methods complying with these specifications.
2. Effectiveness of treatment is warranted for not less than 5 years without additional cost to the Owner, by means of a 5-year repair and replacement bond.
3. Upon evidence of subterranean termite activity, retreat area at no additional charge to the Owner. Additional treatment shall be sufficient to prevent termites from attacking building or its contents.
4. Upon occurrence of damage to building or to its contents within warranty period, retreat soil and replace damage at no cost to the Owner.
5. Warranty bond shall be drawn in favor of the Owner, successor, or assigns and shall be non-cancelable by all parties to the contract except the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. Florida Registered Soil Termiticides:

1. Biflex, bifenthrin, FMC Corporation.
2. Talstar, bifenthrin, FMC Corporation.
3. Demon TC, cypermethrin, Zeneca.
4. Prevail, cypermethrin, FMC Corporation.
5. Tribute, fenvalcrate, Aventis Environmental Science.
6. Termidor, fipronil, Aventis Environmental Science.
7. Premise, imidicloprid, Bayer Corporation.
8. Dragnet SFR, permethrin, FMC Corporation.
9. Prelude, permethrin, Zeneca.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion

of the work have been corrected in an acceptable manner.

3.02 APPLICATION

A. Before mixing concentrate and water as recommended by the manufacturer for specific application and conditions, contact the Owner in writing 48 hours in advance.

B. Apply termiticide mixture to the following:

1. Soil and earth that will be covered by or lie next to buildings.
2. Masonry foundations.
3. Areas around pipes and conduits penetrating slabs on fill to provide a lethal barrier to subterranean termites.

C. Apply termiticide mixture after subgrade has been made ready for placement of any floor slab vapor barrier, and as soon as practical before placement of concrete slabs and caps on masonry piers. Piling, pile caps, grade beams, foundation walls, and below grade waterproofing shall have been completed.

D. Apply at least 12 hours before placement of concrete slabs and during normal working hours to be subject to inspection. Notify applicator at least 24 hours before application of termiticide mixtures will be completed.

E. Soil Conditions: Apply termiticide mixtures when moisture content soil is sufficiently low to allow uniform distribution of chemical throughout specified areas.

F. Application Under Slabs on Fill:

1. Apply termiticide mixtures uniformly to all areas beneath concrete slabs-on-grade, including beneath walkways and entrance platforms and beneath sidewalks within 5 feet of buildings.
2. A minimum of 1 gallon of termiticide mixtures shall be uniformly applied to each 10 square feet of area to be treated.

3. Ground areas beneath concrete slabs-on-grade and paving abutting building slabs shall be similarly treated for a distance not less than 3 feet from building.

G. Application Along Foundation Walls, Pipes, and Conduits:

1. Treat critical areas along both sides of exterior and interior foundation walls, columns, and around utility pipes, conduits, ducts, and other similar items extending through soil beneath, and next to new construction, to a depth of 1 foot in a strip 6 inches wide, at a rate of 4 gallons of termiticide

mixture to each 10 linear feet.
2. Mix chemical with soil as it is placed against walls and utility lines.
3. Apply at least 1 gallon of termiticide mixture around each pipe.

H. Application to Masonry Foundation Walls: Treat voids of unit masonry foundation walls, top of course occurring at or just above grade level, with additional treatment of not less than 2 gallons of chemical for each 5 linear feet.

I. Retreatment of Disturbed Soil: Retreat soil surfaces disturbed after treatment and before placement of slabs and covering structures.

3.03 CLEAN UP

A. Improper disposal of pesticide, spray mixture, or rinsate is a violation of federal law. Comply with manufacturer's instructions for disposal of these materials and empty containers. Do not allow supplies of chemicals to remain on site unattended.

END OF SECTION

SECTION 02780
UNIT PAVERS (WHITE PORTLAND CEMENT)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Concrete paver units, concrete paver edge units.
2. Bedding and joint sand.

1.02 RELATED SECTIONS

02200 - Earthwork

1.03 REFERENCES

A. American Society of Testing and Materials (ASTM)
1. C 33, Specification for Concrete Aggregates.
2. C 136, Method for Sieve Analysis for Fine and Coarse Aggregate.
3. C 140, Sampling and Testing Concrete Masonry Units.
4. C 144, Standard Specification for Aggregate for Masonry Mortar.
5. C 979, Specification for Pigments for Integrally Colored Concrete.
6. C 698, Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5 lb. (2.49 kg) Rammer and 12 in(457 mm) Drop.
7. D 1557, Test Mixtures for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10 lb. (4.54 kg) Rammer and 18 in. (457 mm) Drop.
8. D 2940, Graded Aggregate Material for Bases or Sub-Bases for Highways or Airports.
9. C 936, Specification for Solid Interlocking Concrete Paving Units.

1.04 QUALITY ASSURANCE

A. Installation by a contractor and crew with at least one year of experience in placing interlocking concrete pavers on projects of similar nature or dollar cost.
B. Contractor shall conform to all local, state, federal licensing, insurance and bonding requirements.
C. Contractor shall hold current Basic Level Certificate from the Interlocking Concrete Pavement Institute contractor certification program.

1.05 SUBMITTALS

A. Shop or product drawings, and product data.
B. Full size samples of concrete paving units to indicate color and shape selections. Color will be selected by Architect from manufacturer's available colors.
C. Sieve analysis for grading of bedding and joint sand.
D. Test results from an independent testing laboratory for compliance of paving unit requirements to ASTM C 936 or

other applicable requirements.

E. Manufacturer's certification of concrete pavers by ICPI as having met applicable ASTM or CSA standards.

F. Indicating drawing layout, pattern, and relationship of paving joints to fixtures and project formed details.

1.06 MOCK-UPS

A. Install a 2m x 2m (7 ft x 7 ft) paver area as described in Article 3.02.

B. This area will be used to determine surcharge of the bedding sand layer, joint sizes, lines, laying pattern(s), color(s), and texture of the job.

C. Mock-up approved by the architect and shall be the standard from which the work will be judged.

D. Approved areas shall be included in the work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver concrete pavers to site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by fork lift or clamp lift.

B. Unload pavers at job site in such a manner that no damage occurs to the product.

C. Cover sand with waterproof covering to prevent exposure to rainfall or removal by wind.

D. Secure covering in place.

E. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

1.08 ENVIRONMENTAL CONDITIONS

A. Do not install sand or pavers during heavy rain.

B. Do not install sand or pavers over frozen base materials.

C. Do not install frozen sand.

PART 2 PRODUCTS

2.01 CONCRETE PAVERS

A. Pavers shall be supplied by a member of Interlocking Concrete Paving Institute (ICPI); Contact ICPI at 800-241-3652 for a list of members throughout North America.

B. Provide: "Banjo" paver, 6 in. X 6 in. X 2 3/4 in., color as selected by Architect from manufacturer's standard colorline. **Pavers shall be manufactured using white portland cement**.

C. Meet the following requirements of ASTM C 936, Standard Specification for Solid Concrete Interlocking Paving Units:

1. Average compressive strength of 55 MPa (8,000 psi) with no individual unit under 50 MPa (7,200) psi. For 3.125 in. (80 mm) thick units, the compressive

strength for each shall be corrected for the thickness by multiplying the test result by 1.18. The result shall represent the compressive strength for each unit.

2. Average absorption of 5% with no unit greater than 7% when tested in accordance with ASTM C 140.
3. Resistance to 50 freeze-thaw cycles when tested in accordance with ASTM C67.

D. Use pigment conforming to ASTM C 979.

2.02 BEDDING AND JOINT SAND

A. Note: the type of sand used for bedding is often called concrete sand. Sands vary regionally. Screenings and stone dust can be unevenly graded and have an excess amount of material passing the 75 um (No. 200) sieve. Bedding sands with these characteristics should not be used. Contact paver contractors local to the project and confirm sand(s) successfully used in previous similar applications.

B. Clean, non-plastic, free from deleterious or foreign matter and natural or manufactured from crushed rock. Do not use limestone screenings or stone dust. When concrete pavers are subject to vehicular traffic, use sands as hard as practically available.

C. Grading shall be done according to ASTM C 136. Bedding sand shall conform to the grading requirements of ASTM C 33 shown in Table 1:

Table 1: Grading Requirements for Bedding Sand - ASTM C 33

Sieve Size	Percent Passing
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10

D. Note: Bedding sand may be used for joint sand. However, extra effort in sweeping and compacting the pavers may be required in order to completely fill the joints. If joint sand other than bedding sand is used, the gradations shown in Table 2 are recommended. Joint sand should never be used for bedding sand.

E. The joint sand shall conform to the grading requirements of ASTM C 144 shown in Table 2:

Table 2: Grading Requirements for Joint Sand - ASTM C 144

Sieve Size	Natural Sand	Manufactured Sand

	Percent Passing	Percent Passing
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 to 100	95 to 100
No. 16 (1.18 mm)	70 to 100	70 to 100
No. 30 (0.600 mm)	40 to 75	40 to 100
No. 50 (0.300 mm)	10 to 35	20 to 40
No. 100 (0.150 mm)	2 to 15	10 to 25
No. 200 (0.075 mm)	0	0 to 10

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

B. Inspect and verify that geotextile materials and placement, base/sub-grade preparation, surface tolerances, elevations, compacted density (conduct density tests) for conformance to specifications. See ICPI Tech Spec 2, Construction of Interlocking Concrete Pavements, for further guidance on construction practices.

C. Note: Compaction of the soil sub-grade to at least 98% Standard Proctor Density per ASTM D 698 is recommended. Higher density, or compaction to ASTM D 1557 may be necessary for areas subject to continual vehicular traffic. Stabilization of the sub-grade and/or base material may be necessary with weak or saturated sub-grade soils. Inspect sub-grade preparation, elevations, and conduct density tests for conformance to specifications.

D. Verify that geotextile, if applicable, have been placed according to specifications.

E. Verify that aggregate base materials, thickness, compaction, surface tolerances, and elevations conform to the specifications.

F. Note: Local aggregate base materials typical to those used for flexible pavements are recommended, or those conforming to ASTM D 2940. Compaction to not less than 98% Proctor Density in accordance with ASTM D 698 is recommended for pedestrian areas.

G. Note: The aggregate base should be spread and compacted in uniform layers not exceeding 150 mm (6 in.) thickness. Recommended base surface tolerance should be plus or minus 10 mm (3/8 in.) over a 3 m (10 ft) straight edge.

3.02 INSTALLATION

A. Spread sand evenly over the base course and screed to a nominal 25 mm (1 in) thickness, not exceeding 40 mm (1.5 in) thickness. The screeded sand should not be disturbed. Place sufficient sand to stay ahead of the laid pavers.

Do not use the bedding sand to fill depressions in the base surface.

B. Ensure pavers are free of foreign material before installation.

C. Lay the pavers in the pattern(s) as shown on the drawings. Maintain straight pattern lines.

D. Joints between the pavers on average shall be between 2 mm to 5 mm (1/16 in and 3/16 in) wide.

E. Note: Some pavers require a larger joint. Consult manufacturer for recommended joint width for applicable paver.

F. Fill gaps at the edges of the paved area with cut pavers or edge units. No cut units shall be less than one-third of a whole paver in areas subject to vehicular traffic. In no case shall cut pavers be less than 10 mm (3/8 in) thick.

G. Cut pavers to be placed along the edge with a double bladed paver splitter or masonry saw.

H. Use a low amplitude, high frequency plate vibrator capable of at least 5,000 lbf (22 kN) compaction to vibrate the pavers into the sand.

I. Vibrate the pavers again, sweeping dry joint sand into the joints and vibrating until they are full. This will require at least two or three passes with the vibrator. Do not vibrate within 1 m (3 ft) of the unrestrained edges of the paving units.

J. Note: For installation on a compacted aggregate base and soil sub-grade, the specifier should be aware that the top surface of the pavers may be 3 to 6 mm (1/8 to 1/4 in) above the final elevations after compaction. This difference in initial and final elevation is to compensate for possible minor settling.

K. All work to within 1 m (3 ft) of the laying face including cut or manufactured edge units must be fully paved to edge restraints and compacted with sand filled joints at the completion of each day.

L. Sweep off excess sand when the job is complete.

M. The final surface elevations shall not deviate more than 10 mm (3/8 in) under a 3 m (10 ft) long straightedge.

N. The surface elevation of pavers shall be 3 to 6 mm (1/8 to 1/4 in) above adjacent drainage inlets, concrete collars or channels.

3.03 FIELD QUALITY CONTROL

A. After removal of excess sand, check final elevations for conformance to the drawings.

END OF SECTION

SECTION 02820

ORNAMENTAL FENCES AND GATES

PART 1 - GENERAL

1.01 WORK INCLUDED

The contractor shall provide all labor, materials and appurtenances necessary for installation of the industrial ornamental steel fence system at Curtis Park Pool as defined herein.

1.02 RELATED WORK

Section 02200 - Earthwork
Section 03300 - Cast-in-Place Concrete, Reinforcing and Formwork

1.03 SYSTEM DESCRIPTION

The Contractor shall supply and install a total industrial ornamental steel security fence system as described herein. The System shall include all components (i.e., pickets, rails, posts, connector devices, gates and hardware) required to produce a fully-operable security fencing system.

1.04 QUALITY ASSURANCE

The Contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.05 REFERENCES

- ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- ASTM D523 - Test Method for Specular Gloss.
- ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.
- ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

- ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.
- ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.

1.06 SUBMITTALS

A. Shop Drawings - Provide shop drawings for A/E review showing dimensional layout, plus installation and anchoring details. Shop drawings shall include a copy of the manufacturer's written ten (10) year warranty (which is to go into effect at time of occupancy.)
B. Wind load calculations - Provide wind-load calculations to meet the current Florida Building Code, and all applicable local codes ordinances, showing that the fence, and its installation details, meet or exceed wind-load requirements for this application in Miami-Dade County, Florida. Calculations shall bear the seal and signature of a Structural Engineer currently registered in the State of Florida.

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1.07 PRODUCT HANDLING AND STORAGE

Upon receipt at the job site, all materials shall be checked to ensure that no damages occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

1.08 PRODUCT WARRANTY

A. All structural fence components (i.e. rails, pickets, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 10 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.

B. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufactures warranty shall be guaranteed for five (5) years from date of original purchase.

PART 2 - MATERIALS

2.01 MANUFACTURER

The fence system shall conform to Ameristar Aegis II, Majestic design, model: Invincible (shepherd's hook) 3-Rail style manufactured by Ameristar Fence Products, Inc. or approved equal.

2.02 MATERIAL

A. Steel material for fence framework (i.e. tubular pickets, rails and posts), shall be galvanized prior to forming in accordance with the requirements of ASTM A653/A653M, with minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft^2 (276 g/m^2), Coating Designation G-90.

B. Material for pickets shall be 1″ square x 14 Ga. tubing. The cross-sectional shape of the rails shall conform to the manufacturer's ForeRunner™ double wall design with outside cross-section dimensions of 1.75″ square and a minimum thickness of 14 Ga. Picket holes in the ForeRunner rail shall be spaced 4.715″ o.c., except for Invincible style 6′ long, which shall be, spaced 4.98″ o.c. Picket retaining rods shall be 0.125″ diameter galvanized steel. High quality PVC grommets shall be supplied to seal all picket-to-rail intersections. Fence posts and gate posts shall meet the minimum size requirements of Table 1.

2.03 FABRICATION

A. Pickets, rails and posts shall be precut to specified lengths. ForeRunner rails shall be prepunched to accept pickets. Pickets shall be predrilled to accept retaining rods.

B. Grommets shall be inserted into the prepunched holes in the rails and pickets shall be inserted through the grommets so that predrilled picket holes align with the internal upper raceway of the ForeRunner rails (Note: This can best be accomplished by making an alignment jig). Retaining rods shall be inserted into each ForeRunner rail so that they pass through the predrilled holes in each picket.

C. The manufactured galvanized framework shall be subjected to the PermaCoat® thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pretreatment/wash (with zinc phosphate), an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils (0.0508mm). The topcoat shall

be a “no-mar” TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). **The color shall be Black**. The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2.

D. Completed sections (i.e., panels) shall be capable of supporting a 600 lb. load applied at midspan without permanent deformation. Panels shall be biasable to a 25% change in grade.

E. Swing gates shall be fabricated using 1.75” x 14ga Forerunner double channel rail, 2” sq. x 11ga. gate ends, and 1” sq. x 14ga. pickets. Gates that exceed 6’ in width will have a 1.75” sq. x 14ga. intermediate upright. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding.

PART 3 - EXECUTION

3.01 PREPARATION

All new installations shall be laid out by the Contractor in accordance with the construction plans.

3.02 FENCE INSTALLATION

Fence post shall be spaced according to Table 3, plus or minus ½”. For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36” (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The “Earthwork” and “Concrete” sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

3.03 FENCE INSTALLATION MAINTENANCE

When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces; 1) Remove all metal shavings from cut area. 2) Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry. 3) Apply 2 coats of custom finish paint matching fence color. Failure to seal exposed

surfaces per steps 1-3 above will negate warranty. Ameristar spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-manufacturer approved parts or components will negate the manufactures' warranty.

3.04 GATE INSTALLATION

Gate posts shall be spaced according to the manufacturers' gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacture of the gate and shall be installed per manufacturer's recommendations.

3.05 CLEANING

The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

END OF SECTION

SECTION 02840
SIGNAGE

PART 1 GENERAL

1.01 SUMMARY

A. Signage for Parking Lot and Asphalt driveways.

1.02 REFERENCES

A. Manual on Uniform Traffic Control Devices, U.S. Department of Transportation, Federal Highway Administration.

B. Florida Department of Transportation (FDOT) Specifications for Road and Bridge Construction.

C. Miami-Dade County Public Works Manual (M-DCPW).

D. Florida Building Code (FBC) for accessibility requirements.

1.03 SUBMITTALS

A. Submit properly identified manufacturer's literature and technical data before starting work.

1. Shop Drawings: Submit shop drawings for review, indicating construction details, sizes, elevations, installation requirements, gauges, thickness of materials, colors, and other information necessary to show compliance with the requirements of this section.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sign Panels:

1. Galvanized steel according to the applicable requirements of FDOT Section 700 "Highway Signing or Standard Road Details of the M-DCPW.
2. Size, shape, and color as indicated on the drawings or as specified.

B. Sign Support Posts:

1. Galvanized steel according to the applicable requirements of FDOT Section 700 "Highway Signing" or M-DCPW.
2. Size, shape, and color of posts and mountings as indicated on drawings.

C. Aluminum components are not allowed.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Sign Panels and Supports:

1. Install according to applicable requirements of the following:

a. FDOT Section 700 "Highway Signing".
b. Standard Road Details of M-DCPW.
c. Manual on Uniform Traffic Control Devices.
d. Accepted shop drawings and as indicated on drawings.

END OF SECTION

SECTION 02870
SITE AND STREET FURNISHINGS

PART 1 GENERAL

1.01 SUMMARY

A. Related Work:

1. 02200 - Earthwork.
2. 03300 Cast-In-Place Concrete, Reinforcing and Formwork.

1.02 SUBMITTALS

A. Submit properly identified manufacturer's literature and catalog cuts before starting work.

B. Submit shop drawings including manufacturer's recommended installation procedures for each item of equipment.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Bicycle Racks

1. Provide and install (11) bicycle capacity, in-ground bicycle rack. Finish: Polyester powder coat. Color: black.

A. Model 2168, Wave Rack by Saris Cycling GP., Madison, WI.
B. Wave Rack by Porter Athletic Equipment Company, Broadview,Illinois.
C. CycLoops by Columbia Cascade, Portland OR.
D. Racks by Tubular Forms, represented by Architectural Product Sales Inc., Palm Beach Gardens, FL.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Install equipment according to manufacturer's instructions, approved shop drawings, and the requirements of this section.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

1.1 GENERAL

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture.

C. Shop Drawings: For steel reinforcement and formwork.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete,"
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

D. Preinstallation Conference: Conduct conference at Project site if required by the Architect.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I.

B. Normal-Weight Aggregates: ASTM C 33, graded, 3/4-inch nominal maximum coarse-aggregate size.

1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 VAPOR RETARDERS

A. Refer to Section 07 13 26, SELF-ADHERING SHEET WATERPROOFING

2.5 CURING MATERIALS

A. Only water curing permitted.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength at 28 days: As shown on plans.
2. Maximum Water-Cementitious Materials Ratio: 0.45 unless otherwise noted on plans.
3. Slump Limit: 4 inches. 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
5. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

2.8 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise

damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Hot-Weather Placement: Comply with ACI 301.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to be covered with a coating or covering material applied directly to concrete.

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction or as indicated by the Architect.

1. Apply scratch finish to surfaces indicated on architectural drawings.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces where indicated.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated, exposed to view.
2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Cure concrete according to ACI 308.1

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Curing compounds are not allowed.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

1. Testing Services: Tests shall be performed according to ACI 301.

3.12 ADDITIONAL REQUIREMENTS:

A. The contractor shall include in his bid the cost of the following additional materials and labor. These shall be used, if required as directed by the A/E. The cost of unused portions shall be credited to the owner at the end of the project: **10 cubic yards of 4000 psi concrete including forming, placing and finishing, and 5 tons of reinforcing steel including fabrication and placing.**

END OF SECTION

SECTION 03342
LIGHTWEIGHT INSULATING CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 03300 - Cast-In-Place Concrete.
2. 07525 - Single -Ply Roofing.
3. 07600 - Flashing and Sheet Metal.
4. 15421 - Drains, Floor Sinks, and Cleanouts.

1.02 REFERENCES AND CODES

A. Florida Building Code (FBC), latest edition including FBC Test Protocols TAS 117 and TAS 105.

B. Miami-Dade County Product Control.

C. American Society for Testing and Materials (ASTM):

1.	A653/A-96	Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip process.
2.	C138-92	Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
3.	C150-96	Specification for Portland Cement.
4.	C177-85(93)	Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
5.	C332-87(91)	Specification for Lightweight Aggregates for Insulating Concrete.
6.	C495-91a	Test Method for Compressive Strength of Lightweight Insulating Concrete.
7.	C513-89(95)	Test Method for Obtaining and Testing Specimens of Hardened Lightweight Insulating Concrete for Compressive Strength.
8.	C518-91	Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
9.	C578-95	Specification for Rigid, Cellular Polystyrene Thermal Insulation.
10.	C869-91	Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete.

D. Factory Mutual (FM).

E. Steel Deck Institute Design Manual, latest edition.

F. Underwriters Laboratories (UL) for Class A fire

resistance.

1.03 SUBMITTALS

A. Product Data: Submit for each product required and application instructions.

B. Current Factory Mutual and Miami-Dade County product approvals.

C. Shop Drawings: Provide roof plan showing roof slopes, thickness of insulation, roof penetrations, and specific details required for project installation. **PROVIDE WRITTEN STATEMENT FROM LIGHTWEIGHT INSULATING CONCRETE SYSTEM MANUFACTURER THAT SELECTED ROOFING AND SELECTED LIGHTWEIGHT INSULATING CONCRETE SYSTEM ARE COMPATIBLE.**

D. Show negative pressures on each part of the roof (no less than those shown in the Construction Documents) along with modifications to producer's roofing design, such as fastener numbers and patterns, as needed to withstand negative pressures, calculated by a Florida registered professional engineer following TAS 117.

E. Submit samples of insulation board.

F. Quality control submittals:

1. Laboratory results for Thermal Resistance Values based on ASTM C177 or C518.

2. Test reports showing compliance with FMA 1 - 150 Wind Resistance Classification.
3. Current affidavit from insulating concrete manufacturer approving applicator before installation.
4. UL listing.

1.04 QUALITY ASSURANCE

A. Comply with the Florida Building Code (FBC).

B. Insulating cellular concrete shall be applied by a manufacturer's certified applicator.

C. Any excess water on the lightweight concrete shall be removed before roof installation by vacuuming, evaporation, or other method complying with membrane manufacturer's requirements.

D. Applicator shall maintain a job log for submittal to A/E. The job log shall contain cast density recordings taken at a minimum interval of 1 hour.

1. Cast densities shall be measured with a calibrated scale measuring from 1 to 50 pounds in increments of

1/4 pound and be accurately calibrated to 1/16 pound.
2. The measuring bucket shall be 5 quarts or larger.
3. Measurements shall be taken according to ASTM C138.

E. A "Walkability Inspection" by the A/E and the Owner shall determine the lightweight insulating concrete installation as a satisfactory substrate.

1. If the installation fails the inspection, additional testing shall be required by the A/E to confirm fastener spacing or provide data for the roof system manufacturer to calculate a new fastener pattern.

a. Fastener testing shall be required.
b. Any areas where fasteners will not hold a minimum of 40 pounds after 5 days of cure shall be removed and recast.

F. If continued noncompliance is observed and the roof deck and associated roof system cannot be corrected based on additional testing and attachment calculations, the nonconforming lightweight shall be removed and recast.

G. If a denser fastener pattern is required for elevated pressure zones, a Florida registered professional engineer shall recalculate perimeter and corner spacing according to FBC Test Protocols TAS 117.

H. Field withdrawal resistance testing of lightweight concrete fasteners shall be conducted according to FBC Test Protocols TAS 105.

1. The average withdrawal resistance values obtained in field testing shall be within 10 percent of the values listed in the Roof Assemblies Limitations.
2. If the values are not achieved, a Florida registered professional engineer can recalculate the fastener density following the procedures outlined in FBC Test Protocols TAS 117.

I. Roofing Contractor shall consult with roofing system manufacturer for compatibility with all surface coatings or treatments. **PROVIDE WRITTEN STATEMENT FROM LIGHTWEIGHT INSULATING CONCRETE SYSTEM MANUFACTURER THAT SELECTED ROOFING AND SELECTED LIGHTWEIGHT INSULATING CONCRETE SYSTEM ARE COMPATIBLE.**

J. Direct-adhered single ply systems shall be installed in strict compliance with manufacturer's specifications and the Miami-Dade County Product Control Notice of Acceptance.

K. Installation of this decking component and diaphragm load requirements shall be in strict compliance with application requirements set forth in Chapters 19 and 22 of the Florida Building Code (FBC).

L. All coatings or surface preparation materials applied to the lightweight concrete shall be listed as an approved interface material with the roof membrane manufacturer.

M. Topping applied over insulation boards and any decking/substrate that allows deflection under normal traffic shall be installed within 4 hours of board installation.

1. If installation is interrupted due to inclement weather or other situations beyond the control of the contractor, the installed insulation board shall be inspected to confirm adhesion to the substrate.
2. Over solid substrates, topping installation shall not be delayed over 24 hours.

N. Roof Membrane Application: Contractor shall coordinate commencement of roofing over the lightweight insulating concrete after satisfactorily passing Florida Building Code TAS 105 fastener pullout test.

O. Conduct pre-roofing conference before the installation of the roof insulation with A/E and representatives from manufacturer of insulating concrete, roofing membrane materials, and all other related trades in attendance. At the meeting date determined, by mutual agreement, between parties concerned.

P. Oven-Dry Density: Determine according to Section 7 of Test for Compressive Strength of Lightweight Insulating Concrete, ASTM C495.

Q. Compressive Strength: Determine compressive strength according to requirements of ASTM C495.

1.05 DELIVERY AND STORAGE

A. Deliver material in manufacturer's original undamaged packages or acceptable bulk containers.

B. Store packaged material to protect them from the elements or physical damage.

C. Do not use cement that shows indications of moisture damage, caking, or other signs of deterioration.

1.06 WARRANTY

A. Warrant to the Owner that for 10 years from the date of the completion of the lightweight insulating concrete that:

1. The roof insulation system shall remain in a re-roofable condition should the roof membrane require replacement.
2. The actual resistance to heat flow through the roof

insulation system shall be at least 80 percent of design thermal resistance.
3. The roof insulation will remain in place even if the roof membrane sustains wind damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Insulating Concrete:

1. Elastisell by Elastizell, Corp.
2. Mearlcrete by Aerix Industries.
3. Insulcel by Siplast.
4. Celcore by Celcore, Inc.

2.02 MATERIALS

A. Insulating Concrete Physical Properties:

1. Portland cement and pregenerated foam with water:

a. Wet density at point of placement: 42-50 pcf.
b. Minimum oven dry density: 32-40 pcf.
c. Minimum compressive strength: 300 psi.

2. Portland cement and vermiculite concrete with water(1:3.5):

a. Wet density at point of placement: 60-68 pcf.
b. Minimum oven dry density: 35 pcf.
c. Minimum compressive strength: 300 psi.

B. Insulation Board: One pound density expanded polystyrene board with 25 to 35 bonding and venting slots. Deliver each bundle of 2 foot by 4 foot boards to the job site with clear identification as to the manufacturer and shall carry the FM approval label on each bundle.

Producer/Manufacturer:

1. Holey Board by Apache

2. Insulperm by Siplast
3. Equal product in quality and performance as determined by the A/E and the Owner.

C. Portland Cement shall comply with ASTM C150, Type I, II, or III.

D. Water: Potable, clean, maximum chloride level of 250 ppm, and free from deleterious amount of acid, alkali, and organic material.

E. Foaming agent: Liquid concentrate shall be manufactured

and be delivered to the job site with clear identification as to manufacturer and type of material according to ASTM C869.

F. Admixtures shall not be used unless specifically recommended by the manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Surfaces to receive insulating concrete shall be sound, free of loose material, and free from defects affecting application.

B. Installation of other work passing through fill or concealed shall be complete and accepted before starting the work.

C. The applicator shall be responsible for inspection and approval of the substrate as suitable for roof insulation.

D. Installation of curbs, equipment supports, roof drains, framing for openings, and wood nailers shall be in place before application of material.

E. Poured Surface Finish:

1. Surface shall be bonded firmly and free from loose materials.
2. Screeded finish of surface shall be free from extreme roughness capable of interfering with proper bonding of roofing membrane and free from shrinkage and cracks.
3. Surface Dryness: Exposed surface shall look and feel substantially dry, and shall have a uniformly gray cement color.

3.02 INSTALLATION

A. Slurry: Cover substrate with a 1/8" slurry coat of the lightweight insulating fill.

B. Insulation Board:

1. Place insulation board in the 1/8" slurry coat.
2. Insulation board placement shall be made within 30 minutes of slurry coat placement.
3. Place insulation board in a manner that provides full contact of slurry to board.
4. Lay insulation board in brick paver pattern with joints staggered and side and end joints butted snugly.
5. Under no circumstances shall insulation board be laid dry on substrate.
6. Remove loose boards and immediately re-grout.

C. Lightweight Insulating Fill:

1. Within 24 hours of insulation board placement, place

a minimum of 2 inches of lightweight insulating fill over the insulation board and screed to an even surface to receive the roofing membrane.

2. Increase thickness as required at 1/4" per foot slope to obtain roof drainage slopes as indicated on Drawings.
3. Roof Crickets: At roof low points between roof drains, between roof drains and parapets and at high side of fan curbs, provide insulation concrete crickets uniformly sloped not less than 1/2" per foot.

D. Installed system shall achieve a minimum average R-value of 20.

3.03 QUALITY CONTROL

A. Check the cast density according to ASTM C869 hourly at the point of placement.

B. Testing: Make set of 4 standard cylinders of each day's mix and text according to ASTM C495. When more than 75 cubic yards of concrete are poured in 1 day, make a set of specimens of each 75 yards.

C. Drainage Test: After initial set, provide hose test to assure proper drainage slopes with no ponding.

3.04 PROTECTION

A. Do not expose insulating concrete to prolonged exposure to the elements more than 7 days.

B. Do not use as a temporary working surface without adequate surface protection, nor allow it to function as a temporary dry in.

C. Prevent traffic on roof deck until applicator allows such traffic.

END OF SECTION

SECTION 03410
PRECAST PRESTRESSED CONCRETE JOISTS

PART 1 - GENERAL

1.00 SUMMARY

A. Precast prestressed concrete Sections.
B. Forming of prestressed concrete Sections.

1.01 RELATED SECTIONS

A. Section 03300-Cast-In-Place Concrete.

1.02 REFERENCES (EDITIONS SPECIFIED IN CURRENT APPLICABLE PROVISIONS OF FBC).

A. ASTM International (ASTM).
1. ASTM A370 Test Methods and Definitions for Mechanical Testing of Steel Products.
2. ASTM A416 Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
3. ASTM A615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
4. ASTM A36 Specification for Structural Steel.
5. ASTM C33 Specification for Concrete Aggregates.
6. ASTM C150 Specification for Portland cement.
7. ASTM C.494 Standard Specifications for Chemical Admixtures for Concrete.

B. Codes and Standards
1. Prestressed Concrete Institute MNL 116: Manual for Quality Control for Plants and Production of Precast Concrete Products.
2. ACI 318 Building Code Requirements for Reinforced Concrete and Commentary.
3. ACI 301 (latest Edition) Specification for Structural Concrete for Buildings.
4. AWS Dl.4 Structural Welding Code-Reinforcing Steel.
5. AWS Dl.1 Structural Welding Code-Steel.

C. Prestressed Concrete Institute (PCI).
1. PCI MNL-116, Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products.
2. PCI MNL-120, Design Handbook-Precast and Prestressed Concrete

D. Fire-resistance Rated Precast Units: Where precast concrete units are shown or scheduled as requiring a fire-resistance classification, provide units:

1. Tested and listed by UL according to UL specifications, with each unit bearing UL label and marking.
2. Complying with the requirements of the applicable building codes.
3. E, ASCE 37 Design loads on structures during erection.

1.03 DESIGN REQUIREMENTS

A. Prestressed Concrete Sections: Conform to the requirements of ACI 318 except as noted herein. Design units for the live loads and dead loads as noted on the structural drawings. Superimposed dead loads listed are in addition to weight of units and slab or topping. Connections, openings, erection and details under provisions of manufacturer's specifications and details as noted on the Drawings.

1.04 SUBMITTALS

A. Shop Drawings: Submit shop and erection drawings for approval, showing:
1. Concrete design strength.
2. Unit dimensions and unit weights.
3. Size, number, location, and stress in prestressing strands.
4. Size, number, and location of reinforcing bars including reinforcing for erection and handling stresses.
5. Concrete cover over reinforcing and strands.
6. Bearing and anchorage details.
7. Size and locations of holes for slab form support pins.
8. Concrete finish.
9. Curing method.
10. Erection marks.
11. Joist pick-up points and shoring points.

B. Shoring and re-shoring shop drawings shall be prepared under the supervision of and signed and sealed by a Professional Engineer licensed in the State of Florida.

C. Design Calculations:
1. Submit for approval, neat, legible, and complete design calculations before fabrication.
2. Calculations shall be by a Florida licensed Professional engineer whose seal and original signature shall appear on calculation sheets and shop drawings.

3. Revise calculations if required by A/E or Owner.
4. Calculations shall include predicted in-place cambers without superimposed loads, with superimposed dead loads, and with superimposed dead loads and live loads.
5. Span length in calculations shall be from center of bearing to center of bearing.

D. Shop drawings and calculations shall be prepared under the supervision of and signed and sealed by a Professional Engineer licensed in the State of Florida.
E. Test Reports: Furnish reports of tests on concrete.
F. Certificates: Submit manufacturer's test certificates on pre-stressing strands and reinforcing.
G. Concrete Cylinder Tests: Submit copies of cylinder break reports by an approved commercial test laboratory, made from each casting for this project to verify that concrete has attained minimum ultimate pre-stressed transfer strength specified.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: A recognized pre-stressed concrete manufacturer whose design, fabrication, and erection operations are supervised by a Florida Licensed Professional Engineer, with a minimum of 5 years experience.
B. Erector Qualifications: Regularly engaged for at least 5 (five) years in the erection of precast structural concrete similar to the requirements of this project. Upon request, provide written evidence that equipment and personnel are adequate and qualified for the performance of contract requirements.
C. Testing Agency: Capable of performing testing under provisions ASTM E329.7

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle projects per manufacturer's recommendations.
B. Handle precast members in position consistent with their shape and design. Lift and support only from support points.
C. Protect from dirt and damage. Do not place units in position, which will cause overstress, warp or twist. Handle by means of lifting inserts.
D. Store units off ground. Place stored units so that identification marks are discernible. Separate stacked units by battens across full width of each bearing point.

Do not use upper member of stacked tier as storage area for shorter members or heavy equipment.

PART 2 - PRODUCTS

1.07 MATERIALS

A. Concrete:
   1. Minimum seven (7) day ultimate compressive strength of 5000 PSI.
   2. Higher strength will be allowed to suit manufacturer's design. Use Type III Portland cement.
   3. Ensure concrete complies with Section 03300 - Cast-in-Place Concrete.

B. Pre-stressing Strands:
   1. High strength 7-wire strand conforming with ASTM A416-grade 250 or 270.
   2. Elongation test conforming with ASTM A370 with minimum elongation at rupture of 3.5 percent in 24 inches.
   3. Tests need not be made if certification of conformance with specifications is provided by manufacturer.

C. Reinforcing Steel: ASTM A615, Grade 60, deformed.

D. Forms:
   1. Unit:
      a. Forms: Provide smooth units true to size, shape, and detail with flat planes, sharp lines, and arises free from warp, twist, bow, or similar distortions and spalling, broken edges, or similar defects.
      b. Dimensional Tolerances: Under provisions of ACI 525 standard minimum requirements for thin section precast concrete construction.

E. Slab forms between joists and beam side forms at end of joists:
   1. Provide use of manufacturer's standard forms complete with slab form support pins.
   2. Provide coordination of forming.

1.08 FABRICATION

A. Fabricate units under provisions of approved shop drawings and approved design calculations.
B. Unit Design and Fabrication:
   1. Conform with ACI Standard 318 Building Code requirements for reinforced concrete, Pre-stressed

Concrete Association Standards, and the Florida Building Code.

2. Fabricator shall design joists according to loads indicated on drawings.
3. Camber under dead load or deflection under total load does shall not exceed 1/360 of span.

C. Maintain plant records and quality control program during production of precast members. Make records available upon request.
D. Tension reinforcement tendons as required to achieve design load criteria.
E. Inserts: Install hanger inserts and sleeves in unit forms for mechanical and electrical items as provided under other sections.
F. Top Finish of Units Receiving Cast-In-Place Slab: Rough screeded. Provide projecting stirrups and slab reinforcing support bar per manufacturer's composite action design.
G. Cure members under identical conditions to develop required concrete quality, and minimize appearance blemishes such as non-uniformity, staining or surface cracking.
H. Plant Finish: Normal plant finish; surface may contain small surface holes caused by air bubbles, minor chips or spalling at edges or ends, without major discoloration.
I. Exposed-to-View Finish: Normal plant finish with fins and protrusions removed, ground edges and ends, flat face surfaces.
J. Curing:
   1. Top Surface: receives water curing only.
   2. Sides and Bottoms: Water cured or membrane cured using approved wax free type compound.
   3. Water cure units at least 5 days or cure until concrete reaches minimum specified 7 day strength.

K. Marking: Distinctively mark each unit with manufacturer's name and mark indicated on erection drawings.
L. Age: Ensure units are a minimum 10 days old before shipping or erecting.

PART 3 - EXECUTION

1.09 ERECTION

A. Erection: by manufacturer or another firm with experience in this Work, and supervised by manufacturer's Florida licensed Professional Engineer, or his authorized representative. Handle and install joists with precision, in conformance with drawings, details, and erection drawings. Prior to concrete placement, manufacturer shall provide a written certification stating that all units,

forming, bracing and shoring have been installed in accordance with approved shop drawings

B. Erect members level and plumb within allowable tolerances.

C. Adjust differential camber between units to within tolerance.

D. No drilling, chipping, PAF’s or any other intrusions into precast concrete without written specific approval and detailed instructions of Specialty Engineer and fabricator.

E. Secure units in place.

F. Install and secure forms between joist for cast-in-place concrete.

G. Ensure conformance to provisions of ASCE 37.

H. Design and erect to tolerances listed in ACI 301.

I. When members cannot be adjusted to conform to design or tolerance criteria, advise Project Consultant. Execute modifications as directed.

J. Shoring: Before pouring slabs over units, supervise shoring of unit bottoms for composite action. Shoring to remain in place until cylinder tests indicate the specified concrete strength for slabs and secondary pours over beams have been attained.

K. Forming: Furnish slab form support pins for joist units, slab forms between joists, and beam side forms between joists as required.

L. Repairs: Repair nicks or chips in exposed areas that occur after inspection and approved by the Project Consultant.

M. Fasteners:

1. Drilled holes for expansion anchors, self-tapping concrete screw fasteners or power activated mechanical fasteners (shots), shall not be allowed on any surface of precast joists.

1.010 CLEANING

A. After slab pouring is complete, clean exposed surfaces of units of stains to a uniform appearance. Do not use caustic or acid cleaners.

END OF SECTION

SECTION 03600
GROUT

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 03300 - Cast-In-Place Concrete.
2. 03600 - Grout.

1.02 REFERENCES

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

1. C109-95 Test Method for Compressive Strength of Hydraulic Cement Mortars.
2. C191-92 Test Method for Time of Setting Hydraulic Cement by Vicat Needle.
3. C531-95 Test Methods for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Coatings.
4. C579-96 Test Method for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Coatings.
5. C827-87 Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.

1.03 SUBMITTALS

A. Manufacturer's literature including specifications and printed installation instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Grouting Mortar:

1. Bonsal.
2. Burke.
3. Five-Star Products.
4. Master Builder.
5. Mobil.
6. Thoro.

2.02 NONSHRINK CEMENTITIOUS GROUT

A. Exhibit no visible bleeding 2 hours after placement in a fluid consistency of 20 to 30 second flow through CRD C79 Flow Cone.

B. Grout shall show no shrinkage and a maximum of 4.0 percent expansion at any time before initial set and tested according to ASTM C827.

C. Grout shall show no shrinkage and a maximum of 0.2 percent expansion in the hardened state when tested according to CRD C588.

D. Compressive Strength: Minimum of 5,000 psi at 7 days and minimum strengths as listed below according to ASTM C109 modified.

1. 24 Hours: 2,000 psi.
2. 7 Days: 5,000 psi.

E. Grout shall show initial set time of not less than 60 minutes when tested according to ASTM C191.

F. Grout shall contain no metallic substances, water reducing agents, accelerators super plasticizers, or other materials.

G. Technical service shall be provided by the manufacturer of grout upon request of contractor.

H. Water shall be clean and free from injurious amounts of oil, alkalies, and other deleterious materials according to AASHTO T26.

2.03 EPOXY GROUT

A. Grout shall be flowable and a 100 percent solids system.

B. Grout shall show no shrinkage and a maximum of 4 percent expansion when tested according to ASTM C531 (Modified).

C. Compressive strength shall be determined by ASTM C579 attaining the minimum strengths listed below:

1. 24 hours: 5,000 psi.
2. 2 days: 8,000 psi.
3. 7 days: 11,000 psi.

D. Peak exotherm temperature of a *2* inch diameter by 4 inch high cylinder of grout shall not exceed 95 degrees F. when tested at 75 degrees F. material and air temperatures.

E. Grout shall not exceed a coefficient of thermal expansion of 30×10^{-6} in/in/degrees F. when tested according to ASTM C531.

2.04 GROUT STORAGE

A. Grout components shall be delivered to the construction site in moisture proof bags. Bags shall be stored in a dry weatherproof area within a temperature range of 40 to 90 degrees F.

B. Remove damp or defective material from the site at expense to Owner.

C. Storage time of nonshrink cement grout mix shall be limited to 10 months.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Concrete surfaces shall be prepared for grouting by removing all oil, grease, laitance, and other foreign substances.

B. Roughen surfaces to receive grout by chipping or nail raking of plastic concrete to assure a good bond of grout to existing concrete. Clean thoroughly with water and soak surface for 24 hours before placing cement grout. Surfaces shall be kept completely dry for epoxy grout.

C. Metal surfaces of equipment bases to be epoxy grout shall be thoroughly cleaned to bright metal.

3.02 FORMS

A. Forms for fluid grout shall be built of materials with adequate strength to withstand the placement of grout.

B. Forms for nonshrink cement grout shall be tight against all surfaces and joints shall be sealed with tape. Form oil shall be used for easy form release.

C. Forms for grout shall be watertight with chamfer strips in place. Caulking shall be used on all joints. Forms for epoxy grout shall be lined with polyethylene or waxed for easy form release.

D. Forms shall be 4 to 6 inches higher than the base plate on one side of forms when using hydraulic head pressure for placing.

E. Provide air relief holes at least 1/4" in diameter at every recessed base plate corner.

3.03 MIXING

A. Grout shall be mixed according to manufacturer's recommendations.

B. Nonshrink cement grout shall be added to water to obtain the desired consistency.

C. Epoxy Grout:

1. Components shall be conditioned to a temperature of between 70 and 85 degrees F. before use.
2. Epoxy hardener shall first be added to resin and thoroughly mixed for 2 to 3 minutes without whipping air into the mix.
3. Low speed mixer or hand stirring shall be used.
4. Mixed resin and hardener shall then be put into clean

mortar mixer and the entire bag of aggregate added.
5. Epoxy grout component ratios shall not be altered and no solvents or thinners added to the mix.

D. Mix nonshrink cement grout between 3 and 5 minutes for uniform consistency.

E. Epoxy grout shall be mixed until aggregate is uniformly wetted.

F. Mortar mixer shall be used instead of a concrete mixer for mechanical mixing of grout.

G. Remixing of grout by adding more water or remixing of stiffening grout is not allowed.

3.04 REINFORCEMENT

A. Reinforcement and joints for epoxy grout shall be provided when and by methods recommended by the manufacturer of the grout.

3.05 PLACEMENT

A. Grout shall be rapidly placed continuously from one side of baseplate only in one direction.

B. Grout under base plates to fill all spaces and completely fill anchor bolt sleeves.

C. Hydraulic head grouting pressure shall be maintained by keeping the level of grout in the head box above the bottom of the base plate. Head box shall be filled to the maximum level and grout worked down to top of base plate.

D. Shims used for temporary leveling of equipment and base plates shall be removed after the grout has obtained sufficient strength to carry the baseplate loading. Voids left by the removal of shims shall be filled with a second placement of grout.

3.06 FINISHING

A. Alter cement grout has reached final set, it shall be trimmed back to the level as shown on drawings.

B. Top surfaces of epoxy grout may be finished by troweling with a steel trowel moistened with oil before set.

3.07 CURING

A. Nonshrink Cementitious Grout:

1. Grout shall be cured according to manufacturer’s specifications and recommendations.
2. Forms shall remain in place for 24 hours.
3. Temperature of base plates and supporting concrete shall be maintained between 40 and 90 degrees F.

during grouting and for a minimum of 12 hours after placing.

B. Epoxy Grout:

1. Grout shall be cured according to manufacturer's specifications and recommendations.
2. Forms shall remain in place for a minimum of 24 hours after placing grout.
3. Temperature of base plate and supporting concrete shall be maintained between 40 and 80 degrees F. during grouting and for a minimum of 24 hours after placing.

3.08 TESTING

A. Contractor shall be responsible for preparing, storing, curing, and transporting the test samples to the laboratory for testing.

B. Grout shall develop required compressive strength according to ASTM C109 (modified) for packaged grouts and ASTM C579 for epoxy grout.

C. Three test cubes shall be made for each day of grouting. Tests shall be made of one cube at the following intervals:

1. Cement Grout: 24 hours, 7 days, and 28 days.
2. Epoxy Grout: 24 hours, 2 days, and 7 days.

D. Test reports shall be submitted to the A/E immediately after the result of each age test is available.

END OF SECTION

SECTION 04220
CONCRETE UNIT MASONRY

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 03300 - Cast-In-Place Concrete.
2. 08100 - Steel Doors and Frames.
3. 09200 - Metal Studs, Lath, Suspension Ceiling, Plaster, and Stucco.
4. Furnishing of other items to be built-in - Under respective sections.

1.02 REFERENCES

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

1. A82 Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. C55 Specification for Concrete Brick.
3. C90 Specification for Loadbearing Concrete Masonry Units.
4. C91 Specification for Masonry Cement.
5. C129 Specification for Non-Loadbearing Concrete Masonry Units.
6. C144 Specification for Aggregate for Masonry Mortar.
7. C150 Specification for Portland Cement.
8. C270 Specification for Mortar for Unit Masonry.
9. C331 Specification for Lightweight Aggregates for Concrete Masonry Units.

1.03 SUBMITTALS

A. Submit properly identified product data on masonry units and each type of metal anchor and accessory, before starting work.

1.04 QUALITY ASSURANCE

A. Certifications: Provide certification from concrete unit masonry manufacturer stating the materials supplied meet specifications.

B. U-block is not allowed.

1.05 PROJECT CONDITIONS

A. Environmental Conditions

1. Temperature: 40 degrees F. minimum and rising.
2. Weather: No application during precipitation.

PART 2 PRODUCTS

2.01 LOAD BEARING CONCRETE UNIT MASONRY

A. Weight: Normal.

B. Size: 8 inches x 16 inches x thickness indicated, 2 cell stretcher type with vertical mortar keys at each end.

C. Texture: Medium.

D. Grade: ASTM C90, Type I or II.

E. Unit Linear Shrinkage: Type I, 0.03 percent, ASTM C90.

F. Shapes: Appropriate to suit conditions.

2.02 NON-LOAD BEARING CONCRETE UNIT MASONRY

A. Weight: Normal.

B. Size: 8 inches x 16 inches x thickness indicated, 2 cell flush end type.

C. Texture: Medium.

D. Grade: ASTM C129, Type I or Type II.

E. Unit Linear Shrinkage: Type I, 0.03 percent, ASTM C90.

F. Shapes: Appropriate to suit conditions including partition top closures.

2.03 CONCRETE BRICK

A. Grade: ASTM C55, Grade N-I or N-II.

B. Size: Appropriate to suit conditions.

2.04 MORTAR

A. Portland Cement: ASTM C150, Type I, domestic.

B. Masonry Cement: ASTM C91, domestic.

C. Sand: ASTM C144.

D. Water: Potable.

E. Mortar Mix: ASTM C270, Type S, 1800 psi for above grade use, and Type M-2500 psi for below grade use. Mix accurately in following proportions by volume:

Type S	Type M
1 part masonry cement	1 part masonry cement
1/2 part Portland cement	1 part Portland cement
4 parts sand	4-1/2 parts sand

2.05 REINFORCEMENT, ANCHORS, TIES, AND ACCESSORIES

A. Horizontal Joint Reinforcement: Continuous 9 gage truss design, deformed, galvanized steel, including preformed welded corners according to ASTM A82. Widths to suit thickness of block to within 1 inch of each face.

1. Acceptable manufacturers:

a. Blok-Trus by A.A. Wire Products.
b. Standard Truss by Dur-O-Wal.
c. Trus-Mesh by Hohmann and Barnard, Inc.

B. Buck Anchors: 16 gage corrugated galvanized steel, 1-1/4" wide, 8 inch long leg, with 2 inch upturned end, punched for fastenings, complete with No.10 galvanized machine screws and metal expansion anchors for securement to concrete.

C. Dovetail Slots: 22 gage galvanized with filler, 1 inch wide x 1 inch deep.

D. Dovetail Anchors: 16 gage corrugated galvanized steel, 1 inch wide x 5-1/2" long, sized to fit dovetail slots.

PART 3 EXECUTION

3.01 LOCATION OF MASONRY SYSTEMS

A. Load Bearing Units: For partitions and walls 8 inches or greater.

B. Load Bearing Lightweight Units: For partitions and walls as indicated.

C. Non-Load Bearing Units: For partitions 4 or 6 inches.

D. Concrete Brick: Filling-in to suit conditions.

E. Corners and Special Shapes: As required to suit conditions, including corners, returns, offsets, and to maintain bond.

3.02 LOCATION OF REINFORCEMENT, ANCHORS, TIES, AND ACCESSORIES

A. Horizontal Joint Reinforcement:

1. Provide at every second course and at first joint above and below openings, for all masonry, interior or exterior.
2. Use Standard No.8 ladder type and truss type for all other masonry construction.

B. Buck Anchors: Every second block course for masonry walls and partitions abutting precast concrete and wherever dovetail anchors cannot be incorporated. Secure upturned ends to concrete with specified screws and anchors.

C. Dovetail Anchors: Every second block course for masonry walls and partitions abutting cast-in-place concrete with continuous dovetail anchor slots.

3.03 ERECTION

A. Laying Units:

1. Lay masonry plumb, true to line, with level and accurately spaced courses.
2. Keep bond plumb throughout.
3. Lay corners and reveals plumb and true.
4. Avoid overplumbing of corners and jambs to fit stretcher units after they are set in position.
5. Where adjustment must be made after mortar has started to harden, remove mortar and replace with fresh mortar.
6. Use concrete brick to course out walls concealed in the finished work.
7. Cut masonry units dry.
8. Use masonry saws for cuts exposed in the finished work.

B. Tolerances:

1. Plumb masonry work within tolerance of $\pm$ 1/8" in 5 feet.
2. Level courses within tolerance of 1/4" in length of any run.

C. Bond:

1. Provide common bond, with vertical joints centered over masonry unit below, except where other bonds are indicated. (Provide stack bond with vertical joints centered over joints below).

2. Bond masonry at corners and intersections.

D. Joint Treatment:

1. Block Exposed to View: (Tooled concave joints) (float finished joints) mortar thoroughly compacted and pressed against edges of units and float finish joints.
2. Concealed Block: Joints struck flush.
3. Joint Thickness: 3/8".

E. Jointing Methods:

1. Where concrete block cores are indicated to be filled with concrete, lay in full mortar beds and full mortar end joints.
2. Lay all other concrete block with full beds of mortar on vertical and horizontal face shells.
3. Furrowing of mortar not allowed.
4. Shove vertical joints tight.
5. Finish tooled joints to uniformly straight and true lines and surfaces, smooth and free of tool marks.
6. Uniformly rake joints between masonry and door frames to 3/8" depth to receive caulking or sealant.
7. Rake joints around flush electrical outlets in wet locations to receive caulking or sealant.

F. Mortar Filled Units:

1. First cell of blocks abutting door jambs and window frames.
2. Cells of blocks at free ends of partitions and walls.
3. Where necessary for embedment of anchors, and where otherwise shown.
4. Voids around ducts, pipes, and other items passing through masonry work.
5. Hollow metal door frames and elevator hoistway door frames in masonry walls and partitions: Grout solid with mortar as masonry is laid. Include tops of door frames.

G. Load Bearing Masonry Walls:

1. Erect masonry before reinforced concrete building frame.
2. Close masonry top course cores under poured concrete beams with paper stuffing or metal caps.
3. Do not use flush end type units against columns or poured concrete walls.

H. Non-Load Bearing Masonry Wall and Partition Anchorage:

1. Erect masonry after steel and concrete frames are in

place, and after concrete floors and roof decks are in place.
2. After forms are stripped, remove slot fillers.
3. At edges of non-bearing interior masonry walls and partitions abutting concrete columns and poured concrete walls, provide corrugated dovetail type anchors.
4. Grout dovetail slots and space between end of masonry units and concrete solid.
5. Point up all joints solid and flush on both sides of partitions.

I. Partition Heights:

1. Top of full height partitions and walls to be stabilized laterally as shown on plans.
2. Point up all joints solid and flush on both sides of walls and partitions.

J. Concrete Fill for Masonry Cores:

1. Coordinate masonry work to allow placing of grout as indicated and as specified in Concrete section.

K. Pipe Chase Walls and Partitions: Erect after pipes are in place, tested, and accepted.

L. Slots, Chases, Recesses and Openings: Provide as required for work of other trades.

M. Setting of Items Furnished Under Other Sections: Set anchors, bolts, sleeves, access panels, door frames, and other items occurring in masonry as the work proceeds.

N. Securing Hollow Metal Door Frames: Set in hollow metal frames on floor, floor clips secured and frames braced in proper position. Grout anchors into masonry joints as walls are erected.

O. Lintels: Set reinforced precast concrete or coordinate installation of cast-in-place concrete lintels as indicated. Precast concrete lintels to be set in full mortar beds with 8 inches minimum bearing each end.

P. Installation of Horizontal Wall Reinforcement:

1. In masonry areas indicated to have concrete filled cores, provide reinforcement in every second block course joint.
2. At other areas, provide reinforcing in every second block course joint and at first joint above and below openings for exterior and interior masonry.

3. Cut corners and intersections as recommended by manufacturer.
4. Extend reinforcement 6 inches into concrete tie columns and concrete encasement of steel columns poured after block is in place.
5. Unless walls have cast-in-place concrete corner tie columns, make wall and partition joint reinforcing continuous around corners and at intersections according to manufacturer's published directions.
6. Lap splices in joint reinforcement no less than 6 inches. Reinforcement shall not be continuous through expansion joints.

Q. Covers: At work stoppage, provide waterproof covers secured over exposed wall tops for weather protection.

R. Pointing: Point holes in masonry. Cut out and point up defective joints.

END OF SECTION

SECTION 05120
STRUCTURAL STEEL

PART 1- GENERAL

1.01 RELATED DOCUMENTS

All work of this Division shall be governed by all provisions of the General, Supplementary and Special Conditions and applicable requirements of Division O.

1.02 SCOPE

A. Work included: Furnish all labor, materials, equipment, incidentals, transportation, erection and supervision necessary to complete all structural and miscellaneous steel and related work called for by the plans and/or specifications, or reasonably inferable from either or both.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

A. American Institute of Steel Construction (AISC).
B. American Welding Society (AWS)
C. American Society for Testing and Materials (ASTM).
D. Florida Building Code, latest edition.

1.04 QUALIFICATIONS

A. Structural steel fabricator to be member AISC.

B. Welding procedures, welders, welding operations and tackers shall be qualified in accordance with the "Structural Welding Code," AWS D1.1 latest edition.

1.05 SUBMITTALS

A. Before starting fabrication submit shop drawings indicating all shop and erection details including cuts, connections, holes, threaded fasteners, and welds. Submit description of erection procedures, including sequence or erection, temporary bracing and welding procedures, contractor to check and approve before submitting to engineer for review.

1. Structural steel and miscellaneous steel
2. High-strength bolts
3. Primer paint
4. Shrinkage-resistant grout

1.06 PRODUCT HANDLING

Storage of materials: structural materials, either plain or fabricated, shall be stored above the ground upon platforms, skids, or other supports. Material shall be kept free from dirt, grease and other foreign matter and shall be protected from corrosion and the weather.

PART 2- PRODUCTS

2.01 MATERIALS (as applicable)

A. Steel shapes, bars and plates: Domestic manufacture conforming to ASTM A.36.
B. Structural tubing: Domestic manufacturer conforming to ASTM A-500 grade B (fy=46ksi).
C. Standard bolts and nuts: ASTM A307.

D. High-strength threaded fasteners: ASTM A325 with A325 nuts and washers.
E. Welding electrodes: E-70 series.
F. Grout: Non-metallic, non-staining, shrinkage-resistant, pre-mixed, factory-packed, 6,000 psi minimum. Submit suggested grout for approval.
G. Shop-paint: Grey or white, rust inhibitive primer Sherman Williams KemKromik, Southern Coating Heavy Duty R.I.P., Pratt and Lambert Effecto Rust Inhibitive Primer or approved equal.
H. Steel pipe domestic manufacture: Conform ASTM A-53 grade B welded and seamless (fy-35000 psi).
I. Teflon slide bearings: Fluorogold slide bearings by the Fluorocarbon Company.

PART 3 - EXECUTION

3.01 FABRICATION

A. Conform to above referenced quality standards for fabrication. Fabrication by members of AISC only.

B. Fabricate for delivery sequence which will expedite erection and minimize field handling.

C. Use only certified welders. Welders to carry evidence of qualification within past 12 months under aws procedures for type of work required.

D. Apply one shop coat paint to surface not to be encased in concrete.
1.Cleaning by hand or power tool of all rust, scale, weld slag, dirt and other foreign matter. Oil and grease removed with solvents.
2.Primer: 1 coat to produce a dry film thickness of 2.5 mils.

3. Repaint all areas affected by welding and abrasions after erecting.

E. All members shall be one piece unless shown on plans or reviewed shop drawings. No splices permitted except where shown on plans.

F. Provide all items required to be cast in, or built in, to proper trades in sufficient time to avoid delay. Furnish necessary supervision, templates, spacers, etc., as required to assure proper installation.

G. Galvanize members indicated. Hot dipped galvanized after fabrication in accordance with ANSI-ASTM A123, and ANSI-ASTM A385.

1. Repair galvanized surfaces with specified hot or cold applied compound:
   (a) Hot applied: Federal Specification O-G-93.
   (b) Cold applied: "Galvaneal", "Galvicon, "Z.R.C.", or approved equal.

H. Tolerances: meet such closer tolerances as may be required by special details or methods of erection in addition to tolerance requirements by standards specified above.

I. Shearing, punching, and cutting shall leave clean, true lines and surfaces. Holes 1/16" larger than nominal bolt diameter unless otherwise detailed.

J. Members encased in concrete cleaned as per D above.

K. Shop connections welded unless otherwise indicated. Connection to develop full moment shear capacity of member.

3.02 ERECTION

A. Conform to above referenced standards for erection.

B. All field welding to be by certified welders. Furnish A/E with name and certificate number of all welders.

C. Erect all items plumb, properly spaced true to line and dimension. Work not conforming to these requirements shall be removed and replaced correctly.

D. Provide adequate braces/stays to hold structural steel in place until permanently anchored.

E. Field paint all welds immediately after inspection by owner selected testing laboratory.

F. Touch-up shop coats of paint which are damaged as soon as steel as erected.

G. Dissimilar materials: Where dissimilar metal surfaces come in contact, keep surfaces from direct contact by:
   1. Paint facing surfaces of dissimilar metals with coating of heavy-bodied bitumastic.
   2. Apply full coverage of non-conductive tape or gasket.

H. Permanent connections to be welded or bolted as detailed on drawings. Welded joints shall be full strength butt or fillet welds. Connections to develop full capacity of member.

I. Anchor bolts, inserts, and other miscellaneous items of structural steel required to be cast or built-in shall be furnished to the proper trades in sufficient time to avoid delay of their work. Furnish necessary supervision, templates, spacers, etc., as required to assure proper installation.

J. Field paint all metal surfaces to be placed against concrete with second coat of primer.

K. Do not flame cut holes or enlarge holes by burning.

L. All bolted connections to have heavy duty washer.

M. All anchor bolts cast in concrete shall have a head.

END OF SECTION

SECTION 05400
LIGHT GAGE METAL FRAMING

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 05500 - Metal Fabrications.
2. 08110 - Steel doors and Frames.
3. 09200 - Metal Studs, Suspension Ceilings, Plaster, and Stucco.

1.02 REFERENCES

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

1. A653/A-96 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.03 SUBMITTALS

A. Submit properly identified manufacturer's literature and technical data including specifications and installation instructions before starting work.

B. Samples:

1. Metal framing.
2. Required accessories.

1.04 QUALITY ASSURANCE

A. Florida Building Code (FBC).

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Light Gage Metal Framing:

1. Alamba Metal Industries, Inc.
2. Dietrich Industries, Inc.
3. Dale/Incor.
4. Dole Industries, Inc.
5. Marino Industries, Corp.
6. Unimast Incorporated (USG).

2.02 MATERIALS

A. Steel Studs: NOTE! do not exceed allowable heights for studs.

1. 3-5/8", 22 gage, (minimum), galvanized.
2. 4", 20 gage (minimum), galvanized.
3. 6", 20 gage (minimum), galvanized.
4. 8", 18 gage (minimum), galvanized.

B. Steel Runner Track:

1. 22 gage for 3-5/8" studs.
2. 20 gage for 4" studs.
3. 18 gage for 6" and 8" studs.

C. Coating: Steel studs and runner track shall comply with ASTM A653 and have a G-60 galvanized coating.

D. Steel Studs, Runner Track, and Accessories:

1. 12, 14, and 16 Gage: Form of steel meeting the requirements of ASTM A653, Grade D, with a minimum yield of 50,000 psi.
2. 18 and 20 Gage: Form of steel meeting the requirements of ASTM A653, Grade A, with a minimum yield of 33,000 psi.

E. Metal Screws: According to steel stud manufacturer's recommendations.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Use of powder activated shots is prohibited.

B. Stud Spacing: Maximum 16 inches on center, unless otherwise indicated on the drawings.

C. Runner Track: Securely anchor to floor and overhead structure.

D. Seat studs squarely in runner track with stud web and flanges abutting track web, plumbed and aligned, and securely attached to flanges or web of both upper and lower runner tracks.

END OF SECTION

SECTION 05500
MISCELLANEOUS METALS

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 03300 - Cast-In-Place Concrete.
2. 03420 - Precast, Prestress Concrete Sections.
3. 04420 - Concrete Unit Masonry.
4. 09900 - Painting.
5. 10400 - Identifying Devices.

1.02 REFERENCES

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

1.	A36/A-96	Specification for Carbon Structural Steel.
2.	A53-96	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3.	A123-89a	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4.	A307-94	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
5.	A325-96	Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
6.	A385-80(96)	Practice for Providing High Quality Zinc Coatings (Hot-Dip)
7.	A501-93	Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
8.	B209-96	Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
9.	B221M-96	Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

B. Occupational Safety and Health Administration (OSHA).

1.03 SUBMITTALS

A. Shop and erection drawings for review before starting work.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

A. Security Grilles:

1. Able to withstand a 200-pound force applied to any point from any direction and reject a 1/2" diameter

sphere.
2. 16 gage, powder coat finish, G-90 galvanized steel, with 50 percent minimum open area.
3. Manufacturers:

a. Crime Shield Barriers by Exeter, Wyoming, PA.
b. Securiperf Security Screens by Security Sales Company, Miami, FL.

B. Security Grilles - Missile Impact Resistant:

1. Certified missile impact resistant.
2. 14 gage, powder coat finish, A40 galvannealed steel, with 50 percent minimum open area.
3. Manufacturers:

a. Storm Shield Barriers by Exeter, Wyoming, PA.
b. SureGuard Hurricane Barriers by Phoenix, Lawrenceville, GA.

C. Security Screens - Missile Impact Resistant:

1. Certified missile impact resistant.
2. Type 304 stainless steel, No. 12 mesh, 0.028" diameter, with aluminum alloy frame.
3. Manufacturers:

a. Protect Series by Protech Screens, Pearland, TX.
b. Select Security Screen Co., Wellington, FL.

D. Corner Guards:

1. No. 991, 48 inches long, 18 gage stainless steel by Bradley or accepted equivalent.

2.02 MATERIALS

A. Aluminum Alloy Extrusions: ASTM B221M, 6063-T5 or 6063-T52.

B. Aluminum Alloy Sheet and Plate: ASTM B209, 5050-H32 or temper best suited.

C. Structural Steel Shapes, Plates, Flat Bars, and Rods: ASTM A36M, Grade 36.

D. Steel Pipe: ASTM A53.

E. Welding Electrodes for Steel: AWS A5.1-69, Class E60 and E70 for manual welds.

F. Bolts, smaller than 1/2" diameter: ASTM A307.

G. Bolts, 1/2" diameter and larger: ASTM A325.

H. Concrete Expansion Bolts: Galvanized steel self-drilling type as manufactured by:

1. Philips Drill Co., Michigan City, IN.
2. Rawl Plug Co., Inc., New Rochelle, NY.
3. Star Expansion Industries Corp., Mountainville, NY.

I. Galvanized Metal Repair Compound:

1. Hot Applied: Federal Specifications O-G-93.
2. Cold Applied: Galvaneal, Galvicon, or Z.R.C.

J. Shop Prime Coat: Zinc chromate primer.

K. Stainless Steel Shapes and Plates: Type 304 with stainless fasteners.

L. Isolation Coating: Zinc chromate paint or acceptable non-conductive tape.

M. Fastenings, Anchors and Bolts:

1. Provide required cast-in-place or built-in anchor bolts for miscellaneous metal items of galvanized steel, complete with matching washers and nuts.
2. Where not practical to prelocate bolts, provide self-drilling or toggle type concrete anchors.

N. Hot Dip Galvanizing: Where specified or indicated, hot dip galvanize ferrous items according to ASTM A385 and ASTM A123, minimum 2.0 ounces per square foot.

2.03 FABRICATION

A. Repair to Galvanized Surfaces: Repair damaged galvanized surfaces with hot or cold applied compound.

B. Shop Painting of Ferrous Metal Items: Provide 1 coat of shop primer unless indicated or specified to be hot dip galvanized.

C. Contact With Dissimilar Materials. Provide isolation coating where dissimilar metals are in contact or where aluminum contacts masonry, concrete, plaster, or mortar.

D. Fabricate ferrous items according to AISC Specifications and approved shop drawings.

1. Grind and buff smooth rough edges, sharp corners, and welded joint of exposed steel and miscellaneous ferrous items.

E. Concrete filled metal filled pan stairs may have treads precast and delivered to job site integral with pan at option of Contractor. Landings shall be engineered to have

a live load capacity of 100 psf.

PART 3 EXECUTION

3.01 INSTALLATION

A. Coordination: Coordinate miscellaneous metal items, including field dimensions where required with masonry openings and various other trades as applicable so items fit and function as intended.

B. Erect and install miscellaneous metal items at proper locations and elevations, plumb, level, in alignment and not distorted by fastenings, according to approved shop and erection drawings, manufacturer's directions, and as specified. Provide adequate temporary supports to allow field connections of members without misalignment.

C. Supplementary Parts: Furnish and install necessary to complete each item.

D. Conform to best quality and accepted standard practice.

E. Weld on back or bottom side so welds are not visible.

F. Provide acceptable fasteners, inserts, and expansion anchors for supports placed in shear position where possible.

G. **Powder activated fasteners are not allowed.**

3.02 FIELD QUALITY ASSURANCE

A. Touch up abrasions to shop prime surfaces and welds with specified primer after erection and installation operations are complete.

END OF SECTION

SECTION 05520
METAL HANDRAILS AND RAILINGS

PART 1 GENERAL

1.01 SUBMITTALS

A. Properly identified manufacturer's literature, including shop and erection drawings before starting work.

B. Railing Assemblies or Railing Components: Submit shop drawings prepared under direction of an engineer licensed in the State of Florida showing compliance to the Florida Building Code (FBC).

PART 2 PRODUCTS

2.01 HANDRAIL AND RAILING COMPONENTS

A. Wall Brackets: Malleable iron or aluminum as manufactured by Julius Blum & Company, Inc., Carlstadt, NJ, or accepted equivalent.

1. Material:

a. Type B: Malleable iron, Model #382 for use with steel pipe handrail section.

B. Pipe Handrail Sections:

1. Stair Handrails:

a. Size:

1) Handrail (Typical handrail at 34 to 38 inches): 1-1/4" to 1-1/2" outside diameter.

b. Steel: Schedule 80, of design and dimensions indicated with smooth bends and welded joints ground smooth and flush.

2. Vertical Members (Posts):

a. Steel: 1-1/4" nominal pipe size, Schedule 40, of design and dimensions indicated with welded joints ground smooth and flush.

3. Design and construct to withstand 200-pound concentrated load applied at any point, from any direction.

a. Wall brackets and other points of support are shown to indicate general appearance. Submit shop

drawings to indicate accurate location of necessary brackets and other points of support to show compliance with load requirements.

4. Provide complete with necessary sleeves, brackets, tamper-resistant bolts, and tamper-resistant fastening devices as required for a complete installation.

2.02 HANDRAIL AND RAILING ASSEMBLIES

A. Manufacturers:

1. Dixie Metal Products, Inc., Ft. Lauderdale, FL. or approved equal.

B. Railings shall be able to withstand a 200-pound concentrated load applied to any point from any direction and a 50-pound per lineal foot load applied from any direction.

C. Fabrication:

1. Intermediate Posts:

a. Size: Square shaped, composed of two extrusions joined to form a square shape of not less than 2" x 2", designed to be mechanically fastened to the top rail channel with approved fasteners using not less than 2 extruded fastener seams.
b. Material: Alloy 6061-T6.
c. Minimum Wall Thickness: 0.062".
d. Maximum Spacing: 48 inches on center.

2. Corner Posts: Same as intermediate posts except mechanically attached to top rail using a specially designed aluminum casting.

3. Pickets:

a. Spacing: Equal spacing placed to reject a 4-inch diameter ball.

2.03 FINISHING

A. Malleable Iron Handrail and Railing Components: Finish with paint materials selected from the M-DCPS and Florida Department of Education Paint and Related Materials (M-DCPS/DOE Paints), latest edition referenced in Section 09900.

2.04 MISCELLANEOUS

A. Hot Dip Galvanizing: Hot dip galvanize ferrous items according to ASTM A385 and ASTM A123, minimum 2.0 ounces per square foot.

B. Galvanized Metal Repair Compound:

1. Hot Applied: Federal Specifications O-G-93.
2. Cold Applied: Galvaneal, Galvicon, or Z.R.C.

C. Isolation Coating: Zinc chromate paint, heavy-bodied bituminous paint, water-white methacrylate lacquer, or acceptable non-conductive tape.

D. Expanding Grout: Premix Anchoring Cement by Premix-Marbletite, Miami, FL, or accepted equivalent.

2.05 FASTENINGS, ANCHORS, AND BOLTS

A. Provide required cast-in-place or self-drilling anchor bolts as indicated or as recommended by the handrail and railing assembly manufacturer, complete with matching washers and nuts.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Erection:

1. Erect metal handrail and railing components and metal handrail and railing assemblies at proper locations and elevations as indicated, plumb, level, in alignment, and not distorted by fastenings.
2. Erect according to accepted shop drawings and manufacturer's directions or as specified in this section.

B. Supplementary Parts: Provide as necessary to complete each item.

C. Contact With Dissimilar Materials:

1. Apply isolation coatings where dissimilar metals are in contact or aluminum components contact dissimilar metals or concrete or lime mortar surfaces.
2. Select coatings appropriate to the condition from materials specified in this section.

D. Expanding Grout: Apply according to manufacturer's printed instructions to clean and dust free surfaces to ensure proper mechanical bond.

E. Malleable Iron Handrail and Railing Components: Paint, color as selected by A/E.

END OF SECTION

SECTION 06100
CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Carpentry work including grounds, nailers, blocking, miscellaneous framing, plywood backing panels, plywood sheathing, preservative treatment, and necessary accessories indicated or specified in this section.

B. Related Sections:

1. 06300 - Wood Treatment.
2. 07210 - Building Insulation.

1.02 REFERENCES

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

1. A153-95 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
2. D226-95 Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

1.03 QUALITY ASSURANCE

A. Factory mark each piece of lumber and plywood to identify type, grade, agency providing inspection service, producing mill, and other qualities as specified.

1.04 DELIVERY AND STORAGE

A. Keep materials dry during delivery and storage.

1. Protect against weather and contact with damp or wet surfaces.
2. Stack lumber and plywood and provide air circulation within stacks.

1.05 SITE CONDITIONS

A. **POWDER DRIVEN FASTENERS ARE NOT ALLOWED!**

PART 2 PRODUCTS

2.01 MATERIALS

A. Interior Plywood (Concealed): Where plywood will be concealed by other work, provide exterior type plywood C-D plugged grade, unless otherwise specified.

B. Interior Plywood (Painted Finish): Same as concealed, except with hardwood plywood or medium density overlay,

Grade MDO EXT-101; smooth surface with no grooves.

C. Interior Plywood (Transparent Finish):

1. Exterior type plywood, Grade A veneers on exposed surfaces, Grade B veneers on semi-exposed surfaces, and Grade D or better veneers on concealed surfaces.

   a. Birch - (Natural) (Select) (Rotary Cut) (Red) (White).
   b. Oak - (Rotary Cut) (Plain Sliced) (Red) (White).

D. Lumber:

1. Standard:

   a. Comply with American Softwood Lumber Standards PS-20 by U.S. Department of Commerce.
   b. Nominal sizes are shown or specified, except as shown by actual dimensions.
   c. Provide actual sizes complying with minimum size requirements for PS-20 for moisture content specified for each use.

2. Moisture Content: Seasoned lumber with 19 percent maximum moisture content at time of dressing and complying with dry size requirements of PS-20, unless otherwise specified.

E. Framing Lumber:

1. Lumber complying with grading rules according to requirements of National Grading Rule for Dimension Lumber of American Lumber Standards Committee established under PS-20.
2. Light Framing (2 inches to 2 inches thick and 2 inches to 4 inches wide): "Stud" grade lumber for stud framing and "standard" grade for other light framing.

F. Boards:

1. Boards complying with dry size requirements of PS-20 where lumber less than 2 inches in nominal thickness and 2 inches or more in nominal width is shown or specified.
2. Moisture Content - Exposed Work: Moisture content of 19 percent maximum, SDRY Southern Pine No.2 per SPIB for paint finish.
3. Moisture Content - Concealed Work: Moisture content of 19 percent maximum, Southern Pine (SPIB) No.2 boards.

G. Miscellaneous Materials:

1. Fasteners and Anchorages:

a. Provide size, type, material, and finish and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers, and anchoring devices.
b. Provide metal hangers and framing anchors of size and type recommended by the manufacturer for each use including recommended nails.
c. Where rough carpentry Work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with hot-dip zinc, ASTM A153.

2. Building Paper: ASTM D226, Type I, asphalt saturated felt, non-perforated, 15 lb. type.

H. Treated Wood: Refer to Section 06300, "Wood Treatment".

PART 3 EXECUTION

3.01 PREPARATION

A. Protect installed carpentry work from damage by work of other trades until accepted by the Board.

1. Review proposed protection methods with A/E for acceptance.

B. Examine substrates, adjoining construction, and conditions where work is to be installed.

C. Do not proceed with work where unsatisfactory conditions exist.

D. Where rough carpentry is fitted to other work, obtain measurements of other work and verify dimensions shown on shop drawing details.

E. Apply heavy brush coat of same chemical treatment material to surfaces exposed by sawing, cutting, or drilling.

3.02 INSTALLATION

A. Materials: Use only sound, thoroughly seasoned materials of longest practical lengths and sizes to minimize jointing, free from warp that cannot be easily corrected by anchoring and attachment.

B. Installation:

1. Closely fit and accurately set members to required lines and levels, and rigidly secure in place.
2. Attachment and Anchorage:

a. Nail size and nail spacing shall be sufficient to develop adequate strength for connection without splitting the member.

b. Countersink nailheads on exposed carpentry work and fill holes.
c. Anchors and Attachments: Hot dip galvanized finish, except where otherwise shown.
d. Use common wire nails, except as otherwise shown or specified.
e. Use finishing nails for finish work.
f. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish material(s).
g. Make tight connections between members.
h. Install fasteners without splitting wood, pre-drill as necessary.

3. Wood Grounds, Nailers, Blocking, and Sleepers:
a. Provide as shown and as required for screeding or attachment of other work.
b. Form to shapes as shown and cut as required for true line and level of work to be attached.
c. Set true to line and level, plumb, with intersections true to required angle.
d. Coordinate location with other work involved.
e. Provide wood blocking to strengthen and supplement horizontal metal stud framing members between studs required for recessed or surface mounted items including, but not limited to, cabinets, finish hardware, magnetic door holding devices, chalkboards.
f. Cut blocking to fit between framing members and rigidly attach thereto.
g. Secure blocking and nailers to building structure as indicated and as specified.
h. Provide wood grounds for attachment of finish trim and other work to plaster.
i. Grounds shall be dressed, preservative treated. Use key-beveled lumber not less than 2 inch nominal width and of thickness required to bring face of ground to exact thickness of finish material involved.
j. Remove temporary grounds when not longer required.

4. Roof Sheathing: Nail or staple to framing and use spacer clips at edges for expansion/contraction control.

END OF SECTION

SECTION 06300
WOOD TREATMENT

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 06100 - Carpentry.
2. 06400 - Architectural Woodwork.

1.02 SUBMITTALS

A. Wood Treatment Data:

1. Submit chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material.
2. Preservative Treatment: For each type specified, including certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained and conformance with applicable standards.
3. Water-Borne Treatment: Include statement that moisture content of treated materials was reduced to levels indicated before shipment to project site.
4. Fire-Retardant Treatment: Include certification by treating plant that treatment material complies with specified standard and other requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Preservative Treatment:

1. Where lumber or plywood is specified to be treated, comply with applicable requirements of AWPA Standards C2, Lumber, and C9, Plywood and of AWPB standards listed.
2. Mark each treated item with AWPB Quality Mark Requirements.
3. Pressure treat aboveground items with water-borne preservatives to comply with AWPB LP2.
4. After treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent.
5. Treat indicated items and the following:

a. Wood cants, nailers, curbs, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
b. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in

contact with masonry or concrete.
c. Wood Framing Members: Maximum 18 inches above grade.

6. Pressure treat the following with water-borne preservatives for ground contact use complying with AWPB LP22:

a. Wood members in contact with ground.
b. Wood members in contact with fresh water.

7. Pressure treat softwood lumber, timber, and plywood for wood foundation systems with water-borne preservatives for ground contact to comply with AWPB FDN.
8. Complete fabrication of treated items before treatment, where possible.
9. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

B. Fire-Retardant Treatment:

1. Where fire-retardant treated wood (FRTW) is specified, pressure impregnate lumber and plywood with fire-retardant chemicals shall comply with Military Specification MIL-L-19140E for Lumber and Plywood, Fire-Retardant Treated. Comply with AWPA C20 and C27, respectively, for treatment type indicated.
2. Identify FRTW lumber with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection or other testing and inspecting agency acceptable to authorities having jurisdiction.
3. Interior: Use where FRTW is indicated for interior applications.
4. Exterior: Use where FRTW is indicated for exterior, exposed applications.
5. Inspect each piece of treated lumber or plywood after drying, discard damaged or defective pieces.

PART 3 EXECUTION

3.01 APPLICATION

A. Place treated lumber and plywood as detailed.

END OF SECTION

SECTION 06400
ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.01 SUMMARY

A. Provide necessary services, tools, equipment, material, and labor required to furnish and install millwork and cabinet work. Install cabinet hardware specified. Do all finishing work in the shop.

B. Related Sections:

1. 08710 - Finish Hardware.

1.02 REFERENCES

A. ANSI/AHA A135.4 - Basic Hardwood.

B. American Society for Testing and Materials (ASTM):

1. D1037-96a Test Methods for Evaluating the Properties of Wood-Base Fiber and Particle Panel Materials.

1.03 SUBMITTALS

A. Manufacturer's Data: Submit 8 copies of manufacturer's data for each item furnished under this Section.

B. Shop Drawings:

1. Submit 8 copies of shop drawings showing plans, elevations, and large scale details for each fabricated item. Identify locations of each item. Show plastic laminate colors, patterns, grain direction and inserts.

C. Samples:

1. Submit samples of each wood species to receive transparent finishes.
2. Submit a finished sample of each finish.
3. Submit samples of milled paneling and trim items.

1.04 QUALITY ASSURANCE

A. Built-ins and casework shall be constructed and installed to carry intended loads, not have sharp corners, splinters, or any construction features or projections that would be hazardous to occupants and users. Casework and cabinets shall be constructed in conformance with applicable state and federal accessibility requirements.

B. Cabinet work shall follow minimum requirements described in the latest edition of the Architectural Woodwork

Institute (AWI) following "Custom Grade" standards.

C. Particle board is not allowed.

D. Casework shall be "Custom Grade" overlay design with plastic laminate finish.

E. Only manufacturers with financial stability and 5 years experience in casework manufacture and installations of similar scope will be considered.

1. The installer must be a company whose primary business is the manufacturing of plastic laminate casework.
2. The installer shall have adequate physical facilities and personnel for this size project with a qualified engineering department to provide layout and shop drawings for review before fabrication.

F. Evidence of qualifications shall include product catalog, descriptive literature, and specifications for the proposed product. Submit a sample cabinet, complete with drawer, door hardware, and corner sample of counter top with the product literature.

1.05 PRODUCT DELIVERY AND STORAGE

A. Deliver casework when the building is secure and weather tight.

B. The air circulation control system shall be operating and maintaining humidity and temperature conditions similar to the conditions to be maintained by the Board.

C. Interior plaster and plaster veneer work shall be complete and dry.

D. Painting and other finish work shall be complete in immediate and adjacent areas within the building where millwork/cabinet work/casework is stored.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Plastic Laminate:

1. Nevamar.
2. Formica.
3. Micarta.
4. Pionite.
5. Wilson Art.

2.02 MATERIALS

A. Case members, tops, bottoms, sides, dividers, shelves, door fronts, and drawer fronts shall be 3/4" thick 7 ply

closed grain hardwood plywood.

B. Case backs shall be 1/4" thick closed grain hardwood plywood.

C. Plywood shall have type II water-resistant glue.

D. Plywood: Provide manufacturer's association stamp except where exposed to view.

E. Plywood exposed to view unless otherwise specified shall be hardwood plywood with exterior glue.

F. Plastic Laminate: High pressure laminate conforming to NEMA specification LD3 latest edition. Laminate the plastic laminate sheets to the core stock under pressure with water resistant adhesive to achieve a Type II bond.

1. Material Thickness:

a. 0.050" - Exposed surfaces and edges of drawer fronts, door fronts, counter tops, backsplash, and all other remaining exposed exterior horizontal and vertical surfaces.
b. 0.027" - Exposed interior surfaces of door backs, cabinet sides, backs, and shelving and all other remaining exposed interior horizontal and vertical surfaces.
c. Concealed Surfaces: Not applicable.

2. Colors and Patterns:

a. Colors and patterns shall be as selected by the A/E.
b. Colors and patterns shall be judged equivalent, as determined by the A/E, to those preselected or above specified colors and patterns.
c. Any preselected colors and patterns shown on the drawings or in the specifications shall govern.
d. Where colors or patterns are not shown, plastic laminate equivalent in cost to standard solid colors shall be bid upon, assuming not more than 10 colors.
e. A/E's range of color selection shall not be limited to colors stocked locally, but by entire color line of specific manufacturer as determined by samples in A/E's office.

G. Wood trim, cabinet stiles and rails, and wood door frames:

1. Soft wood: Clear "C" or better when covered by laminated plastic.
2. Hardwood: AWI "Custom" Quality.
3. Where hinges or other attachment requiring screws for holding power in concealed wood are required, lumber

shall be one of the following:

a. Southern Yellow Pine.
b. Gum.
c. Birch.
d. Beech.

4. Where screw holding power is not required, concealed lumber shall be:

a. Southern Yellow Pine.
b. Gum.
c. Birch.
d. Beech.
e. Ponderosa.
f. Pine.
g. Poplar.

5. Lumber scheduled or detailed to be covered with plastic laminate shall be one of the following:

a. Southern Yellow Pine.
b. Gum.
c. Poplar.
d. Birch.
e. Beech.
f. Fir.
g. Virola/Tek Ply.

6. Lumber used for construction of bins or shelving supports located in kitchen pantries, shops, storage rooms, or janitor closets shall be, unless otherwise shown on the drawings, finished under Painting Section with "natural finish" and shall be of one of the following:

a. Southern Yellow Pine.
b. Gum.
c. Poplar.
d. Birch.
e. Beech.

7. Lumber scheduled or detailed to be transparent finished (varnished, stained, oil-rubbed, gloss, or satin polyurethane finish) shall be the following:

a. Birch.
b. White Oak.
c. Red Oak.

8. Lumber scheduled to be painted or enameled shall be one of the following. Do not use fir plywood in this application:

a. Southern Yellow Pine.
b. Gum.
c. Poplar.

d. Birch.
e. Beech.

H. Fiberboard: Class 1 Tempered, smooth face hardboard, with 6,000 psi average modulus of rupture. Comply with ANSI/AHA 135.4 and ASTM D1037.

1. Use fiberboard only where specifically scheduled or called for on drawings or in specifications.
2. Fiberboard as backs for wall supported cabinets is not allowed.

I. Adhesives: Use adhesives meeting Strength and Rate of Loading, Moisture Resistance, and Heat Resistance requirements set forth in AWI 100-G-11. Do not use glues containing formaldehyde.

1. For interior work:

a. Modified Polyvinyl Acetate: For normal use except items requiring high moisture resistance.
b. Casein Glue: For normal use except waterproofed items.
c. Contact Cements (not the solvent type): For bonding high water pressure laminates only.

2. For exterior work or in kitchens, toilets or other rooms with rooms with moisture:

a. Phenolic Resin: Generally for moisture resistance of fully waterproof bond.

J. Wood Paneling:

1. Fabricate with solid lumber to configuration shown on the drawings.
2. Quality: Hardwood meeting AWI Custom Grade.
3. Species: Birch.
4. Type sawing: Plain sawn.
5. Type matching: Random.
6. Type finish: Transparent.

K. Large Hollow-core Doors in Cabinet Work: Comply with requirements of Section 08210 - Wood Doors.

L. Finish Hardware:

1. Hinges for 3/4" Thick Doors:

a. US26D satin chrome plated steel, 5 knuckle, wrap around type allowing 270 degree swing at end of cabinet work unit, mounted with minimum 4 plated No.8 self-tapping screws per hinge leaf. Concealed European type hinges are not allowed.
b. For doors up to and including 48 inches high: Provide 2 hinges.
c. For doors over 48 inches high: Provide 3 hinges.

d. Manufacturers:

1) RPC 376-26D.
2) Accepted equivalent.

2. Pulls: 5/16" wire pull, 4" long, solid brass, US26D satin chrome plated.

a. Stanley 4484.
b. Epco MC.
c. Colonial 753

3. Door Catches: Stanley SP45.

a. For doors up to and including 38 inches high: Provide 1 heavy duty magnetic type catch, slotted for adjustment. Attach with screws.
b. For door 38 inches high and over: Provide 2 heavy duty magnetic type catches, slotted for adjustment. Attach with screws.

4. Surface bolts for inactive doors in cabinet door pairs with locks indicated:

a. Ives 40 x US26D x 6 inches.
b. Quality B-6 x US26D x 6 inches.
c. Baldwin 0324 x US26D x 6 inches.

5. Locks for 3/4" doors with plastic laminate finish: (Where indicated on drawings). Satin chrome or nickel plated steel 6 tumbler lock with grooved key.

a. KV 987, with strike.
b. Yale 9660, with strike.
c. Corbin 0764L, with strike.

6. Drawer Slides: Zinc plated cold rolled steel. Grant or KV 1300 rated for 75 pound capacity.
7. Steel Standards: KV 233ZC with zinc plated finish, 5/8" screw nails, and KV 237ZC shelf clips. Surface mount.

2.03 FABRICATION

A. Construct cabinet work as shown on the drawings and meeting the following requirements:

1. Face frames, mortise and tenon, screw, glue, and make all such joints concealed.
2. Cabinet members, bottoms, sub-top, sides, and back shall be joined by dado and rabbeted joints secured with glue and concealed mechanical fasteners. Case backs shall have a 3-inch anchor cleat the full width of the unit at the top.
3. Case construction of butt joins with dowel pins is not allowed.
4. Construct the toe space base from solid lumber and separately framed.

5. Drawers: Lock shouldered.
6. Drawer Sides and Backs:

    a. Well sanded Southern Yellow Pine, Poplar, Gum, or Birch, with corners rounded and natural finish.
    b. Plastic laminate on 1/2" plywood with plastic laminate interior and exterior.

7. Drawer Bottoms: 1/4" tempered fiberboard with factory applied gloss surface of color approved by A/E.
8. Cabinet interior sides drilled to receive shelf pins leaving exposed core are not acceptable.
9. Shelving:

    a. 3/4" plywood for lengths less than 36 inches.
    b. 1 inch plywood or 3/4" plywood with 3/4" x 1-1/2" hardwood edges at front and rear of shelf for lengths 36 inches or greater.

10. Adjustable Shelving: Use surface mounted standards and notched shelving ends.
11. Exposed Shelving: In storage rooms, utility rooms, kitchen pantries, shops, mechanical or electrical rooms, or in janitor closets, shall be "natural finish" constructed of plywood with edges banded of similar material and have outside face veneers of similar material of either:

    a. Gum.
    b. Poplar.
    c. Beech.
    d. Birch.

B. All other Shelving: Hardwood plywood with bonded edges, finished "transparent" and of plywood with veneers meeting the following criteria:

1. Cabinet and casework hardware will be supplied under the finish Hardware Section and shall be installed by the cabinet and casework fabricator. Locate hardware accurately on shop drawings.
2. Species: Birch, APA grade marked MDO 1 face/2 face, interior grade.
3. Where normally exposed to view (behind cabinet doors): Birch, AWI Custom Quality.
4. Where normally concealed from view (behind cabinet doors): Birch, AWI Economy Quality.

C. When specifically called for on the drawings as laminated plastic faced cabinets doors, ends, drawer fronts, dividers, and backs (except against walls):

1. Provide plywood with laminated plastic on all surfaces not occurring against building walls or fixed partitions.
2. Provide stiles and rails of laminated plastic covered lumber.

D. All other cabinets not specifically called for on the drawings as laminated plastic faced shall be constructed of "transparently finished" hardwood plywood doors, ends, drawer fronts, dividers, and backs (except against walls) with lumber stiles and rails of same species, as follows:

1. Species: Birch or White Oak APA grade marked MDO 1 face/2 faced, interior grade.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which the millwork/ cabinetwork is to be installed, and notify the Contractor in writing of conditions detrimental to the proper and timely completion of this phase of the Work. Do not proceed with this phase until the unsatisfactory conditions have been corrected. Commencement of work shall be construed as acceptance of the conditions.

B. Contractor shall take accurate field measurements and adjust the shop drawings accordingly before fabrication. The A/E shall be informed in writing of any dimension changes resulting from such field measurement before fabrication.

C. The casework shall be set in place, leveled, and secured to walls and floors as normal and standard to the trade. Fillers shall be used between casework and walls and shall be accurately scribed to walls for a neat installation. Casework shall be caulked where meeting walls, floors and soffits. Seal all counter joints and where backsplash meets counter top.

D. The casework installer shall accurately cut openings required for sinks or other equipment as indicated on plans.

3.02 INSTALLATION

A. Provide first quality construction following best trade practices.

B. Cuts, miters, joints, etc. shall be well sawn and joined. Nail heads or holes shall not be exposed in finish work. Drive nails and screws true and straight. Glue joints securely together. Sand all surfaces thoroughly, leaving clean and ready for finishing.

C. Bond plastic laminate to surfaces with technique and contact cement approved by laminated plastic manufacturer.

D. Install cabinet hardware according to requirements of the finish hardware as specified and in accurate positions as indicated on the drawings.

END OF SECTION

SECTION 07190
VAPOR/RADON BARRIER

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 02201 - Earthwork for Buildings.
2. 03300 - Cast-In-Place Concrete.

1.02 SUBMITTALS

A. Submit properly identified manufacturer's literature before starting work.

1.03 QUALITY ASSURANCE

A. Comply with the following regulatory requirements issued by the Florida Department of Health - Bureau of Environmental Toxicology Radon and Indoor Air:

1. Florida Standard for Radon-Resistant New Commercial Building Construction.
2. EPA Handbook for Design and Installation of a Home Radon Reduction System - Sub-Slab Depressurization for Low Permeability Fill Material.

PART 2 PRODUCTS

2.01 MATERIALS

A. Vapor/Radon Barrier:

1. Interior Slabs: 10 mil minimum polyethylene film.
2. Exterior Slabs: 6 mil polyethylene film.

B. Tape: As recommended by vapor/radon barrier manufacturer, except at vertical penetrations, use reinforced duct tape.

PART 3 EXECUTION

3.01 INSTALLATION

A. Lay vapor/radon barrier over entire area to receive interior slab work, lap edges at least 12 inches and seal with tape. TURN DOWN EDGES AT PERIMETER FOUNDATION 12 INCHES.

1. Lay vapor/barrier with seams perpendicular to and lapped in direction of concrete pour.
2. Turn edges down to top of footing.
3. Where expansion joints are indicated at adjacent vertical surfaces, extend vapor/radon barrier beyond expansion joint filler and turn up to top of slab.
4. Do not allow screed supports or other items to

penetrate vapor/radon barrier.

B. Extend vapor/radon barrier over surfaces of areas to be protected from vapor or transmission from conditioned space to unconditioned space after placement of insulation.

1. Seal all joints by lapping 2 inches minimum and tape all joints.
2. Repair any punctures or tears before placement of finished surface material.

C. Seal perimeters, penetrations, and joints and tape to prevent vapor moisture and radon gas penetration.

3.02 FIELD QUALITY CONTROL

A. Inspection: Upon completion of the installation of the vapor/radon barrier, contact A/E at least 48 hours before covering the installed vapor/radon work.

3.03 PROTECTION

A. Protect vapor/radon barrier from damage until permanent covering is in place.

1. Repair punctures and tears in vapor and radon barrier using patches of the material overlapping the puncture or tear a minimum of 12 inches. Seal with tape.

END OF SECTION

SECTION 07210
BUILDING INSULATION

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 05400 - Light Gage Metal Framing.
2. 06100 - Carpentry.
3. 09200 - Metal Studs, Lath, Suspension Ceilings, Plaster, and Stucco.
4. 09250 - Gypsum Wallboard.
5. Division 7 - Thermal and Moisture Protection.

1.02 REFERENCES AND CODES

A. Florida Building Code (FBC).

B. American Society for Testing and Materials (ASTM):

1.	C272-91(96)	Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
2.	C739-91	Specification for Cellulose Fiber (Wood Base) Loose Fill Thermal Insulation.
3.	C1149-90	Specification for Self-Supported Spray Applied Cellulosic Thermal/Acoustical Insulation.
4.	D1622-93	Test Method for Apparent Density of Rigid Cellular Plastics.
5.	E84-96a	Test Method for Surface Burning Characteristics of Building Materials.
6.	E96-95	Test Methods for Water Vapor Transmission of Materials.
7.	E662-95	Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
8.	E736-92	Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
9.	E759-92(96)	Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members.
10.	E859-93	Test Method for Air Erosion of Sprayed Fire Resistive Materials (SFRMs) Applied to Structural Members.

1.03 SUBMITTALS

A. Submit properly identified manufacturer's product data including installation instructions before starting work.

B. Submit Southern Building Code Congress International (SBCCI) Public Safety Testing and Evaluation Services reports including trade name, application, and thermal

protection requirements of insulation used.

1.04 QUALITY ASSURANCE

A. ASTM E84 Flame Spread: 25 or less.

B. ASTM E662 Smoke Development: 450 or less.

C. Materials used shall contain no formaldehyde.

PART 2 PRODUCTS

A. Plastic Foam Board Wall Insulation:

1. Manufacturers:

a. Styrofoam SE by Dow Chemical Co.
b. Formula R by U.C. Industries.
c. Foamular 150 by Owens Corning.

2. Physical Data:

a. "R" Value: 5 per inch minimum at 75 degrees Fahrenheit mean.
b. Size: 3/4 inches thick x 8 feet long.
c. Material: Extruded polystyrene foam board. Beadboard is not acceptable.
d. ASTM C272 Water Absorption: 0.7 percent by volume, maximum.
e. ASTM E96 Moisture Vapor Transmission: 1.1 perm, maximum.
f. Adhesive for Wall Insulation: "Styrofoam No.11 Brand Mastic" or as recommended by insulation manufacturer.

B. Polyisocyanurate Roof Insulation.

1. Manufacturers:

a. Energy 2 by NRG Barriers.
b. Accepted equivalent.

2. Physical Data:

a. "R" Value: 5.6 per inch minimum at 75 degrees Fahrenheit mean.
b. Board Thickness: 1/2 inch minimum (12.7mm), 2 inches (51mm) maximum.
c. Board Size: 4'-0" x 4'-0" maximum.
d. ASTM D1622 Board Density: 2.0 pcf.
e. ASTM D1621 Compressive Strength: 23 psi minimum.
f. ASTM C209 Water Absorption: 1 percent by volume, maximum.
g. ASTM E-96 Moisture Vapor Transmission: 1 perm, maximum.
h. Dimensional Stability: 2 percent maximum linear

change when conditioned at 158 degrees F. And 97 percent relative humidity for 7 days.

i. Curing Time: 24 hours minimum, plus an additional 24 hours minimum per inch (25mm) of thickness at a minimum of 60 degrees F. before shipment from manufacturer.

3. Protection: Provide 1/2" minimum Dens Deck Type X or accepted equivalent.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Install the accepted insulation according to the manufacturer's printed instructions for the specific product.

END OF SECTION

SECTION 07270
FIRESTOPPING AND SMOKE BARRIER CAULKING

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 03300 - Cast-In-Place Concrete.
2. 04220 - Concrete Unit Masonry.
3. 09250 - Gypsum Wallboard.
4. 15375 - Standpipe and Hose System.
5. 15410 - Piping (Plumbing).
6. 15510 - Piping (HVAC).
7. 15515 - Valves, Hangers, and Specialties.
8. 15890 - Ductwork.
9. 15970 - HVAC Control System
10. 16112 - Raceways and Conduits.

1.02 REFERENCES

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

1. E84-96a Test Method for Surface Burning Characteristics of Building Materials.
2. E119-95a Test Methods for Fire Tests of Building Construction and Materials.
3. E814-94b Test Method for Fire Tests of Through-penetration Fire Stops.

B. Underwriters Laboratories, Inc. (UL) 1479 and 2079.

1.03 SUBMITTALS

A. Submit properly identified product data including material specifications, published installation details, material safety data sheets (MSDS), and directions. Provide UL classified fire test data for each slab edge, floor penetration, and fire wall penetration condition.

B. Shop drawings shall show typical installation details for methods of installation and type of firestop materials used.

1.04 QUALITY ASSURANCE

A. Applicator: Acceptable to firestopping and smoke barrier caulking manufacturer.

B. Materials shall be listed in UL Building Materials Directory - Through Penetration Fire Stops Systems and Fill Void or Cavity Materials.

C. Firestopping materials shall not contain lead, PCBs, ethylene gylcol, or lead.

D. Products containing solvents or requiring hazardous waste disposal are not allowed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Firestopping and Smoke Barrier Caulking:

1. AD Firebarrier.
2. Bio Fireshield.
3. Enerstop.
4. Hilti.
5. U.S. Gypsum Company (USG).
6. Specified Technologies Inc (STI).
7. 3M.
8. Tremco.

2.02 MATERIALS

A. Fire Safing Insulation:

1. USG Thermafiber safing insulation complete with impaling clips for slab edges and firestop sealant.
2. Accepted equivalent.

B. Fire and Smoke Barrier Caulk:

1. AD Firebarrier Silicone.
2. Bio Fireshield: Biostop 500+ Sealant, Biotherm 100/200 Sealant:
3. Enerstop: 100 SL Sealant, 200 G Sealant, 300 C Compound.
4. Hilti: FS 601 Sealant, FS 604 Sealant, FS-ONE.
5. STI: Spec Seal Series 100, Pensil 300, Firedam 150+.
6. 3M: CP 25 Fire Barrier Caulk, 303 Fire Barrier Putty, Flame Stop V, Flame Stop VI.
7. Tremco: Fyre Shield, Fyre Sil, WBM, or acrylic.

C. Fire Barrier Wrap/Strip:

1. Bio Fireshield: Biostop Wrap Strip.
2. Enerstop: 400 MW Mineral Wool, 600 P.I. Pipe Insulation.
3. STI: Spec Seal Wrap/Strip.
4. 3M FS-195 Wrap/Strip.
5. Tremco: Intumescent Wrap Strip.

D. Trowelable Fire Barrier Compound:

1. AD Firebarrier Silicone.
2. Bio Fireshield: Bio K-10, Biostop Fire Rated Putty and Putty Pads.
3. Hilti FS 635.
4. STI: Spec Seal mortar, putty, and putty pads.

E. Sheet Metal Fire Barrier Restricting Collars: Provide

suitable galvanized bolts and expansion anchors.

1. STI: Spec Seal metal restraining collars.
2. 3M: Restricting Collar RC-1.
3. Tremco: MCR.

F. Prefabricated Firestop Collar:

1. AD Firebarrier Collars.
2. Bio Fireshield: Biostop Pipe Collar.
3. Hilti: CP 642.
4. STI: Spec Seal plastic pipe collars.
5. 3M: PPD.
6. Tremco: Tremstop D Firestop Collars.

G. Fire Prevention Pillows: Meeting ASTM E814 requirements and classified by UL.

1. Bio Fireshield: Bio Firestop Pillows.
2. Hilti: FS 657 Fire Block.
3. STI: Spec Seal.
4. Tremco: Tremstop.

H. Fire and Smoke Barrier Spray.

1. Bio Fireshield: Biostop 700, Biostop 750.
2. 3M: Fire Dam Spray.

I. Firestopping Sleeve.

1. STI: EZ-Path.
2. Accepted Equivalent.

J. Hose Clamps for Restricting Collars: Standard galvanized steel or stainless steel hose clamps.

K. Fire Barrier Partitions and Covers: 3M type PSS-7904 R device complete with front and back covers of 3M composite sheet CS-195 or accepted equivalent, all necessary related galvanized steel supports, cover plates and fastenings.

L. Metal Supports for Firesafing "Packing Material":

1. 30 gage by 1 inch wide galvanized sheet steel "Z" shaped clips to support "packing material" around floor penetrations.
2. 10 gage galvanized steel wire hat shaped support hangers to support "damming material" or "packing material" at floor penetrations.
3. Hardware cloth of 19 gage galvanized ½" mesh wire.

PART 3 EXECUTION

3.01 PREPARATION

A. Masonry, concrete, and gypsum board surfaces shall be smooth, clean, and free of loose debris, holes, and

projections.

3.02 APPLICATION

A. Apply fire safing insulation, fire and smoke barrier caulk, and fire barrier wrap/strips according to manufacturer's published installation details, directions, UL classified fire test data, and as specified.

B. Gaps at Floor and Roof Edges Abutting Exterior Walls:

1. Install specified fire safing insulation continuously at each floor level above first floor and at roof between back of precast concrete wall panels, concrete beams, and columns of depth to achieve a [2] [3] hour minimum fire resistance according to manufacturer's directions.
2. Install fire stop insulation across exterior faces of columns at each floor level above first floor including roof before erection of precast concrete wall panels. Secure insulation in place across columns with suitable waterproof adhesive with flame spread rating of 25 or less and with impaling clips at each side of columns.
3. Secure fire safing insulation to exterior faces of slab edges and beams with suitable impaling clips spaced 24 inches o.c. and adhesive with flame spread rating of 25 or less.
4. Provide fire safing insulation of required thicknesses as required to compress insulation in joints.
5. Where gap is less than approximately 2 inches, bend clips slightly upward. Where gap is less than approximately 1 inch, apply adhesive to sides of joint and tightly pack safing insulation into joint.
6. Recess top surface of fire safing insulation [½] inch to receive fire and smoke barrier caulk to provide [2] hour fire resistance according to manufacturer's directions.
7. Apply specified fire and smoke barrier caulk of required [½] inch uniform depth over horizontal surfaces of fire safing insulation at each floor level above first floor and roof. Smooth surface of caulk at exposed areas.

C. Floor and Roof Expansion Joints:

1. Provide 10 gage galvanized steel hat shaped wire support hangers at 8 inches o.c. with bottom of wire near bottom of slab or beam.
2. Install specified fire safing insulation tightly packed in each suspended floor expansion joint and roof expansion joint with insulation resting on hardware cloth support and of depth to provide a [2] hour minimum fire resistance according to manufacturer's directions.
3. Apply fire and smoke barrier caulk of required [1/2]

inch uniform depth over horizontal surfaces of fire safing insulation packed in suspended floor expansion joints. Fire and smoke barrier caulk is not required in roof expansion joints.

D. Gaps at Tops of Non-Load Bearing Masonry Fire Walls:

1. Coordinate installation of solid concrete block or solid brick top course to provide solid back up for fire safing insulation.
2. Pack space between top of masonry and underside of overhead structure with specified fire safing insulation. Recess insulation [1] inch on each side of wall to receive fire and smoke barrier caulk to provide [2] hour fire resistance, according to caulk manufacturer's directions.
3. Apply specified fire and smoke barrier caulk or putty of required [1/2] inch uniform thickness on each side of walls to provide [1] and [2] hour fire resistance as indicated according to manufacturer's directions.

E. Floor and Fire Wall Penetrations - Metal Pipes, Conduits, and HVAC Duct Perimeters:

1. Where gaps between metal pipes, conduits, and duct openings are 1/4" or less, seal gaps with specified fire and smoke barrier caulk.
2. Where gaps between metal pipes, conduits and ducts are more than 1/4":

    a. Pack space between opening and pipe, conduit and duct with specified fire safing insulation and of depth of insulation to provide a [1] and [2] [3] hour minimum fire resistance as indicated according to fire safing manufacturer's directions.
    b. Apply specified fire and smoke barrier caulk of required [1/2] inch uniform depth over fire safing insulation support. Smooth surface of caulk at exposed areas.
    c. In place of specified fire and smoke barrier caulk, provide fire and smoke barrier wrap/strips, wire tied in place and covered with of specified fire and smoke barrier caulk according to manufacturer's directions.

F. Floor and Fire Wall Penetrations - Plastic Pipe and Conduit Perimeters and Insulated Metal Pipe Perimeters:

1. Where gaps between plastic pipes and plastic conduits and floor and wall openings are 1/4" or less and where insulated metal pipes occur, provide sheet metal fire barrier restricting collar wrap/strip with fire and smoke barrier caulk on both sides of wall and at bottom of floor only to provide [2] hour fire resistance as indicated according to manufacturer's directions.

a. Provide number of wrap/strips around pipes and conduits according to wrap/strip manufacturer's tables.
b. Enclose wrap/strips with sheet metal restricting collars bolted to each side of wall for fire wall penetrations and to underside of floor for floor penetrations. Bend support tabs back to pipe or insulation and secure collar with metal hose clamp.
c. Seal all seams and edges at wall and floor with 1/4" bead of specified fire and smoke barrier caulk.

2. Where gaps between plastic pipes and plastic conduits and floor openings are more than 1/4":

a. Pack space between floor opening and pipe or conduit with specified fire safing insulation and of depth of insulation to provide [2] hour minimum fire resistance rating. Recess insulation 2-1/4" below floor to receive fire barrier wrap/strips to provide [2] hour fire resistance according to wrap/strip manufacturer's directions.
b. Support fire safing insulation with "Z" shaped galvanized sheet metal clips at 3 locations around pipes and conduits.
c. Provide number of specified fire barrier wrap/ trips around pipes and conduits according to wrap/strip manufacturer's tables. Wire wrap/strips in place and slide down into opening to proper depth.
d. Cover surface and seams of wrap/strip around pipe or conduit with uniform 1/4" depth of specified fire and smoke barrier caulk.

3. Plastic pipe and insulated cable penetrations to fire walls:

a. Provide galvanized steel pipe sleeves equivalent to EMT, sized to allow annular space of not less than 3/4" around pipe or cable. Project pipe sleeve 3 inches on each side of wall. Tightly fit pipe sleeves to wall. Grout sleeves into masonry and fill openings in gypsum board with firecaulk.
b. Fill space around pipe and cable to within 2-1/4" of end of pipe sleeve with fire safing insulation.
c. Provide number of specified fire barrier wrap/ trips around pipes and cable on each side of wall according to wrap/strip manufacturer's table to provide [2] hour fire resistance as indicated according to wrap/strip manufacturer's directions. Wire wrap/strips in place and slide into pipe sleeve, recessing 1/4".
d. Cover surface of wrap/strip around pipe and cable with uniform 1/4" depth of specified fire and

smoke barrier caulk.

G. Floor and Fire Wall Penetrations - Bus Ducts:

1. Where cable trays and bus ducts penetrate floors and fire walls, provide necessary fiber packing and other materials required by manufacturers installation details and appropriate for conditions encountered to provide [1] [2] [3] hour fire resistance.
2. Where "packing material" is shown on the manufacturer's details, only specified fire stop mineral wool shall be used. Depth of "packing material" shall be of minimum 1 inch depth.

H. Floor and Fire Wall Penetrations - Cable Trays:

1. Where cable trays penetrate floors and fire walls, provide fire prevention pillow system placed into opening in a staggered brick style and other materials required by the manufacturer.

3.03 PROTECTION

A. Protect finished firestopping and fire retardant caulking from tears and punctures. Replace torn or pierced firestopping and caulking material.

END OF SECTION

SECTION 07540
FULLY ADHERED SINGLE-PLY ROOFING SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
   1. Thermoplastic Polyolefin Single-Ply Roofing Membrane
   2. Thermoplastic Polyolefin Flashings
   3. Thermoplastic Polyolefin Accessories
   4. Roof Insulation

B. Related Sections
   1. Section 06100: Rough Carpentry
   2. Section 07620: Sheet Metal Flashing and Trim
   3. Section 15430: Plumbing Specialties

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM) - *Annual Book of ASTM Standards*
   1. ASTM D-751 – Standard Test Methods for Coated Fabrics
   2. ASTM D-2137 - Standard Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics
   3. ASTM E-96 - Standard Test Methods for Water Vapor Transmission of Materials
   4. ASTM D1204 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
   5. ASTM D-471 - Standard Test Method for Rubber Property—Effect of Liquids
   6. ASTM D-1149 - Standard Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment
   7. ASTM C-1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
   8. ASTM C-1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers

B. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - *Architectural Sheet Metal Manual*

C. National Roofing Contractors Association (NRCA)

D. American Society of Civil Engineers (ASCE)

E. Factory Mutual (FM Global) - *Approval Guide*

F. Underwriters Laboratories (UL) - *Roofing Systems and Materials Guide* (TGFU R1306)

G. California Title 24 Energy Efficient Standards

H. ENERGY STAR

I. Cool Roof Rating Council (CRRC)

J. Miami Dade County Product Control

K. Uplift requirements based on the basic wind velocity pressures for the project according to American Society of Civil Engineers (ASCE) 7.

L. Factory Mutual requirements for Class I rated assembly and FMA 1-150 uplift classifications as determined by ASCE 7.

M. American Society for Testing and Materials (ASTM):

N. D6754-02 Standard Specification for Ketone Ethylene Ester Based Sheet Roofing.

O. D4434-87 Standard Specification for Poly (Vinyl Chloride) Sheet Roofing.

P. E108-96 Test Methods for Fire Tests of Roof Coverings.

Q. Roofing manufacturer's specifications.

R. National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual.

S. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): Architectural Sheet Metal Manual, latest edition.

T. Underwriters Laboratories UL 790.

1.03 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D1079 and the glossary of the National Roofing Contractors Association (NRCA) *Roofing and Waterproofing Manual* for definitions of roofing terms related to this section.

1.04 SUBMITTALS

A. Product Data: Provide product data sheets for each type of product indicated in this section.

B. Shop Drawings: Provide manufacturers standard details and approved shop drawings for the roof system specified.

C. Calculations: Submit calculations, signed and sealed by a Florida registered professional engineer, establishing wind velocity pressure values for the specific project according to ASCE 7, exposure category "C", and a wind load importance factor of 1.15.

D. Samples: Provide samples of insulations, fasteners, membrane materials and accessories for verification of quality.

E. Certificates: Installer shall provide written documentation from the manufacturer of their authorization to install the roof system, and eligibility to obtain the warranty specified in this section.

1.05 QUALITY ASSURANCE

A. Manufacturer’s Qualifications: GAFMC shall provide a roofing system that meets or exceeds all criteria listed in this section.

B. Installer’s Qualifications:

1. Installer shall be classified as an authorized contractor as defined and certified by the roofing manufacturer.

C. Source Limitations: All components listed in this section shall be provided by a single manufacturer or approved by the primary roofing manufacturer.

D. Final Inspection
Manufacturer’s representative shall provide a comprehensive final inspection after completion of the roof system. All application errors must be addressed and final punch list completed.

1.06 PRE-INSTALLATION CONFERENCE

A. Prior to scheduled commencement of the roofing installation and associated work, conduct a meeting at the project site with the installer, architect, owner, roofing manufacturer's representative and any other persons directly involved with the performance of the work. **The installer shall record conference discussions to include decisions and agreements reached (or disagreements), and furnish copies of recorded discussions to each attending party.** The main purpose of

this meeting is to review foreseeable methods and procedures related to roofing work.

1.07 PERFORMANCE REQUIREMENTS

A. Provide an installed roofing membrane and base flashing system that does not permit the passage of water, and will withstand the design pressures calculated in accordance with the most current revision of ASCE 7.

B. The roofing manufacturer shall provide all primary roofing materials that are physically and chemically compatible when installed in accordance with manufacturers current application requirements.

C. PROVIDE WRITTEN STATEMENT FROM ROOFING SYSTEM MANUFACTURER THAT SELECTED ROOFING AND SELECTED LIGHTWEIGHT INSULATING CONCRETE SYSTEM ARE COMPATIBLE.

1.08 REGULATORY REQUIREMENTS

A. All work shall be performed in a safe, professional manner, conforming to all federal, state and local codes.

B. Exterior Fire Test Exposure: Provide a roofing system achieving a UL Class A rating for roof slopes indicated.

C. Windstorm Classification: Provide a roofing system which will achieve a Factory Mutual 1-180 wind uplift rating, as listed in the current FM Approval Guide.

1.09 DELIVERY, STORAGE AND HANDLING

A. Deliver all roofing materials to the site in original containers, with factory seals intact. All products are to carry the manufacturer's label.

B. Store all pail goods in their original undamaged containers in a clean, dry location within their specified temperature range. Reference data sheets for product storage requirements.

C. Do not expose materials to moisture in any form before, during or after delivery to the site. Reject delivery of materials that show evidence of contact with moisture.

D. Use “breathable” type covers such as canvas tarpaulins to allow venting and protection from weather and moisture. Cover and protect materials at the end of each work day. Do not remove any protective tarpaulins until immediately before the material will be installed.

1.10 PROJECT CONDITIONS

A. Weather
1. Proceed with roofing only when existing and forecasted weather conditions permit.
2. Ambient temperatures must be above 45°F (7.2°C) when applying hot asphalt or water based adhesives.

1.11 WARRANTY/GUARANTEE Provide Manufacturers standard WeatherStopper® Diamond Pledge™ Guarantee

1. **Single source coverage** and no monetary limitation where the manufacturer agrees to repair or replace components in the roofing system, which cause a leak due to a failure in materials or workmanship.

a) Duration: Fifteen (15) years from the date of completion.

b) Extension: GAFMC also guarantees to the original or first subsequent owner that coverage shall be extended by 25% of the original guarantee length, provided that the roof in inspected and maintained in accordance with the MAINTAINENCE section of this specification.

2. TPO Puncture Resistance Limited Warranty:

3. The roofing system manufacturer shall warrant to the original building Owner, that the TPO roof membrane will provide puncture and tear resistance when installed and maintained in accordance with GAFMC’s requirements.

B. TPO Reflectivity Limited Warranty:
1. The roofing manufacturer shall warrant to the original building owner, that the TPO white roof membrane will meet or exceed the initial and “aged” ENERGY STAR® reflectivity requirements for low slope roofing membranes (65% initial, 50% aged) when installed and maintained in accordance with GAFMC’s requirements. The aged reflectivity shall meet or exceed these requirements when measured after cleaning the membrane in accordance with GAFMC recommendations.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. GAF Materials Corporation - 1361 Alps Road, Wayne, NJ 07470, or pre-approved equal that meets all criteria below, based upon the Architect's review of performance standards. The entire roofing system shall be certified by the roofing manufacturer and meet all warranty requirements stated herein.

2.02 INSULATION

A. Rigid polyisocyanurate board, with a strong white or black fibrous glass facer conforming to or exceeding the requirements of ASTM C 1289 / FS HH-I-1972. Tapered Polyiso, with the following characteristics:
   1. Board Thickness: tapered
   2. Thermal Resistance (LTTR value) of: varies

2.03 MEMBRANE MATERIALS

A. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (60 mil) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved. White membrane is Energy Star Listed, CRRC Listed and Title 24 Compliant. Each full roll contains approximately 1000 sq.ft. of roofing material, 10’ X 100’, weighing 322 lbs. EverGuard® TPO 60 mil thermoplastic single-ply roofing membrane by GAFMC.

   1. **Available Stock Colors:** White

2.04 FLASHING MATERIALS

A. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (60 mil) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved. Each full roll contains approximately 1000 sq.ft. of roofing material, 10’ X 100’, **TPO 60 mil** thermoplastic single-ply roofing membrane by GAFMC.

   1. Pre-Formulated Colors: As selected by the Architect from the manufacturer's pre-formulated color range.

2.05 ADHESIVES, SEALANTS and PRIMERS

A. Solvent-based Bonding Adhesive: Solvent based rubberized adhesive for use with EverGuard TPO membranes, EverGuard 1121 Bonding Adhesive, by GAFMC.

B. Solvent based liquid, required to protect field cut edges of EverGuard TPO membranes. Applied directly from a squeeze bottle, EverGuard TPO Cut Edge Sealant, by GAFMC.

C. Solvent based primer for preparing surfaces to receive butyl based adhesive tapes, EverGuard TPO Primer, by GAFMC.

D. Solvent based seam cleaner used to clean exposed or contaminated seam prior to heat welding, EverGuard TPO Seam Cleaner, by GAFMC.

E. Commercial grade roofing sealant suitable for sealing the upper lip of exposed termination bars and penetrations and around clamping rings and comes with a 20 yr ltd warranty against leaks caused by manufacturing defects. Meets the performance criteria of ASTM D412, ASTM D2196, ASTM D1475 and ASTM D1644, FlexSeal™ Roof Sealant, by GAF-Elk.

F. One part butyl based high viscosity sealant suitable for sealing between flashing membrane and substrate surface behind exposed termination bars and for sealing between roofing membrane and drain flange. EverGuard® Water Block, by GAFMC.

G. 100% solids urethane based two-part sealant suitable for filling sealant pans at irregularly-shaped penetrations. EverGuard® 2-Part Pourable Sealant, by GAFMC.

H. Asphalt primer: ASTM D 41 Matrix™ 307 Standard Asphalt Primer, by GAF®.

I. Insulation Adhesive: Oly-Bond 500™ distributed by GAF®.

2.06 BITUMEN

A. Asphalt bitumen: ASTM D 312 Type III & IV

2.07 PLATES & FASTENERS

A. Drill•Tec™ HD Screws: Heavy gauge alloy steel fastener with CR-10 coating with a .245" diameter thread. Miami Dade and Factory Mutual Standard 4470 Approved, #3 Phillips truss head for use on wood, concrete and steel decks.

B. Drill•Tec™ AccuTrac Insulation Plates: Galvalume coated steel 3" square plates recessed or flat bottom. Miami Dade and Factory Mutual Standard 4470 Approved and suitable for use with Drill•Tec™ standard fasteners, Drill•Tec™ heavy duty fasteners, Drill•Tec™ extra heavy duty fasteners. Made for use with Drill•Tec™ AccuTrac stand up tool

2.08 NAILS & SPIKES

A. Drill-Tec™ CD-10: Hammer-in, non-threaded fastener designed to secure insulation and membrane to structural concrete. Miami Dade and Factory Mutual Standard 4470 approved

2.09 ACCESSORIES

A. FLASHING ACCESSORIES

1. A smooth type, unreinforced thermoplastic polyolefin based membrane for use as an alternative flashing/reinforcing material for penetrations and corners. Required whenever preformed vent boots cannot be used, available in White, Tan, Gray, Regal Red, Regal Blue, and Hartford Green, 0.055 inches (55 mils) nominal thickness and sheet size: 24in x 50ft. EverGuard® TPO Detailing Membrane, by GAFMC.

2. An 8 inch (20 cm) wide smooth type, polyester scrim reinforced thermoplastic polyolefin membrane strip for use as a cover strip over coated metal and stripping-in coated metal flanges and general repairs: 0.045 inches (45 mils) nominal thickness with 100 foot length, available in White, Tan, Gray, Regal Red, Regal Blue, and Hartford Green EverGuard® TPO Flashing Membrane, by GAFMC.

3. Extruded aluminum termination bar with angled lip caulk receiver and lower leg bulb stiffener. Pre-punched slotted holes at 6″ on center or 8″ on center. ¾″ x 10′ with 0.090″ cross section, EverGuard® Lip Termination Bar, by GAFMC.

4. A 6 inch (14 cm) wide, smooth type, polyester scrim reinforced thermoplastic polyolefin membrane strip with a factory laminated butyl tape. Designed for use as a cover strip over non-coated metal edges and flanges. Each full roll contains approximately 100 Lineal Ft. of material, 6″ X 100′. EverGuard® TPO Cover Tape, by GAFMC.

5. .045″ reinforced TPO membrane with pressure sensitive adhesive, to be installed on horizontal surfaces using plates and fasteners as a base attachment in fully adhered systems. Size 6″ x 100′**, EverGuard® RTA (Roof Transition Anchor) Strip™, by GAFMC**

6. **24 gauge steel with 0.025″ thick TPO based film as required for fabrication into metal gravel stop and drip edge profiles, metal base and curb flashings, sealant pans, and scupper sleeves. Standard sheet size 4′ x 10′, sheet weight 47 lbs. Custom sizes available, EverGuard® TPO Coated Metal, by GAFMC.**
   a)
   b) Color: As selected by Architect fom manufacturer's pre-formulated colors.

B. **WALL & CURB ACCESSORIES**

1. **55 mil TPO membrane and 24 gauge coated metal prefabricated into standard and custom size thru wall scuppers. EverGuard® TPO Scupper, by GAFMC**

2. **.045" or .060" thick reinforced TPO membrane fabricated corners. Available in four standard sizes to flash curbs that are 24", 36", 48", and 60" in size. Four corners are required to flash the curb, EverGuard® Corner Curb Wraps,** by GAFMC.

3. 0.060" thick molded TPO membrane outside corners of base and curb flashing. Hot-air welds directly to EverGuard TPO membrane. Size 4" x 4" with 6" flange, EverGuard® TPO Universal Corners by GAFMC.

4. 0.055" molded TPO membrane inside corners of base and curb flashing. Hot-air welds directly to Everguard TPO membrane. Size 6" x 6" x 5.5" high EverGuard® TPO Preformed Corners by GAFMC.

C. PENETRATION ACCESSORIES

1. 0.075" thick molded TPO membrane sized to accommodate most common pipe and conduits, (1" to 6" diameter pipes), including square tube. Hot-air welded directly to EverGuard TPO membrane, supplied with stainless steel clamping rings, EverGuard® TPO Preformed Vent Boots by GAFMC.

2. .055" thick smooth type, unreinforced thermoplastic polyolefin membrane designed for use as a conforming membrane seal over T-joints in 60 mil membrane applications. EverGuard® TPO Drain by GAFMC

D. FIELD OF ROOF ACCESSORIES

1. 1.5" wide x 1.25" high x 10' length profiles with pressure sensitive adhesive. Applied to the TPO roofing systems to simulate standing seam metal roof**, EverGuard® TPO Architectural Profile, by GAFMC.**

2. **.055" thick smooth type, unreinforced thermoplastic polyolefin membrane designed for use as a conforming membrane seal over T-joints in 60 mil membrane applications. EverGuard® T-Joint Patches, by GAFMC.**

3. **1/8" thick extruded and embossed TPO roll 30" x 50', heat welds directly to roofing membrane. Unique herringbone traction surface. Gray in color, EverGuard® TPO Walkway Rolls, GAFMC.**

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that the surfaces and site conditions are ready to receive work.

B. Verify that the deck is supported and secured.

C. Verify that the deck is clean and smooth, free of depressions, waves, or projections, and properly sloped to drains, valleys, eaves, scuppers or gutters.

D. Verify that the deck surfaces are dry and free of ice or snow.

E. Verify that all roof openings or penetrations through the roof are solidly set, and that all flashings are tapered.

3.02 SUBSTRATE PREPARATION

A. Structural Concrete Deck

1. Minimum deck thickness for structural concrete is 4” (10.2 cm).
2. Only poured in place concrete decks that provide bottom side drying are acceptable. Decks that are installed over non-vented metal decks or pans that remain in place may trap moisture in the deck beneath the roof system and are not acceptable.
3. **The roof deck shall be properly cured prior to application of the roofing system; twenty-eight (28) days is normally required for proper curing.** Curing agents must be checked for compatibility with roofing materials. Prior to the installation of the roof assemblies, the Contractor shall evaluate the deck's surface moisture and deck’s dryness through the use of ASTM D-4263 or hot bitumen test.
4. The deck must be smooth, level and cannot be wet or frozen. If deck is determined to be wet, it must be allowed to dry.
5. Treat cracks greater than 1/8” (3 mm) in width in accordance with the deck manufacturer’s recommendations.
6. Sumps for the roof drains shall be provided in the casting of the deck.
7. When insulation or roofing is to be adhered with hot asphalt, prime the deck with asphalt/concrete primer, ASTM D 41 at the rate of one gallon per 100 square feet (0.4 L/m^2). Allow the primer to dry prior to the application of the roofing system.

B. Lightweight Insulating Concrete Deck

C.

1. Lightweight insulating concrete decks are required to have a minimum thickness of 2″ (5.1 cm), a minimum compressive strength of 125 psi (87,000 kg/m²) and a minimum density of 22 pcf (352 kg/m²). Individual deck manufacturer's standards apply when their specifications exceed the minimum thickness, compressive strength, or density requirements.
2. **The lightweight insulating deck/fill must be installed by an applicator approved by the deck manufacturer.**
3. The roof system shall be installed immediately following deck curing to prevent damage from exposure to precipitation. The deck manufacturer determines the minimum curing time and maximum exposure limitations.
4. LWIC should not be poured during rainy periods. Deck areas that have frozen before they have cured must be removed and replaced. Decks which receive precipitation prior to installation of the roof membrane must be checked for moisture content and dryness.
5. The moisture content of existing LWIC must be under 20% when insulation is to be fastened directly to it. Where moisture content exceeds 20%, a layer of Stratavent Eliminator Venting Base Sheet must be installed prior to the insulation.
6. Lightweight insulating concrete decks are acceptable only on slopes up to 1″ per foot (8.3 cm/m).

3.03 INSTALLATION - GENERAL

A. Install GAFMC's EverGuard® TPO roofing system according to all current application requirements in addition to those listed in this section.

B. GAFMC EverGuard® TPO Specification #: **T-FA-N-I-60**

C. Start the application of membrane plies at the low point of the roof or at the drains, so that the flow of water is over or parallel to, but never against the laps.

3.04 BITUMEN HANDLING

A. Do not mix different types of asphalt.

B. Use only ASTM D 312, Type III or Type IV Steep Asphalt. **Type III asphalt may be used on slopes up to ½″ per foot (4cm/m). Type IV asphalt must be used on all slopes greater than ½″ per foot (4 cm/m).**

C. Application with hot asphalt requires continuous, uniform interply mopping rates of 25 lbs. +/- 20% per 100 square feet of roof area (1.2 kg/m²). rates up to 60lbs per 100

sq.ft may be required if the substrate surface is rough or porous.

D. Application temperature of the asphalt must be at the Equiviscous Temperature (EVT) with a tolerance of +/- 25°F (13.9°C), at which a viscosity of 125 centipoise is attained. When using mechanical asphalt applicators, the target viscosity should be 75 centipoise.

E. For all SBS modified asphalt flashings; the minimum application temperature of the asphalt must be at the EVT temperature, typically between 425°F and 475°F, whichever is greater, with a rolling bank (puddle) of mopping asphalt across the full width of the roll.

F. Do not heat the asphalt to or above its flash point or hold the asphalt at temperatures above the finished blowing temperature for more than 4 hours.

G. Do not keep heated tankers above 325°F (163°C) overnight.

3.05 INSULATION

A. GENERAL

1. Do not apply roof insulation or roofing until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment. A vapor retarder coated lightly with asphalt may be applied to protect the inside of the structure prior to the insulation and final roofing installation. Before the application of the insulation, any damage or deterioration to the vapor retarder must be repaired.
2. Do not install wet, damaged or warped insulation boards.
3. Install insulation boards with staggered board joints in one direction (unless taping joint).
4. Install insulation boards snug. Gaps between board joints must not exceed ¼″ (6 mm). All gaps in excess of ¼″ (6 mm) must be filled with like insulation material.
5. Wood nailers must be 3-1/2″ (8.9 cm) minimum width or 1″ (25 mm) wider than metal flange. They shall be of equal thickness as the insulation, and be treated for rot resistance. All nailers must be securely fastened to the deck.
6. Do not kick insulation boards into place.
7. Miter and fill the edges of the insulation boards at ridges, valleys and other changes in plane to prevent open joints or irregular surfaces. Avoid breaking or crushing of the insulation at the corners.
8. Insulation should not be installed over new lightweight insulating concrete.
9. Roof tape, if required over insulation joints, must be laid evenly, smoothly and embedded in a uniform coating

of hot steep asphalt with 4″ (10.2 cm) end laps. Care must be taken to assure smooth application of tape, and full embedment of the tape in the asphalt.

10. Do not install any more insulation than will be completely waterproofed each day.

3.06 MEMBRANE APPLICATION

A. Fully Adhered:

1. Place membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent attachment. Roof membrane shall be fully adhered immediately after it is rolled out, followed by welding to adjacent sheets.
2. Overlap roof membrane a minimum of 3″ (15 cm) for side laps and 3″ (15 cm) for end laps.
3. Install membrane so that the side laps run across the roof slope lapped towards drainage points.
4. All exposed sheet corners shall be rounded a minimum of 1″.
5. Use full width rolls in the field and perimeter region of roof.
6. Fully adhere membrane sheets to the substrate with hot roofing asphalt at a rate of 25 lbs per 100 square feet.
7. Prevent seam contamination by keeping the asphalt application a few inches back from the seam area.
8. Adhere approximately one half of the membrane sheet at a time. One half of the sheet’s length shall be folded back in turn to allow for asphalt application. Lay membrane into asphalt immediately after application.
9. Roll membrane with a weighted roller to ensure complete bonding between asphalt and membrane.
10. Membrane laps shall be hot-air-welded together. All welds shall be continuous, without voids or partial welds. Welds shall be free of burns and scorch marks.
11. Weld shall be a minimum of 1-1/2″ in width for automatic machine welding and a minimum 2″ in width for hand welding.
12. All cut edges of reinforced membrane must be sealed with EverGuard® TPO Cut Edge Sealant.
13. Supplemental membrane attachment is required at the base of all walls and curbs, and where the angle of the substrate changes by more than five (5) degrees (1″ in 12″). Roofing membrane shall be secured to the structural deck with appropriate Drill-Tec™ screws and plates spaced every 12″ o.c. The screws and plates must be installed no less than ½″ from the membrane edge. Alternatively, the roofing membrane may be turned up the vertical plane a minimum of 3″ and secured with screws and termination bar Fastener spacing is the same as is used for in-lap attachment. The termination bar must be installed within 1-1/2″ to 2″ of the plane of the roof membrane, with a

minimum of 1″ of membrane extending above the termination bar.

14. Supplemental membrane attachment to the structural deck is required at all penetrations unless the insulation substrate is fully adhered to the deck. Roofing membrane shall be secured to the deck with appropriate Drill-Tec™ screws and plates.
15. Fasteners must be installed to achieve the proper embedment depth. Install fasteners without lean or tilt.
16. Install fasteners so that the plate or termination bar is drawn down tightly to the membrane surface. Properly installed fasteners will not allow the plate or termination bar to move (underdriving), but will not cause wrinkling of the membrane (overdriving).

3.07 FLASHINGS

A. General:

1. All penetrations must be at least 24″ (61 cm) from curbs, walls, and edges to provide adequate space for proper flashing.
2. Flash all perimeter, curb, and penetration conditions with coated metal, membrane flashing, and flashing accessories as appropriate to the site condition.
3. All coated metal and membrane flashing corners shall be reinforced with preformed corners or non-reinforced membrane.
4. Hot-air weld all flashing membranes, accessories, and coated metal. A minimum 2″ wide hand weld or minimum 1 - 1/2" automatic machine weld is required
5. All cut edges of reinforced membrane must be sealed with EverGuard® TPO Cut Edge Sealant.
6. Consult the EverGuard® *Application and Specifications Manual* or GAFMC Contractor Services for more information on specific construction details, or those not addressed in this section.

B. Coated Metal Flashings:

1. Coated metal flashings shall be formed in accordance with current EverGuard construction details and SMACNA guidelines.
2. Coated metal sections used for roof edging, base flashing and coping shall be butted together with a ¼″ gap to allow for expansion and contraction. Hot-air weld a 6″ wide reinforced membrane flashing strip to both sides of the joint, with approximately 1″ on either side of the joint left un-welded to allow for expansion and contraction. 2″ wide aluminum tape can be installed over the joint as a bond-breaker, to prevent welding in this area.
3. Coated metal used for sealant pans, scupper inserts, corners of roof edging, base flashing and coping shall

be overlapped or provided with separate metal pieces to create a continuous flange condition, and pop-riveted securely. Hot-air weld a 6″ wide reinforced membrane flashing strip over all seams that will not be sealed during subsequent flashing installation.

4. Provide a ½″ hem for all exposed metal edges to provide corrosion protection and edge reinforcement for improved durability.
5. Provide a ½″ hem for all metal flange edges whenever possible to prevent wearing of the roofing and flashing membranes at the flange edge.
6. Coated metal flashings shall be nailed to treated wood nailers or otherwise mechanically attached to the roof deck, wall or curb substrates, in accordance with construction detail requirements.

C. Roof Edges:

1. Roof edge flashings are applicable for gravel stop and drip edge conditions as well as for exterior edges of parapet walls.
2. Flash roof edges with coated metal flanged edging with a minimum 3" wide flange nailed 4" on center to wood nailers, and heat weld roof membrane to metal flanges.
3. When the fascia width exceeds 4″, coated metal roof edging must be attached with a continuous cleat to secure the lower fascia edge. The cleat must be secured to the building no less than 12″ O.C.
4. Alternatively, roof edges may be flashed with a 2-piece snap on fascia system, adhering the roof membrane to a metal cant and face nailing the membrane 8″ on center prior to installing a snap-on fascia.
5. Flash roof edge scuppers with a coated metal insert that is mechanically attached to the roof edge and integrated as a part of the metal edging.

D. Parapet and Building Walls:

1. Flash walls with EverGuard TPO membrane adhered to the substrate with bonding adhesive, loose applied (Less than 24″ in height) or with coated metal flashing nailed 4″ on center to pressure-treated wood nailers.
2. Secure membrane flashing at the top edge with a termination bar. Water Block shall be applied between the wall surface and membrane flashing underneath all exposed termination bars. Exposed termination bars shall be mechanically fastened 8″ on center; termination bars that are counter flashed shall be fastened 12″ on center.
3. Roof membrane must be mechanically attached along the base of walls with screws and plates (deck securement) or screws and inverted termination bar (wall securement) at the following rate:

Mechanically Attached Systems	Per in-lap on center spacing, with a 12″ maximum
Fully / Self Adhered Systems	12″ on center
Ballast Applied Systems	8″ on center

4. All coated metal wall flashings and loose applied membrane flashings must be provided with separate metal counterflashings, or metal copings.
5. Metal counterflashings may be optional with fully adhered flashings depending on guarantee requirements. Exposed termination bars must be sealed with Flexseal® Roofing Cement.
6. Flash wall scuppers with a coated metal insert that is mechanically attached to the wall and integrated as part of the wall flashing.

E. Curbs and Ducts:

1. Flash curbs and ducts with EverGuard TPO membrane adhered to the curb substrate with bonding adhesive, loose applied (Less than 24″ in height) or with coated metal flashing nailed 4″ on center to pressure-treated wood nailers.
2. Secure membrane flashing at the top edge with a termination bar. Water Block shall be applied between the curb/duct surface and membrane flashing underneath all termination bars. Exposed termination bars shall be mechanically fastened every 8″o.c.; termination bars that are counter flashed shall be fastened 12″ on center.
3. Roof membrane must be mechanically attached along the base of walls with screws and plates (deck securement) or screws and inverted termination bar (wall securement) at the following rate:

Mechanically Attached Systems	Per in-lap on center spacing, with a 12″ maximum
Fully / Self Adhered Systems	12″ on center
Ballast Applied Systems	8″ on center

4. All coated metal curb flashings and loose applied membrane flashings must be provided with separate metal counterflashings, or metal copings.
5. Metal counterflashings may be optional with fully adhered flashings depending on guarantee requirements. Exposed termination bars must be sealed with Flexseal® Roofing Cement.

F. Roof Drains:

1. Roof drains must be fitted with compression type clamping rings and strainer baskets. Original-type cast iron and aluminum drains, as well as retrofit-type cast iron, aluminum or molded plastic drains are acceptable.
2. Roof drains must be provided with a minimum 36″ x 36″ sump if applicable. Slope of tapered insulation within the sump shall not exceed 4″ in 12″.
3. Extend the roofing membrane over the drain opening. Locate the drain and cut a hole in the roofing membrane directly over the drain opening. Provide a ½″ of membrane flap extending past the drain flange into the drain opening. Punch holes through the roofing membrane at drain bolt locations.
4. For cast iron and aluminum drains, the roofing membrane must be set in a full bed of water block on the drain flange prior to securement with the compression clamping ring. Typical water block application is one 10.5 ounce cartridge per drain.
5. Lap seams shall not be located within the sump area. Where lap seams will be located within the sump area, a separate roof membrane drain flashing a minimum of 12″ larger than the sump area must be installed. The roof membrane shall be mechanically attached 12″ on center around the drain with screws and plates. The separate roof drain flashing shall be heat welded to the roof membrane beyond the screws and plates, extended over the drain flange, and secured as above.
6. Tighten the drain compression ring in place.

3.08 TRAFFIC PROTECTION

A. Install walkway pads/rolls at all roof access locations and other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.

B. Walkway pads must be spaced 2" apart to allow for drainage between the pads.

C. Fully adhere walkway pads/rolls to the roof membrane with solvent-based bonding adhesive, applied at the rate of 1 gal. per 100 sq. ft. to both the walkway and roof membrane surfaces. Press walkway in position once adhesive is tacky to the touch.

D. Alternatively, walkway pads/rolls may be hot-air-welded to the roof membrane surface continuously around the perimeter of the pad/roll.

3.09 ROOF PROTECTION

A. Protect all partially and fully completed roofing work from other trades until completion.

B. Whenever possible, stage materials in such a manner that foot traffic is minimized over completed roof areas.

C. When it is not possible to stage materials away from locations where partial or complete installation has taken place, temporary walkways and platforms shall be installed in order to protect all completed roof areas from traffic and point loading during the application process.

D. Temporary tie-ins shall be installed at the end of each workday and removed prior to commencement of work the following day.

3.10 CLEAN-UP

A. All work areas are to be kept clean, clear and free of debris at all times.

B. Do not allow trash, waste, or debris to collect on the roof. These items shall be removed from the roof on a daily basis.

C. All tools and unused materials must be collected at the end of each workday and stored properly off of the finished roof surface and protected from exposure to the elements.

D. Dispose of or recycle all trash and excess material in a manner conforming to current EPA regulations and local laws.

E. Properly clean the finished roof surface after completion, and make sure the drains and gutters are not clogged.

F. Clean and restore all damaged surfaces to their original condition.

3.11 MAINTENANCE

A. Inspections to the roof shall be performed annually by a GAFMC Master Select™ contractor.

B. An annual roofing system maintenance program shall be performed by a Master Select™ contractor in accordance with GAFMC's 10 Point Maintenance Program provided with your Diamond Pledge™ guarantee.

C. Submit copies of the roof inspection form, accompanying photographs (a minimum of 6 photos showing the condition of the roof and critical details), and a record of all roofing system maintenance to the GAFMC Contractor Services Department within sixty (60) days of the anniversary date of the completion of the roofing system. Annual roof inspections must be started within the first two (2) years of the guarantee term.

END OF SECTION

SECTION 07900
JOINT SEALERS

PART 1 GENERAL

1.01 SUMMARY

A. System Description: Joint sealers, fillers, and other related materials compatible with one another, with joint substrate, and other adjacent materials including finishes.

1.02 SUBMITTALS

A. Shop Drawings: Detail proper joint sealer and backing for the following joints:

1. Vertical and horizontal surfaces at interior and exterior locations.
2. Traffic areas at interior and exterior locations.
3. Kitchen areas to prevent open holes and crevices that could admit vermin.

1.03 QUALITY ASSURANCE

A. Provide single source responsibility for each type of joint materials.

1.04 WARRANTY

A. Manufacturer shall provide warranties covering joint sealers for 10 years from date of Substantial Completion.

B. Contractor shall furnish the Owner a 2 year written warranty covering quality of construction from applicator.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Joint Sealers:

1. Bostick Construction Products Division.
2. Pecora Inc.
3. Sika Chemical Corp.
4. Sonneborn Building Products.
5. Thiokol/Speciality Chemical Division.
6. Thoro Systems Products.
7. Tremco Manufacturing Co.
8. W.R. Meadows.

PART 3 NOT USED

END OF SECTION

SECTION 08110
STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Steel doors and frames including necessary accessories.

B. Section Does Not Include: Use of aluminum doors.

C. Related Sections:

1. 04220 - Concrete Unit Masonry.
2. 04530 - Masonry Patchwork.
3. 06100 - Carpentry.
4. 07900 - Joint Sealers.
5. 08710 - Finish Hardware.
6. 09000 - Patching and Finishes.
7. 09200 - Metal Studs, Lath, Suspension Ceiling, Plaster, and Stucco.
8. 09900 - Painting.

1.02 REFERENCES

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

1. A366-96 Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality.
2. A653/A-96 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. A924/A-96a Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
4. C270-96a Specification for Mortar for Unit Masonry.

B. Factory Mutual (FM), latest edition.

C. National Builders Hardware Association - "Recommended Locations for Builders", latest edition.

D. Steel Door Institute (SDI), latest editions.

1. SDI 100 Standard Steel Doors and Frames, latest edition.
2. SDI 105 Recommended Erection Instructions for Steel Frames.
3. SDI 107 Hardware on Steel Doors (reinforcement application).

E. Underwriters Laboratories (UL), latest edition.

F. UL 1784 Air Leakage Test of Door Assemblies.

G. National Fire Protection Association (NFPA)

1. NFPA 80 Standard for Fire Doors and Windows.
2. NFPA 101 Life Safety Code.
3. NFPA 105 Smoke and Draft Control Assemblies.

H. Florida Building Code (FBC).

I. Americans with Disabilities Act and Accessibility Guidelines (ADA).

J. American National Standards Institute (ANSI):

1. A250.4-1994 Test Procedure and acceptance criteria for physical endurance, steel doors and frames.
2. A224.1-1980 Test Procedure and acceptance criteria for prime painted steel surfaces for steel doors and frames.
3. All7.1 Accessible and Usable Buildings and Facilities.

K. Warnock Hersey International (WHI), Division of Inchcape Testing Services.

1.03 SUBMITTALS

A. Exterior Door Certification: Miami-Dade County product approval single listing with specified door, door frame, and hardware, demonstrating compliance with FBC missile impact criteria.

1. Comply with calculations, signed and sealed by a Florida registered professional engineer, establishing wind velocity pressure values for the specific project according to American Society of Civil Engineers (ASCE) 7-98 using a wind speed of 146 mph, exposure category "C", and a wind load importance factor of 1.15.

B. Submit properly identified product data including manufacturer's specifications and installation instructions before starting work, and any information

necessary to indicate compliance to these specifications.

C. Shop Drawings:

1. Indicate manufacturer's model number, door and frame elevations and sections, materials, gauges and finishes, fabrication and erection details, locations of finish hardware by dimension and locations/details of all openings and louvers. Do not proceed with any

fabrication until all details are approved.
2. Provide shop drawings for louver kits and light kits.

D. Upon request, submit nonreturnable samples necessary to be evaluated for construction compliance.

E. Label Construction Certification: For door assemblies required to be fire-rated and exceeding sizes of tested assemblies, submit manufacturer's certification for each door and frame assembly constructed to conform to design, materials, and construction equivalent to requirements for labeled construction.

1.04 QUALITY ASSURANCE

A. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies complying with NFPA 80 and have been tested, listed, and labeled according to UBC-43-2 and ISO-3008 by a nationally recognized independent testing and inspection agency.

B. Provide doors and frames complying with SDI 100 and as specified.

C. A/E reserves the right to cut open, at no cost to the Owner, a random door to verify construction and reinforcements for compliance with A/E's previously accepted manufacturer's shop drawings. Non-Compliance will be grounds for removal and replacement of installed door at no expense to the Owner.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver steel doors and frames cartoned or crated to provide protection during transit and job storage. Provide additional sealed plastic wrapping for factory finished doors.

B. Inspect steel doors and frames upon delivery for damage. Minor damage may be repaired if refinished items are equal in all respects to new work and acceptable to A/E. Remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4 inch high wood blocking. Avoid use of non-vented plastic or canvas shelters that could create a humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4" spaces between stacked doors to promote air circulation.

D. Deliver all doors and frames to the jobsite in a timely manner to not delay progress of other trades.

1.06 WARRANTY

A. Hollow metal doors and frames shall be supplied with a l

year warranty against defects in materials and construction.

B. Warranty shall begin on date of substantial completion of the project.

1.07 DEFINITIONS

A. Areas subject to wet mopping include kitchens, dining rooms, toilets, locker/showers, custodial, and other similar spaces with hard or resilient flooring.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors and Frames:

1. Medal by Ceco Corporation, Door Division, Carol Stream, IL.
2. Model 747-DCPS by Curries Company, Mason City, IA.
3. Model DCPS No.1 by Firedoor Corporation, Miami, FL.
4. Model H1930200 by Flemming.
5. Model F-16 by Quality Engineered Products Co., Inc., Tampa, FL.
6. Model DCBF by Steelcraft, Cincinnati, OH.
7. Model 4084475 by Republic Builders Products, Pembroke Park, FL.

2.02 DOORFRAMES

A. Fabricate exterior frames and interior frames to profiles indicated of 16 gage hot-dip zinc-iron alloy coated sheet steel, A366, with A60 coating designation according to ASTM A924 and ASTM A653 0.50 oz. zinc per sq.ft. total both sides. Steel shall be of commercial quality, stretcher leveled flatness.

B. Frames: Fully welded with mitered or butted head and jamb members with integral stops and with combination buck and trim as shown.

1. Corners shall have continuous flush and smooth welds without dishing.
2. Sanitary or hospital type stops shall have 6 inch high cutoffs with 45 degree caps.

C. Hardware Reinforcements and Preparations:

1. Frames shall be mortised, reinforced, and drilled/ tapped for mortised hardware according to approved finish hardware schedule and templates by hardware supplier.

a. Drilling and tapping for surface applied hardware shall be done in the field.
b. Locate finish hardware according to "Recommended

Locations for Builder's Hardware" published by National Builders Hardware Association, SREF, or as otherwise directed by A/E.

2. Butt (Hinge) Reinforcing:

   a. Steel plate 3/16" thick by 1-1/4" minimum to 1-1/2" maximum by 10 inches long, offset as required to have faces of butts flush with doorframe edge and secured by not less than 6 spot welds.

3. Strike Reinforcement: Offset clips of 12 gage steel, 1-1/4" x 4-7/8" long.
4. Closer Shoe Reinforcing for Parallel Arm:

   a. 12 gage steel plates (minimum 20" long x 1-3/4" wide) at bottom of door stop located next to door rabbet on hinge.
   b. Provide styrofoam or treated wood over plates to allow closer foot screws to seat without interference from grout fill.

D. Silencer (Mute) Provisions: Punch frames to receive silencers on strike jamb scheduled in Section 08710.

E. Center Hardware Mullions, Removable: Grout filled and fabricated with only one thickness of metal occurring at point of silencer punch-outs, 2" x 3", 11 gage hardware mullion by exit device manufacturer.

F. Grout:

1. Grout Guards:

   a. Provide 26 gage sheet metal covers welded to the back of frames at hinges, lock, bolts, tapped reinforcements at hardware and silencer locations.
   b. At silencer locations, furnish suitable removable plugs in holes to keep grout free.

2. Coatings:

   a. Provide full coverage at frame interior before grouting with corrosion inhibiting bituminous coating.

3. Grout At Frames:

   a. Grout fill doorframes at metal stud walls.
   b. Grout fill-in-place doorframes at masonry and concrete walls after installation.
   c. Grout shall be a mortar mix complying with ASTM C270, Type S-1800 psi minimum.

G. Frames at precast construction shall be cast-in-place.

H. Jamb Anchors: Provide according to frame manufacturer's recommendations for attachment to masonry walls, concrete columns, and metal stud system as shown on drawings to allow grout fill.

I. Floor Anchors: Provide 14 gage galvanized sheet steel angle shaped anchors for each jamb extending to the floor, punched for not less than two 1/4" diameter bolts.

J. Spreaders: Provide frames with temporary steel spreader bars tack welded to jambs to maintain full rigidity and proper alignment during installation.

K. Security Switch Preparation: Refer to the Drawings and M-DCPS Design Criteria Appendix.

2.03 HOLLOW METAL DOORS

A. Fabricate exterior and interior doors to profiles indicated of 16 gage hot-dip zinc-iron alloy coated sheet steel, A366, with A60 coating designation according to ASTM A924 and ASTM A653 0.50 oz. zinc per sq. ft. total both sides. Steel shall be of commercial quality, stretcher leveled flatness.

B. Types: Flush, seamless hollow construction with louvers or vision cutouts as shown or specified.

C. Sizes and Thickness: Sizes shall be as indicated and with 1-3/4" thickness unless otherwise specified or shown.

1. Provide undercuts where indicated for ventilation. Do not exceed 3/4" undercut for fire labeled doors.
2. Provide 3/8" undercut at doors for exterior openings with ADA threshold.

D. Door Perimeters:

1. Stile Edges: Bevel for single acting doors shall be 1/8" in 2 inches.
2. Reinforcing: Refer to the Drawings and M-DCPS Design Criteria Appendix.
3. Top and Bottom Channels.

    a. Not less than 16 gage A60 zinc coated steel channels-flush or inverted.
    b. Welded to the face sheets.
    c. Exterior door tops shall have flush surface.

E. Doors:

1. Classification: SDI Grade III - Model 2, 16 gage, seamless, and steel stiffened with M-DCPS required reinforcement and as shown on Drawings.
2. Doors shall have minimum 20 gage, continuous one piece, vertical steel stiffeners spaced not to exceed

6 inches apart and welded at 6 inches on center to face skin.

3. Lock Rail shall be one piece, full height minimum 16 gage channel.
4. Hinge Rail Reinforcement Manufacturer's Option:

    a. One piece, full height, 12 gage channel formed, and tapped for hinges.
    b. One piece, full height, minimum 16 gage channel formed and with minimum 3/16" thick steel by minimum 8" long at each hinge.

5. Cylindrical Lock Reinforcement: Minimum 16 gage standard hardware lock box.
6. Exit Device Reinforcement: Minimum 14 gage channel or box minimum 16" long by 3-1/2" wide.
7. All spaces between stiffeners shall be insulated with fiberglass or mineral insulation.
8. Door closer reinforcement shall be minimum 12 gage channel or box, welded to top channel. Bottom of reinforcement shall be a minimum of 5-3/4" from top of door, by width of door.
9. Astragals: Flat security type or "Z" as indicated in drawings or specifications.
10. All doors shall comply with ANSI A250.4-1994 Level "A" criteria and be tested to 1,000,000 operating cycles and 23 twist tests.

    a. Certification of Level "A" doors shall be submitted with approval drawings by the distributor.
    b. Do not bid or supply any type or gage of door not having been tested and passed this criteria.

F. Core material.

1. Stiffeners: Provide vertical members spaced not more than 6 inches o.c. with shape standard to manufacturer.
2. Core Fill: Provide fiberglass or mineral standard to manufacturer.

G. Hardware Reinforcements and Preparation:

1. Hardware Reinforcement: Comply With A/E's accepted manufacturer's drawings.
2. Hardware preparation.

    a. Drill for hardware according to accepted finish hardware schedule and templates furnished by hardware supplier.
    b. Drilling and tapping for surface applied hardware shall be done in the field.
    c. Locate finish hardware according to recommended locations for hardware as shown on drawings.
    d. Through bolts for exit devices and locksets shall be by manufacturer.

e. Lock reinforcement shall be located as height required for standard and disabled users as shown on drawings and as specified.

H. Security Switch Preparation: Refer to Drawings.

I. Exterior Door Louvers:

1. Zee profile weather resistant type equal to thickness of door, with center rail and of sizes indicated.
2. Fabricate frames and louvers of 18 gage bonderized electro zinc coated sheet steel.
3. Weld or secure frame and louvers into doors without use of screws or through bolts visible from the secured side.
4. Provide security grille as specified on inside of louvers.
5. At louver opening cutout, provide minimum of 20 gage zinc coated steel channel closure welded at opening perimeter.

J. Interior Door Louvers:

1. Inverted "Y" profile sightproof type equal to thickness of door, of sizes indicated.
2. Fabricate frames and louvers of 18 gage bonderized electro zinc coated sheet steel.
3. Weld frame and louvers into doors without use of screws or through bolts visible from the secured side.
4. Provide security grille as specified on inside of louvers.
5. At louver opening cutout, provide minimum of 20 gage zinc coated steel channel closure welded at opening perimeter.

K. Fire Door Louvers: Provide UL or FM labeled assemblies of sizes indicated, subject to the following:

1. Louver maximum size limited to 24 inches height and width.
2. Louver minimum size limited to 6 inches high and 12 inches wide.
3. Secure double louver frames to doors with sex bolts through door at 12 inches o.c. maximum.
4. Provide security grille as specified on inside of louvers.

L. Security Grilles:

1. Able to withstand a 200-pound force applied to any point from any direction and reject a 1/2" diameter sphere.
2. 16 gage, powder coat finish, A60 galvanized steel, with 50 percent minimum open area.
3. Manufacturers:

a. Crime Shield Barriers by Exeter, Wyoming, PA.
b. Security Barrier Screens by Phoenix, Lawrenceville, GA.
c. Securiperf Security Screens by Security Sales Company, Miami, FL.

M. Security Grilles - Missile Impact Resistant:

1. Certified missile impact resistant.
2. 14 gage, powder coat finish, A40 galvannealed steel, with 50 percent minimum open area.
3. Manufacturers:

a. Storm Shield Barriers by Exeter, Wyoming, PA.
b. SureGuard Hurricane Barriers by Phoenix, Lawrenceville, GA.

N. Insect Screens for Exterior Door Louvers:

1. 18 x 16 mesh aluminum screen on rewireable extruded aluminum frame.
2. Mount screen on interior of exterior doors with zinc plated sheet metal screws at 12 inches o.c.

O. Rat Screens for Exterior Door Louvers:

1. 1/4" mesh hot dipped galvanized steel hardware cloth secured in 16 gage bonderized hot dipped zinc coated steel "U" frames.
2. Mount screens on interior of exterior doors with zinc plated sheet metal screws at 12 inches o.c.

P. Interior Lightproof Door Louvers:

1. Interlocking channel lightproof type, equal to thickness of door, of sizes indicated.
2. Fabricate frames and louvers of 18 gage bonderized electro zinc coated sheet steel.
3. Weld or secure frame and louvers into doors without use of screws or through bolts visible from the secured side.

Q. Slip-on Spats: 20 ga., #4 satin finish.

R. Light Opening in Doors:

1. Provide light openings of sizes indicated.
2. At light opening cut outs, provide 16 gage zinc coated steel channel closures welded into opening perimeter.

S. Glass light frames in doors fabricated of not less than l8 gage galvanized steel with attachment screws allowed only on the non-secure side, not visible when viewing door lite frame face.

2.04 FINISHING AND SHOP PAINT

A. After Fabrication: Grind exposed weld marks smooth and flush, clean and degrease surfaces, apply metallic filler, sand smooth, and apply shop coat of manufacturer's standard rust-inhibitive metal primer baked on.

B. Prime Coat: Thoroughly cover all surfaces to provide uniform dry film thickness of not less than 1.0 mil without runs, smears, or bare spots.

C. Primer Coat: Use manufacturer's standard rust inhibiting primer complying with ANSI A-224.1-1990.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Frames:

1. Install plumb, level, and true to line, secured in openings.
2. Install frames according to accepted shop drawings, manufacturer's printed instructions.
3. Grout fill doorframes at metal stud walls and grout fill-in-place all other doorframes after installation. Frames at precast construction shall be cast-in-place.
4. Install fire-rated frames according to NFPA 80.
5. Install stainless steel slip-on spats at food service doorframes.

B. Doors:

1. Install in openings plumb, level, and true to line.
2. Apply hardware and adjust to achieve smooth and quiet operation.
3. Install insect/rat screens on interior of exterior door louvers.
4. Place fire-rated doors with clearances as specified in NFPA 80.

3.03 ADJUST AND CLEAN

A. Prime Coat Touch-Up: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective plastic wrappings from prefinished doors.

C. Fill all dents, holes, etc. with metal filler and sand smooth flush with adjacent surfaces-paint to match.

D. Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition. Provide final adjustment as follows:

1. Door Contact With Silencers: Doors shall strike a minimum of two silencers without binding lock or latch bolts in the strike plate.
2. Head, Strike, and Hinge Jamb Margin: 1/8".
3. Meeting Edge Clearance, Pairs of Doors: ± 1/16".
4. Bolts and Screws: Leave tight and firmly seated.
5. Soundseal gasketing.
6. Vermin Protection:

    a. Drop Seal: Full contact with no gaps.
    b. Brush weatherstripping.

END OF SECTION

SECTION 08305
ACCESS PANELS

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 07900 - Joint Sealers.
2. 09200 - Metal Studs, Lath, Suspension Ceiling, Plaster, and Stucco.
3. 09250 - Gypsum Wallboard.
4. 09310 - Ceramic Tile.
5. 09900 - Painting.
6. 15430 - Piping Specialties (Plumbing).

1.02 SUBMITTALS

A. Submit properly identified manufacturer's literature including manufacturer's specifications and installation instructions before starting work.

B. Shop Drawings: Submit shop drawings for review.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Access Panels:

1. Milcor Limited Partnership, Lima OH.
2. Nystrom Inc., Minneapolis, MN.

2.02 EQUIPMENT

A. Sizes as shown on Drawings or required to provide sufficient access for the proper operation of maintenance. Minimum size shall be 12 inches x 12 inches.

B. Provide 14 gage steel door with 16 gage steel frame with baked enamel prime coat.

C. Provide fire-rated components at fire rated construction.

D. Access Panels for Plastered Surfaces:

1. Milcor K.
2. Nystrom Flush PW.
3. Williams Bros. WB-PL.

E. Access Panels for Masonry and Tile Surfaces:

1. Milcor M.
2. Nystrom Flush TM.

F. Access Panels for Gypsum Wallboard.

1. Milcor DW.
2. Nystrom Flush WB.
3. Willaims Bros. WB-DW.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumb and level in suspended metal lath and stucco ceilings, metal lath and Portland cement plaster, gypsum wallboard, or tile side walls where shown on drawings.

1. Leave surfaces clean and ready for final painting.
2. Adjust to operate properly and replace damaged units.

B. Finishes: Refer to respective sections of specifications. Paint to match adjacent surface.

END OF SECTION

SECTION 08316
REMOVABLE ALUMINUM FLOOD BARRIERS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Product engineering and fabrication techniques, shop drawings, structural calculations and Professional Engineering Stamps State of Florida in accordance with the FEMA design manual requirements for Non-Residential Flood proofing.

B. Factory fabrication and installation of aluminum flood barriers.

C. Finish of flood barrier assembly.

1.02 RELATED WORK

A. 07900 - Joint Sealers

1.03 REFERENCES

A. FEMA Technical Bulletin 3-93 Non-Residential Flood proofing

B. FEMA Flood Proofing Non-Residential Structures #102

C. American Architectural Manufacturers Association (AAMA) 501, 603.8, 605.2, 607.1

D. NFIP Title 44 US Code of Federal Regulations, Section 60.3

E. FIRM (Flood Insurance Rate Map)

F. ASCE 24-98, ASCE/SEI 24-05

1.04 QUALITY ASSURANCE

A. Provide for a flood barrier and application that is structurally sound, impact resistant and conforming to applicable performance requirements described herein.
B. Except as otherwise indicated, requirements for aluminum flood barriers, terminology, tolerances, standards of performance and workmanship are those specified in NFIP Section 60.3.

C. Base Flood Elevation (BFE) and Building Sub Elevations shall be furnished to Barrier Manufacturer by the Architect or Engineer of Record.

D. All Barrier heights shall be finished to 12″ above BFE. Provide Flood Proofing Certification for compliance and approval.

1.05 PERFORMANCE REQUIREMENTS

A. Design Criteria

1. Assembly shall conform to the requirements for A and AE Zones as set forth by the NFIP.

B. Performance

1. Hydrostatic Pressure Resistance – Flood Barriers shall conform to the criteria for resisting lateral forces due to hydrostatic pressure from Freestanding Water as set forth by FEMA Technical Bulletin 3-93.

2. Hydrodynamic Force Resistance – Flood Barriers shall conform to the criteria for resisting lateral forces due to moving flood waters at a minimum Velocity of 8 Feet per second, unless otherwise noted, as set forth by FEMA Technical Bulletin 3-93.

3. Debris Impact Force Resistance – Flood Barriers shall conform to the criteria for resisting a 1000 pound object at minimum Velocity of 8 Feet per second unless otherwise noted, as prescribed by FEMA Technical Bulletin 3-93.

C. Egress

1. Provide for a fully removable system including all frame, sill and jamb assembly members. Permanent sub-frame assemblies shall not be permissible.

1.06 SUBMITTALS

A. Shop Drawings

1. Submit scaled shop drawings including all conditions of construction, location diagrams including identification of and spacing of anchorage, framing members, joinery and sealant details.

B. Structural Calculations

1. Provide structural calculations by a currently licensed structural engineer, P.E State of Florida, demonstrating structural compatibility with project requirements.

C. Samples

1. Submit (1) 6” length of aluminum extrusions as requested by A/E.

D. Warranties

1. Provide manufacturer’s warranty in accordance with the contract documents.
2. Provide installation warranty in accordance with the contract documents.

1.08 WARRANTY

A. Provide manufacturer's written Warranty stating that flood barriers for this project will be free from defects and workmanship for a period of five (5) years from date of substantial completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Acceptable Flood Barrier Manufacturers

1.ArchitectureMetalsLtd.Co.
5500Military Trail
Suite 22-220
Jupiter, FL 33458
561-630-0020

B. Architect Approved Equal

1. Products of other manufacturers must be pre-qualified to bid not less than 10 days prior to bid date.
2. Submit proof of compliance inclusive of supporting technical data, engineering calculation, certification of equivalent experience and samples for comparison.

C. Aluminum

1. Extruded aluminum structural frame members, support angles and mullions shall be 6063-T6 alloy and temper and not be less than .125” wall thickness.

2. Aluminum sheet skin shall be 3003-H16 alloy and temper and not less than .125” wall thickness on exterior sheet and not less than .024” on interior sheet.

3. Extruded aluminum brace plates shall be 6063-T6 alloy and temper and not be less than .125” wall thickness.

4. Finishes on all components shall be “Mill Finish”.

d. Gaskets

1. All gaskets shall be a dense 20 durometer rubber not neoprene.

e. Fasteners

1. All anchor bolts to be galvanized steel in conformance with ASTM A-307 or 304 Series Stainless Steel.

f. Sealants

1. Use only sealants that are compatible with all substrates and field applied in accordance with the manufacturer’s recommendations.

2.03 FABRICATION

A. Fabricate flood barriers to comply with requirements indicated for design, dimensions, materials joinery, and performance. Assemble flood barriers at manufacturer’s factory where feasible. Assemble in the largest possible sections according to job site conditions and clearly mark units for reassembly assuring a coordinated installation.

B. Fabricate frames including integral sills to fit in openings of size indicated with allowances made for fabrication and installation tolerances of barriers, adjoining construction and perimeter rubber gasket joints.

C. Supports, anchorages and accompanying accessories required complete assembly to be supplied by installing contractor.

2.04 REMOVABLE ALUMINUM FLOOD BARRIERS

A. Removable Flood Barriers and Frames are to be designed to restrain the force of water and debris by means of structural tubular and cladding members in a compression set against a smooth substrate utilizing rubber gasket seals in either an inset or face mounted application.

B. Flood barriers shall be specifically engineered and designed to meet a minimum safety factor based on yield strength to provide for an effective seal against site specific and specified flood forces.

C. Attachment anchors to be permanent drop-in threaded type, to accommodate repeatable put up and take down as required for mitigation.

D. Owner shall provide for onsite storage of removable flood barrier system for quick access.

PART 3 EXECUTION

3.01 INSTALLATION

A. Building contractor shall see to it that all surfaces to receive Flood Barriers shall be “paper smooth”, plumb, true and level before installation can begin.

B. After verification of field conditions and properly prepared openings, install flood barriers in strict accordance with approved submittal drawings.

C. Attach only to smooth surfaces providing for proper and compatible infill for gaps in substrate.

D. Existing slabs and walls adjacent to openings where flood barriers are to be installed shall be given a water proof sealer surface treatment prior to installation of flood barriers by the building contractor.
E. Protect all dissimilar metals with a heavy coat of zinc chromate or bituminous paint.

F. Install true and plumb without warping or racking.

G. Apply appropriate sealants where indicated on shop drawings and in accordance with manufacturers recommendations.

H. Flood shield installer shall install barriers one time, for fitting and anchoring. Installer shall uninstall, and Contractor shall then move barriers to storage location or as directed by architect or owner’s representative.

3.02 CLEANING, PROTECTION AND STORAGE

A. Clean all exposed surfaces and remove all labels from barriers.

B. Building contractor shall move all flood barriers to location as designated, and shall store in such a manner as to protect the sealing gaskets from any damage.

END OF SECTION

SECTION 08331
OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 05500 - Metal Fabrications.
2. 07900 - Joint Sealers.
3. 09900 - Painting.

1.02 REFERENCES

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

1. A653/A-96 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. A924/A-96a Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

B. Florida Building Code (FBC), latest edition

1.03 SUBMITTALS

A. Submit properly identified manufacturer's literature including specifications, installation details, and the following data before starting work.

1. Shop Drawings: Indicate size, construction details, gages, finish, installation details, anchorage, and hardware location.
2. Certification: Miami-Dade County product approval demonstrating compliance with FBC missile impact criteria.

a. Comply with calculations, signed and sealed by a Florida registered professional engineer, establishing wind velocity pressure values to meet current wind speed, exposure category, and wind load importance factor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Overhead Coiling Doors:

1. Model S21-PS by Atlas Door, Orlando, FL.
2. Series S-10 by Best Rolling Doors, Hialeah-Gardens, FL.
3. Model F-H-S by Kinnear Division of Wayne Dalton,

Wayne Dalton, OH.
4. Series 610 by Overhead Door, Dallas, TX.
5. Model SSD-FF by Raynor, Dixon, IL.

2.02 FABRICATION

A. Galvanizing: Hot-dip zinc coated sheet steel according to ASTM A924, G90 or ASTM A653, 1.25 oz. zinc per sq.ft.

B. Operation:

1. Overhead Door at Ballfield Restroom building - Chain hoist operation, maximum 35 lb. pull on hand chain.
2. Overhead doors at Swimming Pool facility - Electrical operation.

a. Momentary switch with safety edge for automatic stop and change of direction.

C. Curtain: Flat slat, 20 gauge galvanized steel minimum.

D. Locking: Provide means for padlocking. Padlock is NIC.

2.03 FINISHES:

A. Factory primed with baked-on enamel or polyester top coat. Color selection by A/E.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install according to manufacturer's installation instructions and with accepted shop drawings.

B. Install accurately, without warpage, true to line, plumb and level.

END OF SECTION

SECTION 08520
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 03300 - Cast-In-Place Concrete
2. 03450 - Architectural Precast Concrete
3. 07200 - Joint Sealers.
4. 08800 - Glass and Glazing.

1.02 REFERENCES

A. AAMA/NWWDA 101-97 Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.

B. American Society for Testing and Materials (ASTM):

1. A123-89a Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2. C509-94 Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
3. D2000-96 Classification System for Rubber Products in Automotive Applications
4. E283-91 Test Method for determining the Rate of Air Leakage Through Exterior Windows, Curtain walls, and Doors Under Specified Pressure Differences Across the Specimen.
5. E330-96 Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
6. E331-96 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

C. Florida Building Code (FBC).

1.03 DEFINITIONS

A. Exposed: Any fasteners, anchors, clips, accessories, sealants, etc., visible on the exterior or interior side of a window when in the maximum open position.

1.04 SUBMITTALS

A. Product Data: Manufacturer's specifications and catalog cuts.

B. Shop Drawings:

1. Indicate elevations, locations, markings, quantities, materials, jamb conditions, metal thicknesses, sizes, shapes, dimensions, and finishes.
2. Indicate locations for installing frames.

3. Indicate methods of assembling, connecting, anchoring, fastening, and bracing.
4. Indicate types, material, finishes, sizes, and locations of hardware.
5. Indicate operable and fixed panels of each window unit.
6. Identify each type of mullion and anchorage system.

C. Missile Impact Certification:

1. Provide current Miami-Dade County Notice of Acceptance (NOA) or Florida Product Approval, demonstrating compliance with FBC missile impact criteria for High Velocity Hurricane Zone (HVHZ), for window type, size, and configuration indicated on drawings.

2. Comply with calculations, signed and sealed by a Florida registered Professional Engineer, establishing wind velocity pressure values for the specific project, according to FBC and ASCE 7, using Classification Of Buildings Category III, Exposure Category "C" and Importance Factor of 1.15.

D. Calculations/Test Results/Details:

1. Provide wind pressure test results by a nationally recognized testing laboratory (NRTL) demonstrating compliance with applicable HVHZ requirements for supplied window units.
2. Provide Installation details, signed and sealed by a Florida registered Professional Engineer, detailing anchorage system noted and specified to comply with ASCE 7.

E. Samples:

1. Aluminum and color finish
2. Sealants: Manufacturer color chart.

1.05 SYSTEM DESCRIPTION

A. Performance Requirements: Fabricate units to comply with:

1. Design Wind Velocity Pressures: According to ASCE 7, latest edition.
2. Requirements of testing and certification by AAMA/NWWDA 101 for commercial or higher rated windows complying with AAMA/NWWDA 101, Table 2.1 Gateway Performance listed values as determined by ASCE 7, latest edition.
3. Provide double glazed windows with 45 condensation resistance factor, according to AAMA 1502.6.

1.06 QUALITY ASSURANCE

A. Notify inspector within 24-hours after completion of

windows to arrange for inspection.

B. Do not conceal anchors and connections until inspection is complete.

C. Exposed fasteners, when the window is in a closed or opened position, shall be tamperproof.

D. Means of egress shall comply with the requirements of SREF without compromising the aesthetics of the windows.

1. Designated egress windows shall comply with handicap accessibility requirements, opening from the inside with one 5 pound movement, without tools. Screens or louvers of egress windows shall open with the same one movement opening of the egress window.

E. Coordination of Fabrication:

1. Check actual window openings in construction work by accurate field measurement before fabrication. Show recorded measurements on final shop drawings.
2. Coordinate fabrication schedule with construction progress as directed by Contractor to avoid delay of work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials in manufacturer's original, unopened, labeled containers.

B. Store items to prevent damage to materials or structure and in approximate order of use to avoid excessive rehandling.

C. Repair damaged materials and replace materials that cannot be repaired to original condition. Replace warped materials.

D. Protect exposed surfaces of metal with removable covering to prevent damage to finish. Protect metal while adjacent painting and caulking are being performed.

1.08 WARRANTY

A. Submit written warranty, signed jointly by manufacturer, installer, and Contractor, agreeing to replace aluminum window units that fail in materials or installations within 3 years after substantial completion. The 3 parties jointly and separately are responsible for the installation for the warranty period.

B. Failure of materials or installation shall include, but not be limited to, excessive leakage or air infiltration, excessive deflections, faulty operation of sash, deterioration of finish or metal in excess or normal weathering, and defects in hardware and weatherstripping.

PART 2 PRODUCTS

A. Missile Impact Resistant Horizontal Sliding Service Window: Certified missile impact resistant glass.

1. Traco.
2. Accepted equivalent.

2.01 COMPONENTS

A. Aluminum Extrusions: 6063-T5, alloy, minimum 22,000 psi ultimate tensile strength and minimum 0.062" thickness at any location for main frame and sash members.

B. Window Fabrication:

1. Provide manufacturer's standard fabrication and accessories that comply with indicated standards and are reglazable without dismantling of sash framing.
2. Include complete assembly of components and anchorage of window units, and prepare sash for glazing except where preglazed at factory.
3. Sizes and Profiles:

a. Fabricate to sizes and profiles indicated on final shop drawings.
b. Details in drawings are based upon standard details by one or more manufacturers.
c. Similar details by other manufacturers will be acceptable, provided they comply with size requirements, minimum/maximum profile requirements, and referenced performance standards and are approved by the Board.

4. Preglazed Fabrication:

a. Preglaze window units at factory where possible and practical.
b. Comply with requirements of Section 08800, in addition to requirements of ANSI/AAMA 101.

5. Provide subframes with anchors for window units as shown, of profile and dimensions indicated minimum 0.062" thickness extruded aluminum, with mitered or coped corners, welded and dressed smooth or with concealed mechanical joint fasteners. Finish to match window units. Seal joints on inside with sealant.

C. Fasteners:

1. Aluminum, nonmagnetic stainless steel, or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components

of window units.
2. Reinforcement: Fasteners screw-anchored into aluminum less than 0.125" thick, shall have interior reinforced with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.
3. Exposed fasteners, when the window is in a closed or opened position, shall be tamperproof.
4. Do not use exposed fasteners except for application of hardware.
5. Exposed fasteners shall match finish of adjoining metal.
6. Provide tamperproof machine screws or rivets for exposed fasteners.

D. Anchors, Clips and Window Accessories: Depending on strength and corrosion-inhibiting requirements, fabricate units of aluminum, nonmagnetic stainless steel, or hot-dip zinc coated steel complying with ASTM A123. Exposed items shall match the window frame color.

E. Compression Glazing Strips and Weatherstripping: Molded neoprene gaskets complying with ASTM D2000 designation 2BC415 to 3VC620, or molded expanded neoprene gaskets complying with ASTM C509, Grade 4.

F. Sealant:

1. Seal frame joints, completely filling voids, flush with exposed surfaces. Provide type recommended by window manufacturer for joint size and movement, to remain permanently elastic, non-shrinking, and non-migrating.
2. Comply with Section 07900 for materials and installation of sealants.
3. Color shall be as selected by A/E.

G. Friction Shoes: Nylon or other non-abrasive, nonmetallic, non-staining, non-corrosive durable material.

H. Balance Mechanism: Spring loaded, with adjustable tension control.

I. Mullions:

1. Provide mullions and cover plates as shown, matching window units, and complete with anchors for support and installation.
2. Allow for erection tolerances and provide for movements of window units due to thermal expansion and building deflections.

J. Finish for Windows and Window Components:

1. Anodized: NAAMM AA-C2241, Class I, minimum 0.7 mils, Color: Black anodized.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install windows according to Section 08800, manufacturer's printed instructions, Miami-Dade County product approvals and accepted shop drawings under direct supervision of manufacturer's representative.

B. Bed windows with sealants, mastic, or glazing tapes to masonry lip, concrete/precast lip, or wood buck as applicable and secure according to Miami-Dade County product approvals.

C. Separate aluminum from masonry and ferrous metals by use of bituminous coating or gasketing to eliminate possibility of corrosion from electrolytic action.

D. Erect windows plumb, level, and true.

1. Do not distort windows by erection screws or fittings.
2. After window erection, apply an even spray coat of liquid wax to window surfaces for protection against stains and scratches.

E. Protect work from corrosion, prime coat concealed steel stiffeners, anchors, brackets, fasteners, and the like before installation and seal joints between window frames and building tightly and continuously.

F. Maintain wire or clips holding ventilators closed in place until windows are completely erected and hardware is attached.

3.02 ADJUSTING AND CLEANING

A. Adjust operating sash and hardware to provide tight fit at contact points and at weatherstripping, and to ensure smooth operation and weathertight closure.

B. Cleaning:

1. Clean surfaces promptly after installation of windows, exercising care to avoid damage to protective coatings and finishes.
2. Remove excess glazing and sealant compounds, dirt, and other substances.
3. Lubricate hardware and moving parts.
4. Clean glass of preglazed units promptly after installation of windows.
5. Comply with Section 08800 for cleaning and maintenance.

C. Protection: Provide protection to prevent damage to window units.

END OF SECTION

SECTION 08710
FINISH HARDWARE

PART 1 GENERAL

1.01 SUMMARY

A. Provide finish hardware including necessary accessories.

B. Related Sections:

1. 06100 - Carpentry.
2. 08110 - Steel Doors and Frames.
3. 16721 - Fire Alarm and Detection System.

1.02 SUBMITTALS

A. Exterior Door Certification: Miami-Dade County product approval single listing with specified door, door frame, and hardware, demonstrating compliance with Florida Building Code missile impact criteria.

1. Provide and comply with calculations, signed and sealed by a Florida registered professional engineer, establishing wind velocity pressure values for the specific project according to American Society of Civil Engineers (ASCE) 7, exposure category "C", and a wind load importance factor of 1.15. Select hardware at exterior doors to resist the wind load resistance forces and missile impact resistance requirements in the Construction Documents.

B. Hardware Schedules:

1. Hardware schedules with A/E review comments shall be resubmitted with corrections.
2. Approval of Hardware Schedule shall not relieve the Contractor of the cost and responsibility to furnish all necessary and required hardware for this project.
3. Three weeks before ordering hardware, submit 2 copies of Hardware Schedule covering all items required for entire project to A/E.
4. Identify manufacturer of each item with type, numbers, and finish symbols.
5. Indicate door numbers at individual hardware set numbers.
6. Include a separate index, listing all doors in the project sorted numerically and with appropriate hardware set number next to each door number with building numbers.
7. Horizontal type schedules are not acceptable.

C. Catalog Cuts: Submit 2 sets of catalog cuts for each piece of hardware furnished.

D. Templates: Furnish suitable templates, with approved Hardware Schedule, to respective trades and suppliers as required to insure accurate setting, reinforcing, and

fitting of finish hardware specified.

E. Keying:

1. Lock cylinders shall be keyed and registered by the factory for all Master Key (MK) and Construction Master Key (CMK) systems to maintain security and identification.

a. Provide Great Grand Master Keys (GGMK), Grand Master Keys (GMK), Master Keys, Section Master Keys (SMK) and Change Keys (CK) according to the keying schedule.
b. Provide individual lock cylinder keying according to M-DCPS Central Lock Department furnished keying schedule.
c. Master Keys

a) Do not pack keys with locksets.

2) Key Bows: Standard and unembossed.

d. Miscellaneous Keys:

1) Mark and tag keys to electric panels, access panels, built-in cabinets, and any other miscellaneous keys with description and room number or location.
2) Turn all keys over to Owner's representative upon acceptance of project and obtain a receipt. Do not leave the facility without obtaining receipt.

1.03 QUALITY ASSURANCE

A. Florida Building Code (FBC).

B. Americans with Disabilities Act and Accessibility Guidelines (ADA).

C. National Fire Protection Association:

1. NFPA 80 - Standard for Fire Doors and Windows.
2. NFPA 101 - Life Safety Code.

D. State and local fire safety codes.

1.04 DELIVERY, STORAGE, AND HANDLING:

A. Properly package and mark hardware according to the Hardware Schedule, complete with necessary screws, special tools, instructions, and installation templates.

B. Keys: Do not package keys with the individual hardware sets.

C. Store hardware in a secured area.

PART 2 PRODUCTS

2.01 MANUFACTURERS - All acceptable manufacturers are listed under components.

2.02 COMPONENTS

A. Substitutions will not be considered for any of the following listed manufacturers of hinges, locksets, door closers, or exit devices.

1. Lock Cylinders: Six pin and single ring only.

2. Locksets: Locksets shall be furnished and assembleed with cylinder and labeled with door tag number and key symbol from hardware supplier, as specified and meeting ADA requirements.

a. Schlage D Series Rhodes - Heavy-duty lever handle locksets (Vandlgard) x 26D x thru-bolts. Thru-bolts required for wood and steel doors, regardless of manufacturer's recommendations.
b. Marks 195 Survivor Series: Heavy-duty lever handle locksets (American Design) x 26D.
c. Example:

Function	Description	Part Number Schlage	Part Number Marks
Office	Individual Admin. offices	D92	195AB
Exit Lock	Exit Only	D25	195NB
Storeroom*	Mech., Elec., Custodial Storerooms	D96	195F
Hotel/Motel	Individual Staff Toilets	D85	195H
Privacy	Individual Unisex Toilets	D40S	195L
Passage	Passage Only	D10	195N
Communicate	Communicating (Restricted Usage)	D66	195DC

*Knurled outside levers required for Mechanical, Electrical, Custodial, and Hazardous areas.

3. Hinges: By Hager, McKinney, or M-DCPS Central Lock Department accepted equivalent.

a. Interior hollow metal doors:

1) Hager BB1168 x ss pin 4-1/2 x 4-1/2 USP.

b. Interior wood doors:

1) Hager BB1279 4-1/2 x 4-1/2 USP.

c. Exterior doors:

1) Hager AB933 4-1/2 x 4-1/2 US32D.
2) Accepted equivalent with stainless steel oil-impregnated bearings and stainless steel hinge pins.

d. Interior High Security Doors:

1) Hager AB930 4-1/2 x 4-1/2 USP.
2) Accepted equivalent with stainless steel oil-impregnated bearings and stainless steel hinge pins.

4. Exit Devices:

a. Comply with ADA requirements and shall be by the same manufacturer.

b. Precision 1100 Series or M-DCPS Central Lock Department accepted equivalent.

1) Non-labeled: Pairs of doors shall have outside door pull on RHR door only. Provide "exit only" device on LHR door.
2) Labeled: Interior labeled doors requiring exit devices, shall have outside lever trim on RHR door. Provide "exit only" device on LHR door.

c. Exterior and Courtyard Non-Labeled Openings:

1) Entry Doors:

a) Precision 1103 x US32D x SNB x less trim x cylinder x door pull x SNB.

2) Exit Only Doors:

a) Precision 1101 x less trim x less cylinder x US32D x SNB.

3) Card Access Doors:

a) SS1103 x US32D less trim xSNB with Hager H4G door pull and cylinder.

d. Interior, Exterior, and Courtyard Labeled Openings:

1) Entry Doors:

a) Precision FL1108-V39-L x cylinder.

2) Exit Only Doors:

a) Precision FL1101 less trim and less cylinder.

5. 5. Vertical Rod Exit Devices: Vertical Rod Exit Devices are not acceptable.

6. Bore-In Deadbolt Locks:

   a. Used at non-labeled exterior group toilets, custodian rooms, and mechanical rooms: Marks or Schlage.
   b. Other than exterior group toilets, deadbolt locks shall not be used on labeled doors or any student occupied area.

      1) Marks 13OS/26D with door pull Hager H4G for classroom function deadbolt.
      2) Marks 13OK/26D with door pull Hager H4G for non-labeled doors.

7. Surface Mounted Head/Foot Bolts.

   a. Use at labeled and non-labeled doors on telephone closets, mechanical rooms, electrical rooms, flammable storage, and interior storage rooms at the LHR door of a pair of doors without a center mullion. Comply with NFPA-80 2.8-2.5.
   b. Do not use at student occupied areas.
   c. Left Hand Reverse (LHR) leaf.

      1) Exterior Labeled: Hager 275D (UL).

   d. Right Hand Reverse (RHR) leaf.

      1) Exterior Labeled: Exit device x door pull and cylinder.
      2) Exterior Non Labeled: Deadbolt x door pull and cylinder.
      3) Interior: Storage function cylindrical lever lock, knurled outside.

8. Removable Hardware Mullion:

   a. For exterior pair of doors except at non-occupied spaces.
      1) Labeled openings: Precision FL822.
      2) Non-labeled openings: Precision 822.

9. Weather Stripping, Thresholds, Door Bottoms, and Astragals.

   a. Accepted Manufacturers: Baldwin, Brookline, Cipco, Corbin, Glynn Johnson, Hager, Ives, National Guard Products, Quality, Pemko, Reese, Russwin, Trimco, Rockwood, or Zero.
   b. Stop applied sound seals or weather stripping shall not exceed more than 5/16" thickness.

c. Provide rain drips for all exterior doors not having over head roof protection.
d. Provide door weatherstripping for head and jamb legs at building perimeter doors to air-conditioned spaces, exterior classroom entrance and exit doors, exterior electric rooms, and exterior doors to media center.
e. Soundseals and automatic door bottoms shall be used at perimeter doors to band rooms, media centers, music suites and at interior doors of music rooms, CCTV rooms, mechanical rooms, and other sound sensitive rooms. Use bumper type thresholds for exterior doors and saddle type thresholds for interior doors.
f. Thresholds:

1) Panic Type Thresholds (For exterior and sound control use):

a) Hager 520SAS: 5" wide x 1/2" high.

2) Saddle Type Thresholds (Only for interior use at change of floor finishes and sound control use):

a) Hager 418SA: 3" wide x 1/4" high.
b) Hager 413SA: 5" wide x 1/4" high.

3) Marble Thresholds: For toilet rooms, wet mop areas adjacent to other spaces and sink or mop receptor equipped custodial closets.
4) Thresholds shall comply with ADA requirements.

g. Door Bottoms.

1) Automatic Door Bottoms: Hager 747S.

h. Weatherstrip/Soundseals:

1) Rigid Weatherstrip: Hager 891SAS.
2) Press on Weatherstrip: Hager 736.
3) Brush Weatherstrip: Hager 801S.
4) Soundproofing: Hager 862SXN or SDN.
5) Silencers: Hager 307D.
6) Overhead Rain Drip: Hager 810S.

i. Astragals:

1) Hager 837SAV.
2) Use only at a pair of doors with head and foot bolts.

10. Auxiliary Hardware: Push Plates, Kick Plates, Doorstops and Holds, and Doorstops.

a. Accepted Manufacturers: Architectural Builders Hardware (ABH), Baldwin, Brookline, Cipco, Corbin,

Glynn Johnson, Hager, Ives, National Guard Products, Quality, Pemko, Reese, Rockwood, Russwin, Trimco, or Zero.

b. Push-Plates: Hager 60S PK, hard black plastic with beveled edges.

1) Provide push plates at non labeled doors with exit devices or deadbolts, and at toilet room doors without locksets.
2) Omit push plates at doors with lever handle cylindrical locksets.
3) Provide 2 push plates and 2 kick plates on double acting doors.
4) Do not use push-plates on fire labeled doors.
5) 16 inches x 16 inches x 1/8", hard black plastic.

a) 4 inches x 16 inches x 1/8" on doors with vision panels.

6) Clear plastic, push-plates are not acceptable.

c. Kick Plates: Hager 214SBL.

1) Provide at all doors except to individual offices at administration areas.
2) 16 inches x 1/8" thick x less 2 inches the width of door, hard black plastic with beveled edges. At louvered doors, provide 16 inch height maximum or to bottom of louver.
3) Clear plastic kick plates are not acceptable.
4) Kick plates for labeled doors shall be UL labeled.

d. Doorstops and Holds:

1) Wall mounted doorstop and holds: Hager 254W x US26D.

a) At custodial, electrical, and mechanical non labeled spaces and exterior non-labeled access to corridors.

2) Floor mounted door holders: Hager 258F x US26D.

a) At non-labeled doors only if doorstop and holds cannot be used and cush-n-stop closers at labeled doors.

3) Door holds at labeled doors with closers shall be magnetic hold open devices connected to the fire alarm system.

e. Doorstops:

1) Wall mounted doorstops: At non-labeled wood doors to administrative individual offices,

conference rooms, storage rooms, and work rooms and at all labeled doors. Install on solid concrete or masonry walls or at drywall or plaster applications with adequate backing reinforcement.

a) Convex type for doors not having push button locksets: Hager 230W.
b) Concave type for doors having office function or push-button locksets, locate on button side of door: Hager 234W.

2) Floor mounted doorstops: At labeled doors only if wall mounted stops cannot be used.
3) Provide doorstops or other door control devices at doors if stop and holds are not specified.

f. Door Pulls, Cast aluminum: Hager H4G.

11. Fasteners:

a. Hollow Metal Doors: Accepted machine.
b. Kick Plates: O.H. Phillips recess Type A SMS.
c. Thresholds: Hager FHSL 25-1/4 x 1/4-20 x 2" cadmium plated expansion screw in one unit or accepted equivalent.
d. Brush Weatherstripping: As recommended by manufacturer.
e. Finish: Match finish of surfaces to which they are applied.

12. Door Closers:

a. For hollow metal doors, doors exposed to wind conditions, labeled doors, and doors to student occupied spaces.
b. Pairs of doors shall require closers.
c. Do not provide a closer on a leaf with head and foot bolts.
d. LCN Series 4111-N AVB x EDA x TB, parallel arm only.
e. 4111-N DEL x AVB x AL x EDA x TB (Special delay action closer, do not provide at doors opening 180 degrees or greater).
f. 4111-N Spring Cush AVB x AL x EDA x TB.
g. 4116-N AVB x AL x EDA x TB (oversize doors only, verify with manufacturer).
h. 4111-N Cush-n-stop x AVB x EDA x TB. Provide where 180 degree swing is obstructed or where a wall stop is not practical.

13. Overhead Stop and Hold:

a. 3324-US26D, surface mounted, by ABH.

14. Electromagnetic Lock: Locknetics or accepted equivalent.

a. Labeled and non-labeled doors:

1) Locknetics Series 390 x MBS x L1 x ATD x FSE x US28. Minimum holding force shall be 1500 pounds.
2) Signal Switch (SS): Internally mounted switch to monitor the use of the touch bar.
3) Exit Device, labeled: SS FL1108 x 39LA
4) Exit Device, non-labeled: SS 1103 x door pull.
5) Hinge: AB850 x 4.5" x4/5" x US32D x ETW-4.
6) Motion Detector: ScanII B.

15. Viewfinder (peephole).

a. 1755 x 26D Hager.

16. Key Cabinet: At elementary, middle, and high schools.

1) Tel-kee AWC 250.

17. Sliding Glass Door Locks for display cabinets etc. using only 1/4" thick, solid sliding safety glazing glass doors: By Wonder Lock.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not proceed with the work of this section until conditions detrimental to the proper installation and protection of hardware have been performed.

3.02 INSTALLATION

A. Door hardware locations shall be as follows:

1. Pushplates: 1 inch above pushpad and 1 inch from exit device head.
2. Pushplates with a Vision Panel: 1 inch above exit device between vision panel and edge of door.
3. Exit Device: 40-5/16" from door bottom or 34 inches as required for children's accessibility.
4. Lever Lockset: 38 inches from door bottom or 34 inches as required for children's accessibility.
5. Deadbolt: 48 inches from door bottom.
6. Kickplate: 1 inch from door bottom or 1/2" from top of surface mounted automatic door bottom.
7. Viewport: 60 inches from door bottom.

B. Finish Hardware:

1. Lockset and cylinders: Permanent restricted cylinders shall be installed with lockset.
2. Do not install finish hardware until operations causing dampness have been completed.

C. Door Closers:

1. Install with closer manufacturer's thru bolts and adjust for proper operation.
2. Location: Locate closer on door as if door were to swing 180 degrees, regardless of the actual swing of the door. When using Cush-n-stop, mount for maximum opening swing. Verify 90, 100, or 110 degree template mounting.
3. Do not allow closer to act as a stop.
4. Closer Foot: Install with 5 screws for wood jambs or 5 stove bolts for metal jambs. Provide an accepted spacer (if required by the width of stop) for fifth fastener.

    a. Use of screw type fasteners are not allowed for metal frames.

D. Exit Devices: Install with thru bolts.

E. Door Pulls: Top hole of door pull shall be 2 inches above bottom of exit device casing at casing centerline.

F. Stop and Hold, Wall Mounted: Install at top outside corner of door, with thru bolts or grommet nuts.

1. Install wall portion according to manufacturer's recommendations and based on field conditions to withstand 100 lbs. shear pressure.

G. Stop and Hold, Floor Mounted: Install at bottom outside corner of door, with thru bolts or grommet nuts.
1. Install floor portion according to manufacturer's recommendations, after finish floor covering has been installed. Secure to subfloor using full size spacer if necessary to keep bottom flush with finish flooring, i.e. carpet.

H. Surface Bolts (Head and Foot): Install with thru bolts or grommet nuts.

I. Thresholds at Exterior Doors Exposed to Weather:

1. Set in full bed of sealant.
2. If threshold is saddle type, then door bottom shall seat against threshold. Threshold shall not exceed 1/4" in height.

J. Brush Weatherstripping: Install according to manufacturer's recommendations and after final finish has been applied to door and frame.

K. Push Plate:

1. 1 inch above push pad and 1 inch from exit device head
2. With vision panel, 1inch above exit device head between vision panel and edge of door.

3.03 FIELD QUALITY CONTROL

A. At final acceptance, hardware shall be clean and free from

disfigurement, paint, and other foreign matter.

3.04 HARDWARE SCHEDULE

A. The Contractor's hardware schedule and related shop drawings shall be sent to the A/E for review as specified for submittals.

B. Do not include single doors and pairs of doors within the same hardware set.

C. Incorporate in the Door Schedule, located in the Drawings, corresponding with the Hardware Set numbers as shown in the project Finish Hardware section.

D. List every door required for each Hardware Set.

END OF SECTION

SECTION 08800
GLASS AND GLAZING

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 08110 - Steel Doors and Frames.
2. 08210 - Wood Doors.
3. 08510 - Steel Windows.
4. 08520 - Aluminum Windows.

1.02 REFERENCES

A. Florida Building Code (FBC).

B. Flat Glass Marketing Association (FGMA): Glazing Manual, 1986 Edition.

C. CPSC Standard 16CFR 1201 Category II.

D. American Society for Testing and Materials (ASTM):

1. C1036-91 Specification for Flat Glass.
2. C1048-92 Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
3. E119-95a Test Methods for Fire Tests of Building Construction and Materials.
4. E152-81a Methods of Fire Tests of Door Assemblies.
5. E163-84 Methods of Fire Tests of Window Assemblies.

E. ANSI Z97.1 - Safety Performance and Methods of Test for Safety Glazing Materials Used in Buildings.

1.03 SUBMITTALS

A. Product Data: Manufacturer's specifications, recommendations for setting blocks, spacers and edge clearance, and installation instructions.

B. Color Charts: For preformed glazing materials and glazing sealant.

C. Certification:

1. Certification of tempered and laminated glass complying with Consumer Product Safety Commission 16CFR 1201-CII.
2. Certification of Miami-Dade County product approval demonstrating compliance with FBC missile impact criteria.

a. Comply with calculations, signed and sealed by a Florida registered professional engineer, establishing wind velocity pressure values for

the specific project according to American Society of Civil Engineers (ASCE) 7-98 using a wind speed of 146 mph, exposure category "C", and a wind load importance factor of 1.15.

1.04 QUALITY ASSURANCE

A. Labels:

1. Label each unit of glass with manufacturer's sticker showing quality, grade, thickness, and type of glass.
2. Labels shall remain in place until approval by the A/E.

B. Trademarks: Each panel of tempered glass shall bear the manufacturer's trademark.

C. Glass of each type shall be supplied by the same manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glazing:

1. Guardian.
2. LOF, Libby-Owens-Ford.
3. PPG.
4. St.Gobain Architectural Glass Products.
5. Viracon.

B. Missile Impact Resistant Glazing:

1. Saf-Glas by Security Impact Glass.
2. Accepted Equivalent.

C. One-way Glass:

1. Mirrorpane E.P. by LOF Company
2. Accepted equivalent.

D. Fire Rated Safety Glazing:

1. Superlite by O'Keefe, San Francisco, CA.
2. Firelight Series, Pyrostop, and Pyro Swiss by Technical Glass Products, Kirkland, WA.

E. Glazing Sealant: Dow Corning 999-A Silicone Building and Glazing Sealant or General Electric Contractors 1000 Sealant.

F. Backer Rod: Dow Corning Ethafoam SB polyethelene cord or butyl rubber foam cord.

G. Edge Protection Tape for Laminated Glass: "Scotch Brand Cellopane Tape", manufactured by 3M Company.

H. Moisture-Resistant Paint for Frameless Mirror Glass: Palmer Products Corp., Mirro-Bac Paint.

I. Bond Sealer Coat for Mirrors: Palmer Products Corp., Mirro-Mastic Bond.

J. Mirror Adhesive: Palmer Products Corp., Mirro-Mastic.

2.02 MATERIALS

A. Tempered Glass: Comply with ASTM C1036 and further processed according to ASTM C1048, Kind FT, which has been fully tempered by the manufacturer's standard horizontal process. Minimum thickness of 1/4".

B. Missile Impact Resistant Glazing:

1. 0.070" polycarbonate between two 1/4" annealed glass sheets.

C. Fire Rated Glazing:

1. Wire Glass: ASTM C1036, Type II, Class 1, Form 1, Quality q8, Mesh M2, bearing UL label.
2. Safety Glazing: ASTM E152, ASTM E163, ASTM E119, NFPA 80, NFPA 251, NFPA 252, NFPA 257, CPSC 16 CFR Part 1201, bearing UL label.

D. Laminated Glass: Two sheets of equal thickness clear heat strengthened glass according to ASTM C1036, Type I, Class 1, Quality q3 permanently laminated with a 0.060 inch thick sheet of clear polyvinyl butyral.

E. One-way Glass: ASTM C1036, 1/4" thick clear float glass.

F. Wall Mirrors:

1. 1/4" laminated glass with electrolytic copper plated back, ANSI Z97.1 - Category II backing, and guaranteed for 1 year.
2. Mirrors shall provide distortion-free reflected images and be optically matched for distortion-free reflected images from panel to adjacent panel.

G. Glazing Materials:

1. Glazing Sealant: Curing type gunable elastomeric sealant complying with TT-S-001543A, Type II Class A. Color as selected by A/E.

a. Glazing sealants for use with insulating glass units shall be approved by the fabricator of the insulating glass units.

2. Unshimmed Glazing Tape: Butyl-polyisobutylene with 20 to 30 "Shore A" hardness, self-sticking; color to be

selected by the Architect.

3. Pre-Shimmed Glazing Tape: Butyl-polyisobutylene with built-in synthetic rubber spacer; 20 to 30 "Shore A" hardness, self-sticking; color to be selected by the Architect.
4. Setting Blocks: Solid neoprene, 80 to 90 Shore A durometer hardness; sizes as required.
5. Edge Blocks: Solid neoprene, 60-70 Shore A durometer hardness; sizes as required.
6. Shims: Solid neoprene, 40 to 60 Shore A durometer hardness; sizes as required.
7. Glazing Gaskets: Compression gaskets, closed cell, neoprene, EPDM or silicone rubber composition designed to provide a water-resistant seal between glass and frame.
8. Primers and Cleaning Agents: Type recommended by the sealant, glass, and glazing accessories manufacturer.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify glazing frames are acceptable for the correct installation of glass and glazing accessories.

3.02 INSTALLATION

A. Glass Cutting: Make cuts clean, only moderately convoluted, with flare or bevel not exceeding 1/8 of glass thickness.

1. Unacceptable defects:

a. Impact chips, spalls, or nipped edges.
b. Flake chips or shark teeth deeper than 1/4 of glass thickness.
c. Serration hackle deeper than 1/8 of glass thickness.

B. Comply with recommendations of FGMA Glazing Manual, glass manufacturer, manufacturer of sealant, and other glazing accessories.

C. Do not attempt to cut, seam, nip, or abrade glass tempered or heat strengthened.

D. Remove and replace glass broken, chipped, cracked, abraded, or damaged during construction.

E. Install wall mirrors and fasten with non-corrosive, theftproof, concealed hangers and plywood backing according to standard practices. Fasten with mirror adhesive according to manufacturer’s instructions.

F. Manufacturer's label showing strength, grade, thickness, type, and quality of glass shall remain on each piece of glass until it has been set and inspected.

G. Guarantee work to be waterproof.

3.03 CLEANING

A. After glass has been inspected and approved, remove labels and wash and polish glass on both faces before the Board's approval of the project.

1. Comply with glass manufacturer's recommendations for cleaning materials and methods.

END OF SECTION

SECTION 09200
METAL STUDS, METAL LATH,
SUSPENSION CEILINGS, PLASTER, AND STUCCO

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Non-load bearing steel studs.
2. Metal furring and lath.
3. Ceiling suspension system.
4. Portland cement plaster and stucco.

B. Related Sections:

1. 04220 - Concrete Unit Masonry.
2. 05400 - Light Gage Metal Framing.
3. 06100 - Carpentry.
4. 09900 - Painting.

1.02 REFERENCES

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

1.	A641-92	Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2.	A653/A-96	Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3.	A924/A-96a	Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
4.	C150-96	Specification for Portland Cement.
5.	C645-96a	Specification for Nonstructural Steel Framing Members.
6.	C754-96	Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
7.	C841-90	Specification for Installation of Interior Lathing and Furring.
8.	C897-96	Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters.
9.	C926-95a	Specification for Application of Portland Cement-Based Plaster.
10.	C932-80(90)	Specification for Surface-Applied Bonding Agents for Exterior Plastering.
11.	C1007-96a	Specification for the Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
12.	E119-95a	Test Methods for Fire Tests of Building Construction and Materials.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data for cementitious materials, lath, metal support components, and accessories.

B. Material Certificates:

1. Submit producer's certificate for each kind of plaster aggregate indicated materials comply with requirements.
2. Provide design calculations for metal support systems indicating load calculations, sizing of members, and anchorages for review.

1.04 QUALITY ASSURANCE

A. Design Criteria:

1. Fire-Resistance Ratings:

a. Where plaster systems with fire-resistance ratings are indicated, provide materials and installations identical with applicable assemblies tested per ASTM E119 by fire testing laboratories acceptable to authorities having jurisdiction.
b. Provide plaster for fire-resistance rated systems having same aggregate as specified for similar non-rated work, unless specified aggregate has not been tested by accepted fire testing laboratories.
c. Portland cement plaster/stucco shall not be used in areas requiring fire-rated construction. Use only accepted listed UL rated materials.

2. Coordinate layout and installation of suspension system components for suspended ceilings with other work supported by or penetrating through ceiling.
3. Clear bonding agents are not allowed.
4. Metal corner beads are not allowed. Use plastic trim accessories.
5. Prefabricated metal or plastic stucco reveals are not allowed. Strike final stucco coat to achieve score patterns. Slope bottom edge of horizontal score lines to dispel water.

B. Mockups:

1. Before installation of plaster work, fabricate mockup panels for each type of finish and application required using materials, including lath and support system, indicated for final work.
2. Build panels 4 feet x 4 feet x full thickness in location indicated, or if not otherwise indicated, as directed by A/E.
3. Demonstrate proposed range of color, texture, and installation to be expected in completed work.
4. Obtain A/E acceptance of panel's visual quality

before start of work.
5. Retain panel during construction as standard for judging completed work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Supports:

1. Dale/Incor.
2. Dietrich.
3. Gold Bond Building Products Division.
4. Unimast Inc. (USG Co.)

B. Expanded Metal Lath:

1. Dale/Incor.
2. Gold Bond Building Products Div.
3. South Lath Inc.
4. Unimast Inc. (USG Co.)

C. Accessories:

1. Dietrich.
2. Fry Reglet Corp.
3. Gold Bond Building Products Div.
4. Plastic Components Inc.
5. South Lath Inc.
6. United States Gypsum Co.
7. Vinyl Corp., Miami, FL.

D. Portland Cement Plaster/Stucco:

1. Florida Super Stucco by Lafarge Florida.
2. Lonestar Products.
3. Rinker Materials Corp.
4. Southdown, Inc.
5. United States Gypsum Co.

E. One Coat Veneer Plaster Over Cement Board: 3/32" Imperial Finish over 5/8" Durock cement board by US Gypsum Co. over metal framing at 16 inches o.c. maximum or accepted equivalent. UL U407 for 1 hour rating.

2.02 MATERIALS

A. Metal Supports - Suspended and Furred Ceilings or Soffits:

1. Portland Cement Plaster/Stucco Installation: ASTM C926.
2. Wire for Hangers and Ties: ASTM A641, 16 gage monel.
3. Rod Hangers: Mild steel, zinc, or cadmium coated.
4. Flat Hangers: Mild steel, zinc, or cadmium coated or protected with rust inhibitive paint.
5. Channels:

a. Cold-rolled steel, minimum 0.0598" thickness of uncoated base metal, allowable bending stress of 18,000 psi. Protect with rust inhibitive paint or galvanizing complying with ASTM A924 for G60 coating designation.
b. Carrying Channels: 1-1/2" deep x 7/16" wide flanges, 475 lbs. per 1,000 feet painted, 508 lbs. per 1,000 feet galvanized.
c. Furring Channels: 3/4" deep x 7/16" wide flanges, 300 lbs. per 1,000 feet painted, 316 lbs. per 1,000 feet galvanized.
d. Provide galvanized channels for exterior installations.

6. Hanger Anchorage Devices:

a. Screws, cast-in-place concrete inserts, or other devices appropriate for anchorage to the form of structural framing indicated and whose suitability for use intended has been proven through standard construction practices or certified test data.
b. Size devices to develop full strength of hanger minimum 3 times calculated hanger loading, except size direct pullout concrete inserts for 5 x calculated hanger loading.

B. Steel Studs and Runners/Tracks:

1. Non-Load (Axial) Bearing Studs and Runners:

a. ASTM C645 and complying with following requirements for minimum thickness of uncoated base metal and other characteristics:
b. Stud Thickness: 0.0179", unless otherwise indicated.
c. Stud Depth: As indicated on the drawings.

2. Load Bearing (Transverse and Axial) Studs and Runners:

a. ASTM C955 and complying with following requirements for quality, grade, finish of steel sheet, design thickness of uncoated base metal, and other dimensional characteristics:
b. Metal Quality: Zinc-coated steel sheet complying with ASTM A653, Coating Designation G60.
c. Grade A - 33,000 psi Yield Point: Maximum 0.0359" design thicknesses.
d. Grade D - 50,000 PSI Yield Point: Minimum 0.0598" design thicknesses.
e. Stud Thickness: 0.0359", unless otherwise indicated.
f. Stud Flange Width: 1-3/8".
g. Stud Lip Depth: 1/4".
h. Stud Depth: 3-1/2" minimum unless otherwise indicated.

C. Vertical Metal Furring:

1. Channel Furring and Braces:
   a. Cold-rolled steel, minimum 0.0598" thickness of uncoated base metal.
   b. Allowable Bending Stress: 18,000 psi.
   c. Protected with rust inhibitive paint finish or galvanizing.
   d. 3/4" deep x 7/16" wide flanges.
   e. 300 lbs. per 1,000 feet with painted finish.
   f. 316 lbs. per 1,000 feet with galvanized finish.

2. Z-Furring Member:

   a. Manufacturer's standard screw-type zee-shaped furring members formed from zinc-coated steel sheet.
   b. Minimum 0.0179" uncoated base metal thickness, complying with ASTM A924, Coating G60.
   c. Design for mechanical attachment of insulation boards or blankets to monolithic concrete and masonry walls.

3. Furring Brackets: Serrated-arm type, minimum 0.0329" thickness of base (uncoated) metal, adjustable from 1/4" to 2-1/4" wall clearance for channel furring.

D. Metal Lath:

1. Diamond Mesh Lath:

   a. Flat: 2.5 lbs. per sq.yd.
   b. Self-Furring: 2.5 lbs. per sq.yd.
   c. Paper Backing: Provide asphalt-impregnated paper factory-bonded to back and complying with Fed. Spec UU-B-790, Type I, Grade D vapor permeable, Style 2.
   d. Lath Attachment Devices:

      1) Devices of material and type required by referenced standards and recommended by lath manufacturer for secure attachment of lath to framing members and of lath to lath.
      2) Provide resilient clips for attachment of gypsum lath to steel at locations indicated.

2. Welded Wire Fabric Lath:

   a. Weather Protected Exterior Horizontal Surfaces (Soffits, Ceilings, and Other Decorative Elements): Pyro K-Lath, Gun Lath, or accepted equivalent.
   b. Back of Ceramic Tile (Interior Usage Only): Aqua Lath or accepted equivalent.
   c. Fire Resistance and Waterproofing (Interior Usage Only): Pyro K-Lath or accepted equivalent.

E. Accessories for Portland Cement Stucco:

1. Comply with material provisions of ASTM C926; coordinate depth of accessories with thickness and number of coats required.
2. Plastic Trim Accessories: Corner beads, casing beads, control joints, and expansion joints with perforated flanges and fabricated from high impact polyvinyl chloride.

F. Portland Cement Plaster Materials:

1. Base Coat Cements: Portland Cement, ASTM C150, Type I or III.
2. Finish Coat Cement: Portland Cement, ASTM C150, Type I, white.
3. Factory-Prepared Finish Coat:

   a. Manufacturer's standard product requiring addition of water only. White in color unless otherwise indicated.
   b. Product: Oriental Exterior Stucco by United States Gypsum Co.

4. Sand Aggregate - Base Coats: ASTM C897.
5. Aggregate - Finish Coats: ASTM C897, manufactured or natural sand, white in color.
6. Fiber - Base Coat:

   a. Alkaline-resistant glass fibers, 1/2" long, free of contaminates, manufactured for use in Portland cement plaster.
   b. Product: Dur-O-Fiber AR Glass by Dur-O-Wal, Inc.

G. Miscellaneous Materials:

1. Water for Mixing and Finishing Plaster: potable, free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
2. Bonding Agent - Portland cement: ASTM C932.

2.03 MIXES

A. Portland Cement Plaster/Stucco Mixes and Compositions - Base Coats:

1. Comply with ASTM C926 for Portland cement plaster base and finish coat mixes as applicable bases, materials, and other requirements indicated.

2. Base Coat:

   a. Proportion materials for respective base coats in parts by volume for cementitious materials and in parts by volume per sum of cementitious materials for aggregates to comply with the following

requirements for each method of application and plaster base indicated.
b. Adjust mix proportions below within limits specified to attain workability.

3. Base Coats for Three-Coat Work Over Metal Lath:

a. Contractor's Option 1:

1) Scratch Coat: 1 part Portland cement, 2-1/2 to 4 parts sand.
2) Brown Coat: 1 part Portland cement, 3 to 5 parts sand.

b. Contractor's Option 2:

1) Scratch Coat: 1 part Portland cement, 1 to 2 parts masonry cement, 2-1/2 to 4 parts sand.
2) Brown Coat: 1 part Portland cement, 1 to 2 parts masonry cement, 3 to 5 parts sand.

c. Contractor's Option 3:

1) Scratch Coat: 1 part masonry cement, 2-1/2 to 4 parts sand.
2) Brown Coat: 1 part Portland cement, 1 parts masonry cement, 3 to 5 parts sand.

4. Two-Coat Work Over Concrete Unit Masonry:

a. Contractor's Option 1:

1) Base Coat: 1 part Portland cement, 3 to 4 parts sand.

b. Contractor's Option 2:

1) Base Coat: 1 part masonry cement, 3 to 4 parts sand.

5. Fiber Content:

a. Add fiber to mixes above to comply with fiber manufacturer's directions, maximum 2 lbs. per cu. feet of cementitious materials.
b. Reduce aggregate quantities accordingly to maintain workability.

B. Portland Cement Plaster/Stucco Mixes and Compositions - Finish Coats:

1. Job-Mixed:

a. Contractor's Option 1:

1) 1 part Portland cement, 2-1/4 to 3 parts sand.

b. Contractor's Option 2:

1) 1 part Portland cement, 1 part masonry cement, 2-1/4 to 3 parts sand.

c. Contractor's Option 3:

1) 1 part masonry cement, 1-1/2 parts sand.

2. Factory-Prepared Portland Cement Plaster/Stucco Finish Coats:

a. Add water only.
b. Comply with finish coat manufacturer's directions.

C. Mixing: Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Lath and Furring:

1. Interior Lath and Furring Installation Standard: Install lath and furring materials indicated for gypsum plaster to comply with ASTM C841.
2. Portland Cement Plaster/Stucco Lath and Furring Installation Standard: Install lath and furring materials indicated for Portland cement plaster to comply with ASTM C926.
3. Install supplementary framing, blocking, and bracing at terminations in work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar work to comply with details indicated or, if not otherwise indicated, to comply with applicable published recommendations of gypsum plaster manufacturer or, if not available, of Gypsum Construction Handbook, latest edition, published by United States Gypsum Co.
4. Isolation:

a. Where lath and metal support system abuts building structure horizontally, and where partition/wall work abuts overhead structure, isolate work from structural movement sufficiently to prevent transfer of loading into work from building structure.
b. Install slip or cushion type joints to absorb deflection but maintain lateral support.
c. Frame both sides of control and expansion joints independently.

d. Do not bridge joints with furring and lath or accessories.

B. Ceiling Suspension Systems:

1. Preparation and Coordination:

a. Coordinate installation of ceiling suspension system with installation of overhead structural systems to ensure inserts and other structural anchorage provisions have been installed to receive ceiling hangers to allow development of their full strength and at spacings required to support ceiling.
b. Furnish concrete inserts and other devices indicated, to other trades for installations before time needed for coordination with other work.
c. Powder activated fasteners are not allowed.

2. Hanger: Attach hangers to structure above ceiling to comply with Metal Lath/Steel Framing Association (ML/SFA) Specifications for Metal Lath and Furring and with referenced standards.
3. Ceiling Suspension System:

a. Install components of sizes and spacings indicated but not in smaller sizes or greater spacings than required by referenced lath and furring installation standards.
b. Wire Hangers: Space maximum 48 inches o.c. parallel with, and maximum 36 inches perpendicular to, direction of carrying channels, unless otherwise indicated, and within 6 inches of carrying channel ends.
c. Carrying Channels: Space carrying channels maximum 36 inches o.c. with 48 inches o.c. hanger spacing.
d. Furring Channels to Receive Metal Lath: Space furring channels maximum 16 inches o.c. for 3.4 lb. diamond mesh lath or 24 inches o.c. for 3.4 flat rib lath.

C. Steel Stud Wall/Partition Support System:

1. Install components for steel stud wall/partition support systems to comply with directions of steel stud manufacturer for application indicated.
2. Non-Load (axial) Bearing Stud Systems: Comply with ASTM C754.
3. Loadbearing (axial and transverse) Stud Systems: Comply with ASTM C1007 and as indicated.
4. Steel Stud Systems to Receive Metal Lath: Comply with requirements of ML/SFA Specifications for Metal Lath and Furring applicable to each installation condition and type of metal system indicated.
5. Extend partition support systems to finish ceiling

and attach to ceiling suspension members, unless otherwise indicated.

D. Vertical Metal Furring:

1. Metal Furring to Receive Metal Lath: Comply with requirements of ML/SFA Specification for Metal Lath and Furring applicable to each installation condition indicated.

E. Metal Lath:

1. Install expanded metal lath for following applications where plaster base coats are required.
2. Provide appropriate type, configuration, and weight of metal lath selected from materials indicated which comply with referenced lath installation standards.
3. Suspended and Furred Ceilings: Minimum weight of diamond mesh lath, 3.4 lbs. per sq.yd.
4. Exterior Sheathed Wall Surfaces: Minimum weight of self-furring diamond mesh lath, 3.4 lbs. per sq.yd.

F. Plastering Accessories:

1. Comply with referenced lath and furring installation standards for provision and location of plaster accessories of type indicated.
2. Miter or cope accessories at corners and install with tight joints and in alignment.
3. Attach accessories securely to plaster bases to hold accessories in place and alignment during plastering.
4. Accessories - Portland Cement Plaster:

    a. Corner Reinforcement: Install at external corners.
    b. Corner Bead: Install at external corners.
    c. Casing Beads: Install at termination of plaster work unless otherwise indicated.
    d. Control Joints: Install where an expansion or control joint occurs in surface of construction directly behind plaster membrane, where distance between control joints in plastered surface exceeds 10 feet in either direction, where area within Portland cement panels exceed 100 square feet, where Portland cement plaster panel sizes or dimensions change.

G. Portland Cement Plaster/Stucco Application:

1. Portland Cement Plaster Application Standard: Apply Portland cement plaster materials, compositions, and mixes to comply with ASTM C926.
2. Number of Coats: Apply Portland cement plaster, of composition indicated.
3. Finish Coat: Floated finish unless otherwise indicated; match A/E's sample for texture and color.
4. Moist cure Portland cement plaster base and finish

coats to comply with ASTM C926, including recommendations for time between coats and curing in ASTM C926 Annex A2 - Design Considerations.

3.02 ADJUSTING, CLEANING, AND PROTECTION

A. Cutting and Patching:

1. Cut, patch, point-up, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections.
2. Repair or replace work to eliminate blisters, buckles, excessive crazing and check cracking, dryouts, efflorescence, sweat-out and similar defect, and where bond to substrate has failed.
3. Sand smooth-troweled finishes lightly to remove trowel marks and arises.

B. Cleaning:

1. Remove temporary protection and enclosure of other work.
2. Promptly remove plaster from door frames, windows, and other surfaces that are not to be plastered.
3. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering work.
4. When plastering is completed, remove unused materials, containers, and equipment, and clean floors of plaster debris.

C. Protection: Provide final protection and maintain conditions, in manner suitable to Installer, that ensures plaster work being without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 09250
GYPSUM WALLBOARD

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 09200 - Metal Studs, Lath, Suspension Ceiling, Plaster, and Stucco.
2. 09310 - Ceramic Tile.

1.02 REFERENCES

A. American Society for Testing and Standards (ASTM):

1. C11-97 Terminology Relating to Gypsum and Related Building Materials and Systems.
2. C36-95b Specification for Gypsum Wallboard.

1.03 SUBMITTALS

A. Before starting work, provide product data and samples as directed by A/E.

1.04 QUALITY ASSURANCE

A. Finish work shall be subject to inspection using a lighting level of not less than 50 foot candles at the surface of the gypsum board. Surfaces judged to be unsuitable for finishing, even if finish has been applied, shall be rejected.

B. The A/E will direct repair or replacement of rejected work.

C. **Gypsum wallboard manufactured in China is unacceptable and will be rejected.**

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver in original unopened packages. Provide protection from damage and exposure to the elements.

B. Prevent damage to edges and surfaces. Do not bend or damage metal corner beads and trim.

1.06 PROJECT CONDITIONS

A. Environmental Requirements: Proceed with installation of gypsum board materials only after building is weather tight.

1. Maintain temperature in areas receiving gypsum board materials between 55 degrees and 90 degrees F. during and after installation and provide adequate ventilation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Gypsum Wallboard:

1. National Gypsum.
2. United States Gypsum Company (USG).

B. Accessories shall be by gypsum wallboard manufacturer.

2.02 MATERIALS

A. Gypsum Wallboard:

1. Fire Rated Hi-Abuse Board: 5/8" thick x 48 inches wide x longest stock length, Type "C" or Type "X", with tapered edges or accepted equivalent.
2. Fire Rated Composite Board: 1/4" thick fiber-cement board with tapered edges over 1/2" thick Type "X" gypsum board, by GypGuard or accepted equivalent. UL V422 for 1 hour rating.
3. High Impact Abuse Resistant Gypsum Board: USG Fiberock - VHI Abuse- Resistant or Hi-Abuse XP Wallboard (Nat'l Gypsum), 5/8" thick.

B. Fasteners: Type S Bugle Head by USG or accepted equivalent, with lengths as specified by manufacturer.

C. Joint Treatment: Reinforcing tape, taping, or embedding and topping materials as recommended and manufactured by gypsum wallboard manufacturer.

D. Accessories:

1. Use internal and external corner beads, casing beads, and control joints, to provide a finished job with true, straight edges against adjoining work.
2. Provide expansion joints as required for conditions and according to manufacturer's recommendations.

E. Tile Backer Boards:

1. Aggregated Portland cement board with vinyl-coated, woven glass fiber embedded on both surfaces.
2. Joint Reinforcement, Fasteners, Adhesives, and Grout: According to manufacturer's recommendation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Place panels with long dimension parallel to the framing members and abutting edges occurring over stud flanges.

1. Fit ends and edges closely (maximum 1/16" between boards), but not forced together.
2. Stagger end joints in successive courses. Place end or edge joints on opposite sides of framing in different locations to avoid creating joints of panels ending on the same stud.
3. Panel edge above floor shall be 1/2" clear.

B. Panel Attachment:

1. Drive fasteners in field of panel first, working toward ends and edges.
2. Hold panel in firm contact with framing while driving fasteners.
3. Install perimeter fasteners at 3/8" from ends or edges and spaced a maximum of 8 inches on center.
4. Attach gypsum panels in field of panel with fasteners spaced a maximum of 12 inches on center.

C. Accessories: Apply accessories according to manufacturer's instructions. Sand after application of final joint treatment coat and leave surface smooth and ready for work by other trades.

1. Treat metal accessories with not less than 2 coats of joint compound in the same manner as joints. Feather joint compound out from 8 to 10 inches on both sides of corners.
2. Apply metal trim at intersections where gypsum board abuts other materials, unless detailed otherwise, and at all other locations indicated. Neatly fit and secure corner beads over external corners.
3. Install expansion joints as detailed.
4. Install control joints as detailed.

D. Joint Treatment Application:

1. Taping and Embedding:

    a. Apply taping or embedding compound in a thin, uniform layer to joints and angles.
    b. Immediately apply reinforcing tape centered over joint or angle and firmly seat into compound. Sufficient compound (approximately 1/64" to 1/32") shall remain under tape to provide proper bond.
    c. Immediately follow with a thin skim coat to embed tape but not to function as a second coat.
    d. Fold and embed tape properly at interior angles to provide a true angle.
    e. Tape or embedding coat shall be thoroughly dry before application of second coat.

2. Second Coat Embedding:

a. Apply a second coat of joint compound over embedding coat, filling panel taper flush with surface.
b. Cover tape and feather out at least 2 inches on each side beyond first coat.
c. On joints with no taper, cover tape and feather out at least 4 inches on either side of tape.
d. Allow second coat to dry thoroughly before application of finish coat.

3. Topping:

a. Spread a finish coat evenly over and extend at least 2 inches on each side beyond second coat on joints and feather to a smooth uniform finish.
b. Over tapered edges, do not allow finished joint to protrude beyond plane of surface.
c. Apply finish coat to cover tape and taping compound at taped angles and provide a true angle.
d. Where necessary, sand between coats and following final application of compound to provide a smooth surface ready for painting.

E. Finishing Fasteners:

1. Apply a taping or all-purpose type compound to fastener depressions as the first coat.
2. Follow with minimum of 2 additional coats of topping compound, leaving depressions level with plane of surface.

END OF SECTION

SECTION 09310
CERAMIC TILE

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 03300 - Cast-In-Place Concrete.
2. 07900 - Joint Sealers.
3. 09200 - Metal Studs, Lath, Suspension Ceiling, Plaster, and Stucco.
4. 09250 - Gypsum Wallboard.
5. 10800 - Toilet Room Accessories.
6. 15421 - Drains, Floor Sinks, and Cleanouts.
7. 15440 - Plumbing Fixtures, Trim, and Supports.

1.02 REFERENCES

A. American National Standards Institute (ANSI) latest edition:

1. A108.1 Installation of Glazed Wall Tile, Ceramic Mosaic Tile, Quarry and Paver Tile with Portland Cement Mortar.
2. A108.5-85 Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
3. A108.10-85 Installation of Grout in Tilework.
4. A118.1-85 Dry-Set Portland Cement Mortar.
5. A118.6-85 Ceramic Tile Grouts.
6. A137.1-80 Specifications for Ceramic Tile.

B. Tile Council of America, Inc. (TCA): Handbook For Ceramic Tile Installation, latest edition.

1.03 SUBMITTALS

A. Product Data: Submit material specifications, printed installation and mixing instructions, and maintenance recommendations for ceramic tile and accessories.

B. Samples: Submit the following:

1. Panels: 12 inches square, of each type, color, and pattern of tile required.
2. Tile manufacturer's full color and pattern range for each type of tile required.
3. Grout manufacturer's full color range samples.
4. Each type of trim shape and special shape required, if requested.

1.04 QUALITY ASSURANCE

A. Tile shall conform to requirements of TCA 137.1, Standard Grade.

1.05 MAINTENANCE

A. Maintenance Materials: At the job site, provide 2 unopened boxes of each color and type of tile installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Ceramic Tile:

1. American Olean Tile Company.
2. Dal-Tile.

2.02 MATERIALS

A. Slip-Resistant Ceramic Mosaic Floor Tile: 2 inches x 2 inches x 1/4" thick, unglazed, plain face, cushioned edges, having a minimum of 0.5 wet coefficient of friction, attained without use of abrasive impregnation.

B. Glazed Wall Tile: Nominal 4" x 4" x 5/16" thick, matte or crystalline face, cushioned edges.

C. Color and Pattern:

1. As shown on the drawings, colors and patterns shall be selected by the Architect from price group #4.
2. Colors and patterns shall be judged equivalent, as determined by the A/E, to those preselected or above specified patterns and colors.
3. Any preselected colors and patterns shown on the drawings or in the specifications shall govern.
4. Where colors or patterns are not shown, tile equivalent in cost to manufacturer's price group #4 shall be bid upon, assuming not more than 10 colors.
5. A/E'S range of color selection shall not be limited to colors stocked locally but by entire color line of specific manufacturer as determined by samples in A/E'S office.

D. Trim and Special Shapes: Provide the following trim units and special shapes of same material and finish as ceramic wall tile:

1. Base: Cove base units, width and height to match wall tile.
2. External Corners: Bullnose shapes with round out base and top trim special shapes.
3. Internal Corners: Field-butted square with square in-corner base and top trim special shapes.

E. Marble Thresholds: 2-1/4" wide, 3/4" thick, White Georgia or Madre Cream Alabama marble with exposed edges beveled and honed finish on exposed surfaces.

F. Setting Materials: Dry-Set pre-sanded mortar according to ANSI A118.1-1985 and by manufacturer licensed by the Tile Council of America.

G. Mortar Additive: Laticrete 3701 latex additive or accepted equivalent.

H. Grout: Certified by the tile manufacturer as suitable for type of tile and application.

1. Dry-Set Grout: A mixture of Portland cement and additives furnished by a firm licensed to manufacture products, and tested and approved by the Tile Council of America. Colors as selected by A/E.
2. Commercial Latex-Portland Cement Grout: A mixture of Portland cement and mortar additive conforming to ANSI A118.6.

a. Color: Natural mortar color.

I. Tile Cleaner: Biscayne Chemical Laboratories, Inc.,"Blue Boy" or accepted equivalent.

PART 3 EXECUTION

3.01 INSTALLATION

A. Tile Setting Requirements:

1. Examine surfaces for foreign matter, unevenness, flatness, plumb planes, and damage. Make repairs if necessary to substrate to be in the proper condition to receive tile. Verify waterproofing at shower receptors will not affect tile installation adversely.
2. Construct sloped mortar beds using mortar consisting of 1 part Portland cement, 4 parts damp sand by volume, and gauged with mortar additive according to ANSI A108.5.
3. Secure tile firmly in place with uniform joints well filled and lines straight and true.

a. Bring finished surfaces to true and flat planes, plumb on walls.
b. Completed work shall be free of cracked or broken tiles.

4. Form intersections and returns perfectly and perform cutting and drilling of tile neatly without marring tile face.

a. Carefully grind and joint cut edges of tile against any trim, finish, and built-in fixtures.
b. Fit tile close around plumbing pipes, fixtures and fittings so usual plates, collars, or coverings will overlap tile.

5. Where borders, lines, patterns, panels, or other effects are a part of the work, properly space tiles and accurately reproduce required designs.
6. Where acoustic tile ceilings occur, install ceramic wall tile to a line 2 to 4 inches above plane of exposed surface of ceiling.
7. Layout tile work on floors or walls so, wherever possible, no tiles less than half full size will occur unless indicated.
8. Movement Joints:

    a. Provide control, isolation, expansion, and contraction joints according to movement joint designs and install according the TCA Handbook for Ceramic Tile Installation.
    b. Locate movement joints:

        1) At 24 to 36 feet in each direction.
        2) At tile abutting perimeter walls, dissimilar floors, pipes, and columns.
        3) Over cold joints and saw-cuts in the slab.

    c. Extend joints through the setting bed to the concrete substrate equal in width to the tile grout joints.
    d. Provide approved solid neoprene filler and approved polysulfide caulking.

9. Where tile abuts restraining surfaces, cut tile to match contour of that surface.
10. At shower receptors continue slip-resistant ceramic mosaic floor tile up and over curbs to meet floor tile in adjoining areas using special shapes where necessary.
11. At floor drains, slope floor tile from high points at walls around perimeter of rooms down to floor drains.

B. Setting Ceramic Tile With Dry-Set Mortar:

1. Concrete Substrate:

    a. Set ceramic tile according to applicable requirements of ANSI A108.5.
    b. Set tile with dry-set mortar, 3/32" to 1/8" thick.
    c. Provide latex mortar additive in setting mortar per manufacturer's directions.

C. Grouting: Comply with ANSI A108.10.

1. Ceramic mosaic floor tile: Use commercial latex Portland cement grout.
2. Glazed ceramic wall tile: Use dry-set grout.
3. Force grout into joints to fill solid.

    a. Remove and re-grout discolored joints. Fill voids

in joint grout.

D. Thresholds: Set marble thresholds where indicated or at dissimilar floor finishes with the same material used for setting ceramic mosaic floor tile.

E. Tolerances: Finished installation shall be trued to a tolerance of $\pm$1/8" in a 10 foot radius and +1/16" within any given running foot.

3.02 CLEANING

A. Apply tile cleaner according to cleaner manufacturer's printed instructions.

B. Leave finished installation clean and free of cracked, chipped, broken, and unbonded or otherwise defective tile.

END OF SECTION

SECTION 09730
EPOXY RESIN FLOORING

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 03300 - Cast-in-Place Concrete.
2. 09900 - Painting.

1.02 REFERENCES

A. American Society for Testing and Standards (ASTM):

1. F710-92 Standard Practice for Preparing Concrete Floors and other Monolithic Floors to Receive Resilient Flooring.

1.03 SUBMITTALS

A. Manufacturer's specifications, recommendations, and installation instructions for specified underlayment and topping materials. Include the following:

1. Manufacturer's published data, or letter of certification, or certified testing laboratory report, indicating each material complies with specified requirements and is intended for application shown.
2. Manufacturer's standard color chart.
3. Manufacturer's top coat skid-resistance chart ranging from fine to coarse.

B. Samples: Provide 4 inch by 4 inch minimum samples in the color and finish as selected by the A/E.

1. Provide a minimum of 3 samples per color and finish as selected by the A/E.
2. The epoxy resin composition flooring samples shall be applied to a rigid backing.

1.04 QUALITY ASSURANCE

A. Applicator: Submit evidence in writing that intended applicator is approved by the flooring materials manufacturer.

B. Compliance: Upon completion of work submit report signed by an authorized representative of applicator certifying compliance with the flooring manufacturer's recommended procedures and specifications.

C. Pre-Installation Conference:

1. Arrange a meeting not less than 30 days before

starting work.
2. Attendance: General Contractor, A/E, manufacturer's representative, and installer's representative.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Check delivered material to job-site for completeness and shipping damage before starting work.

B. Materials used shall be factory pre-weighed and prepackaged in single, easy to manage batches.

C. Store materials in a dry and enclosed area, protected from exposure to moisture. Maintain temperature of storage area between 68 and 90 degrees F.

1.06 PROJECT CONDITIONS

A. Allow for concrete substrate to properly cure concrete substrate for a minimum of 28 days.

1. If manufacture’r requirements are stricter than the minimum required 28 days curing time, comply with manufacturers requirements.

B. Work area shall be free of other trades during installation, and for a minimum period of 24 hours after installation.

C. Protect finished floor from damage by subsequent trades.

1.07 WARRANTY

A. Manufacturer shall furnish a single written warranty covering both material and labor for a period of 5 years from date of substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Epoxy Resin Composition Flooring:

1. Dex-O-Tex: Decorflor and Cheminert KD.
2. Dur-A-Flex: Dur-A-Quartz.
3. Selby: Selbaclad, Selba Twede HD.
4. Master Builders: Morritex.
5. StonHard, Inc.: Stonshield HRI.

B. Slip Retardant Epoxy Resin Coating:

1. Dex-O-Tex: Posi-tred "O".
2. Accepted equivalent.

2.02 MATERIALS

A. Epoxy Resin Composition Flooring:

1. Basecoat:

    a. Thickness: 3/8".
    b. Color: Selected by the A/E from the basecoat manufacturer's stock color selection.

2. Top Coat:

    a. Colored, skid-resistant, orange peel texture, non-abrasive topping in quantity as recommended by the basecoat manufacturer for use with the specified basecoat.
    b. Color: Matching basecoat color.

3. Skid-Resistance: Selected by the A/E from the basecoat manufacturer's stock selection showing a smooth skid-resistance and with a coefficient of friction of at least 0.5.

4. Underlayment: As recommended by the basecoat manufacturer.

5. Joint Sealant Materials: As produced by manufacturer of epoxy resin composition flooring system for type of service and joint condition indicated.

B. Slip Retardant Epoxy Resin Coating:

1. Skid-resistant, metallic oxide aggregate course topping in quantity as recommended by the basecoat manufacturer for use with the specified basecoat.
2. Skid-Resistance: Dry and wet coefficient of friction of at least 0.8.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

B. Existing Slopes To Floor Drains: Before starting work, verify existing slopes to floor drains function properly and do not leave standing water or "bird baths". If such conditions are found to exist, notify the A/E before proceeding with the work.

3.02 PREPARATION

A. Comply with ASTM F710, manufacturer’s recommendations, and as specified for surface preparation of new and existing substrates.

B. Remove fixed and movable equipment before application of impervious flooring material. Reinstall after application

of impervious flooring materials is complete.

C. Moisture Tests:

1. Determine whether the concrete slab is adequately dry for flooring installation.
2. Test concrete slabs in new construction or existing slabs on grade for manufacturer's allowable moisture content by one of the following:

   a. The protimeter electrical conductivity survey master moisture test instrument.
   b. Calcium chloride test.

D. Concrete shall be smooth and level, with maximum surface variations not exceeding 1/8" in a 10 foot radius. Grind down ridges and other irregularities.

1. Fill cracks, holes, and depressions with latex cement underlayment as recommended by the flooring manufacturer.

E. Cleaning Before Installation:

1. Clean substrate surfaces to be free of paint, wax, oil, grease or other materials that can effect bonding and smoothness of basecoat materials. Provide a clean, dry, and neutral substrate.
2. Shot-blast concrete surfaces as required to obtain optimum bond of flooring to concrete.

   a. Remove sufficient material to provide a sound surface free of laitance, glaze, efflorescence, and any bond-inhibiting curing compounds or form release agents.
   b. Remove grease, oil, and other penetrating contaminates.
   c. Repair damaged and deteriorated concrete to acceptable condition.
   d. Leave surfaces free of dust, dirt, laitance, and efflorescence.

3.03 INSTALLATION

A. Application:

1. Apply troweled epoxy resin composition flooring with integral 4 inch high cove base by an applicator approved by the manufacturer of the flooring materials.
2. Apply without seams according to shop drawings and the flooring manufacturer's printed instructions.
3. New flooring thickness shall be uniform to maintain existing slope to floor drain, chip a minimum of 12 inches around floor drain to maintain new flooring thickness at the drain.

B. Patching or Repair: Patch or repair cracks and level

uneven areas with specified underlayment materials according to underlayment manufacturer's recommendations.

3.04 ADJUSTING AND CLEANING

A. Use cleaning materials and procedures recommended by flooring manufacturer.

B. Contractor is responsible for protection and cleaning of surfaces after final coats.

3.05 PROTECTION

A. Protect installed floor from damage and wear during overall construction operation. Contractor shall comply with manufacturer's recommendations for protective materials.

END OF SECTION

SECTION 09900
PAINTING OF UNPAINTED SURFACES

PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Field painting of exposed and covered pipes, ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated.
2. Six year warranty for labor and materials from the paint manufacturer.

B. Related Section:

1. 07900 - Joint Sealers.

1.02 REFERENCES

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

1.	D3359-95a	Test Methods for Measuring Adhesion by Tape Test.
2.	D3927-87	Standard Guide for State and Institutional Purchasing of Paint.
3.	D4262-83(88)	pH of Chemically Cleaned or Etched Concrete Surfaces.
4.	D4263-83(93)	Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

B. OSHA Workers Environmental Conditions.

C. National Fire Protection Association (NFPA): NFPA 30 - Flammable and Combustible Liquids Code.

D. Steel Structural Painting Council (SSPC) - 6.

1.03 DEFINITIONS

A. Alkyd: Oil-based paint.

B. Latex: Water-based paint.

C. New Work: Surface or area of a surface not previously painted, including areas patched, replaced, or sandblasted causing a painted or unpainted surface or part of a painted or unpainted surface to exist.

D. Old Work: Surface that has been previously painted.

E. Paint: All coating systems materials, including primers, emulsions, enamels, stains, varnishes, sealers and

fillers, and other applied materials used as prime, intermediate, or finish coats.

F. Smooth: A surface free from roughness, ridges, and projections.

1.04 SUBMITTALS

A. Product Data: Submit Manufacturer Safety Data Sheet (MSDS), manufacturer's technical information, including paint label analysis and application instructions for each material proposed for use.

B. Samples:

1. Color Chips:

a. Before starting work, furnish color chips for surfaces to be painted to the A/E.
b. Use representative colors when preparing samples for review.

2. Representative Samples:

a. Submit representative samples for review of color and texture only.
b. Provide listing of material and application for each coat of each finish sample.
c. Provide three samples of each color and material on 6 inch x 18 inch panels with texture to simulate actual finish. Label and identify each as to location and application.

1) Provide three samples of each color and material on 6 inch x 18 inch samples of natural and stained wood finish on actual wood surfaces. Label and identify each as to location and application.
2) Provide three 6 inch x 18 inch samples of masonry for each type of finish and color, defining filler, prime, and finish coat. Label and identify each as to location and application.

d. Resubmit samples as requested by A/E until acceptable sheen, color, and texture are achieved.

3. Paint Sample: Provide 4-one quart containers of each color or type. Label each container with the school name, project number, name of the Contractor, name of the supplier, designated use, and type of paint in the container.

C. Warranty:

1. Submit paint manufacturer's proposed 6 year warranty

document.

2. Submit paint manufacturer's proposed program of inspection and approval before and during the Work as required by paint manufacturer to implement the submitted 6 year warranty.
3. At the end of the paint work, provide to the Owner, from the authorized paint manufacturer representative, a signed and notarized letter stating that the surfaces painted have met all the conditions for paint adhesion.
4.

1.05 QUALITY ASSURANCE

A. Qualifications: Paint applicator shall be licensed in the State of Florida or in Miami-Dade County and use state or county-certified journeymen. Provide a legible copy of license and, when applicable, a journeyman's certification attesting to qualification requirements.

B. Certifications:

1. Paint applicator shall provide a certification attesting to having worked on projects similar in scope to this project for a minimum of 5 years. Paint applicator not providing such documentation or not having the required experience will be removed from the project and replaced by the Contractor.

C. Quality assurance issues, including but not limited to, material selection, surface integrity and other tests, surface preparation, painting procedures, workmanship, and warrantability require review and acceptance by Architect.

D. Pre-Construction Meeting: At this meeting, or within 24 hours after that, Contractor shall meet with Architect, Painting Subcontractor, representatives of the proposed materials manufacturers, and other parties involved in the work of this section. The agenda shall include:

1. Review of proposed materials, their status concerning Paints and compliance with specifications.

2. Procedures to be followed and methods to be used in painting of new work and repainting of existing surfaces, with special emphasis on testing, repair, and preparation of existing surfaces.

a. Discuss and agree to modifications to the procedures established in Part 3 of this section required by the paint manufacturer to uphold the required 6 year warranty. Modifications, if any, are to be noted in writing by the manufacturer. Provide signed and notarized copies to A/E and the Owner and to all other parties present at the preconstruction meeting.

3. Coordination of the mockup requirements of this

section and of other related sections.

4. Review of extent, procedures, and schedules for on-site tests, observation, and supervision by Materials Manufacturer's Representative according to requirements of this section and to enable the manufacturer to issue the required guarantees.
5. Review of warranties and guarantees required by the various parties, as specified in this section, in addition to the general guarantee required by Instructions to Bidders and General Conditions and statement by all parties concerned of their agreement or objection to the terms. Such statements shall be recorded in writing as part of the minutes of the meeting, with action suggested or taken to comply with contract requirements.

E. Coordination of Work:

1. Review other sections of the specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates.
2. Upon request from other trades, furnish information or characteristics of finish materials to be provided, to ensure compatible prime coats are used.
3. Phase projects to allow a minimum of 28 days for stucco and plaster to cure properly. If painting begins before the 28-day curing period, then a moisture and pH test shall be made according to ASTM D4262 and ASTM D4263. Provide a written record of such test and receive written approval from the A/E, and paint manufacturer.

F. Surfaces to be Painted:

1. Except where natural finish of material is specifically noted as surface not to be painted, paint exposed surfaces with colors as designated in schedules.
2. Where items or surfaces are not specifically mentioned, paint same as similar adjacent materials or areas.
3. If color or finish is not designated, coordinate with A/E for selection.

G. The following categories of Work are not included as part of field-applied finish work, unless otherwise specified:

1. Pre-Finished Items: Do not include painting of factory-finished or installer-finished specified items such as, but not limited to, pre-finished partition systems, acoustic materials, architectural woodwork and casework, elevator entrance doors and frames, elevator equipment, finished mechanical and electrical equipment, light fixtures, switchgear, and distribution cabinets.
2. Concealed Surfaces: Painting is not required, unless

noted otherwise on the Drawings, on concrete or masonry surfaces such as walls or ceilings in concealed and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts, and elevator shafts.

3. Finished Metal Surfaces: Metal surfaces of anodized or enameled aluminum, stainless steel, chromium plate, copper, bronze, and similar finished materials will not require finish painting.
4. Operating Parts: Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts will not require finish painting.

H. Shop Priming:

1. Shop priming of ferrous metal items is included under various sections for structural steel, metal fabrications, hollow metal work, and similar items.
2. Shop priming of fabricated components such as architectural woodwork, wood casework, and shop-fabricated or factory-built mechanical and electrical equipment or accessories are included under other sections of these specifications.

I. Do not paint over code-required labels such as Underwriters Laboratories (UL) and Factory Mutual (FM), name, equipment identification, performance rating, or nomenclature plates.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to job site in original, new, and unopened packages and containers bearing manufacturer's name and label, and following information:

1. Name or title of material.
2. Federal Specification number.
3. Manufacturer's stock number and date of manufacture.
4. Manufacturer's name.
5. Contents by volume, for major pigment and vehicle constituents.
6. Application instructions.
7. Color name and number.
8. Indicate if paint is for interior or exterior use.

B. Storage:

1. Store materials not in actual use in tightly covered containers.
2. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.
3. Protect from freezing or extreme heat, 95 degrees F. or above.
4. Keep storage area neat and orderly.
5. When flammable materials are to be left on-site

during the Work, store the tightly covered materials in cabinets meeting the requirements of NFPA 30 and have FM and UL labeling.

6. Remove from the project site contaminated products from oil-based products and their by-products by the end of each working day.

1.07 PROJECT CONDITIONS

A. Environmental Requirements:

1. Apply water-based paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 degrees F., unless otherwise allowed by paint manufacturer's printed instructions.
2. Do not apply paint in rain, fog, or mist, or when relative humidity exceeds 85 percent, or to damp or wet surfaces, unless otherwise allowed by paint manufacturer's printed instructions.
3. Do not apply paint in areas that are not broom clean and free of dust and debris.
4. 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.

B. Workers Environmental Conditions:

1. Comply with the standards established in OSHA Workers Environmental Conditions.
2. Take precautions to ensure that personnel and work areas are adequately protected from fire and health hazards resulting from handling, mixing, and application of paints.
3. Illumination: Provide lighting equal to the permanent lighting planned for designated space.
4. Ventilation: Provide adequate ventilation to prevent buildup of fumes.

1.08 SEQUENCING AND SCHEDULING

A. Phase projects to allow a minimum of 28 days to properly cure concrete and stucco/plaster surfaces before the application of paint.

B. Phase the project to allow reasonable time for the inspection and written approval at each phase of the work by the Paint Manufacturer's Representative.

1.09 WARRANTY

A. Provide a written guarantee, co-signed jointly and severally by the Painting Subcontractor and Materials Manufacturers, against cracking, peeling, flaking, chalking, and mildew on interior painted surfaces, and additionally against erosion and unreasonable fading on

exterior surfaces, for 6 years; agreeing to repair and repaint surfaces affected by such defects, at no cost to the Owner including necessary removal or protection of other work, without limit, within 30 days after notification by the Board, and to perform such work based on the provisions of this section, including extension of the guarantee to cover new work.

1.10 MAINTENANCE

A. Provide two 5 gallon containers to the Owner, properly labeled and sealed, of each type and color of finished paint used on the project. If less than 10 gallons of a particular type and color was used, then provide 1 one-gallon container.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Use approved manufacturers only.
1. Benjamin Moore
2. Sherwin-Williams
3. Approved equal

2.02 MATERIALS

A. Use materials listed below.

1. Latex-based materials shall be used for painting of exterior and interior finishes.

B. Primers, Undercoats, Split and Finish Coats: Use materials from same manufacturer when such materials are applied on same surface.

C. Paints for interior and exterior use shall be factory tinted with <u>each stage of coating application (primer, first coat, and finish coat) to be visually distinguishable from the preceding coat</u> until the final coat. The final coat shall match the selected color.

1. Label each container indicating whether it is primer, first coat, or finish coat.
2. Label each container with the name and number of the color.
3. Label each container indicating if it is intended for exterior or interior usage.

D. Color Selection:

1. If color is not listed for a specific area or item, Contractor is not relieved of responsibility for providing colors subsequently selected.
2. Color selection made by A/E is to determine basic color required for surface.

3. Colors with same designation but produced from two or more sources shall match when viewed from distance of 24 inches or more.
4. Final application of colors shall match prepared samples approved by A/E.

E. Storage Cabinets and Disposal Containers for Flammable Materials:

1. Meet the requirements of NFPA 30.
2. Contain Factory Mutual (FM) label and Underwriters Laboratories label.

PART 3 EXECUTION

3.01 INSPECTION

A. Pre-Construction Inspection: In conjunction with the meeting required in Part 1 of this section, the Painting Subcontractor and the Materials Manufacturer Representative shall conduct on-site inspections and perform tests to determine

1. Whether the corrective and preparatory work specified below is adequate, excessive, or insufficient to obtain the required performance criteria required in this section and the guarantee.

B. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

C. Start of painting operations implies contractor's acceptance of the surface conditions and responsibility for required standards of quality and appearance.

3.02 PREPARATORY WORK

A. Remove electrical outlet and switch cover plates, finish hardware escutcheons and cover plates, air-conditioning registers, and other finished items installed on surfaces to be painted, and replace afterwards or provide protection as approved by A/E. Protect items and surfaces that cannot be removed or that do not interfere with the painting, and leave clean and completely free of paint.

B. Clean surfaces of all dirt, dust, or other contaminants that affect adhesion of paint or appearance of paint. Clean grease and oil from metal surfaces with turpentine or mineral spirits, and wipe dry before priming. Wire brush or sand metal surfaces to remove rust and scale. Touch-up factory primed surfaces with compatible factory primers. Schedule the cleaning so that contaminants from the cleaning process will not fall onto the wet painted surfaces.

C. Fill nail holes, cracks, open joints, and other defects

after priming or first coat is dry and before second coat is applied.

D. Allow all coats to dry thoroughly before applying succeeding coats. Comply with paint manufacturer's recommendations.

E. Prime finished work not shop coated when delivered to the job or as soon as possible after delivery. Back prime all woodwork to be erected against masonry or concrete before erection. Protect the tops and bottoms of all wood doors with a heavy coat of varnish before installation.

F. Clean and sand surfaces between coats with 150 Fine sandpaper or as recommended by the paint manufacturer.

3.03 APPLICATION

A. General:

1. Perform work in a thorough and professional manner in conformance with accepted good practices and requirements of authorities having jurisdiction.
2. Protect finished materials and areas not to be painted by using drop cloths, masking, or other accepted methods.
3. Provide adequate ventilation for proper drying of surfaces before and after painting.
4. Drying Period: Allow each coat to dry thoroughly before succeeding coats are applied. Minimum drying time shall be according to manufacturer's recommendations.
5. Paint Shading: Each coat of paint shall vary sufficiently to easily distinguish it from previous coats of paint, both interior and exterior applications.
6. Observation and Acceptance: As required by paint manufacturer between coats before application of next coat of paint materials.

B. Apply materials, as they come from manufacturer, to dry surfaces according to manufacturer's directions as printed on container. Any mixing on site requires specific and special approval of the A/E.

C. Apply paint materials to give an even, solid color with each coat. For deep tone finish colors, use deep base primers recommended by manufacturer.

D. Apply paint materials by brush, roller, or spray method.

1. Select method best suited to profile, texture, and finish of existing surface, subject to suitability regarding safety and conditions in existing or occupied areas, and subject to approval by paint manufacturer and A/E.
2. Apply materials evenly, smoothly flowed on and cut in

neatly, without runs, sags, wrinkles, shiners, streaks, and brush marks; drying uniformly to color and sheen selected. Make dividing lines that separate colors straight and clean cut.

E. Dry Film Thickness:

1. Comply with manufacturer's specifications.
2. Minimum Dry Film Thickness: 5 mils (unless otherwise recommended by paint manufacturer), total finished application. Reduction of minimum thickness due to special coating characteristics or application procedures requires written approval for each case.

3.04 FIELD QUALITY CONTROL

A. Notify A/E and material manufacturers representatives, when critical points in the painting and repainting work are reached, to allow timely inspection and approvals. Critical points include during and after the operation, plus other points designated by A/E, or material manufacturer representatives:

1. Surface patching and preparation.
2. Sealing of surfaces.
3. Application of primer and transition coats. Adhesion testing of transition coats may be required.
4. Intermediate and finish coats.

3.05 ADJUSTING AND CLEANING

A. Remove construction debris, material containers, equipment, and other trash resulting from work of project.

B. Upon completion of work, remove stains and paint spots from floors, wall, woodwork, electric trim, hardware, fixtures, and other items of the Board's property.

C. Dispose oil-based products, their by-products, and waste contaminated by them, in a manner acceptable to DERM.

3.06 IDENTIFICATION OF SURFACES AND PAINTING SCHEDULE

A. Material designations refer to coatings listed in these specifications.

1. Submit requests for substitutions originating from the materials manufacturers at the Pre-Construction meeting specified in Part 1 of this section.
2. Such substitutions will be considered only to allow manufacturers to meet the terms of guarantees required, and will be subject to approval by the A/E.
3. Substitutions from other sources will be considered as provided in Instructions to Bidders and General Conditions.

B. Special Notes:

1. Sand surfaces normally smooth before application of paint materials and between coats of paint.
2. Preparation not completed or overlooked before application of first coat of paint shall be accomplished between coats of paint, regardless of acceptance on original preparation.
3. Severely corroded metal, if not specified for replacement, may need sandblasting according to SSPC-6 to achieve a warrantable surface for paint.

C. EXTERIOR SURFACES PAINT SCHEDULE

1. Stucco Walls:

1st Coat	Acrylic Primer-sealer pigmented.
2nd Coat	Acrylic latex flat.
3rd Coat	Acrylic latex flat.

2. Metal Doors:

1st Coat	Field applied rust inhibitive primer over shop primer.
2nd Coat	Acrylic latex enamel.
3rd Coat	Acrylic latex enamel.

3. Stucco Ceilings:

1st Coat	Acrylic latex primer.
2nd Coat	Acrylic latex semi-gloss.
3rd Coat	Acrylic latex semi-gloss.

4. Concrete or Blown Stucco Ceilings and Blown Stucco Walls.

1st Coat	Filler.
2nd Coat	Acrylic latex primer.
3rd Coat	Acrylic latex semi-gloss.
4th Coat	Acrylic latex semi-gloss.

5. Wood:

1st Coat	Sanding sealer.
2nd Coat	Acrylic latex semi-gloss.
3rd Coat	Acrylic latex semi-gloss.

D. INTERIOR SPACES PAINT SCHEDULE

1. Walls:

1st Coat	Acrylic latex wall primer.
2nd Coat	Acrylic latex satin.
3rd Coat	Acrylic latex satin.

2. Walls (Veneer Plaster only)

1st Coat	Alkyd-based penetrating chalky wall primer/sealer.
2nd Coat	Acrylic latex satin.
3rd Coat	Acrylic latex satin.

3. Metal Doors:

1st Coat	Field applied rust inhibitive primer over shop primer.
2nd Coat	Acrylic latex semi-gloss.
3rd Coat	Acrylic latex semi-gloss.

4. Ceilings Not Acoustically Treated:

1st Coat	Acrylic latex primer.
2nd Coat	Acrylic latex semi-gloss.
3rd Coat	Acrylic latex semi-gloss.

5. Wood Natural Finish - Shelving and Cabinets:

3 coats of wood sanding sealer.

6. Wood Natural Finish - Interior Doors, Frames and Trim:

1st Coat	Sanding sealer.
2nd Coat	Gloss varnish.
3rd Coat	Gloss varnish.

7. Wood Semi-Gloss Finish - Interior Wood Surfaces and Doors:

1st Coat	Wood primer.
2nd Coat	Acrylic latex semi-gloss.
3rd Coat	Acrylic latex semi-gloss.

E. INTERIOR AND EXTERIOR METALS PAINT SCHEDULE

1. Galvanized Metal: Apply neutralizer and allow to dry thoroughly.

1st Coat	Galvanized metal primer.
2nd Coat	Acrylic latex enamel (or aluminum paint)
3rd Coat	Acrylic latex enamel (or aluminum paint).

2. Metal Sash - Doors and Frames:

1st Coat	Metal primer.
2nd Coat	Acrylic latex enamel (or aluminum paint).
3rd Coat	Acrylic latex enamel (or aluminum paint).

3. Exposed Ferrous Metal:

1st Coat	Rust inhibitive primer (reference page F-1 of M-DCPS Paints.
2nd Coat	Acrylic latex enamel.
3rd Coat	Acrylic latex enamel.

4. Exterior Ungalvanized Metal Including Pipe Systems Subjected to Corrosive/Chemical Environments. System shall be at least 10 mil minimum dry film thickness.

1st Coat	High performance rust inhibitive primer of aluminum epoxy mastic or accepted equivalent.
2nd Coat	High performance chemical resistance coating.
3rd Coat	High performance chemical resistance coating.

5. Other Metals Not Previously Mentioned:

1st Coat	Rust inhibitive metal primer.
2nd Coat	Acrylic latex enamel (or aluminum paint).
3rd Coat	Acrylic latex enamel (or aluminum paint).

END OF SECTION

SECTION 10170
SOLID PLASTIC TOILET PARTITIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Toilet partitions and urinal screens, complete with hardware.

1.02 REFERENCES

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

1. E84-96a Test Method for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

A. Product Data:

1. Show details of construction, assembly and anchorage to building construction, manufacturer's specifications including description of hardware, and maintenance instructions.
2. Include test reports confirming Class C and toxicity requirements.

B. Shop Drawings:

1. Provide dimensioned partition plans, elevations, details, swing of doors, color, and location of hardware items and required wall blocking.
2. Label components and fully describe anchorage devices and substrates.
3. Show relationship to plumbing fixtures.

C. Samples:

1. 6 inch by 6 inch samples of panel material in both stock and custom colors.
2. Include sample of fastener and shield for wall bracket anchorage.

D. Copy of manufacturer's standard 15-year warranty submitted with shop drawings, guaranteeing against material defects or faulty fabrication, assembly, and installation.

1.04 QUALITY ASSURANCE

A. Installer Certification: Provide documentation from the toilet partition manufacturer that installers have been factory-trained in the installation of these partitions.

B. Mock-Up: If required by A/E, install mockup of stall in area designated by A/E. Approval by A/E is required before ordering, production, or delivery of remaining partitions.

C. Gravity cam or integral hinges are not allowed.

1.05 PRODUCT DELIVERY, HANDLING, AND STORAGE

A. Ship components with protective wrap. Store and handle according to manufacturer's printed instructions.

1.06 WARRANTY

A. Upon completion of installation, submit warranty for 15-years starting at date of substantial completion, stating that failed products or installation shall be replaced at no additional cost to the Board.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Solid Plastic Toilet Partitions:

1. Ampco Products, Hialeah, FL: High Density Polyethylene.
2. Capitol Partitions, Columbia, MD: Poly-Pro HDPE.
3. Comtec Industries, Scranton, PA: Series S200.
4. Santana Products, Scranton, PA: Poly-Mar HD.

2.02 MATERIALS

A. Panels, pilasters, and doors of 1 inch thick seamless high-density polyethylene resin compound. A/E shall select color from manufacturer's stock or custom colors. All edges shall be machined to a 0.250" radius. Phenolic resin construction is not acceptable.
1. Plastic material shall comply with the following:

a. Flame Spread of less than 200 and Smoke Developed of less than 450 when tested according to ASTM E84.
b. Products of combustion of "no more toxic" than those from burning wood when tested according to NBS-TOX, 48.1.
c. Integral color shall be uniform throughout panel and all panels shall match.

B. Hardware: Provide solid plastic hardware when available.

1. Headrails: Extruded aluminum alloy with a clear anodized finish; anti-grip design, with stainless steel headrail brackets.
2. Hinges: Continuous hinge, aluminum, self-closing spring loaded barrel, snap-on covers, and tamper resistant sex bolts, 54 inches long.

a. Model A19 by Santana.
b. 400 Series by Markar Products, Lancaster NY.
c. Accepted equivalent.

3. Wall Brackets: Plastic to match type and color of plastic panels and full panel length. Through-bolt brackets to panels and pilasters with tamper resistant sex bolts. Wall brackets shall be used for panel and pilasters, pilaster to wall, and panel to wall connections.
4. Pilasters: Plastic to match type and color of plastic panels with leveling bolts.
5. Shoes and Fasteners: Plastic shoes to match type and color as plastic panels. Use tamper resistant sex bolts.
6. Door Pulls, Door Strikes, and Door Stops: Heavy chrome-plated Zamac or stainless steel.
7. Door Latches: Stainless steel or aluminum housing, slide bolt, and button. Use tamper resistant sex bolts.
8. Provide clear anodized aluminum bars fastened to bottom edge of panels and doors with theft-proof countersunk screws. Bars shall be flush with faces of panels.
9. Finish of exposed portion of screws, bolts, and nuts shall match finish of attached hardware item. Sex bolts shall be stainless steel barrel nut and shoulder screw design with tamperproof head. Color to match bracket.

C. Anchorages:

1. Connection to wall shall provide a rigid and durable anchorage to wall construction. Use plastic shields, expansion bolts or "butterfly" type bolts. Finish of exposed portions shall match finish of wall brackets.
2. Plastic shields will not be accepted unless partition manufacturer can demonstrate that they will not work loose in wall or cause a less than rigid and durable anchorage, and be guaranteed by the partition manufacturer and the partition installer against pullout or loosening.

2.03 FABRICATION

A. Fabricate compartments to the following configuration. Dividing panels and doors shall be 58 inches x length required and with bottom edge of panels 12 inches from the floor. Top of pilasters shall be 82 inches above finish floor and fastened to 3 inch high shoes of same material as pilaster.

B. Fabricate urinal screens to the following configuration. Dividing panels shall be 42 inches x 24 inches long and with bottom edge of panels 18 inches from the floor. Provide ceiling support and fasten to floor shoes.

C. Using template provided by toilet accessories manufacturer, provide cutouts for recessed items.

D. Compartments for handicapped use shall be fabricated according to the latest accessibility code requirements.

E. Stall doors shall be self-closing.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify dimensions at areas to receive partitions and plumbness of walls and soundness of wall surfaces that would affect installation of holding brackets. Verify blocking is installed in stud walls to receive partition anchorages.

B. Verify spacing of plumbing fixtures to assure compatibility with installation of partitions.

C. Do not begin installation of partitions until conditions are satisfactory.

3.02 ERECTION

A. Install partitions rigid, straight, plumb, and level. Follow partition manufacturer's printed installation instructions and final approved shop drawings.

B. Provide uniform clearance of not more than 1 inch between panels and walls, and clearance of not more than 1/4" at vertical edges of doors uniform from top and bottom.

C. Locate wall brackets with holes for wall anchorages occurring in masonry or tile joints wherever possible.

D. Conceal evidence of drilling, cutting, and fitting.

3.03 ADJUSTING AND CLEANING

A. Perform final adjustments to leveling devices and hardware.

B. Clean exposed surfaces of partitions, hardware, fittings, and accessories.

1. Avoid soiling other adjacent finishes.
2. Follow partition manufacturer's printed cleaning instructions.

END OF SECTION

SECTION 10400
IDENTIFYING DEVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Labor and materials required for installation of plaque, school name and address numbers, directional signage, signage for buildings, traffic control, parking, emergency exits, fire system and warning information, elevators, toilet rooms, and capacity signs and obstruction warnings.

1.02 SUBMITTALS

A. Submit properly identified manufacturer's literature before starting work.

B. Shop Drawings:

1. Submit shop drawing for review prior to fabrication.

C. A list of laminated signs for room names will be furnished by the A/E.

D. Samples: Submit 3 samples of laminated signs to A/E for approval before fabrication. Approved samples may be used in work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Building Name, Cast Aluminum Letters:

1. Material: Cast aluminum, alloy 214.
2. Style: As selected by A/E.
3. Finish: Satin aluminum with clear lacquer spray coating.
4. Sizes:

a. 18" to 24" letters, 1/4" thick, for building name, approximately 40 required.

5. Manufacturers:

a. A.R.K. Ramos.
b. Gemini Inc.
c. Sheidow Bronze Corp.

B. Raised Image Laminated Signs:

1. Comply with Florida Building Code (FBC) for accessibility requirements.
2. 1/8" thick minimum plastic laminated material with 0.008" thick minimum plastic face layer, of sizes,

quantity, colors, with raised numbers, letters, Braille, or symbols as indicated on Drawings or as specified in this section for accessible signage, room identification, and life safety signage. Tape applied or glued raised text, braille, or symbols are not allowed.

a. Manufacturers:

1) Andco Industries Corp., Greensboro, NC.
2) A&J Signs Corp., Hialeah Gardens, FL.
3) ASE (Architectural Signs and Engraving) Inc., Orofino, ID.
4) Best Sign Systems, Montrose, CO.
5) Industrial Frames, Inc., Miami, FL.
6) Mohawk, Schenectady, NY.

3. 1/32" Raised Images:
   a. Letters: Size, according to Drawings or 1 inch high, Helvetica medium.
   b. Numbers: Size according to Drawings or 1 inch high Helvetica medium.
   c. Braille: Tactile Grade II. Adhered labels are not allowed.
   d. Symbols: Use Braille, letters, numbers, and Group One symbols sized per requirements of standard spacing.

4. Sizes:

   a. Accessible Signage, Room Identification, and Life Safety Signage: 1-3/4" wide by length required or as custom designed.
   b. Symbol Signage: 9 inches x 9 inches or as custom designed.
   c. Directional Signage: 9 inches x 9 inches or as custom designed.

5. Mountings:

   a. Mount using tamperproof screws, shields, and double face tape or adhesives to hold signage in place.

6. Colors:

   a. Black background for sign face and Braille and white raised text or symbols for the following:

      1) Assembly Spaces:

         a) Interior/exterior signage for room names and room numbers, as scheduled on drawings.
         b) Minimum one room name/number/Braille sign per each main entrance door.
         c) Room descriptions average 10 letters.

d) Provide room numbers and Braille only at secondary or exit doors of these spaces.

2) Toilets/restrooms: One sign minimum at each entrance.
3) Specialty Use Rooms: One name/number sign minimum at each entrance door.
4) Specialty description as required or as indicated on drawings.
5) Accessible egress signage.
6) Directional accessibility signage for the disabled at the following locations as required or as indicated on drawings:

a) At inaccessible facility entrances and along the route indicating the route to accessible facility entrances.
b) At entrances to inaccessible toilet and bathing facilities and along the route indicating the route to the accessible entrances of accessible toilet and bathing facilities.

b. Red background for sign face and Braille, with white raised text or symbols for the following:

1) "FIRE EXTINGUISHER INSIDE" at each main door of a room containing a fire extinguisher.
2) "FIRE ALARM PULL STATION INSIDE" at each main door of a room containing a pull station.
3) "EMERGENCY EGRESS - KEEP AREA CLEAR" at emergency egress openings and not readily identifiable secondary egress doors.
4) "EMERGENCY RESCUE - KEEP AREA CLEAR" at emergency rescue openings.
5) "STORAGE NOT PERMITTED" at mechanical, electrical rooms.
6) Occupancy load signs for spaces with 50 or more occupants.
7) "NO SMOKING" as indicated on Drawings and specified in this section.

C. Evacuation Signage.

1. Metal frames with safety glazing to receive an 8-1/2" x 11" floor plan, provided by the A/E, showing the primary and secondary evacuation routes from each space with an occupant load of 6 or more and not having a door opening directly to the exterior.
2. Number of Frames: 8.
3. Frame Color: black.

D. Traffic Signage.

1. Comply with Florida Department of Transportation requirements for signage as indicated on Drawings.

2. The use of aluminum components is not allowed.

E. Obstruction Warnings:

1. Comply with FBC for potential hazards.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Mounting of Laminate Plastic Signs:

1. Mount laminated signs with centerlines at 3'-6" and 5'-0" above finish floor according to FBC and as indicated on drawings with tamperproof fasteners and predrilled holes and double face tape or adhesives.

2. Signage shall be left clean and without any rough edges. Signage shall be left without any defects concerning installation from plumb and level, concerning material quality or any other discrepancy in mounting.

B. Obstruction Warnings: Apply padding to exposed lower edges and corners with screws at 6 inches on center and double stick tape. Use rabbeted joints at corners of padding strips. Cover exposed padding with warning tape.

END OF SECTION

SECTION 10450
PEDESTRIAN CONTROL DEVICES (GATES/TURNSTILES)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section covers the furnishing and installation of an electric lock control full height security turnstile.

1.02 RELATED SECTIONS

A. Section 02820 – Ornamental Fences and Gates

1.03 QUALITY ASSURANCE

A. Manufacturer shall be a company specializing in the supply of security turnstiles with a minimum of 10 years experience.
B. Installer shall have a minimum of one year experience installing similar equipment, or shall supply a factory representative during installation of the turnstile.

1.04 SUBMITTALS

A. Submit manufacturer’s descriptive literature for specified equipment, including options.
B. Provide shop drawings for A/E review showing dimensional layout, plus installation and anchoring details. Shop drawings shall include a copy of the manufacturer's written one year warranty (which is to go into effect at time of occupancy.)

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to job site in manufacturer’s packaging undamaged, complete with installation instructions.
B. Store off ground, under cover, protected from weather, construction activities and debris.
C. Use forklift and pallet jack equipment as required for moving.

1.06 PROJECT/SITE CONDITIONS

Install unit on a level concrete pad.

1.07 WARRANTY

Pedestrian Control Equipment shall be warranted against defects in material and workmanship for a period of one (1) year from the date of final occupancy. The warranty shall cover defects in materials and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURER

Approved manufacturers include:

1. Hayward Turnstiles, Inc., 160A Wampus Lane, Milford, CT. (203) 877-7096
2. Controlled Access, 1636 W. 130th Street, Brunswick, NJ. (800) 942-0829
3. Alvarado Mfg. Co., Inc. 12660 Colony Street, Chino, CA. (800) 423-4143

2.02 PRODUCT

A. Full Height Turnstiles: Quantity: One (1)

1. Model: HT-439S, with electronic control, by Hayward Turnstiles Inc., Milford, CT. (203)877-7096
2. Approved equal.

B. ADA Access Gate: Quantity: One (1)

1. Model: HT-336 ADA, with electronic control, by Hayward Turnstiles Inc., Milford, CT. (203)877-7096
2. Approved equal.

C. ADA Egress Gate: Quantity: One (1)

1. Model: HT-336 ADA, (with panic egress push bar, full height security mesh and door closer), by Hayward Turnstiles Inc., Milford, CT. (203)877-7096
2. Approved equal.

2.03 CONSTRUCTION

A. Top Channel Frame and Top Channel Cover:

1. The Top Channel Frame shall be a 7" wide, 4-gauge, steel U channel powdercoated in a zinc rich powdercoat.
2. The Top Channel Cover system shall slide apart horizontally, providing access to the interior of the top channel without having to lift the cover vertically when removing. The Top Channel Cover shall be fabricated from 16-gauge, #304 stainless steel, polished to a satin (#4) finish.

B. Yoke (Shield Section):

1. The Yoke (curved section) shall be an all-welded single assembly, not multiple assemblies bolted together. It shall consist of 10 pieces of vertically aligned 1 3/4"OD 16-gauge steel tubing notched and welded to two curved, horizontal tubes. Two 3/16" x 1" steel straps shall be welded to the outside of the ten tubes for support. No

external fasteners shall be used in the fabrication of the yoke section.

C. Roto (Rotating Section):

1. The Roto (rotating section) shall be an all welded single assembly, not multiple assemblies bolted together. It shall consist of three vertical groupings of arms, with each arm notched and welded vertically to a vertical 3" x 3/16" wall tube. Each grouping of arms shall be positioned 120 degrees apart from one another and shall consist of 13 arms (39 total arms per Roto). Each arm shall be 14-gauge, 1 3/4"OD steel tubing. Each arm shall have a securely fitting plastic cap. No external fasteners shall be used in the fabrication of the Roto section.

D. Bottom Bearing Assembly:

1. The Bottom Bearing Assembly shall consist of a sealed inter-ring bearing a bearing shaft which fits into the underside of the Roto and bottom bearing housing and cover.

E. OV (Barrier)

1. The OV (barrier section) shall be an all welded single assembly. It shall consist of 13 arms notched and then welded to a 3"OD x 3/16" wall steel vertical tube. The arms shall be constructed from 1 3/4" OD x 14-gauge steel tubing. Each arm shall have a securely fitting ribbed plastic cap. No external fasteners shall be used in the fabrication of the OV section.

F. Yoke Guard Plate

1. The Yoke Guard Plate is a single piece of 16-gauge steel that bolts to the underside of the Top Channel Assembly and the top of the Yoke.

2.04 EQUIPMENT

A. General: The turnstile shall have key lock control to allow field configurable rotation. The turnstile shall have the ability to provide free passage in both directions; free passage in one direction and no passage in the opposite direction; or no passage in both directions.

B. Mechanical Operation:
1. Roto / Top Channel Connection: The connection between the Roto and the Top Channel shall be accomplished through the use of a multiple grooved splined shaft and coupling.
2. Top Bearings: The top bearings shall be fully concealed from view by a cover fabricated from #304 stainless steel.
3. Self-Adjusting Speed Control / Self-Centering: The turnstile shall have self-adjusting speed control which

automatically increases or decreases resistance depending on the pushing force of the user. The turnstile shall also self-center, automatically returning to the “home” position after rotation. Self-centering shall be controlled. When lockarms are disengaged, the turnstile shall rotate only once when the Roto is spun with up to 250lbs of force. A Roto that self-centers through spinning and settling is not acceptable.

2.05 FACTORY TESTING

A. Product shall be fully tested at the factory prior to shipment.
B. Check all mechanical connections.
C. Inspect product finish. Touch up prior to shipment.

2.06 FINISH

A. Hot Dipped Galvanized: All exterior components, except the Top Channel Cover and top and bottom bearing covers (which are to be #304 stainless steel) are to be hot dipped galvanized to ASTM Standard A 123/A 123M-02.

2.07 ACCESSORIES

A. Arm Guards: Provide and install manufacturer' standard snug fitting padded arm guards for turnstile arms.
B. Provide and install manufacturer's Out of Service Lock Bracket: Enables the turnstile to be secured with a padlock.
C. Computerized Counting: Provide to the Owner, GateWatch, Alvarado’s Windows based facility counting software program.

PART 3 EXECUTION

3.01 SITE EXAMINATION

A. Inspection: Installer must examine the installation location and advise the Contractor of any site conditions inconsistent with proper installation of the product. These conditions include but are not limited to the following:

    1. Turnstile must be installed on a level concrete pad. Installation shall not begin until unacceptable conditions are rectified.

B. Installation: Install turnstiles in accordance with manufacturer’s instructions.
C. Adjustment: Installer shall adjust turnstiles for proper performance after installation.
D. Instruction: A factory trained installer shall demonstrate to the owner’s maintenance crew the proper operation and the necessary service requirements of the equipment, including exterior maintenance.
E. Cleaning: Clean turnstile and area carefully after installation to remove excess caulk, dirt and labels. Touch up any damaged

areas with cold galvanizing spray purchased from the manufacturer or which contains a minimum of 95% pure zinc.

END OF SECTION

SECTION 10522
FIRE EXTINGUISHERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Fire extinguishers and cabinets including necessary accessories.

B. Related Sections:

1. 09900 - Painting
2. 10400 - Identifying Devices

1.02 SUBMITTALS:

A. Product Data: Properly identified product data for fire extinguisher cabinets, mounting brackets and fire extinguishers.

B. Shop Drawings:

1. Shop and erection drawings for review indicating materials, dimensions, fasteners, and installation methods.

1.03 QUALITY ASSURANCE:

A. Comply with applicable standards of:

1. National Fire Protection Association (NFPA).
2. Florida Department of Education, Office of Educational Facilities - State Requirements for Educational Facilities - 1999 (SREF).

B. Equipment, accessories, materials, and quality of construction shall have a 5 year warranty against defects.

C. Fire extinguishers for "Low Hazard Areas" shall be in fire extinguisher cabinets.

1.04 SOURCE QUALITY CONTROL:

A. Manufacturer: Provide equipment manufactured by one manufacturer except where otherwise noted, uniform throughout as to method and type of construction used.

B. Nameplates: Identify the manufacturer with appropriate nameplates, UL labels, manufacturer's labels, and model numbers.

C. Pack each extinguisher with a hanging bracket acceptable for wall mounting with a latching metal, retainer strap around the cylinder, ready for installation, in a sturdy cardboard box labeled to identify contents fully when delivered to the site.

D. Store product in manufacturer's original protective packaging in a dry protected space until installed.

E. State Fire Marshall Tag Requirements: Size 2-1/4" x 5 1/4".

1. Notice not to remove.
2. Serial number of extinguisher and type of extinguisher.
3. Name of person who serviced the extinguisher.
4. Permit number of person who serviced the extinguisher.
5. Type of service performed.
6. Month and year the service was performed.

1.05 WARRANTY

A. Provide a 5-year warranty against defects for equipment, accessories, materials and quality of construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:

1. Dry Chemical Type:

a. General Fire Extinguisher Corp.
b. Larsen's, MP and DC series.
c. Potter Roemer, 3000 and 3300 series.
d. J-L Industries, Cosmic and Galaxy series.

2. Carbon Dioxide Type:

a. General Fire Extinguisher Corp.
b. Larsen's, CD Series.
c. Potter Roemer, 3400 series.
d. J-L Industries, Sentinel series.

B. Fire Extinguisher Cabinets, aluminum:

1. Larsen's: Architectural series.
2. Potter Roemer: Alta series.
3. J-L Industries: Academy series.

C. Extinguisher Brackets:

1. General Fire Extinguisher Corp. Model MVCP-5.
2. Accepted equivalent.

2.02 EQUIPMENT

A. Fire Extinguisher Cabinets and Supports:

1. Fire extinguishers in "Low Hazard Areas" shall be

contained in an aluminum, fully recessed fire extinguisher cabinet.
2. Fire extinguisher brackets for ABC type models shall be provided in places where cabinets are not called for.

B. Fire Extinguishers: Dry chemical and ABC type multi-purpose with fog nozzle attached to a hose.

1. Types of Fire Extinguishers:

a. Hazardous Areas: 4A-60BC.

1) Storage rooms where paper products are stored.
2) Class C fire areas.

b. Flammable Areas: (Sodium Bicarbonate) 40BC.

1) Air handling rooms.

c. Low Hazard Areas: 2A-10BC.

1) Hallways and remaining rooms.
2) Class A or B fire areas.

2. For use where wall brackets are specified (Hazardous Areas):

a. The extinguisher shall be a multi-purpose, dry chemical stored pressure type with a corrosion-resistant reusable metal cylinder with a durable red finish.
b. The extinguisher shall have a squeeze type valve, handle, and operating lever of corrosion-resistant metal having no plastic parts.
c. The extinguisher shall have a valve locking pin with a pull ring at one end of stainless steel or hard aluminum and shall not be removable without breaking the metal or plastic seal. One end of a metal chain shall be fastened to the valve lock pin pull ring with the other end securely attached to the extinguisher.
d. The extinguisher shall have a screw-in type visual pressure gage and discharge hose.
e. Each extinguisher shall have a securely attached nameplate or band bearing complete operating instructions, the name or mark of Underwriters Laboratories, Inc., a control number, the words "Listed", "Dry Chemical Fire Extinguisher", and the manufacturer's name and extinguisher model number. The classification shall also be indicated on the nameplate or band and shall indicate a minimum UL classification of 4A-60BC.
f. The extinguisher shall not exceed an overall height of 19-1/4", a cylinder diameter of 5-3/4" and an overall width of 9 inches.

3. For use where extinguisher cabinets are specified (Low Hazard Areas):

    a. The extinguisher shall be a multi-purpose, dry chemical stored pressure type with a corrosion-resistant reusable metal cylinder of 5-pound capacity with a durable red finish.
    b. The extinguisher shall have a squeeze type valve, handle, and operating lever of corrosion-resistant metal having no plastic parts.
    c. The extinguisher shall have a valve locking pin with a pull ring at one end of stainless steel or hard aluminum and shall not be removable without breaking the metal or plastic seal.
    d. The extinguisher shall have a screw-in type visual pressure gage and a discharge hose.
    e. Each extinguisher shall have a securely attached nameplate or band bearing complete operating instructions, the name or mark of Underwriters Laboratories, a control number, the words "Listed", "Dry Chemical Fire Extinguisher", "Classification 2A-10BC", and the manufacturer's name and extinguisher model number.

4. Each type of extinguisher shall arrive on site, ready for use, charged with non-toxic, multi-purpose, silicon-treated ammonium phosphate type dry chemical and dry nitrogen gas.
5. Cabinet Door: Panel with full tempered glass, catch, and no lock.
6. Each 2A-10BC extinguisher shall also be at least the equal of the General Fire Extinguisher Corp. extinguisher Model TCP-5JH fitted with a discharge hose and provided with a Model MVCP-5 hanging bracket.

C. Fire Extinguishers: Alkaline dry chemical with a minimum UL classification of 20BC.

1. For Use With Wall Brackets (Flammable Areas)

    a. The extinguisher shall be an alkaline dry chemical stored pressure type with a corrosion-resistant reusable metal cylinder with a durable red finish.
    b. The extinguisher shall have a squeeze type valve, handle, and operating lever of corrosion-resistant metal shall have no plastic parts.
    c. The valve locking pin with a pull ring at one end shall be of stainless steel or hard aluminum and shall not be removable without breaking the metal or plastic seal. One end of a metal chain shall be fastened to the valve lock pin pull ring with the other end securely attached to the extinguisher.
    d. The extinguisher shall have a screw-in type

visual pressure gage and discharge hose. Provide a discharge nozzle consisting of a 15 inch minimum hose assembly.

e. Each extinguisher shall have a securely attached nameplate or band bearing complete operating instructions, the name or mark of Underwriters Laboratories, Inc., a control number, the words "Listed", "Dry Chemical Fire Extinguisher", and the manufacturer's name and extinguisher model number. The classification shall also be indicated on the nameplate or band and shall indicate a minimum UL classification of 20BC.

f. The extinguisher shall not exceed an overall height of 19-1/4", a cylinder diameter of 5-3/4" and an overall width of 9".

g. Each extinguisher shall be ready for use, charged with an alkaline dry chemical, such as sodium bicarbonate or potassium bicarbonate, with a hanging bracket acceptable for wall mounting.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Install according to manufacturer's installation instructions and with approved shop drawings.

B. Verify rough openings for cabinets are correctly sized and located.

C. Install extinguisher cabinets accurately, without warpage, true to line, plumb and level at a maximum of 4'-6" height to the top of the fire extinguisher in the cabinet.

D. Install extinguishers using wall mount brackets true to line plumb and level at a maximum of 4'-6" height to the top of the fire extinguisher.

3.03 ADJUSTING AND CLEANING

A. Adjust extinguisher cabinets to provide tight fit at contact points and to ensure smooth operation, closure, and locking.

B. Cleaning:

1. Clean aluminum surfaces and glass promptly after installation exercising care to avoid damage to protective coatings and finishes.
2. Remove excess glazing and sealant compounds, dirt, and other substances.

3. Lubricate hardware and moving parts.

3.04 PROTECTION

A. Initiate and maintain protection and other precaution required to ensure that all units will be without damage or deterioration until time of acceptance.

END OF SECTION

SECTION 10675
SHELVING (UTILITY/STORAGE)

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Related Section:

1. 06100 - Carpentry.

1.02 SUBMITTALS

A. Submit properly identified manufacturer's catalog cuts and installation instructions before starting work.

1. Shop Drawings:

a. Layout.
b. Details.
c. Dimensions.
d. Assembly and anchorage.

B. Samples: Submit samples for review as directed by A/E.

PART 2 PRODUCTS

2.01 SHELVING

A. Manufacturers:

1. Adapto Storage Products.
2. Equipto, Tatamy, PA.
3. Hallowell, Deerfield Beach, FL.
4. Republic Storage Systems, Canton, OH.
5. Penco Products, Oaks, PA.
6. Triple A Shelving and Equipment.
7. Wilson Metal Products.

B. Design and Construction: Clip-type adjustable metal shelving of modular unit construction of individual bolted rigid frame assemblies (no cross bracing), constructed so any section can be moved and each shelf can be independently adjusted without the use of tools, 18 gage.

C. Shelving Unit Sizes:

Type A: 84/87" high x 36" wide x 12" deep, with top and 6 adjustable shelves, closed base fronts.

Type B: 84/87" high x 36" wide x 18" deep, with top and 6 adjustable shelves, closed base fronts.

Type C: 84/87" high x 36" wide x 24" deep, with top and 6 adjustable shelves, closed base fronts.

D. Pallet Rack Sizes:

1. 84 " high x 96" wide x 48" deep with 2 shelves.

E. Wall and Floor Attachment Hardware: Include manufacturer's recommended brackets and mounting screws for wall and floor attachment.

2.02 CUSTODIAL STORAGE SHELVING

A. Manufacturers:

1. Adapto.
2. Accepted equivalent.

B. Unit Components:

1. 12 inch x 36 inch, 18 gage steel shelf (3 per unit). Model S8-12-36, gray.
2. 12 inch sway brace (6 per unit). Model XB-12, gray.
3. 31 inch, 12 gage upright post (2 per unit). Model P12-31, gray.

C. Wall Hardware: Include manufacturer's recommended fasteners and mounting screws for wall attachment.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Set fixed shelving units accurately in place as indicated on drawings and fasten to adjacent walls with approved anchoring devices to blocking as recommended by the shelving manufacturer.

B. Touch-up marred surfaces, replace units damaged beyond cosmetic correction as directed by A/E.

C. Install intermediate shelves at equal spacing in each unit.

3.03 CLEANING

A. Leave shelving clean and free from dirt, smears, fingerprints, and other foreign matter.

END OF SECTION

SECTION 10800
TOILET ROOM ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 04220 - Concrete Unit Masonry.
2. 06100 - Carpentry.
3. 09310 - Ceramic Tile.
4. 10170 - Solid Plastic Toilet Partition.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for each toilet accessory before starting work.

B. Samples:

1. Submit full-size samples of units to A/E for review of design and operation.
2. Acceptable samples will be returned and may be used in work.

C. Setting Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices.

1.03 QUALITY ASSURANCE

A. Coordination:

1. Inserts and Anchorages: Furnish inserts and anchoring devices to be set in concrete or built into masonry. Coordinate delivery with other work to avoid delay.
2. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.

B. Source Quality Control:

1. Products: Provide products of same manufacturer for each type of accessory unit and for units exposed in same areas, unless otherwise acceptable to A/E.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Toilet Room Accessories:

1. A&J Washroom Accessories.
2. American Specialties.
3. Baylor American Accessories.

4. Bobrick.
5. Gamco.
6. McKinney/Parker.
7. Meek Manufacturing Company, Fort Smith, AR.
8. Moore Dispensers.

2.02 MANUFACTURED UNITS

A. Toilet Paper Dispenser:

1. Surface mounted, multi-roll, stainless steel with theft resistant spindles and tumbler lock keyed like other bathroom accessories.
2. Manufacturers:

a. A&J Washroom Accessories: Model U840.
b. American Specialties: Model 0030.
c. Baylor American Accessories: VT-5.
d. Bobrick: Model B-288.
e. Gamco: Model TTD-5.
f. McKinney/Parker: Model 615.

B. Grab Bars:

1. Lengths and configurations as indicated on drawings and as specified in this section.
2. Heavy duty with peened non-slip gripping surface, 1-1/2" diameter, stainless steel, with 1-1/2" wall clearance and with theftproof exposed fasteners.
3. Straddle bars, wall to floor with socket and horizontal grab bars according to manufacturer's model/series numbers.
4. Manufacturers:

a. A&J Washroom Accessories: UG Series.
b. American Specialties: 3500 Series.
c. Baylor American Accessories: Georgia Series.
d. Bobrick: B-6106 Series.
e. Gamco: 150 E Series.
f. McKinney/Parker: 9705 Series.

C. Paper Towel Dispensers:

1. Surface mounted, equipped to dispense single-fold paper towels, stainless steel, with tumbler lock keyed like other bathroom accessories.
2. Manufacturers:

a. A&J Washroom Accessories: Model U190.
b. American Specialties: Model 245SS.
c. Baylor American Accessories: Model TN-5.
d. Bobrick: Model B-263.
e. Gamco: Model TD-5.
f. Moore Dispensers: Model 850.

D. Mirrors:

1. One piece roll formed frame of stainless steel angle with corners heliarc welded, ground and polished smooth, complete with minimum 20 gage galvanized steel back.
2. Tempered glass mirror electrolytically copper plated, No.1 quality, guaranteed against silver spoilage for a minimum 15 years. Sizes and locations as shown on Drawings.
3. Manufacturers:

    a. A&J Washroom Accessories: Model U700.
    b. American Specialties: Model 0600-A.
    c. Baylor American Accessories: Series AR.
    d. Bobrick: Model B-290.
    e. Gamco: A Series.
    f. McKinney/Parker: Model 150 or 170.

E. Feminine Napkin/Tampon Disposal:

1. Stainless steel, single recessed or dual access, self-closing doors, with tumbler lock keyed like other bathroom accessories.
2. Manufacturers:

    a. A&J Washroom Accessories: Models U581 (single) or U580 (dual).
    b. American Specialties: Models 0473 (single) or 0472 (dual).
    c. Baylor American Accessories: Model NM-40 (single) or NM-60 (dual).
    d. Bobrick: Models B-353 (single) or B-354 (dual).
    e. Gamco: ND-4. (single) or ND-6 (dual).

F. Soap Dispensers, Wall Mounted:

1. Surface mounted, stainless steel container, liquid type, with refill indicator, and with 40 oz. stainless steel soap container and tumbler lock keyed like other bathroom accessories.
2. Manufacturers:

    a. A&J Washroom Accessories: Model U124.
    b. American Specialties, Inc.: Model 0342.
    c. Baylor American Accessories: Model SD-58AP.
    d. Bobrick: Model B-4112.
    e. Gamco: G-58AP.
    f. McKinney/Parker: Model 304H.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Install toilet room accessories at locations shown on Drawings according to manufacturers' printed installation instructions.

B. Secure toilet room accessories to supporting substrate with fasteners and anchors of types necessary for rigid anchorage to substrate construction.

C. Install toilet room accessories plumb and true with horizontal lines level.

1. Conceal evidence of drilling or fitting in adjacent surfaces.

D. Special Tools or Keys:

1. Deliver properly identified special tools or keys of each type required for theftproof fasteners and for refilling dispensers or emptying receptacles.

E. Cleaning:

1. After installation, clean toilet room accessories in a manner not to damage finish and leave in conditions satisfactory to A/E.

END OF SECTION

SECTION 14410
HANDICAP POOL LIFT

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 03300 - Cast-in-Place Concrete.
2. 15410 - Piping (Plumbing)

1.02 REFERENCES

A. Americans with Disabilities Act 2012 edition

B. Florida Building Code (FBC), latest edition.

1.03 SUBMITTALS

A. Submit properly identified manufacturer's literature including specifications, installation details, and the following data before starting work.

1. Shop Drawings: Indicate size, construction details, gages, finish, installation details, anchorage, and hardware location.
2. Certification: Miami-Dade County product approval.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Handicap Pool Lift:

1. Model IGAT-180 by Aquatic Access, Inc., Louisville, KY.
2. Approved equal. Products of other manufacturers must be pre-qualified to bid not less than 10 days prior to bid date.

2.02 FABRICATION

A. Construction:

1. Handicap lift shall be constructed from 304L and 316L stainless steel, rubber, plastics, and brass, with Unibody construction with cylinder as main component of frame structure. All welds by GTAW method per ANSI/AWS D 1.6.

2. Unit shall have adjustable plastic seat with patient security belt with convenient hook and loop closure system. Seat shall have a width of 17″, seat depth of 18″, and seat height 17 1/4″. Lift shall include integral footrest.

3. Unit shall include stainless steel 2 3/8″ OD, 7″ deep

deck socket (provided by unit manufacturer) with grounding/bonding stud affixed. Unit shall also include manufacturer's socket cover (3 1/2″ OD flat with 2″ extension for proper fit into socket) for use when lift is removed.

B. Operation

1. Unit shall be powered by water pressure from standard plumbing hose connection, with 55-65 PSI operating pressure.

2. Capacity of unit: 400 lbs., min.

3. Automatic 180° rotation

4. Standard vertical seat travel of 42″

5. Deck level and water level controls.

6. Adjustable seat height on deck, variable (19″, 21″, 23″ standard)

7. Install in 2 3/8″ OD, 7″ deep deck socket (included) with 1″ grounding/bonding stud.

8. Include socket cover to protect socket when lift is removed.

9. IMPORTANT: Lift shall be capable of unassisted operation from both deck and water levels.

10. Unit shall be capable of being locked in "up" position. Unit shall also be stable and shall not permit unintended movement when person is getting into or out of the seat.

11. Handicap lift shall be capable of lowering the operator to chest depth (approximately 18″) below surface of the pool water.

C. Quality Assurance

1. Provide manufacturer's Five-year warranty on all stainless steel parts, and a One-year warranty on plastic, rubber, and brass components.

2. Provide written certification from the manufacturer that the lift complies with the Americans with Disabilities Act of 2012 (ADA), Florida Building Code (CBC) and other state and various local ordinances regarding access to swimming pools.

IV. Submittals

1. Submit scaled shop drawings including all conditions of construction, location diagrams including identification of and spacing of anchorage, framing members, and joinery details.

2.03 FINISHES:

A. Factory primed with baked-on enamel or polyester top coat.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install according to manufacturer's installation instructions and with accepted shop drawings.

B. Install accurately, true to line, plumb and level.

END OF SECTION

SECTION 15010
GENERAL PROVISIONS

PART 1 GENERAL

1.01 SUMMARY

A. Substitutions and Product Options:

1. Products List: Submit list of major products proposed to be used with names of manufacturers and installing subcontractors.
2. Contractor's Options:

a. For products specified only by standard, select any product meeting standard.
b. For products specified by naming 1 or more products by manufacturer's name and catalog number, select any 1 of the products or manufacturers named.
c. Contractor may submit a request for substitution for any product or manufacturer not specifically named according to Instructions to Bidders and General Conditions.

3. Substitutions:

a. The A/E will consider written requests from the Contractor for substitution of products for 45 days after contract award date.
b. Submit a separate request for each product, supported with complete data, with drawings, and appropriate samples, including, in addition to the requirements of the General Conditions, the following:

1) Comparison of qualities of proposed substitution with product specified.
2) Changes required in other elements of the work because of proposed substitution.
3) Effect on construction schedule.
4) Cost data comparing proposed substitution with product specified.
5) Any required license fees or royalties generated by the proposed substitution.
6) Availability of maintenance service and source of replacement materials.

c. The A/E’s decision on approval or rejection for substitution will be final.

4. A request for a substitution is a representation that the Contractor:

a. Has investigated proposed product and determined it is equal for less cost to or superior for equal cost in all respects to product specified.
b. Provides the same warranties or bonds for the proposed substitution as for the product specified.
c. Will coordinate installation of any accepted substitution into work and make other changes as may be required to make work complete.
d. Waives all claims for additional costs, under Contractor's responsibility, that may become apparent.
e. Has verified the proposed product qualifies for FPL Commercial/Industrial Energy Conservation Programs Standards rebates by meeting or exceeding FPL specified qualifications.

5. A/E will review requests for substitutions with reasonable promptness, and notify the Contractor, in writing.

1.02 SUBMITTALS

A. Submit shop and detail drawings, factory certified prints, brochures, and materials lists for items specified according to Instructions to Bidders and General Conditions.

B. Substantial Completion Submittal Requirements:

1. Operating and Maintenance Manuals and Charts: Provide 3 complete sets of operating and maintenance instructions, literature, and information concerning equipment under this Division, including, but not limited to HVAC systems, indexed and bound in accepted loose leaf binders.
2. Record Prints:

a. Keep 1 complete set of prints on file at job site for sole purpose of recording "record" data. Mark

changes in red on the prints as work progresses.
b. Update "record" prints before each requisition for payment for review and acceptance by A/E.
c. Deliver completed set of "record" prints to A/E before request for final payment.

1.03 QUALITY ASSURANCE

A. Qualifications: Perform work by workers skilled in their respective trades and install specified materials and equipment according to manufacturer's recommendations.

B. Where special qualifications are required, i.e., for welders or brazers, a currently active certificate of qualification from a recognized testing laboratory and dated within 12 months before performance of work will be required.

1. If quality of work of any such specially qualified worker creates reasonable doubt as to skill, A/E may require worker to be removed and replaced.

C. Tradesperson Qualifications:

1. Contractor shall provide or cause to be provided by the appropriate subcontractors in the plumbing trades for all work required by this Division 15 a ratio of one licensed master or journeyman for every three trainees at all times as those terms are defined by Chapter 10 of the Miami-Dade County Code. No other workers shall be allowed.
2. Where the work of these trades is subcontracted:

a. The contractor shall include this requirement in those subcontracts.
b. The subcontractor shall show capacity to bond the subcontracted work. The decision to require such bond to be issued remains with the general contractor.

1.04 WARRANTY

A. Furnish copies to the owner of guarantees for equipment or materials as specified in Instructions to Bidders and General Conditions.

B. The Contractor shall respond to repair of compressors,

pumps, and other routine warranty service requests by completing repairs within 24 hours of service request by the owner.

C. The Contractor shall respond to emergency warranty service requests with the arrival of service technician at affected site within 4 hours of notification of emergency. Repairs shall be expedited to bring system online as soon as possible. Emergencies include, but are not limited to failures of controls, and any other component causing system failure.

D. If problem is not correctable within specified time frames, the Contractor shall provide in writing an expected completion date to the owner.

E. Inspections at End of Warranty:

1. At the end of the 1 year warranty period, the owner will decide if the warranty items cited during the course of the warranty period have been completed to the satisfaction of the owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide new materials, free from defects, of domestic manufacture unless otherwise noted.

2.02 EQUIPMENT

A. Use equipment scheduled in the Construction Documents to determine space and service requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Clean surfaces free of grease, scale, rust, and other foreign matter and leave ready for painting.

B. Provide starters, required control items, and wiring diagrams for motors specified under this Division, unless otherwise noted.

C. Electrical items furnished shall conform to the requirements of Division 16.

3.02 FIELD SUPERVISION

A. Verify measurements at building site before starting work. Submit discrepancies and differences to A/E for consideration and decision before proceeding with work.

B. Obtain full information regarding:

1. Peculiarities and limitations of space available for installation of equipment.
2. Materials under contract.
3. Accessibility required to dampers, valves, and other apparatus, including any part of any system needing maintenance or operation.

C. Provide accurate layout, grades, and elevations. Set sleeves and openings in ample time for other trades to proceed in a timely manner. Take proper precautions to protect work and equipment from damage.

D. Cut openings and chases required to accommodate the Work and repair floors, walls, and ceilings damaged by such cuttings.

E. Perform required tests in the presence of A/E and authorities having jurisdiction. Give 48 hour notice before tests.

F. Insure compliance with safety codes and other codes and ordinances applicable to the performance of work under this Division.

3.03 FIELD QUALITY CONTROL

A. Work will be inspected by A/E during construction.

B. HVAC systems shall be operational and maintain 75 $\pm$ 2 degrees F. and a constant 55 $\pm$ 2 percent relative humidity for a period of at least 3 days (72 hours) before installation of specified interior finishes. These conditions shall be maintained at all times until interior finish installations are completed and accepted by owner. Record conditions at least every 4 hours and provide

supplemental temporary air-conditioning or dehumidification if HVAC is not operating at specified conditions. Exterior openings shall be be kept closed during these periods by using temporary or permanent barriers.

C. Maintain a repair log of equipment before substantial completion.

D. Prerequisites to substantial completion inspection shall be completed construction, testing, adjustments, repair logs, balancing, start-up, and required instruction periods on specified mechanical equipment and systems.

1. Air-conditioning:

a. Ductwork shall be installed complete with required dampers, deflectors, hangers, and insulation.
b. Air-conditioning units shall be leveled.
c. Control system components shall be installed and tested for function.
d. System testing and balancing shall be completed.

3.04 DEMONSTRATION

A. As a condition for substantial completion and after systems have been tested and checked as complete and operational, Upon the owner’s request and at no cost to the owner, provide on-site training of the operation of systems to the owner’s maintenance and administrative staff.

B. Furnish a minimum of 8 hours or as needed to provide adequate in-service training. These sessions will be broken into segments to facilitate the training of individuals in operating the equipment. Operating manuals and user's guides shall be provided at training sessions.

C. The completion of such training shall be documented to the satisfaction of the owner.

END OF SECTION

SECTION 15023
CODES AND STANDARDS

PART 1 GENERAL

1.01 REFERENCES

A. Comply with the following:

1. Florida Building Code (FBC).
2. Florida Building Code (FGC) - Gas.
3. Florida Building Code (FMC) - Mechanical.
4. Florida Building Code (FPC) - Plumbing.
5. National Electrical Code - (NFPA 70).
6. National Fire Protection Association - (NFPA).
7. American National Standards Institute (ANSI) A117.1, 1995.
8. American Society of Civil Engineers (ASCE).

1.02 QUALITY ASSURANCE

A. Where materials and equipment are available under the continuing inspection and listing service of Underwriters Laboratories (UL) and National Electrical Manufacturer's Association (NEMA), furnish materials and equipment so listed.

PART 2 NOT USED

PART 3 NOT USED

END OF SECTION

SECTION 15044
GENERAL COMPLETION

PART 1 NOT USED

PART 2 NOT USED

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Construction, satisfactory testing, adjustments, balancing, start-up, and required instruction periods shall have been completed on specified mechanical equipment and systems before substantial completion inspection. All safety equipment shall be in place and operational. There shall be no undue equipment noises, leaks, or misaligned equipment.

1. Air-conditioning:

a. Ductwork: Installed complete, including required dampers, deflectors, hangers, and insulation.
b. Air-conditioning Units: Installed, cleaned, and leveled. New filters in place.
c. Condensers: Installed, leveled, and charged with refrigerant.
d. Insulation: Installed with no condensation leaks.
e. Control System Components: Installed and tested for function.
f. Safety Equipment: Installed and tested.
g. System Testing and Balancing: Complete.

2. Plumbing:

a. Piping: Pressure testing complete. System free flowing.
b. Plumbing Fixtures: Unchipped, leveled, clean, and handicapped accessible. Grouting completed.
c. Toilet Room Accessories. Installed and secured.
d. Insulation: Installed.
e. Domestic water: Permanent connection with backflow preventers in place.
f. Safety Equipment: Installed and tested.
g. Valving: Open.

END OF SECTION

SECTION 15047
IDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Identification including necessary accessories indicated on Construction Documents and specified in this section or as required for proper identification of equipment and piping.

B. Related Sections:

1. 15410 - Piping (Plumbing).
2. 15510 - Piping (HVAC)

1.02 SUBMITTALS

A. Submit properly identified product and technical data including printed installation instructions before starting work.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Color Coding: ANSI Z535.1 (latest edition) shall take precedence over any discrepancies in determining proper color code identification.
2. Conform to the standards established in ANSI A13.
3. Comply with OSHA standards.

PART 2 PRODUCTS

2.01 EQUIPMENT IDENTIFICATION

A. Identify equipment served by piping systems by number or legend as shown on Construction Documents.

B. Engraved Plastic Name Plates: Provide engraved laminated plastic name plates with 1 inch high letters on equipment cabinets.

C. Brass Tags: Provide appropriate sized brass tags on equipment where cabinets do not exist.

D. Piping Identification:

1. Color Coding: Identify piping with markers and directional arrows according to the following color coding system:

Description	Background	Letters
Hot Water	Yellow	Black
Cold Water	Green	White
Gas	Yellow	Black
Air	Blue	White
Vacuum	Green	White
Steam	Yellow	Black
Nitrogen	Green	White
Oxygen	Yellow	Black
Hydrogen	Yellow	Black
Refrigerant	Yellow	Black
Fire	Red	White

2. Piping Identification Materials:

a. Identify contents and flow direction of piping or pipes wrapped with insulation by using:

1) Brady B-946 self-sticking vinyl.
2) Champion America Inc., pressure sensitive vinyl.
3) Seton Opti-Code.
4) Ready Made adhesive pipe markers.

3. Valve Identification:

a. Identify location and system under valve control with a color coded thumb tack under valve and lay-in ceiling tile.

E. Underground Tapes:

1. Electrical Warning Tape: 6 mil, 3 inches wide polyethylene.

a. BURIED ELECTRICAL LINE BELOW - No.37236 by Seton or accepted equivalent.

2. 2" Metallic Detection Tapes:

a. BURIED SEWER LINE BELOW - No.37220 by Seton or accepted equivalent.
b. BURIED WATER LINE BELOW - No.37222 by Seton or accepted equivalent.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

B. Verify surfaces are clean and dry before application of identification signage.

3.02 INSTALLATION

A. Brass Tags or Engraved Plastic Name Plates:

1. Install brass tags or engraved plastic name plates according to manufacturer's instructions.

a. Place brass tags or name plates in locations easily visible within the space at normal eye level or as otherwise directed by A/E.

B. Piping Markers and Directional arrows:

1. Location:

a. Pipes Passing Through Walls: Provide pipe markers and directional arrows on the pipe on each side of the wall.
b. Pipes Behind Access Doors/Panels: Provide pipe markers and directional arrows within view.
c. Continuous Run Pipe Lines: Provide pipe markers and directional arrows at intervals not exceeding 50 feet.
d. Risers and Joints: Provide pipe markers and directional arrows at each riser and joint.
e. Vertical and Horizontal Change of Direction: Provide pipe markers and directional arrows at each vertical and horizontal change of direction.

2. Special Requirements:

a. Directional Arrows: When identifying by directional arrows, point arrow head away from pipe markers and in the direction of flow.

1) Direction of Flow: If the flow can be in both directions, identify by using double-headed directional arrows.

b. Thin Film Pipe Markers and Thin Film Directional Arrows: When using both thin film pipe markers and thin film directional arrows on soft insulation, provide a spiral wrap of accepted pipe banding tape around the pipe as foundation for both markers and directional arrows.

C. Underground Tapes:

1. Electrical Warning Tape: Install warning tape 8 inches below finish grade on all underground outside electrical lines.
2. 2" Metallic Detection Tapes: Install metallic detection tape 4 inches to 6 inches below finish grade on all underground outside plumbing and air-conditioning lines.

END OF SECTION

SECTION 15090
SUPPORTS, ANCHORS, AND SEALS

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15410 - Piping (Plumbing).
2. 15430 - Piping Specialties (Plumbing).
3. 15515 - Valves, Hangers, and Specialties.

1.02 REFERENCES

A. Pipe Supports: ANSI B31.1, Power Piping.

1.03 SUBMITTALS

A. Submit properly identified manufacturer's literature before starting work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Inserts:

1. Malleable iron case of galvanized steel shell expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, and lugs for attaching to forms.
2. Size insert to suit threaded hanger rods.
3. Wall Support:

    a. Pipe Sizes to 3 Inches: Cast iron hook.
    b. Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamps.

4. Vertical Support: Steel riser clamp.
5. Floor Support:

    a. Pipe Sizes to 4 Inches and All Cold Pipe Sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange and concrete pier to steel support.

b. Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws and concrete pier or steel support.

6. Provide copper plated supports for copper piping or provide sheet lead packing between support and piping.

B. Hanger Rods: Provide steel hanger rods, threaded both ends, threaded one end, or continuous threaded.

C. Flashing:

1. Steel flashing: 26 gage stainless steel.
2. Safes: 5 pounds per square foot sheet lead or 8 mil thick neoprene.
3. Caps: Stainless steel, 22 gage minimum except 16 gage at fire resistant structures.

D. Sleeves:

1. Pipe Through Floors: Form from 18 gage galvanized sheet metal.
2. Pipes Through Beams, Walls, Fireproofing, Footings, Potentially Wet Floor: Form from steel plate or 18 gage galvanized sheet metal.
3. Size large enough to allow for movement due to expansion.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Inserts:

1. Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams wherever practicable.
2. Where concrete slabs form finished ceiling, furnish inserts flush with slab surface.

B. Supports:

1. Support CPVC and polypropylene according to manufacturer's requirements.
2. Support riser piping independently of connected horizontal piping where practical.

C. Priming: Prime coat exposed steel (not galvanized) supports.

D. Flashing: Flash and counterflash where mechanical equipment passes through weather or waterproofed walls, floors, and roofs.

E. Sleeves: Where piping passes through floor, ceiling, or wall, close space between pipe or duct and construction with noncombustible insulation. Provide tight fitting metal caps on both sides and caulk.

END OF SECTION

SECTION 15180
MECHANICAL SYSTEMS INSULATION

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15510 - Piping (HVAC).
2. 15410 - Piping (Plumbing).
3. 15515 - Valves, Hangers, and Specialties.
4. 15890 - Ductwork.

1.02 REFERENCES

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

1. C534-94 Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
2. C547-95 Specification for Mineral Fiber Pipe Insulation.
3. C552-91 Specification for Cellular Glass Thermal Insulation.
4. C553-92 Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
5. C585-90 Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
6. C612-93 Specification for Mineral Fiber Block and Board Thermal Insulation.
7. D1056-91 Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
8. D1668-95 Specification for Glass Fabrics (Woven and Treated) for Roofing and Waterproofing.
9. E84-96a Test Method for Surface Burning characteristics of Building Materials.
10. E96-95 Test Methods for Water Vapor Transmission of Materials.

B. National Bureau of Standards (NBS).

C. National Fire Protection Institute: NFPA 90A.

D. Underwriters Laboratories (UL) - 723.

E. Insulation Contractor’s Association of South Florida Inc.

1.03 SUBMITTALS

A. Submit properly identified manufacturer's catalog cuts, performance curves, and procedures before starting work.

1.04 DELIVERY AND STORAGE

A. Protect materials from the weather during storage and installation.

1.05 QUALITY ASSURANCE

A. Materials shall be labeled, listed, or have certified test reports submitted from testing laboratory accepted by the owner.

B. Comply with the most stringent requirements between the Insulation Contractors Association of South Florida Inc. and as specified.

C. There shall be no fiberglass in contact with the HVAC airstream anywhere in the system whether protected by encapsulation or not.

D. Foam plastic insulation shall be certified, by an independent third-party national recognized laboratory, that the product emits less than 1 part per million formaldehyde out gassing after 24 hours.

1.06 FIRE HAZARD RATING

A. Fire hazard rated materials shall be UL labeled or a certified test report by a Board accepted testing laboratory shall be submitted indicating compliance with specified fire hazard requirements.

B. Insulation (including adhesives) shall be fire retardant or self-extinguishing. Finishing jackets, insulation, and adhesives shall have composite fire and smoke ratings complying with ASTM E84, NFPA 255, and UL 723, as plain or on a composite basis.

C. When insulation, vapor barrier covering, wrapping materials, and adhesives are applied separately in field,

each item shall be tested individually.

D. When insulation, vapor barrier covering, wrapping materials, and adhesives are factory composite systems, they shall be tested as an assembly.

E. Insulation materials, adhesives, coatings, and other accessories shall have a fire hazard rating not more than 25 for flame developed and not more than 50 for fuel contributed and smoke developed, except as follows:

1. Flexible unicellular insulation.
2. Nylon anchors for securing insulation to ducts or equipment.
3. Factory premolded 1 piece PVC fitting and valve covers

F. Flame resistance treatments subject to deterioration due to effects of moisture or high humidity are not acceptable.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Insulation:

1. Armaflex.
2. Armstrong.
3. Certain-Teed.
4. Cell-U-Foam.
5. Foamglas.
6. Manville.
7. Owens-Corning.
8. Pittsburgh Corning.

B. Insulating Cement:

1. Keene Powerhouse.
2. Benjamin Foster.
3. Fibrex FBX fast set.

2.02 MATERIALS

A. Insulation: Type and thickness as specified.

1. Provide fire retardant or self-extinguishing insulation, including adhesives.
2. Finishing jackets, insulation, and adhesives shall have composite fire and smoke ratings per ASTM E84, NFPA 255, and UL 723.

B. Domestic Hot Water Supply Piping Insulation:

1. 1" thick molded fiberglass insulation with pre-sized factory applied FRJ jacket of glass cloth with longitudinal lap and butt joint strips with self-sealing adhesive.
2. Insulation may be 1/2" insulation for vertical branches to individual fixtures.
3. Minimum density of 7-1/4 pounds per cubic foot, maximum thermal conductivity factor of 0.26K at 75 degrees F. mean temperature, and alkalinity of 0.696.
4. Flame Spread: 25 or less.
5. Smoke Developed: 50 or less.
6. Accessories: Adhesives, mastics, cements, tapes for fittings, and related materials shall have the same composite ratings as listed above.

C. Cold Drainage Piping Drinking Fountain, and Electric Water Cooler Drain Piping Insulation:

1. Elastomeric (foam plastic) thermal insulation 1 inch thick with built-in vapor barrier rated self-extinguishing ASTM D1056.
2. Maximum thermal conductivity factor of 0.26K at 70 degrees F. mean temperature, density of 5-6 pounds per cubic foot, and a water vapor transmission of 0.1 perms.

D. Tape: As recommended by the insulation manufacturer or 3M adhesive EC-1329.

E. Insulating Cement: All-purpose mineral wool cement.

F. Glass Cloth Jacket: Factory sized white, standard weight, with 1-1/2" minimum longitudinal pressure sealing lap and seal strips for butt joints.

G. Vapor Barrier Jacket:

1. Flame resistant glass fiber adhered to outside of a 1 mil aluminum foil sheet with longitudinal pressure

sealing lap and seal strips for butt joints.
2. End cement perm rating shall not exceed 0.05.

H. Weatherproof Metal Jacket (Exterior Above Ground Only):

1. Damage and corrosion resistant, longitudinal seam closure, joint construction capable of locking insulation and jacket securely in place.
2. Seal and weatherproof butt joints with factory supplied 2 inch wide "snap-straps" lined with plastic sealing compound secured with outer holding band.
3. Jacket Material: O.016 aluminum.

I. Molded Fiberglass Pipe Insulation:

1. Rigid molded sectional pipe covering with integral factory jacket.
2. Comply with ASTM C547.
3. Maximum Thermal Conductivity: 0.23K factor at 75 degrees F. mean temperature.
4. Alkalinity: Less than 0.6 percent.

J. Foamed Plastic Insulation:

1. Closed cell.
2. Comply with ASTM C534.
3. Maximum Thermal Conductivity: 0.27K factor at 75 degrees F. mean temperature.
4. Water Vapor Permeability: 0.1 perms.

K. Cellular Glass Insulation:

1. Comply with ASTM C552
2. Maximum Thermal Conductivity: 0.33 K factor at 75 degrees F.
3. Water Vapor Permeability: 0.00 perm-in.

L. Flexible Fiberglass Ductwrap Blanket Insulation:

1. 2.2/2.3 inches thick, 3/4" pcf density fiberglass blanket with UL approved aluminum foil vapor seal facing reinforced with fiberglass scrim, laminated to 30 lb. kraft paper, R = 6.5.
2. Comply with ASTM C553, TYPE I, Class B-4.
3. Maximum Thermal Conductivity: 0.24K factor at 75 degrees F.

M. Rigid Fiberglass Ductboard Insulation:

1. Comply with ASTM C612.
2. Maximum Thermal Conductivity: 0.24K factor at 75 degrees F.
3. Provide scrim foil facing having a minimum 3 pcf density, 2 inches thick.

N. Accessories:

1. The following accessories shall be used in the application of thermal insulation:

a. PVC fittings cover and PVC jacketing:

1) Certain-Teed "Snap Form".
2) Manville Corp. "Zeston".
3) Proto.

b. Vapor Seal Mastic:

1) Benjamin Foster 30-86 or 30-25.
2) Childers CP-30.

c. Lagging Adhesive:

1) Benjamin Foster 81-42W.
2) Childers CP-50.

d. Breather Mastic:

1) Benjamin Foster 45-00 or 30-86.
2) Childers CP-10.

e. Insulation Bonding Adhesive (to metal):

1) Benjamin Foster 85-20, or 85-15.
2) Childers CP-82.

f. Insulating and Finishing Cement:

1) Fibrex Inc. FBX Super Blend Cement.
2) Manville Corp. No.375 Insulating and Finishing Cement.
3) Keene Corp. Super Powerhouse.

g. Coatings: Sealfas G-P-M mastic or accepted

equivalent.

h. Fire Resistive Mastic: As manufactured by Benjamin Foster or accepted equivalent.
i. Sealants: 81-33 as manufactured by Benjamin Foster or accepted equivalent.
j. Staples: Type 304 or 316 stainless steel outward clinching type.
k. Wire: 16 gage, copper weld wire.
l. Bands: 3/4 by 0.015" thick galvanized steel.
m. Glass Fabric:

1) Woven open mesh type glass fabric conforming to ASTM D1668.
2) Type I asphalt treated for below ground use.
3) Type III light color organic resin treated for aboveground or below ground use.

n. Insulation Jackets:

1) Jackets inside building shall comply with fire hazard classifications as specified. Insulation jackets shall not support mold growth.
2) Vapor Barrier Jackets:

a) For Cold Pipelines (-30 degrees F. to 60 degrees F.): Perm rating not more than 0.05, ASTM E96 Procedure A. Puncture resistance not less than 50 beach units.
b) For Air-conditioning Ducts: Perm rating not more than 0.05, ASTM E96, Procedure A. Puncture resistance not less than 25 beach units.

2.03 SYSTEMS INSULATION BY TYPE

A. Interior Domestic Hot Water Supply/Return Piping Insulation:

1. Molded Fiberglass Pipe Insulation: 1 inch thick with pre-sized factory applied FRJ jacket of glass cloth with longitudinal lap and butt joint strips with self-sealing adhesive.
2. Contractor's Option: Foamed plastic insulation, 1 inch thick.

B. Electric Water Cooler Drain, Cold Drainage Piping

Refrigerant Suction Piping, and Interior Condensate Drain Piping Insulation:

1. Foamed Plastic Insulation: 1 inch thick with field applied vapor barrier mastic at joints.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install insulation according to applicable codes and regulations.

B. Except as specified, install materials according to manufacturer's recommendations and specifications for obtaining conformance to construction documents.

C. Packages or standard containers of insulation, jacket material, cements, adhesives, and coatings delivered for use and samples required for acceptance shall have manufacturer's stamp or label attached listing manufacturer, brand name, and a description of material.

D. Provide allowances for expansion/contraction, and wall and manhole penetrations.

E. Run continuous through wall, floor, and ceiling penetrations.

F. Insulation materials shall not be applied until:

1. Test results specified in other sections of these specifications are completed and accepted.
2. Rust, scale, dirt, and any other foreign material have been removed.
3. Ductwork or piping material are clean, dry, joints firmly butted together, and tightly sealed at all joints, seams, and fittings.

G. Wrap butt joints with a 3 inch wide strip of the same material as the jacket.

H. Insulation shall be kept clean and dry at all times.

I. Protection Shield: Where pipe or tubing insulation pass through hangers, provide:

1. For Piping 4 inches and smaller: A protection shield, 180 degree arc, 16 gage galvanized sheet metal covering, minimum 12 inches long.
2. For Piping Larger than 4 inch diameter: A protection shield, 180 degree arc, 16 gage galvanized sheet metal covering, minimum 18 inches long.
3. Hangers not exceeding maximum spacing distances recommended by insulation manufacturer to prevent crushing or compressing insulation.

J. Ductwork sizes shown on drawings are actual internal "air side" dimensions.

K. Flanges, Fittings, and Valves on Insulated Piping:

1. Provide pre-molded glass fiber fittings wired or taped on and adhered with canvas jacket.
2. Terminate insulation and jacket neatly and finish with insulating cement troweled to a bevel and of the same thickness as adjoining insulation.
3. Vapor seal insulation on cold systems.

L. Vapor Barriers:

1. Intact and continuous.
2. Do not install with staples.

M. Omit Pipe Insulation From the Following:

1. Screwed unions, except at "cold drains" and air-conditioning wastes. Terminate insulation neatly at both sides of unions with insulation cement.
2. Discharge lines from safety and relief valves.
3. Nickel or chrome plated piping.

N. All ductwork shall be insulated, except as noted below:

1. Outside air intake ductwork.
2. Exhaust air ductwork.

O. Ceiling supply air registers located on perimeter rooms and corridors shall be field insulated with flexible fiberglass ductwrap insulation as specified. Insulation shall cover the upper body and installation flanges.

P. All appurtenances subject to condensation shall be

protected as necessary and covered with vapor seal mastic.

3.02 APPLICATIONS

A. Molded Fiberglass Pipe Insulation Installation (Hot Water Supply/Return):

1. Tightly butt together sections of insulation on pipe runs sealing longitudinal seams of jacket with self-sealing laps. Position longitudinal seam so seam is on bottom to prevent dirt and moisture infiltration. Seal end joints with 3 inch wide straps of vapor barrier tape. Seal ends of insulation with vapor seal mastic at valves, fittings and flanges.
2. Cover valves, fittings, and flanges with insulation similar to adjacent pipe covering, or one piece PVC cover sections as specified.

B. Foamed Plastic Insulation Installation (Return Suction Piping, Interior Condensate Drains, and Electric Water Cooler Drains):

1. Insulation shall be slipped on pipe without slitting. Butt joints shall be sealed with the manufacturer□s recommended adhesive.
2. Where slip-on techniques are not possible, the insulation shall be carefully slit and applied to the pipe. Seal joints with the manufacturer□s recommended adhesive.
3. Insulate valves and fittings with fabricated foamed plastic insulation, or one piece PVC cover sections as specified.
4. Provide mastic vapor barrier for chilled water service insulation for areas subject to conditions of 90 degrees F or 85 percent relative humidity or higher.

C. Flexible Fiberglass Ductwrap Blanket Insulation Installation:

1. Apply insulation to duct with joints tightly butted. Prepare stretch-out dimensions and cut out insulation so a 2 inch minimum overlap is created that will overlap the facing and insulation at the other end, and the adjoining seam. Install so insulation is not excessively compressed at duct edges. Foil face shall be on outside. Seams shall be stapled approximately

at 6 inches on center with outward clinching staples.

2. On ductwork having a 24 inch or larger dimension, insulation shall be secured to the bottom of the duct with mechanical fasteners spaced at not more than 18 inches on center. and held in place with washers or clips. Cut off protruding pin after clips are secured.
3. Seal all insulation joints, pinheads, tears, punctures, washers, clips, and staples with 2 coats of a vapor barrier mastic type sealant, reinforced with 1 layer of 4 inch woven glass fabric.

D. Rigid Fiberglass Ductboard Insulation Installation:

1. Apply insulation tightly and smoothly to duct.
2. Secure insulation on the sides and bottom of duct by impaling insulation over pins or anchors located not more than 18 inches apart and held in place with washers or clips.
3. Cut off protruding pins after clips are secured and seal with vapor barrier mastic.
4. Apply insulation with joints tightly butted.
5. Seal ductwork joints, punctures, and pin heads with a vapor barrier mastic type sealant.
6. Insulation shall be continuous through walls and floors except at fire dampers and at combination smoke/fire dampers.
7. Finish with field applied fab and mastic finish consisting of a 10 x 10 glass fabric imbedded in 2 coats of a white breather weather barrier mastic.

END OF SECTION

SECTION 15240
VIBRATION ISOLATION

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15510 - Piping (HVAC).
2. 15515 - Valves, Hangers, and Specialties.
3. 15855 - Air Handling Units.
4. 15890 - Ductwork.

1.02 SUBMITTALS

A. Vibration Isolators: Provide catalog cuts, diameters, isolation efficiencies, deflections, free height, operating height, solid height, and lowest equipment speed for each isolator.

B. Equipment Bases: Provide catalog cuts or drawings.

1.03 QUALITY ASSURANCE

A. Vibration isolators and equipment bases shall be the products of 1 manufacturer who shall determine mounting sizes and provide field supervision and inspection to assure proper installation and performance.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Vibration Isolation:

1. Consolidated Kinetics Corp., Columbus, OH.
2. Korfund Dynamics Corp., Westbury, NY.
3. Mason Industries, Inc., Hollis, NY.
4. Vibration Mountings and Controls, Inc., Butler, NJ.

2.02 MATERIALS

A. Rubber-in-Sheer Type Isolators:

1. Molded mount shaped elements with bolt holes for

bolting to equipment bases and mounted on bottom steel plates for bolting to foundations.
2. Double rubber-in-shear elements shall be mounted in series.
3. Metal surfaces shall be neoprene covered and have friction pads both top and bottom.

B. Spring Isolators:

1. Free-standing type, laterally stable without any housing, complete with rubber sound-deadening pads between active spring and its support, leveling adjustment bolts, and adequate facilities for bolting to both equipment and supporting structure.
2. Spring diameter not less than allowable compressed height of spring.
3. Spring base, minimum 1/4" thick rubber acoustical friction pads at underside.
4. Spring isolators for equipment with operating weight different from installed weight shall have built-in adjustable limit stops to prevent equipment rising when weight is removed.
5. Limit stops shall be out of contact during normal operation. Similarly, springs having a deflection of 2 inches or greater shall have neoprene limit stop to prevent undue motion during starting and stopping, but unrestrained otherwise.

C. Hanger-Type Isolators:

1. Rubber-in-shear or combination rubber-in-shear and springs, mounted in a hanger box, as required to meet static deflection.
2. Provide lockout plates when required.

D. Vertically Restrained Spring Isolators:

1. Incorporate a single spring vibration isolator having characteristics specified and a steel mount assembly designed to limit vertical movement of isolated equipment.
2. Provide flat steel top load plate and base plate bonded to 1/4" thick neoprene noise-stop pad.

PART 3 EXECUTION

3.01 INSTALLATION

A. Mount equipment and piping on or suspended from accepted foundations and supports, as indicated in construction documents or as required. Mountings shall be non-resonant with equipment operating or with building structure natural frequencies.

B. Place floor-mounted equipment on 4 inch high concrete pads extending 6 inches beyond equipment outline, unless otherwise specified.

C. Vibration Isolation Systems:

1. Guaranteed to have deflection indicated on schedule on Construction Documents.
2. Mounting sizes shall be determined by vibration isolation manufacturer.
3. Install according to manufacturer's instructions.

D. Vibration isolation systems for each floor or ceiling supported equipment shall have a maximum lateral motion under equipment start-up or shut down conditions of 1/4". Motions in excess shall be restrained by accepted spring type mountings.

E. Mounting systems exposed to weather and other corrosive environments shall be protected with factory corrosion resistant coatings. Metal parts of mountings (except springs and hardware) shall be hot dip galvanized. Springs shall be cadmium plated and neoprene coated. Nuts and bolts shall be cadmium plated.

F. Where steel spring isolation systems are described in following paragraphs, mounting assemblies shall use bare springs with spring diameter not less than 0.8 of loaded operating height of spring. Each spring isolator shall be designed and installed with ends of spring to remain parallel. Spring deflection before becoming solid shall be at least 50 percent greater than specified minimum deflection.

G. Factory Assembled Air Handling Units:

1. Mount units directly on stable bare steel spring isolators.
2. Where units to be mounted are furnished with internal

structural frames and external lugs, both of suitable strength and rigidity, or without any severe overhangs, no additional structural frame need be furnished and installed beneath unit.

3. Motor shall be integrally mounted to unit and shall be mounted on slide rails. Mountings shall provide static deflection shown on drawings.

H. Ceiling Supported Fans, Unit Ventilators, and Air Handlers:

1. Units shall be hung by means of vibration isolator hangers consisting of steel housing or retainer incorporating a steel spring and neoprene isolators.
2. If equipment to be mounted is not furnished with integral structural frames and external mounting lugs, both of suitable strength and rigidity, accepted structural sub-base shall be installed in the field to support equipment to be hung and receive hangers.
3. Diagonal hanger rod isolators shall be provided as required to limit horizontal motion to 1/4" maximum under fan operating conditions.

I. Roof Mounted Equipment:

1. No additional vibration isolation is required for curb mounted equipment.
2. Roof mounted equipment not installed on curbs shall be installed on a structural framing system as indicated on drawings. The clearance from the finished roof the bottom of the supporting steel shall be as follows:

Width of Equipment	Clearance
Up to 36"	18"
Above 36" to 48"	24"
Above 48" to 60"	30"
Above 60" and wider	48"

END OF SECTION

SECTION 15410
PIPING (PLUMBING)

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15440 - Plumbing Fixtures, Trim and Supports.

1.02 REFERENCES

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

1.	A53-96	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2.	A74-96	Specification for Cast Iron Soil Pipe and Fittings.
3.	A106-95	Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
4.	B32-96	Specification for Solder Metal.
5.	B88-96	Specification for Seamless Copper Water-Tube.
6.	B306-96	Specification for Copper Drainage Tube (DWV).
7.	C564-95a	Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
8.	D312-95a	Specification for Asphalt Used in Roofing.
9.	D2241-96	PVC Pressure Rated Pipe.
10.	D2564-96a	Specification for Solvent Cements for Poly (Vinyl Chloride)(PVC) Plastic Piping Systems.

1.03 SUBMITTALS

A. Submit properly identified manufacturer's literature before starting work.

B. Shop Drawings:

1. Pipe and Fittings: Manufacturer's name and mill reports.
2. Expansion Joints: Catalog cuts.
3. Dielectric Unions: Catalog cuts.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials shall be new, unused, and best of their respective kinds, free from defects in labor quality, complying with latest publications in effect at time of bidding, and according to Construction Documents.

B. Cast Iron Drainage Pipe and Fittings:

1. Hub and Spigot: Service weight centrifugally spun cast iron, hub and spigot, tar coated inside and out, ASTM A74.
2. No-Hub: Service weight centrifugally spun cast iron, no-hub, tar coated inside and out, CISPI 310.

C. Galvanizing: By hot process on both inside and outside of pipe with zinc coating averaging at least 2 ounces per square foot and free from defects.

D. Threaded Cast Iron Drainage Pipe:

1. Uncoated service weight, ANSI A40.5.

E. Copper Tubing:

1. Type K or L: Seamless hard drawn or annealed, ASTM B88.
2. Type DWV: Seamless hard drawn, ASTM B306.

F. Steel Pipe: Seamless or welded steel, Schedule 40, black or galvanized threaded, ASTM A53 seamless Grade A.

G. Ductile Iron Pipe: ANSI/AWWA C151/A21.51.

H. Polyvinylchloride Pipe (PVC):

1. Threaded.
2. Non-Threaded.

I. Cast Iron No-Hub Pipe Joint:

1. Cast Iron: ASTM A888.
2. Neoprene Gaskets: ASTM C564.
3. Aboveground: Stainless Steel Clamp and Shield Assembly: 300 Series, CISPI 301-69T.

4. Underground: ASTM C1277, cast iron couplings with neoprene compression gasket and stainless steel bolts.

J. Cast Iron Threaded Drainage Fittings: Recessed pattern ANSI B16.12.

K. Cast Iron Threaded Fittings: Standard weight unless noted otherwise, ANSI B16.4.

L. Malleable Iron Fittings: Standard weight, threaded banded 150 pounds ANSI B16.3. Galvanized or black to match piping.

M. Cast Iron Fittings and Flanges:

1. Standard Weight: ANSI B16.1, unless otherwise noted.
2. Extra Heavy: ANSI B16.2.

N. Steel Flanges: 150 psi and 300 psi Class, ANSI B16.5, Grade 1.

O. Brass Fittings:

1. Copper Tubing Solder Drainage Fittings: Wrought copper, ANSI B16.22.
2. Copper Tubing Solder Fittings: Wrought copper, ANSI B16.22.
3. Threaded: Standard weight, banded, ANSI B16.15.

P. Press Fittings for Copper: Type K copper and bronze, ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM.

1. Viega, Lakewood, OH.
2. Ridge Tool Co., Elyria, OH.
3. Accepted equivalent.

Q. Polyvinylchloride (PVC) Solvent Cement: ASTM D2564.

R. Compression Gaskets, Cast Iron Soil Pipe: ASTM C564.

S. Solder Metal:

1. Similar to silver-tin-copper alloy ASTM B32.
2. All solder shall be certified no-lead.

T. Joint Compound: Tite-Seal or accepted equivalent.

U. Unions: As specified in Section 15430.

V. Protective Coating: Cabot's Flexi-Black or accepted equivalent.

W. Vent Flashing: Provide flashing for vents through the roof for installation as specified in Section 07600.

X. Vandalproof Ventstack Caps: Provide vandalproof ventstack caps,

1. Vandalproof hood (threaded) and counterflashing (threaded) cast iron with standard rust resistant prime coating for installation under this section. No.1530-3 hood and 1520-2 counterflashing by Stoneman.
2. Vent extension/flashing by Vent Extensions, Inc., Wellington, FL.
3. Vandalproof cap, 18 gage, type 304 stainless steel by S.B.C., North Miami, FL.

Y. Glass Pipe: Borosilicate glass with compression type stainless steel coupling and tetra-fluorethylene gasket. Fed.Spec.DD-G-541-B and Mil.Spec.MIL-P-22561-B. Kimax by Schott Process Systems, Inc. or accepted equivalent.

Z. High Silica Cast Iron: 14-1/2 percent silicon content cast iron with mechanical joints and 300 stainless steel coupling with PFTE gasket torqued to 9-11 ft. lbs. or bells and spigots with acid-proof rope packing.

AA. Stainless Steel: Schedule 10, seamless with plain ends, ASTM D312, Type 304.

BB. Thermoplastic:

1. Polypropylene acid resistant piping joined by fusion collars of electrical resistance coils.

    a. Enfusion by Enfield Industrial Corp.
    b. Fuseal by R & G Sloane.
    c. Fusion Lock by Zurn.
    d. Orion Fittings Inc.

2. Polypropylene acid resistant piping joined by

mechanical joint stainless steel compression fittings.

a. Orion Fittings Inc.
b. Accepted equivalent.

CC. Silicon Cast Iron Fittings: Plain end with mechanical couplings, or bell and spigot with acid-resistant packing.

DD. Exterior Wall Pipe Penetration: Provide a multi-joint circular clamping device to the pipe. Link Seal by Thunder Line Corp., or accepted equivalent.

EE. Locator Tape for PVC: 2 inches wide, metallic. No.37220 for sewer lines and 37222 for water lines, by Seton or accepted equivalent.

PART 3 EXECUTION

3.01 INSTALLATION

A. Run piping as indicated in Construction Documents subject to modifications as required to suit field conditions, to avoid interference with other trades, and for proper, convenient, and accessible locations to parts of the piping system.

B. Run piping in wall chases, recesses, pipe shafts, and hung ceilings where provided.

1. Do not run gas or water piping in floor fill.
2. Run piping as high as possible under building, above ceilings, and close to slabs.
3. Do not permanently close, furr in, or cover piping before examination and final tests.

C. Run piping straight and where concealed as direct as possible with risers erected plumb and true.

1. Install piping with minimum 1 inch clearance between finished pipe coverings and adjacent work.
2. Support piping from structure above, maintaining maximum headroom available.

D. Do not run piping in telephone rooms, electrical equipment rooms/closets, transformer vaults or rooms containing related equipment, or close to or above control panels,

switchboards and electric motors except required branch piping to pumps. If pipes are installed in these rooms, they shall be relocated at no extra cost to the owner.

E. Provide control valves where noted or required for complete regulating control of systems, plumbing fixtures, and equipment. Provide valves in accessible locations or accessible through access panels.

F. Coat Underground metal piping, except cast iron, with 1/16" thick black bituminous protective coating.

G. Fittings, Valves, and Hangers on Chrome Plated Piping: Chrome plated finish to match.

H. Provide reducing fittings for changes in pipe sizes. Bushings will not be allowed.

I. Provide extra heavy pipe for nipples where unthreaded pipe is less than 1-1/2".

1. Do not use close nipples. Use saddle nipples.
2. Provide galvanized iron sleeves for pipes passing through roof slabs, interior floors, ceilings, walls, or partitions.

J. Provide at least 20 feet of bitumen coated type "K" copper pipe for exterior underground domestic water at each service entering the building.

K. Expansion Swings:

1. Make adequate provisions for proper expansion and contraction of piping and for piping passing through building expansion joints.
2. Make branch connections from risers with ample swing or offset to avoid strain on fittings or short pipe lengths. Anchor horizontal runs of pipe over 50 feet in length to walls or supporting structure about midway of run to allow expansion evenly divided toward ends.
3. Provide sufficient number of elbow swings or accepted expansion joints to allow proper expansion and contraction of mains and risers.

L. Pipe Slopes:

1. Lay horizontal soil and waste pipes, unless otherwise noted on drawings, to:

    a. 1/8" per foot minimum for pipe 3 inches and larger
    b. 1/4" per foot minimum for pipe less than 3 inches
    c. Horizontal vent lines shall have a minimum grade back to the stacks or vertical lines and shall run as direct and free from bends as possible.

2. Lay storm drainage pipes to 1/8" per foot minimum, unless otherwise noted on drawings.

M. Exposed Piping:

1. Install horizontal runs maximum 4 inches below adjacent structure and run parallel or perpendicular to walls, ceilings, beams, and columns unless otherwise noted on Construction Documents.

N. Piping Materials by System:

1. Sanitary Soil, Waste, and Vent Piping:

    a. Aboveground: PVC, service weight no-hub cast iron pipe and fittings, DWV copper pipe with cast brass or wrought copper solder joint drainage fittings.
    b. Under Ground Floor Slabs:

        1) Cast iron bell and spigot pipe and fittings.
        2) Cast iron no-hub pipe and fittings with corrosion resistant couplings and neoprene compression gaskets.

2. Vandalproof Vent Caps:

    a. Install according to manufacturer’s printed instructions.

3. Domestic Water Supply Piping: Drilling tubes for field manufactured fittings is not allowed.

    a. Aboveground Interior:

        1) Copper Tubing Type L:

a) Wrought copper solder joint fitting without the use of lead components. Tubing used with this type shall not be soft drawn.
b) Bending of tubing having a radius of not less than 4 tube diameters without deformation may be used for tubing diameters not exceeding 1 inch. Copper tubing used for this type connection shall be bending temper.
c) Victaulic copper connection system with Style 606 couplings. Tubing used with this type connection shall be drawn temper.

b. Underground Exterior:

1) PVC.
2) Copper Tubing Type K:

a) Soft tempered copper with cast bronze or soldered joint fittings coated with bitumen.

c. Optional Press Connections for Aboveground Interior Copper Tubing Type L and Underground Exterior Copper Tubing Type K:

1) Press fittings shall be made according to the manufacturer's installation instructions.
2) The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting.
3) The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting.
4) The joints shall be pressed using the tool approved by the manufacturer.

4. Storm Drainage Piping: Same as for sanitary systems.
5. Natural and Liquefied Petroleum Gas Piping:

a. Aboveground, Interior: ASTM A53 threaded Schedule 40 black steel pipe with malleable iron fittings

(ANSI B16.3, A19.7).

b. Aboveground, Exterior: ASTM A53 threaded schedule 40 galvanized steel pipe.
c. Below Ground Floor Slabs: ASTM A53 threaded sleeve to building exterior and gas line.
d. Test gas piping with pressures and test durations according to NFPA 54.

6. Condensate Drainage Piping:

a. Aboveground: DWV copper pipe with cast brass or wrought copper solder joint drainage fittings.
b. Underground: PVC pipe and socket type plastic drainage fittings.

O. Joints and Methods of Connections:

1. Cast Iron Bell and Spigot Pipe:

a. Compression Gaskets:

1) Gasket and pipe by same manufacturer.
2) Install according to manufacturer□s instructions.

2. Cast Iron No-Hub Pipe:

a. Aboveground: Joint with neoprene rubber sleeve and stainless steel ring clamp according to manufacturer□s instructions.
b. Underground: Joint with cast iron coupling, neoprene gasket, and stainless steel bolts according to manufacturer□s instructions.

P. Pipe Cleaning Systems:

1. Domestic Water Piping: Flush clean domestic water distribution systems for cold water before placing in service.

3.02 TESTS

A. Furnish necessary instruments, test equipment, and personnel required to perform tests and remove test equipment and drain pipes after tests have been made and accepted.

B. After portions of mechanical work are completed and ready for testing, given 48 hours notice to A/E and perform tests in A/E's presence.

C. Tests may be made of isolated portions of piping to facilitate the general progress of installation.

1. Revisions subsequently made in piping system shall require retesting of such affected portions of piping systems.
2. Subject piping and connections to a hydrostatic or pneumatic pressure test before painting, installation of insulation or concealment.
3. Sanitary, Storm, and Drainage Systems:

a. Apply a water test to all parts of drainage systems before pipes are concealed or fixtures set in place.
b. Close openings of each system to be tested tightly except highest openings above roof and fill entire system with water up to overflow point of highest opening.
c. Subject systems to not less than 10 feet of hydrostatic head, except uppermost 10 feet of piping directly below opening.

1) Water shall remain in the systems for not less than 60 minutes after which time no leaks occur at any point and no lowering of water level at overflow point is visible.

4. Water Supply Piping:

a. Apply a pressure test to water system before piping is concealed or insulated and before fixtures and equipment are connected.
b. Apply a hydrostatic pressure of not less than 200 psig for 2 hours, with no leaks occurring in the system.

1) Water used for tests shall be obtained from a potable source of supply.

3.03 CLEANING AND ADJUSTING

A. Clean fixtures, equipment, piping, and exposed work.

1. Show traps, wastes, and supplies free and unobstructed.
2. Plated, polished bronze, or painted surfaces bright and clean.

B. After installation, adjust valves, faucets, and automatic control devices for quiet operation. Balance system as required for proper operation.

C. Disinfection: After cleaning and testing domestic water system, disinfect by introducing a solution of calcium hypochlorite with 50 parts per million of chlorine.

1. Open and close all valves while system in being chlorinated. After disinfecting agent has been applied for 24 hours, test for residual chorine at ends of pipe.
2. If less than 5 ppm is indicated, repeat process until it is equal to or greater than 5 ppm or according to AWWA C601 Standards.

END OF SECTION

SECTION 15421
DRAINS AND CLEANOUTS

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15410 - Piping (Plumbing).

1.02 SUBMITTALS

A. Product Data: Submit properly identified manufacturer's literature before starting work.

B. Submit Shop Drawings/Catalog cuts on the following:

1. Drains.
2. Cleanouts.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Model numbers are taken from Josam.

1. Accepted equivalents:

a. Jay R. Smith Mfg. Co.
b. Blucher-Josam.
c. Wade.
d. Zurn.

2.02 MATERIALS

A. Drains:

1. Shower Stall:

a. Coated cast iron floor drain, 2 piece body, double drainage flange, invertible non-puncturing flashing collar, weepholes, bottom outlet, inside caulk connection, and adjustable satin Nikaloy 6" X 6" super-flo strainer.
b. Josam No.30000-6S-X.

2. Toilet Room:

   a. Same as Shower Stall above except for primer trap.
   b. Josam No.30000-6S-50-X by Josam or accepted equivalent.

3. Mechanical Equipment Room:

   a. Modular coated cast iron floor drain with double drainage flange, non-puncturing flashing collar, weepholes, bottom outlet, inside caulk connection, round top, removable shallow sediment bucket, trap primer connection, and medium duty anti-tilting super-flo grate with perimeter drainage slots.
   b. No.32120-50-X by Josam or accepted equivalent.

4. Funnel Drain:

   a. Two piece body, double drainage flange, flashing collar, weepholes, 9" x 3-1/2" oval Nikaloy Funnel.
   b. No.30000E3-6S-X by Josam or accepted equivalent.

5. Area Drain:

   a. Coated cast iron floor drain with double drainage flange, weepholes, bottom outlet inside caulk connection, square top, medium duty grate, and sediment bucket. If drain occurs over occupied area use flashing clamp option.
   b. No.35440-81-X by Josam or accepted equivalent.

6. Area Drain:

   a. Coated cast iron with round heavy duty anti-tilting grate with perimeter drainage slots, medium sump, bottom outlet.
   b. No.24000 by Josam or accepted equivalent.

7. Area Drain:

   a. Coated cast iron deep drain with double drainage flange, weepholes, side outlet hub connection, removable sediment bucket and heavy duty hinged

grate.
b. No.36640 by Josam or accepted equivalent.

8. Trench Drain:

a. Square, satin Nikaloy strainer with composition decking flange, adapted for 3-1/2" I.P.S. thread.
b. No.76000-1 by Josam or accepted equivalent.

9. Rectangular Drain:

a. With 5" X 13" strainer.
b. No.30000-R Josam or accepted equivalent.

10. Roof Drain:

a. Coated cast iron roof drain with sealing gasket, large vandalproof cast iron locking dome, non-puncturing clamp ring with internal gravel stop, adjustable top with wide roof flange, under deck clamp assembly, large sump with anchor flange and bottom outlet inside caulk connection.
b. No.21000-10-22-Z-3 by Josam or accepted equivalent.

B. Cleanouts and Cleanout Access Covers:

1. Floor, Interior Finished Rooms:

a. Cast iron, adjustable inside caulk outlet, brass internal plug, Nikaloy scoriated cover plate secured by countersunk plug.
b. No.56020-88-15 by Josam or accepted equivalent.

2. Stack Base for Use in Block Walls:

a. Cast iron "T" branch tee with plated cast iron countersunk plug, lead seal, satin stainless steel round access cover plate secured with countersunk screw.
b. No.58790-15 by Josam or accepted equivalent.

3. Stack Base for Use in Plaster Walls:

a. Cast iron "T" branch tee coated cast iron countersunk plug, lead seal, cast brass round access cover with anchor lugs, satin stainless

steel cover secured with countersunk screw.
b. No.58750-15 by Josam or accepted equivalent.

4. Stack Base for Use in Tile Walls:

a. Cast iron "T" branch with brass countersunk plug, cast brass square access cover with satin top, anchor lugs, cover plate secured with 4 screws.
b. No.58770-15 by Josam or accepted equivalent.

5. Exterior, Heavy Duty:

a. Cast iron, inside caulk outlet bronze internal plug, ductile iron scoriated heavy duty cover.
b. No. 56040-15 by Josam or accepted equivalent.

6. Cleanout Sizes:

a. Full pipe size up through 4 inches, pipe cleanouts with bodies of standard pipe size and caulking ferrules conforming to thickness required for pipe and fittings of same metal.

7. Removable Cleanout Plugs:

a. Cast bronze with screw threads and recessed bronze socket. No.58540 by Josam or accepted equivalent.

C. Wall Access:

1. Cast bronze, polished chrome plated square frame and cover, 12" X 12" minimum opening or larger, as required.
2. No.58640 by Josam or accepted equivalent.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide drains and cleanouts as scheduled on drawings.

B. Cleanouts:

1. Place pipe cleanouts at the foot of each soil and waste stack in sanitary system and place pipe

cleanouts in horizontal runs not to exceed 50 foot spacing.

2. Install access covers as specified.

C. Interior Flush Cleanouts:

1. Flush cleanouts with recessed sockets (without access covers) may be used in non-finished areas such as equipment rooms, storage rooms, and the like, if top of hub is installed in level position and top of clean out plug is flush with the concrete floor.

D. Exterior Unfinished Grade Mounted:

1. Cast iron, inside caulk outlet, bronze internal recessed plug mounted flush with grade. Surround cleanout with concrete doughnut.

E. Exterior Finished Grade Mounted:

1. Ductile iron scoriated heavy duty cover, flush with walkway or floor. No.56040-15 by Josam or accepted equivalent.

END OF SECTION

SECTION 15430
PIPING SPECIALTIES (PLUMBING)

PART 1 GENERAL

1.01 SUMMARY

A. Related Section:

1. 15410 - Piping (Plumbing).

1.02 REFERENCES

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

1. A126-95 Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

1.03 SUBMITTALS

A. Submit properly identified manufacturer's literature before starting work.

B. Submit Shop Drawings/catalog cuts for the following:

1. Unions and Flanges.
2. Hangers and Inserts.
3. Trap Resealers.
4. Vacuum Breakers.
5. Backflow Preventors.
6. Water Hammer Arrestors.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Backflow Preventors:

1. Reduced pressure zone, with 2 quarter turn, full ported, bronze ball valves, upstream strainer, and flanged adaptor ends. By Watts or accepted equivalent.

B. Trap Resealers:

1. Water Closet Valve: Chrome plated with tubing to wall

and wall flange. Water closet shall be no more than 20 feet from floor drain. No.F-72-A1 by Sloan Valve Co. or accepted equivalent.

2. Lavatory or Sink: Cast brass chrome plated with 1/2" female union connection and 1/2" female outlets, integral vacuum breaker.

    a. Manufacturers:

        1) Josam, No.88250.
        2) Chicago Faucet Co., No.447.
        3) Zurn Industries, Inc., No.Z-1022.

3. Remote Location:

    a. Machined brass valve with integral vacuum breaker, pressure adjustment and distribution units with visual operations inspection cover where required for multiple connections.
    b. By Precision Plumbing Products Model P.1 or P.2 as applicable, or accepted equivalent.

C. Water Hammer Arrestors:

1. Sioux Chief Mfg. or accepted equivalent.

D. Vacuum Breakers:

1. Hose Bibb Vacuum Breaker: Non-removable. No 8A by Watts Regulator Co. or accepted equivalent.
2. Atmospheric Type: No.288A by Watts Regulator Co. or accepted equivalent.
3. For Plumbing Fixtures: As specified under Section 15440.

E. Unions and Flanges:

1. Steel Pipe 2" and Smaller: Malleable iron unions with brass seat. Galvanized pipe requires galvanized unions.
2. Steel Pipe 2-1/2" and Larger: Bronze flanged connections 150 pound Class. Galvanized pipe requires galvanized unions.
3. Copper Pipe 2" and Smaller: Bronze unions.
4. Copper Pipe 2-1/2" and Larger: Bronze flanged connections 150 pound Class.
5. Dielectric Unions or Flanges:

a. Meet dimensional requirements and tensile strength of pipe unions or flanges according to Fed. Spec. WW-U-531D.
b. Suitable for required operating pressures and temperature conditions.
c. Provide metal connections on both ends. Ends shall be threaded or soldered to match adjacent piping.
d. Separate metal parts at union to prevent current flow between dissimilar metals.

F. Escutcheons:

1. Provide escutcheons securely in place on exposed pipes passing through walls, partitions, floors, and ceilings of finished areas unless otherwise noted on Construction Documents.
2. Provide escutcheons with sufficient outside diameter to adequately cover sleeved openings.
3. Interior Walls, Partitions, and Ceilings: Solid or stamped chrome plated brass or stainless steel, one piece or split pattern.
4. Floors and Exterior: Solid cast brass, rough chrome plated or cast nickel bronze alloy, one piece or split pattern.

G. Flexible Connectors:

1. Rubber flexible pipe, 125 psi minimum working pressure rating, 6 inch maximum length.
2. Install according to manufacturer's recommendations.
3. Style 100 by Metraflex or accepted equivalent.

H. Pressure Reducing Valves:

1. 25 to 75 psi range, union connection, built-in bypass, all bronze, monel screen.

a. 1/2" through 2": 600 Series by Wilkins or accepted equivalent.
b. 1/2" through 3": for higher flow capacities, 500 Series by Wilkins or accepted equivalent.
c. 1/2" to 1": for lower flow capacities, 70 Series by Wilkins or accepted equivalent.

I. Pipe Hangers and Supports:

1. Provide hangers, supports, and supplementary steel as specified for different applications.
2. Insert, Hangers, Rods, and Clamps: Figure numbers used refer to Grinnell. Fee and Mason or Elcen Metal Products are also accepted manufacturers.

    a. Inserts:

        1) Universal Concrete Insert: Fig.282.
        2) CB Junior Concrete Insert: Fig.279.
        3) Wedge Type Concrete Insert: Fig.281.
        4) Expansion Case: Fig.117.

    b. Hangers: Adjustable clevis type.

        1) Cast Iron Pipe: Fig.590.
        2) Copper Tubing: Fig.CT-65.
        3) Insulated Steel Pipe: Fig.300.
        4) Uninsulated Steel Pipe: Fig.146.

    c. Clamps:

        1) V.F.S. beam clamp with weldless eyenut, Fig.292, clamp size 1, rod size 3/4".
        2) C-clamp with retaining clip, Fig.87.
        3) I-beam clamp, Fig.131.
        4) Universal side I beam clamp, Fig.225.
        5) C-clamp, copper finish, Fig.CT88.

    d. Rods: Galvanized with continuous thread, Fig.146.
    e. Riser Clamps:

        1) Black Steel, Fig.261.
        2) Plastic coated, Fig.261C
        3) Copper finish, Fig.CT121.

3. Horizontal Steel and PVC Piping:

Pipe Size	Rod Diameter	Clamp or Hanger Maximum Spacing
Up to 1-1/4"	3/8"	8 feet
1-1/2 and 2 inches	3/8"	10 feet
2-1/2 and 3 inches	1/2"	12 feet
4 and 5 inches	5/8"	12 feet
6 inches	3/4"	15 feet
8 inches & larger	1 inch	15 feet

4. Horizontal Copper Piping:

Pipe	Rod Diameter	Clamp or Hanger Maximum Spacing
Up to 1 inch	3/8"	6 feet
1-1/4 and 1-1/2"	3/8"	6 feet
2 inches	3/8"	8 feet
2-1/2"	1/2"	8 feet
3 and 4 inches	1/2"	8 feet

5. Horizontal Cast Iron Piping:

Pipe Size	Rod Diameter	Maximum Spacing
Up to 4 inches	1/2"	5 feet
4 inches	5/8"	5 feet
6 inches and larger	3/4"	5 feet

6. Wall Support:

   a. U-clamps as accepted.
   b. Unistrut supports.

7. Vertical Support: Steel riser clamps.

J. Insulation Protection Shield: Fig.167.

PART 3 EXECUTION

3.01 INSTALLATION

A. Inserts:

1. Use inserts for suspending hangers from reinforced concrete slabs or beams when possible.
2. Provide flush inserts at concrete to be a finished surface.

B. Flashing:

1. Flash and counterflash where mechanical equipment passes through exterior or waterproofed floors, walls, or roofs.

C. Sleeves:

1. Seal space between pipe or duct and surrounding floor, wall, or ceiling construction with

noncombustible insulation and tight fitting metal caps on both sides with caulking.

a. Pipe Through Floors: Form from 18 gage galvanized sheet metal.
b. Pipes Through Beams, Walls, Fireproofing, Footings, and Potentially Wet Floors: Form from steel plate or 18 gage galvanized sheet metal.

2. Size sleeves to allow movement caused by expansion.
3. Seal and fireproof penetrations.

D. Pipe Hangers and Supports:

1. Provide adjustable hangers, inserts, brackets, rolls, clamps, and supplementary steel as required for proper support of pipelines.

a. Design hangers to allow for expansion and contraction of pipelines. Size to allow pipe covering to run continuously through hangers. Allow for proper anchoring and movement of all hot lines.
b. Install hangers to allow 1/2" minimum clear space between finished covering and adjacent work.
c. Place a hanger within 1 foot of each horizontal elbow.
d. Use hangers with 1-1/2" minimum vertical adjustment after piping is erected.
e. Provide multiple or trapeze hangers if several pipes can be installed in parallel and at the same elevation.
f. Support riser piping independently of connected horizontal piping when practical.
g. Piping shall not be supported by equipment.
h. Coordinate location of hangers with light fixtures.
i. Wire brush steel or iron supports and prepare surfaces ready for painting specified under Section 09900. Prime coat exposed non galvanized hangers and supports.
j. Provide copper plated hangers and supports for copper piping or provide sheet lead packing between hanger or support and piping. Dissimilar metal contact is not allowed.

2. Horizontal Cast Iron and PVC Pipe: Place hangers

within 18 inches of hub or joint.

3. Hubless Joints: Provide support at every other joint. Support each joint when length between supports exceeds 4 feet.
4. Plastic Pipe: Provide roll hangers and install loose to allow for contraction and expansion.
5. Trapeze Clamp or Hangers:

    a. Secure pipes supported by trapeze clamp or hangers and not mounted on pipe rolls to trapeze with pipe clamps or □U□ bolts.
    b. Place clamp or hangers at each change of direction.
    c. Place clamp or hangers within 1 foot of valves and other appurtenances in horizontal piping.
    d. Place clamp or hangers maximum 3 feet from end of each branch runout.

6. Insulated Pipes:

    a. Provide hangers with a diameter large enough to include insulation.
    b. Install a protection shield with each hanger. 180 degree arc, 16 gage galvanized sheet metal covering, minimum 12 inches long.
    c. Provide support saddles for insulated piping over 2 inches in diameter.

7. Special Supports: Clamps, hangers, and supports required by equipment manufacturers shall be installed according to equipment manufacturer's recommendations.
8. Plumbers tape, straps, chain, wire hangers, or perforated bar are not allowed for hanging pipe.

E. Backflow Preventors:

1. Install aboveground in 6'-0" high fenced enclosures.

F. Water Hammer Arresters:

1. Supply Piping: Provide a water hammer arrester for each fixture supply including hot and cold water. Do not provide air chambers where water hammer arresters are installed.

G. Unions and Flanges: Provide at connections of equipment

and at strainers and control valves.

H. Escutcheons: Fit and firmly secure escutcheons to pipes passing through finished floors, ceilings and walls.

END OF SECTION

SECTION 15440
PLUMBING FIXTURES, TRIM, AND SUPPORTS

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15410 - Piping (Plumbing).
2. 15430 - Piping Specialties (Plumbing).

1.02 SUBMITTALS

A. Submit Shop Drawings for the following:

1. Fixtures: Catalog cuts with rough-in dimensions identified as designated in fixture schedule, riser diagrams, and as specified.

P-1	*Water closet*
P-1A	*Water closet, ADA accessible*
P-1B	*Water closet, Floor Mounted ADA accessible*
P-2	*Urinal*
P-2A	*Urinal, ADA accessible*
P-3	*Lavatory, wall hung*
P-3A	*Lavatory, ADA accessible*
P-4	*Mop Sink*
P-5	*Shower*
P-6	*Electric water cooler, Hi-Lo ADA accessible*
P-7	*Wall Hydrant*
P-8	*Water Heater*
P-8A	*Water Heater*
P-9	*Floor sink*
P-10	*3 comp sink*
P-11	*Hand sink*

2. Faucets: Catalog cuts and templates for drilled openings.
3. Fixture Trim: Catalog cuts.
4. Carriers: Catalog cuts.

1.03 QUALITY ASSURANCE

A. Certification: Submit a letter, signed jointly by the manufacturer of the product and the installer of the product, attesting that no lead is contained in any piece

of equipment or in the piping connections that could contaminate water, drinks, or food by contact.

B. Comply with Florida Building Code (FBC).

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fixtures:

1. American Standard.
2. Acorn Engineering.
3. Bradley.
4. Fiat.
5. Elkay.
6. Kreolab.
7. Kohler.
8. Toto.

B. Fittings:

1. American Standard.
2. Chicago Faucets.
3. Fiat.
4. Elkay.
5. Powers Process Controls.
6. Symmons Industries.
7. Sloan.
8. T & S Brass.
9. Toto.
10. Zurn.

C. Equipment:

1. Guy Gray.
2. Haws.
3. Halsey Taylor.
4. Oasis.

2.02 FIXTURES

A. Water Closets:

1. Wall Hung Water Closet (P-1):

a. White vitreous china, top spud, direct fed siphon jet flush action, 1.1 gpf, elongated bowl, with Ever Clean surface.

1) Afwall EL 1.1 – 3351.711 by American Standard.

b. Flush Valve: Selectronic, electronic flush valve with UL approved hard wired AC transformer model 6067.111.002 by American Standard
c. Seat: Elongated, extra heavy duty open front less cover.

1) American Standard #5905.100

2. Wall Hung Water Closet, HC Accessible (for replacement at existing conditions with non ADA carrier) (P-1A):

a. White vitreous china, top spud, direct fed siphon jet flush action, 1.1 gpf, elongated bowl, with Ever Clean surface.

1) Afwall EL 1.1 – 3351.711 by American Standard.

b. Flush Valve: Selectronic, electronic flush valve with approved handwired AC transformer model 6067.111.002 by American Standard
c. Seat: Elongated, extra heavy duty open front less cover.

1) American Standard #5905.100

3. Floor Mounted Water Closet (P-1B):

a. White vitreous china, top spud, direct fed siphon jet flush action, 1.1 gpf, and elongated bowl.

1) Madera FloWTSE, 16 1/2” High, 1.1 gpf with Ever Clean surface, 3461.711 by American Standard.

b. Flush Valve: Selectronic, electronic flush valve with approved handwired AC transformer model 6067.111.002 by American Standard
c. Seat: Elongated, extra heavy duty open front less

cover.

1) American Standard #5905.100

B. Urinal (P-2): (P-2A mounted ADA accessible height)

1. Washout Flush Action: Wall hung, 0.125 gpf, vitreous china, 3/4" top inlet spud, ultra high efficiency, low consumption.

a. Washbrook Flowise 0.125 gpf 6590.530 by American Standard.

2. Flush Valve: Selectronic electronic, pressure compensating “hands free: operation with UL approved hard wired AC transformer 6062013.002 by American Standard.

C. Mop Receptor (P-4):

1. Molded resin, 24 inches x 24 inches x 10 inches, rim guards, center drain.

a. Model MSR-2424 by Florestone.
b. Model MSB-2424 by Fiat.

2. Fitting: Exposed yoke, wall mounted, vacuum breaker, top brace, stops in shanks.

a. Heritage 8344.111 by American Standard.
b. Knoxford K-8904-RP by Kohler.
c. Model 830-AA by Fiat.

D. Lavatories:

1. Wall Hung LAV/HC Lav (P-3, P-3A):

a. Vitreous China, wall hung, front overflow, self-draining deck area with backsplash, single faucet hole #0356.421 by American Standard with concealed arms support.

b. Cold Water Fitting, accessible: Single lavatory fitting, Electronic, sensor operated faucet with proximity operation. Vandal resistant cast brass construction with single post mounting; check valve and filter screen. All electronics enclosed

in the spout, 0.5 gpm.

1) 7059.105 by American Standard hard wired AC powered
2) 7057.105 by American Standard multi-AC powered one transformer can run up to 15 faucets.

E. Shower (P-5):

1. Thermostatic mixing valve with integral service stops and hand held showerhead, 48 inch minimum wall bar, 5 foot long chrome plated hose.

a. 96-300-B48-X-L by Symmons Industries.

F. Electric Water Coolers (P-6):

1. Wall Mounted, 2-stream mound building projector, self-closing valve with automatic stream regulator, polished chrome plated brass bubbler, push bars in front and on both sides, for handicapped and standard use. See Drawings for mounting elevations.
2. Manufacturers:

a. Halsey Taylor: Model HAC8FS.
b. Haws: Model HWBF8.
c. Oasis: Model P8AM.

3. No lead shall be allowed in the manufacture of any piece of equipment within water coolers nor in any piping joint or connection within the unit.

G. Floor Drain Reseal: F 72A1 by Sloan or accepted equivalent.

H. Plumbing Fittings for Kitchen Equipment:

1. Pot Wash Sink (3 compartments)(P-10)

a. Two faucets and three quick opening valves: Same as specified for vegetable/salad sink.
b. Grid strainer with tailpiece for skimmer compartment. LK-8 by Elkay or accepted equivalent.
c. Angle supplies with flexible riser and loose key. LK-1005 by Elkay or accepted equivalent.

d. Chrome plated P-Traps.

2. Kitchen Hand Sink: (P-11)

a. Stainless steel construction with:

1) Deck or splash mounted gooseneck, electric eye/sensor operation, and low voltage adaptor.
2) Basket drain, 1-1/2" tailpiece.
3) Angle supplies with flexible riser and loose key, LK-1005 by Elkay or accepted equivalent.
4) Chrome plated P-trap.

b. Manufacturers:

1) Advance Tabco: Model 7-PS-51.
2) Aero Manufacturing: Model HSFE.
3) Eagle Foodservice Equipment by Metal Masters: Model HSA-10-FE.

2.03 CARRIERS

A. All carriers shall be fully bolted to floor and installed as recommended by manufacturer.

1. Lavatory/Lavatory HC:

a. Rectangular structural steel uprights with integral welded heavy steel foot, cast iron concealed arms. Model 17100 by Josam or accepted equivalent.

2. Urinal:

a. Rectangular structural steel uprights with integral welded steel foot, hanger bracket, lower bearing plate. Model 17810 by Josam or accepted equivalent.

3. Water Closet:

a. Josam 12000 Series Chase-Saver II, 4 inch pipe size, with pylon feet, adjustable, provided with vandal proof trim, supply pipe support and adjustable chase extensions or accepted

equivalent.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected.

3.02 EQUIPMENT AND FIXTURE CONNECTIONS

A. Provide necessary material and labor to connect fixtures and equipment having plumbing connections including fixtures and equipment specified and furnished in other sections.

B. Supply Pipe Cut-off Valves:

1. Equip supply pipes to each item of equipment or fixture (except faucets furnished with an integral stop) with a cutoff valve to enable isolation of the item of equipment or fixture for repair and maintenance without interfering with operation of other items of equipment or fixtures.

C. Supply Pipe Support: Anchor supply piping to all items of equipment or fixtures to prevent movement.

D. Templates: Furnish templates and rough opening dimensions to fabricators of countertops and case work for location and sizes of openings for faucets and sink.

END OF SECTION

SECTION 15457
WATER HEATERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: A complete hot water generating system with necessary accessories as indicated on Construction Documents, as specified, and as required by code.

B. Related Sections:

1. 15410 - Piping (Plumbing).
2. 15430 - Piping Specialties (Plumbing).

1.02 SUBMITTALS

A. Submit properly identified manufacturer's literature before starting work.

B. Shop Drawings:

1. Water Heaters and Boilers: Catalog cuts, performance characteristics.
2. Pressure and Temperature Relief Valve: Catalog cuts, capacity.
3. Gages: Catalog cuts.
4. Recirculating Pumps: Catalog cuts and performance characteristics.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Instant Type Water Heaters (Tankless):

1. Electric water heaters shall be tankless type with a flow activation switch operating only when hot water side of faucet is turned on.
2. The heat exchanger shall be constructed of a noncorrosive metal alloy. The units shall have high temperature thermal cutoffs for a maximum temperature of 190 degrees F. to shut down the heating elements and avoid a steam situation.
3. The minimum flow activation shall be 0.5 GPM and

minimum pressure requirements shall be 5 psi.

4. Maximum operating pressure of 150 psi. Units shall be tested to UL 499.
5. Controls shall not allow water temperature to exceed 110 degrees F.
6. Provide 15 year warranty.
7. Manufacturers:

    a. Cronomite Laboratories, Inc.
    b. Eemax Inc., Botsford, CT.
    c. Titan

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide a gate valve and union at cold water connection to heater. A union shall be provided at hot water connection.

B. Provide on cold water supply to heater a vacuum relief valve of sufficient size to protect tank from back pressures.

C. Pressure relief valve and drain pan drain shall discharge to outside per code regulation or according to local ordinances.

D. Provide thermometer on top of heater in oversized tee and nipple on outlet piping of heater.

E. Adjust individually controlled elements to start at 5 degrees F. temperature differential for each heater element.

F. The water heater shall fit properly in the floor space provided. Installation shall be according to local, municipal, state, and national codes.

END OF SECTION

SECTION 15510
PIPING (HVAC)

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15990 - Tests (HVAC).

1.02 REFERENCES

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

1.	A47-90(95)	Specification for Ferritic Malleable Iron Castings.
2.	A53-96	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3.	A183-83(90)	Specification for Carbon Steel Track Bolts and Nuts.
4.	A197-87(92)	Specification for Cupola Malleable Iron.
5.	A234/A-96b	Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
6.	A536-84(93)	Specification for Ductile Iron Castings.
7.	B32-96	Specification for Solder Metal.
8.	B88-96	Specification for Seamless Copper Water Tube.
9.	D1784-96	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

1.03 SUBMITTALS

A. Pipe and Fittings: Manufacturer's name and mill test reports.

PART 2 PRODUCTS

2.01 MATERIALS

Size	Description

A. Type "F" Piping (Refrigerant)

1.	Pipe:	To 3"	Copper tubing per ASTM B88 a, type "K" hard drawn, with silver soldered connections.
2.	Fittings:	To 3"	Wrought copper, soldered type. Where required for connection to gauges and control devices tubing not larger than 3/8" o.d. may be Type K soft (annealed) with flared tube or double ferrule compression fittings suitable for high pressure.

PART 3 EXECUTION

3.01 INSTALLATION

A. Furnish and install as shown on Construction Documents, or as necessary to complete working systems according to Construction Documents, a system of piping and valves to control and isolate apparatus and appurtenances.

1. Construction Documents are diagrammatic and indicate general location and connections.
2. Piping may be offset, lowered, or raised as required or as directed at site. This does not relieve Contractor from responsibility for proper erection of systems of piping in every respect suitable for the work intended according to specifications and accepted by A/E.

B. Arrangement:

1. Piping shall not interfere with removal of other equipment or devices.
2. Piping shall not block access to doors, windows, panels, or other access openings. Piping shall be arranged to facilitate removal of tube bundles.
3. Provide flanges or unions, as applicable for type of piping specified, in piping at connections to equipment and piping interfering with access or tube pull space.
4. Place and install piping to not interfere with

installation of the equipment and ducts.

5. Piping shall be installed to insure noiseless circulation.
6. Place valves and specialties to allow easy operation and access, and valves shall be regulated and packed and glands adjusted at completion of work before acceptance.
7. Piping shall be erected and pitched to insure proper draining.

3.02 REFRIGERANT PIPING

A. Install refrigerant piping to insure continuous automatic return of oil to compressors at system capacities. Oil traps shall be properly sized, located, and installed. Install piping according to standard engineering practice as recognized by ASHRAE.

B. Refrigerant piping shall be installed to allow removal of DX coil.

C. Refrigerant pipe shall be cut with an accepted type of pipe cutter and reamed before brazing. Pipe shall pitch sharply toward the reamer during reaming and cuttings shall be carefully removed after reaming. Moisture and dirt shall be removed from piping before joining as follows:

1. A clean, lintless cloth shall be drawn through the tubing by means of wire or an electrician's tape, to remove coarse particles of dirt and dust.
2. A clean, lintless cloth saturated with trichloroethylene shall be pulled through pipe, until the saturated cloth is not discolored by dirt.
3. A clean, lintless cloth saturated with compressor oil, squeezed dry, shall be drawn through the tubing. A visual inspection shall be made to see that tubing is perfectly clean.
4. Cleaning shall be completed by pulling through a clean, dry, lintless cloth.

D. Joints shall be brazed with silver solder containing 49 percent silver and having a melting point of 1,120 degrees F.

E. Pressure test lines before charging. When testing is complete, evacuate lines by the double evacuation method,

breaking each vacuum with the system refrigerant to 5.16 mm of pressure absolute. Bring first vacuum break to 2 psig and final break to normal operating pressure. The compressor shall not be used to evacuate the system.

3.03 PIPING PENETRATIONS TO FLOORS AND FIRE WALLS:

A. Joints around pipe penetrations shall be packed with fire safing insulation and sealed with fire and smoke barrier caulk as specified in Section 07270 Firestopping and Fire and Smoke Barrier Caulking.

END OF SECTION

SECTION 15670
AIR COOLED CONDENSING UNITS

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15240 - Vibration Isolation.
2. 15510 - Piping (HVAC).

1.02 SUBMITTALS

A. Submit properly identified product data before starting work.

B. Unit Schedule: Provide air cooled condensing units of type, size, efficiency rating, and capacity shown in unit schedule.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Air Cooled Condensing Units:

1. Trane.

2.02 EQUIPMENTS

A. Air Cooled Condensing Units:

1. Casing:

a. Fully weatherproof unit, suitable for outdoor installation.
b. Fabricate casing of galvanized or zinc-coated steel and finish with baked enamel.
c. Fabricate structural members of continuous galvanized steel with steel channel.
d. Provide openings for power and refrigerant connections and adequate removable panels for service access.
e. Unit shall be welded hermetic type with internal vibration isolation.

f. Compressor shall have both thermal and current sensitive overload devices and internal high pressure protection.

2. Condenser Coils:

a. Copper or Aluminum Plate Fins: Mechanically bonded to copper tubes.
b. Adequately protect fins against hail damage on coils for 20 tons or greater.
c. Fin Coating: Heresite or Bronze Glow epoxy coating.

3. Control Center and Accessories:

a. Factory wired controls within a weatherproof cabinet.
b. Accessories:

1) Heating/cooling thermostat with sub-base suitable for continuous or automatic fan operation.
2) Head pressure control to maintain proper condensing temperature at low ambient temperature.
3) Low voltage control transformer.
4) Indoor fan relay.

4. Refrigerants:

a. HFC 410A.

5. Efficiency Rating: Air cooled condensing unit shall comply with FPL Commercial/Industrial Energy Conservation Program Standards.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install according to manufacturer's recommendations, accepted Shop Drawings, and as indicated on Construction Documents.

END OF SECTION

SECTION 15821
FANS

PART 1 GENERAL

1.01 SUBMITTALS

A. Submit properly identified manufacturer's catalog cuts and technical data before starting work.

1.02 QUALITY ASSURANCE

A. Fans shall be constructed and rated according to AMCA Standards.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Ceiling Mounted Fans, Centrifugal Type:

1. Panasonic.

B. Curb Mounted Exhaust Fans:

1. Cook.
2. Greenheck.

2.02 EQUIPMENT

A. Ceiling Mounted Fans, Centrifugal Type:

1. Enclose in an acoustically insulated housing and provide with an integral back draft damper and aluminum inlet grille.
2. Provide capacities and electrical requirements as shown in schedule.
3. Statically and dynamically balance fan wheels at factory.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until

conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Install according to the manufacturer's recommendations and accepted Shop Drawings.

END OF SECTION

SECTION 15890
METAL - DUCTWORK

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15910 - Duct Accessories.
2. 15940 - Outlets (HVAC).

1.02 REFERENCES

A. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), latest edition:

1. HVAC Duct Construction Standards (Metal and Flexible).

B. National Fire Protection Association (NFPA):

1. NFPA 90A Standard for the Installation of Air-conditioning and Ventilating Systems of Other than Residence Type.

C. National Electrical Code - (NEC) - 70.

D. American Society of Heating, Refrigerating, and Air-conditioning Engineers, Inc. (ASHRAE) 62 - Ventilation for Acceptable Indoor Air Quality.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Flexible: Genflex or Flexible Technologies.

B. B. Ductwork and Fittings:

1. Metalaire.
2. Semco.
3. Spiramatic.
4. United Sheet Metal.

2.02 MATERIALS

A. Ductwork shall be fabricated and installed according to the SMACNA Standards, except as shown on drawings or specified.

B. Ductwork shall have manufacturer's gage stamp intact.

2.03 LOW PRESSURE DUCTWORK

A. Includes ductwork from exhaust, and outside air ductwork. Velocities shall not exceed 1,300 fpm and static pressures not to exceed 2 inches WG.

B. Provide galvanized steel ductwork, designed, constructed, installed and tested according SMACNA - "HVAC Duct Construction Standards" and as shown on drawings. Ductwork to have manufacturer's gage stamp. Provide cross-breaking or beading to prevent flexing, but do not reduce gage of metal below that required for flat ductwork sheets.

C. Provide galvanized steel saddles at points of support of insulated piping saddles.

D. Flexible Insulated Ductwork:

1. Lightweight duct, core of corrosion resistant reinforcing wire helix permanently bonded within fabric, insulated with 1-1/2" thick, 3/4 lb. density fiberglass flexible insulation and covered with a vapor barrier of aluminum metalized polyester film laminated to glass mesh, elastomer back coated. Duct shall meet NFPA 90A requirements and be listed as Class 1 Air Duct Material, UL 181.
2. Manufacturers:

    a. Atco Rubber Products.
    b. Genflex.
    c. Thermaflex II.
    d. Venture Type VTKC.
    e. Wiremold Co.

E. Ductwork and splitter dampers within the ductwork shall be made of the same material.

F. Turning vanes shall be provided in square elbows and shall be of same material as the ductwork. Turning vanes shall be of airfoil type, double thickness factory fabricated.

PART 3 EXECUTION

3.01 LOW PRESSURE DUCTWORK

A. Seams and joints in ductwork shall be made airtight. Seal duct joints with sealer as specified for field sealing of high pressure ductwork. Make exhaust ducts passing through return air chases airtight.

B. Install flexible ductwork shall be installed in sizes to match diffuser necks as indicated on drawings schedules. Duct length shall be not less than 5 feet and no longer than 7 feet. Duct shall be adequately supported to prevent kinks and sharp bends. Install according to manufacturer's recommendations and as shown on drawings.

3.02 DUCTWORK SUPPORTS AND HANGERS

A. Provide support and hangers according to SMACNA HVAC Duct Construction Standards.

B. Hangers shall be galvanized steel hung from inserts or clip angles secured to structure with expansion bolts in shear or tension as follows:

1. Roof Slab: In tension.
2. Structural Beams: In shear, 12 inches minimum from bottom of beam.
3. Joists: Use existing forming bolts openings only. Hangers shall be bent under ductwork at least 2 inches. Hangers for ducts over 48 inches wide shall be secured to bottom and sides of duct.

END OF SECTION

SECTION 15910
DUCT ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15890 - Ductwork.
2. 15940 - Outlets (HVAC).

1.02 REFERENCES

A. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): Low and High Velocity Duct Manuals.

B. National Fire Protection Association (NFPA) 90-A Standard for the Installation of Air-conditioning and Ventilating Systems of Other Than Residential Type.

1.03 SUBMITTALS

A. Volume Dampers: Shop drawings.

B. Low Pressure Ductwork Round Fittings: Shop Drawings or catalog cuts.

C. Flexible Connections: Catalog cuts.

D. Test Holes: Pipe couplings, catalog cuts, and proposed installation locations.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Volume Dampers:

1. Dampers shall be manual or automatic as indicated on drawings. Dampers furnished with automatic actuators shall be furnished and installed under this section.
2. Volume dampers shall have opposed blades.
3. Volume dampers shall be 2 gages heavier than the installed duct and shall be reinforced to prevent vibration and noise.

a. Dampers shall be according to SMACNA "Low Velocity Manual", as referred to in "Ductwork". Dampers shall have an indicating device with lock to hold damper in position for proper setting.
b. Splitter dampers shall be double thickness at the leading edges.
c. Volume dampers shall be fabricated according to Figure 2-12 of SMACNA Low Pressure Manual.

4. Bridge lock type quadrant operators of dampers shall mount flush with surface of duct insulation.

B. Motor Operated Dampers:

1. Motor operated dampers for 100 percent outside air and smoke shall be minimum leakage Arrow-Foil Damper No.OBDAF-207 as manufactured by the Arrow Louver and Damper Corp., Maspeth, NY 11378.
2. Frames and blades shall be minimum 12 gage (0.081") extruded aluminum: Blades shall be single unit Arrow-Foil design, 6 inches wide, with Pin-Lock an integral section within the blade core.
3. Frames shall be a combination of 4 inch extruded aluminum channel and angle with reinforcing bosses and groove inserts for vinyl seals.
4. Minimum size dampers shall have 2 inch X 5/8" aluminum frames.
5. Pivot rods shall be 1/2" diameter extruded aluminum, Pin-Lock design interlocking into blade section. Bearings to be "Double-Sealed" type with Celcon inner bearing on rod riding in Merlon Polycarbonate bearing inserted in frame so outer bearing cannot rotate.
6. Rod bearings shall be designed with no metal-to-metal or metal-to-bearing riding surfaces. Interconnecting linkage shall have a separate Celcon bearing to eliminate friction in linkage.
7. Blade linkage hardware shall be installed in angle or channel frame section out of air stream. Hardware shall be of non-corrosive reinforced material or cadmium plated.
8. Dampers shall be engineered for minimum air leakage by means of overlapping design and by extruded vinyl seals to fit into integral ribbed grooved inserts in both frames and blades. All dampers over 10 square feet free area shall have reinforced corners by means of gusset plates.

9. Opposed blade dampers, when closed, shall have less than 3/4 of 1 percent leakage at 5 inches and less than 1 percent at 9 inch WG static pressure.

C. Flexible Connectors: Size flexible connections at a minimum of 4 inches between connected items. Provide 30 ounce glass fabric fire retardant and air tight, coated with neoprene on both sides. Ventglass by Ventfabrics, Inc. or Neoprene Fabriduct by Elgen.

D. Fire Dampers: Provide approved fire dampers where indicated on drawings. Dampers shall be constructed and installed according to requirements of NFPA 90A, and each damper shall be provided with fusible link designed to melt at 165 degrees F. Damper blades shall be stacked outside of air stream.

1. Manufacturers:

a. Action Air Incorporated.
b. Air Balance.
c. National Control Air.
d. United Sheet Metal Company, Series 200.

PART 3 EXECUTION

3.01 INSTALLATION

A. Flexible connections shall be provided as shown on drawings. Lengths shall be between 3 feet and 8 feet.

B. Fire Dampers:

1. Fire dampers shall be furnished and installed in duct openings and return air openings through fire partitions and as shown on drawings.
2. Seal around fire dampers with therma-fiber at walls per UL and NFPA requirements.
3. Install dampers as shown on drawings and according to manufacturer’s recommendations.

C. Low pressure ductwork round fittings shall be installed as shown on drawings and according to manufacturers recommendations.

D. Provide test holes at mains and main branches and as

required by test and balance contractor.

END OF SECTION

SECTION 15940
OUTLETS (HVAC)

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15890 - Ductwork.
2. 15910 - Duct Accessories.

1.02 SUBMITTALS

A. Outlets: Catalog cuts and schedules of installation and performance data at noted capacities.

B. Outlet Accessories: Plaster frames, opposed blade dampers, and square to round neck adapter catalog cuts.

C. Samples: Submit color chips for manufacturer's standard baked enamel colors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Air Outlets:

1. Air Guide.
2. Anemostat.
3. Carnes.
4. Krueger.
5. Metalaire.
6. Price.
7. Titus.
8. Warren Technology.

2.02 MATERIALS

A. Plaster frames shall be provided for plaster and dry wall ceiling and wall installations.

B. Finishes shall be as follows:

1. Devices installed on surfaces to be painted shall

match surface color. Factory prime coat.
2. All Other Areas: Factory applied baked enamel. Color to match color chip furnished by A/E.
3. Aluminum Devices: Satin aluminum baked enamel, except as specified.

C. Provide a synthetic sponge rubber gasket between each frame and mounting surface forming an airtight seal.

D. Manufacturer's published performance data shall be obtained from testing performed in a laboratory certified by the Air Diffusion Council. Testing shall be according to ADC Test Code 1062R4.

E. Air diffusers shall be provided with opposed blade volume dampers adjustable from diffuser face, blanking for proper coverage, and blow without producing objectionable noise or air motion at occupied level.

1. Diffusers in the same room shall be the same size and type, except as otherwise noted.
2. Diffusers shall be suitable for operation at 5 percent excess and 25 percent less than noted capacities.
3. Louvered face ceiling diffusers shall be of square, round, or rectangular face patterns. Provide:

a. Removable central core, snap-in type.
b. Flat flanged frame.
c. Welded aluminum construction.
d. White baked enamel finish.

4. Perforated ceiling diffusers are not allowed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Manufacturer of air distribution devices shall be responsible for examining application of each diffuser, grille, and register and guaranteeing each will provide comfort space conditions without drafts and excessive noise at noted capacity.

END OF SECTION

SECTION 15991
TESTING AND BALANCING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Test and Balance Agency: An independent firm shall perform test and balance services required for this project.

a. Do not include the cost of obtaining the services of a test and balance agency.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Testing and balancing equipment and instruments will be provided by contracted firm.

PART 3 EXECUTION

3.01 CONTRACTOR'S RESPONSIBILITY

A. Furnish to Test and Balance Agency 1 complete set of approved equipment submittal data and the latest, approved mechanical drawings or Shop Drawings.

B. Before and during construction assist Test and Balance Agency with inspection and pre-completion requirements.

C. Perform a preliminary balance to verify components and systems are operational and ready for test and balance agency.

D. Provide sufficient notice and time before final completion date to enable testing and balancing be completed within project schedule.

E. Prerequisite To Substantial Completion Inspection: Construction, starting, adjustment, testing and balancing, and instruction shall have been completed.

F. Provide at no additional cost to the owner, labor, materials, and tools necessary to make corrections when required without undue delay.

G. Put applicable systems into full operation and continue operation during each working day until testing and balancing is complete.

H. Test and Balance Agency shall be kept informed of any major changes made to the system during construction and shall be provided with a complete set of "record" Construction Documents.

I. Prepare air side for balancing in following manner:

1. Fans, blowers, and air handling equipment shall be mechanically checked and available to operate under design conditions.
2. Splitters, volume dampers, fire dampers, and vanes shall be in neutral positions.
3. Controls: Electronic, electric, or pneumatic, or any combination thereof, shall be mechanically checked and available to operate under design conditions. Provide a written letter attesting the controls are installed and operating per design requirements.
4. Provide and install filters with design static drops for clean filters acceptable to the Test and Balance Agency.
5. Locking devices at dampers shall be marked to represent the position of the dampers.
6. Make whatever adjustments necessary.
7. Change pulleys, belts, and dampers, as required for correct balance as requested by Test and Balance Agency.
8. Check variable air volume boxes in operation to verify no loose linkages, damper blades, etc. and all parts move freely.
9. Check safety and operating controls of electric strip heaters and verify heaters operate at minimum air flow conditions.
10. Provide fixed diameter pulleys in place of adjustable pulleys at supply fans and at return air fans after test and balance has been completed. Pulley size shall be as directed by the Test and Balance Agency. Install new belts as required and as directed by the Test and Balance Agency.
11. Provide to the Test and Balance Agency a start-up

report including rated nameplate volts and amps and actual volts and amps on HVAC equipment.

12. Provide scaffolding as required for Test and Balance.

END OF SECTION

SECTION 16023
CODES AND STANDARDS

PART 1 GENERAL

1.01 REFERENCES

A. Comply with the following:

1. Florida Building Code (FBC).
2. Florida Building Code (FBC) - Mechanical.
3. Florida Building Code (FBC) - Plumbing.
4. National Electrical Code - 2008 (NEC), (NFPA 70).

1.02 QUALITY ASSURANCE

A. Where materials and equipment are available under the continuing inspection and listing service of Underwriters Laboratories (UL), furnish materials and equipment so listed.

END OF SECTION

SECTION 16100
BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 SUMMARY

A. Coordination With Other Trades:

1. Examine drawings and specifications. Visit site to determine work to be performed by Electrical, Mechanical, HVAC, and other trades.
2. Provide required electrical materials and equipment to put work into operation, completely wired, tested, and ready for use including raceways, conductors, disconnects, starters/contactors, or other devices for proper operation and sequences of electrical, mechanical, or other systems or equipment.
3. Unless otherwise noted, conduit, wire for controls, and devices, both line and low voltage, shall be provided and installed as described in this or other parts of the Construction Documents.

    a. Install boxes or housings necessary for conduit and wire to controls, excluding items to be installed in piping, ducts, tanks, machinery, solenoid valves, pressure switches, aquastats, or similar devices.
    b. These items are specified for installation in other sections. Connecting wiring is specified in this Division.

4. Control wiring in separate conduit between HVAC sensing devices and control panels or motors, shall be installed under this Division after verification from approved shop drawings of the required locations and connections.
5. Seal penetrations through fire rated floors or walls with fire resistant compound.
6. Connect electrical equipment and devices as parts of the equipment or furniture furnished under other sections.

1.02 SUBMITTALS

A. Manufacturer’s Data:

1. Complete list of materials to be furnished under this section.
2. Manufacturers' specifications and other data required to assure specification compliance.
3. Catalog cuts, clearly marked for identification of items to be provided, including disconnects, breakers, fuses, starters, lighting fixtures, transformers, or other materials not requiring specially prepared Shop Drawings.

B. Shop Drawings for nonstandard items, including but not limited to panelboards, switchboards, control centers, anchoring layouts and details, lighting fixtures, or similar products.

C. Contract Closeout Submittals:

1. Record Drawings.
2. Warranties.
3. Operating Instructions, maintenance manuals, and parts lists.
4. Point-to-point wiring diagrams.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage:

1. Deliver materials to jobsite in their original unopened containers with labels and certifications intact and clearly legible at time of use.
2. Store materials according to manufacturers' recommendations and as approved by A/E.

B. Protection: Use necessary means to protect materials of this section before, during, and after installation, including protection of installed work and materials of other trades.

PART 2 NOT USED

PART 3 NOT USED

END OF SECTION

SECTION 16112
RACEWAYS AND CONDUIT

PART 1 GENERAL

1.01 SUMMARY.

A. Related Sections:

1. 16120 - Wire and Cable.
2. 16131 - Outlet, Pull, and Junction Boxes.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements: Materials shall bear Underwriters Laboratories (UL) labels.

1.03 SUBMITTALS

A. Product Data: Manufacturer's literature including printed installation instructions and recommendations before starting work. Submit samples if requested.

1.04 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with NFPA 70 - National Electrical Code - 1999 (NEC).

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fibrated Emulsion Conduit Coatings:

1. Karnak Chemical Corp., 220 Fibrated Emulsion.
2. Monsey Products Co., Monsey Asphalt Emulsion Roof Coating Fiber.
3. Sonneborn Building Products, Hydrocide 700B.

2.02 EQUIPMENT

A. Conduit shall be sized according to NEC, unless otherwise noted and shall not be less than 3/4" diameter.

B. Rigid Conduit:

1. Galvanized Rigid Steel Conduit (GRS): Hot dip galvanized or electro-galvanized, with corrosion resistant coating on the inside, threaded, standard weight steel conduit complying with ANSI C80.1-1990, and Article 346 of the NEC.
2. Intermediate Metal Conduit (IMC): Hot dip galvanized or electro-galvanized, threaded, steel conduit complying with ANSI C80.6-1986 and Article 345 of the NEC.
3. Rigid Non-Metallic: Schedule 40, PVC plastic 90 degrees C. complying with ANSI/UL 651-1989, and Article 347 of the NEC.

C. Electrical Metallic Tubing (EMT):

1. Galvanized steel tubing with smooth interior coat of lacquer enamel or zinc coat.
2. Comply with ANSI C80.3-1983, and UL 797, and Article 348 of the NEC.

D. Flexible Metal Conduit:

1. Steel: Flexible galvanized steel conduit (Greenfield) complying with UL 1 and Article 350 of the NEC.
2. Liquid Tight: Flexible galvanized steel conduit with oil and water-resistant overall plastic sheath, complying with UL 1, and Article 351 of the NEC.
3. Minimum size for flexible metal conduit 1/2" except 3/8" where allowed by Section 349 of the NEC for connections to lighting fixtures.

E. Conduit Fittings:

1. Rigid Steel Conduit and Intermediate Metal Conduit: Zinc or cadmium plated steel or galvanized malleable iron complying with ANSI C80.1 and C80.3. Fittings shall be threaded type. Die cast zinc alloy fittings are not allowed.
2. Rigid PVC conduit: 90 degrees C., PVC fittings UL listed. Fittings shall match conduit and complying with ANSI/UL 651-1989.
3. EMT fittings: Zinc or cadmium plated steel or malleable iron of the compression type or stainless steel multiple point locking (set screw) type. Connectors shall have insulated throats. Fittings shall comply with ANSI C80.3-1983. Die cast zinc

alloy fittings are not allowed.

4. Flexible metal conduit fittings: Steel or malleable iron only with insulated throat, complying with Fed. Spec.W-F-406B. Die cast zinc alloy fittings are not allowed.
5. Bushings and connectors shall incorporate an insulating insert of at least 150 degrees C. rated plastic or 105 degrees C. rated nylon. Conduit bushings made entirely of nonmetallic material are not allowed. Grounding and bonding bushings shall have clamp type terminal for copper conductor.
6. Expansion Fittings and Sealing Fittings: UL listed with ground continuity means.

F. Conduit Supports:

1. Straps: Formed zinc coated steel or malleable iron one-hole pipe straps or conduit clamps sized for conduits or tubing.
2. Fastenings: Zinc coated or cadmium plated steel screws, bolts, toggles, and expansion anchors as required.
3. Electrical steel channels shall be equivalent to Unistrut P-3000 Series. Provide trapeze, clamps, supports, concrete inserts, galvanized steel or plated steel with galvanized conduit clamps, and threaded 1/4" diameter minimum suspension rods.
4. For individual branch circuit EMT or flexible metal conduit concealed above accessible hung ceilings only, "caddy clips" spring steel conduit clamps.

G. Conduit Coatings: Steel conduit buried directly in the earth shall receive a factory applied PVC coating or 2 coats of fibrated emulsion conduit coating. Comply with manufacturer's application recommendations.

H. Wireways and Auxiliary Gutters:

1. Hot dip galvanized code gage sheet steel, complete with knockouts, enclosures, and removable covers unless indicated as hinged.

a. Manufacturers:

1) Hoffman.
2) Lee Products.
3) Keystone.

4) Square D.

2. Exterior locations shall have weathertight gasketed covers, joints, and drip-proof rain shields. Paint after installation with exterior enamel paint.
3. Wireways and gutters shall comply with Articles 362 and 374 of the NEC.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not proceed with the work of this Section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Provide where indicated and where required, ducts, conduits, tubing, wireways, and gutters to form a complete and integrally grounded raceway system. The system shall be installed according to NEC and local code requirements. Components of the system shall be of sufficient size, strength, and capacity to allow for placements, pulling-in, or other installation of conductors, wires, cables, splices, taps, and terminations whether included in this Contract or for future use without strain or injury to those items being installed.

B. Provide pull wires in empty raceways where no conductors are installed in this Contract. Allow 10 inches minimum slack at each end of pull wire and securely caulk in place. Provide marking tags showing opposite destination noting building and closet number at each end.

C. The minimum size of rigid conduit, EMT, and flexible metallic conduit shall be according to NEC except as follows:

1. Unless otherwise specified under "Products" or shown on the Drawings.
2. Unless otherwise shown on the Drawings, telephone conduits shall be not less than 1 3/4 inch trade size.

D. Check sizes of raceways to determine the green equipment ground conductor specified, shown, or required can be

installed in the same raceway with phase and neutral conductors according to the percentage of fill requirements of NEC. If necessary, increase the duct, conduit, tubing, or raceway sizes shown or specified to accommodate conductors without additional cost to the owner.

E. Raceway and Conduit Locations: Unless indicated otherwise, conduit types specified shall be used in the following locations. Any deviation from this schedule shall be submitted for approval with corresponding price adjustments before installation. Any conduit installed and not of the specified type shall be removed and replaced with the specified type at no additional cost to the Board.

1. Exterior Raceways:

a. Below Grade:

1) Below Grade Direct Buried:

a) Galvanized rigid steel (GRS), painted or PVC jacketed.
b) PVC Schedule 40, as noted on plans.

2) Below Grade Concrete Encased:

a) GRS.
b) PVC Schedule 40.

b. Exterior Exposed:

1) GRS conduit.
2) IMC conduit.
3) PVC flexible conduit, PVC jacketed with liquid tight fittings.
4) Gutters, wireways, and troughs of the gasketed, raintight type.

2. Interior Raceways:

a. Under Slabs on Grade:

1) GRS (painted or PVC coated).
2) PVC Schedule 40, with 12 inches clear to bottom of slab.

b. Embedded in Concrete Walls or Floor On or Below Grade: PVC or GRS with threaded or concrete tight steel fittings.
c. Embedded in Concrete Walls or Floors Above Grade:

    1) PVC Schedule 40.
    2) GRS or IMC with threaded or concrete tight steel fittings.
    3) EMT with concrete tight steel fittings.

d. Concealed in Masonry Walls:

    1) GRS or IMC with steel fittings.
    2) EMT with concrete tight fittings.

e. Concealed in dry wall construction, or in suspended ceilings: EMT or flexible metal conduit with steel fittings.
f. Interior Exposed:

    1) GRS or IMC at 8 feet or less above finish floor.
    2) EMT with steel fittings more than 8 feet above finish floor.
    3) Option: EMT installed below 8 feet from floor in electrical, mechanical, and telephone rooms.

3. Sealing fittings shall be installed at the following points and as otherwise indicated:

    a. Where conduits enter or leave hazardous areas and enclosures for explosion-proof lighting fixtures, switches, receptacles, etc., use sealing compounds according to NEC to be of a type approved for the conduits.
    b. Where conduits pass from warm locations to cold locations, such as refrigerated spaces and air conditioned spaces, use to prevent passage of water vapor.
    c. Where required by the NEC.

4. PVC conduit shall not be used indoors either exposed or concealed, except embedded in concrete or under slabs on grade.

a. The depth of conduits under interior slabs shall be based on the minimum allowable bending radii of stub-ups.
b. Stub-ups shall be GRS, with transitions from PVC to GRS occurring below grade. Curves to stub-ups shall be GRS.

F. Raceway and Conduit Installation:

1. Conduit Routing:

a. Route feeders, homeruns, and conduits as indicated, except for minor deviations as accepted.
b. Maintain a minimum separation of 12 inches between conduits containing emergency feeders and conduits containing normal feeders.
c. The routing of conduit, as shown on the plans, is general.
d. Before installing any work, examine the working layouts of all other trades to determine exact locations and clearances.
e. Where equipment is installed by other trades requiring connection as specified in this section, determine exact conduit entry locations from the approved shop drawings.
f. Modifications to conduit runs shown on the electrical drawings, based on this section, shall be made without additional cost to the owner, and shall be subject to A/E approval.
g. In determining clearances, conduit shall not be run within 6 inches of any heated pipe or duct, or if unavoidable, the conduit must be kept at least 1 inch from the outer covering.

2. Conduits In Finished Spaces:

a. Conduits, fittings, outlet boxes, and pull boxes shall be concealed in ceilings, floor slabs, walls, or partitions of the buildings.
b. Provide sufficient space at concealed conduits over conduit and coupling for the applications of finished floor, walls, and ceilings.
c. Examine the Drawings, and if necessary, confer with the A/E to determine the type of construction containing the concealed conduits and the space available for such conduits.

d. Unless otherwise shown on the Drawings, conduit may be run exposed on unfinished walls, on unfurred basement ceilings, in mechanical rooms and in penthouses, attics, and roof spaces.

3. Roof Conduit:

   a. Not Permitted.

4. Conduits Penetrating Waterproof Membranes Under Floor Slabs on Grade:

   a. Coordinate installation of conduits before installation of waterproof membrane.

5. Conduits Penetrating Waterproof Membranes on Walls: Provide properly coordinated Schedule 40 galvanized steel pipe sleeves for conduits in concrete forms. Membrane to be sealed waterproof to conduits.
6. Conduit Embedded in Concrete:

   a. Conduit embedded in poured concrete shall be of the specified type, unless otherwise indicated.
   b. EMT shall not be installed underground, in slabs on grade, in wet locations or in hazardous areas.
   c. Metallic conduit buried in the ground shall be of the specified type.
   d. The outside diameter of any conduit buried in concrete shall not exceed one-third of the thickness of the structural slab, wall or beam in which it is placed. The conduit shall be located entirely within the middle third of the member whenever possible.
   e. Lateral spacing of conduits buried in concrete slabs shall be not less than three diameters except where drawings indicate the concrete slab has been specially designed to accommodate a closer spacing of conduits entering signal or electric closets, panelboards, etc., or the arrangement is accepted by the A/E.
   f. In general, conduits shall not be run through beams, except where clearly indicated on Drawings, specified, or where allowed by the A/E.
   g. No vertical conduit passing through horizontal concrete beams shall interfere with reinforcing. Where accepted by the A/E, horizontal conduit may pass through beams, provided they are not closer

than 6 inches clear and are confined to upper half of beam section.

h. Properly support conduit to be embedded to maintain correct location and spacing during concreting operations. If necessary, provide suitable metal supports for this purpose.

i. Where a concrete embedded conduit passes through an expansion or contraction joint in the structure, install the conduit at right angles to the joint, and provide an approved conduit expansion fitting at the joint installed according to the manufacturer's instructions. Paint the conduit with an approved bituminous compound for 1 foot on either side of the expansion joint.

j. Conduits concealed in slabs on grade shall be installed over vapor barrier. Underground rigid conduit not encased in concrete shall receive the specified conduit coating.

k. Factory applied plastic resin or epoxy coated metal conduit and fittings may be used, provided that coating holidays and abrasions to coating are repaired with compatible mastic.

l. At any 1 point, not more than 2 lines of conduits shall intersect in any portion of slab.

    1) In all such cases, any additional conduit shall be rerouted through other areas, or run under the slab and stubbed through the slab at the required locations.
    2) Conduits and pipes shall have a minimum cover of 1 inch of concrete.
    3) Do not install conduit in slabs 3 inches thick or less.
    4) Under no conditions shall aluminum conduit be buried in concrete slabs.
    5) Slab installed conduit shall be stubbed within webbing of block and shall be extended vertically concurrently with laying of block.
    6) Determine centerline of block partitions measured from column centerlines.

7. Conduit Bending, Cutting, and Placement:

    a. Conduit bends and offsets shall be avoided where possible.

b. Required bends shall be made with standard benders designed for the purpose and with a minimum radius of 6 times the internal conduit diameter.
c. Make conduit bends according to the NEC unless otherwise shown on the contract Drawings. Use of a pipe tee or vise for bending conduit is not allowed.
d. Conduit crushed or deformed shall not be installed.
e. Bends shall be free from dents or flattening. Bends more than 360 degrees are not allowed in conduit between any 2 terminations of pull boxes.
f. Make no bend in surface raceways. Use factory formed fittings for surface raceways.
g. The ends of conduit shall be carefully reamed out free from burrs before installation and after threading.

    1) Cuts shall be made square.
    2) Coupling of conduit by means of running threads is not allowed.
    3) Where it is impossible to run the conduit and coupling sections together, an Erickson coupling or other accepted combination coupling shall be used.
    4) Joints shall be made up tight.
    5) Joints in conduits concealed in slab, floor fill, earth, etc., shall be made using approved silicone paint on threads.

h. Prevent lodgement of plaster, dirt, or trash in raceways, boxes, fittings, and equipment during course of construction. Clogged raceways shall be entirely freed of obstructions or replaced.
i. During installation of conduit, unfinished runs and terminations in pull boxes, cabinets, etc., shall be capped until conductors are installed.
j. Plastic caps designed for this specific purpose shall be used to cover and align conduits before concrete pours and shall remain on conduit stub-ups until conduit is extended. Caps shall have self-aligning, interlocking male or female wings molded on each side. Duct or electrical tape and wire are unacceptable.

8. Conduit Connections:

a. Conduit and EMT runs shall be mechanically and electrically continuous from service entrance to outlets. Unless otherwise specified, each conduit shall enter and be securely connected to a cabinet, junction box, pull box or outlet box by means of a locknut on the outside and a bushing on the inside or by means of a liquid-tight, threaded, self-locking, cold-weld type wedge adapter. Where nominal circuit voltage exceeds 250 volts:

   1) In rigid conduit, an additional locknut shall be provided, 1 inside locknut and 1 outside locknut.
   2) In EMT or flexible metal conduit, the 1 locknut shall be made wrench-tight.
   3) Locknuts shall be the bonding type with sharp edges for digging into the metal wall of an enclosure and shall be installed to provide a locking installation.
   4) Locknuts and bushings or self-locking adapters will not be required where conduits are screwed into tapped connections.
   5) Protect vertical runs of conduit or EMT terminating in the bottoms of wall boxes or cabinets, etc., from the entrance of foreign material before the installation of conductors.

b. Plastic conduit joints shall be made by brushing a plastic solvent cement on the inside of the plastic coupling fitting and on the outside of the conduit ends. Slip together the conduit and fitting, until seated, with a slight twist to set the joint tightly, and the conduit then rotated one-half turn to distribute the cement evenly. Remove excess cement built-up on the surface of the conduit.

c. The end of each conduit one inch and smaller shall be provided where it enters a junction box, outlet box, cabinet, etc., with the locknut and bushing. For conduits 1-1/4" and larger, use insulated bushings with ground stud. If insulated bushings are of the fully insulated type, use additional locknuts inside the junction box or cabinet before installing the bushing. Provide conduit entering main distribution switchboard

feeder pull boxes with insulated bushing with ground stud regardless of size.

d. Install the conduit system complete before any conductors are drawn in. Each run of conduit shall be blown through and swabbed after plaster is finished and dry, and before conductors are installed.

e. Install conduit to drain any moisture, collecting in the conduit, to the nearest outlet or pull box, where possible.

f. Where metallic conduit is exposed to different temperatures, seal the conduit to prevent condensation and passage of air from one area to the other.

g. Light and power conduit shall run from a permanent and continuous ground return back to the service ground connection point. Conduits used on systems entirely isolated from the light and power distribution system shall be electrically continuous and grounded in an approved manner.

9. Conduit Penetrations and Supports:

a. Sleeves, conduits, or other pipes passing through floor slabs, beams, or walls shall be located to not impair the strength of the structure.

b. Conduits penetrating the walls or smoke partitions shall be fire stopped (sealed). Filling materials for openings in floors shall be fire-resistive, and finished to prevent passage of water, smoke and fumes. Filling material for openings in walls shall be fire-resistive where it occurs in fire walls, and shall be installed to prevent the passage of air, smoke or fumes. Where conduit and wiring pass through fire walls or floor slabs, the Contractor shall fill the opening with fireproof sealant.

c. Roof penetrations shall be made using approved flashings and counterflashings. Do not penetrate cant strips or expansion joint covers with conduits. Do not run conduits up through roof nearer than 12 inches from toe of cant strip. Where conduits penetrate exterior walls near flashings, penetration shall be at least 3 inches above the flashing reglet.

d. Where conduits passing through the openings are

exposed in finished rooms, the finishes of the filling materials shall match and be flush with the adjoining floor, ceiling, or wall finishes.

e. Where unused sleeves or slots are provided for future installation of conduit, etc., they shall be suitably identified if not readily recognizable.

f. EMT and conduits not embedded in concrete or masonry shall be securely and independently supported so that no strain will be transmitted to outlet box and pull box supports, etc. Supports shall be rigid enough to prevent distortion of conduits during wire pulling.

g. Run conduits exposed in unfinished spaces, mechanical equipment spaces, where specifically indicated on the Drawings, or with the expressed permission of the A/E.

    1) Feeder conduits shall be run exposed or in hung ceilings, except as noted.
    2) Where exposed conduits are installed, they shall be run parallel to the building walls or partitions, using approved conduit fittings.
    3) Exposed conduits shall be securely supported with malleable iron pipe straps, angle iron pipe straps, angle iron or steel channel racks or other approved means as required for clearance of other piping or ductwork.
    4) Wood hangers and perforated sheet metal hanger straps are not allowed.
    5) Spacing of conduit supports shall not exceed 7 feet.
    6) Horizontal feeder conduit banks shall have their hangers fastened to the building structure by approved means.
    7) Hangers for banks consisting of 1 or 2 conduits may be fastened from inserts in the slab.
    8) Auxiliary steel for fastening shall be furnished and installed under this section.

h. Support individual conduits not larger than 1-1/2" diameter by means of one-hole pipe straps or individual pipe hangers. Support individual horizontal conduits larger than 1-1/2" diameter by individual pipe hangers.

i. Conduit located in hung ceilings shall be supported in approved manner similar to exposed conduits.
j. Branch circuit conduits above suspended ceilings may be supported from the floor construction above or from the main ceiling support members, however, the finished installation shall not interfere with the removability of ceiling panels. Individual branch conduits above suspended ceilings with removable panels may be supported from the ceiling suspension wires provided the load imposed on any individual wire is not greater than 64 pounds, including the ceiling weight.
k. Unsupported vertical drops over 10 feet from bus ducts or at motors shall be in rigid steel conduit. For vertical drops of less than 10 feet EMT may be used. Brace conduit to prevent swaying.
l. Space conduits installed against concrete or masonry surfaces away from the surface by clamp backs or other approved means.
m. In dry locations, spring steel fasteners, clips, or clamps specifically designed for supporting exposed single conduits may be used instead of pipe straps or pipe hangers.

    1) Hanger rods used with spring steel fasteners shall be not less than 1/4" diameter steel with corrosion resistant finish.
    2) Spring steel fasteners shall be specifically designed for supporting single conduits or EMT
    3) Type, size and spacing of spring steel fasteners with accessories shall by approved by the A/E and the Contractor.
    4) Submit applicable load and rating data for approval.
    5) Wire shall not be used for support.
    6) Nails are not allowed for the support of conduit.

n. Where 2 or more horizontal conduits or EMT run parallel and at the same elevation, they shall be supported on multiple trapeze pipe hangers. Each conduit or EMT shall be secured to the horizontal hanger member by a U-bolt, one-hole strap, or

other suitably designed and approved fastener.

o. U-bolts, clamps, attachments, and other hardware necessary for hanger assembly, and for securing hanger rods and conduits shall be provided. Each multiple hanger shall be designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger, plus 200 pounds. Hardware shall be hot-dip galvanized after fabrication.

10. Fittings:

    a. Expansion Fittings: Each buried conduit in or rigidly secured to the building construction on opposite sides of a building expansion joint and each long run of exposed conduit that may be subject to excessive stresses shall be provided with an expansion fitting. Expansion fittings shall be made of hot dip galvanized malleable iron and shall have a factory installed packing that will prevent the entrance of water, a pressure ring and a grounding ring.
    b. In addition to the grounding ring, a separate external copper bonding jumper secured by grounding straps on each end of the fitting shall be provided.
    c. Sealing Fittings: Sealing fittings for use with rigid steel conduits shall be of the threaded, zinc or cadmium coated, cast or malleable iron type. Fittings used to prevent passage of water vapor shall be of the continuous drain type.
    d. Sealing fittings shall be installed and sealed according to the manufacturer's recommendations at suitable, approved, accessible locations. In concealed work, each fitting shall have an access door or panel to allow access to the fitting.
    e. Compression fittings shall be made up tight according to manufacturer's recommendations. No screw type fittings are allowed.

11. Conduit Fastening: Fasten raceways as follows:

    a. To Wood: Wood screws, sheet metal screws, or screw type nails.
    b. To Hollow Masonry: Toggle bolts or expansion bolts as required. Holes not used to be filled.
    c. To Concrete or Solid Brick Masonry: By expansion

bolts. Holes drilled to a depth of more than 1-1/2".

d. To Steel Work: Machine screws, welded threaded studs, or spring-tension clamps. Raceways or pipe straps shall not be welded to steel structures.
e. To Light Steel Construction Partitions: Sheet metal screws. Bar hangers may be attached with saddle ties of 16 gage double strand zinc-coated steel wire.
f. Nail-type nylon anchors with lock washers and nuts may be used instead of expansion bolts or machine screws.
g. Explosive charge setting devices are not allowed for any type of fastening on the project.
h. Conduits, tubing, or raceways shall be continuous from outlet to outlet, cabinet, junction box, or pull box.
i. Surface Wireways and Auxiliary Gutters: Fasten according to manufacturer's directions with fastenings appropriate for surface as specified.
j. Cable Supports in Vertical Raceways: According to NEC Article 300-19.

12. Flexible Conduit:

a. Flexible conduits shall be used for connections to motors and other electrical equipment when it is subject to movement, vibration, misalignment, cramped quarters, or where noise transmission is to be eliminated or reduced. Flexible conduit used to meet the above requirements shall be of the liquid-tight type when installed under any of the following conditions:

1) Exterior locations.
2) Moisture or humidity laden atmosphere where it is possible for condensation to accumulate.
3) Corrosive atmospheres.
4) Where water or spray due to wash-down operations is frequent or possible.
5) Wherever there is a possibility of seepage, dripping, etc., of oil, grease, or water.

b. Flexible conduit shall be used for short connections to control devices, recessed fixtures, and similar items with enough slack to

avoid tension. Connection between structure and first point of attachment to vibrating equipment shall be flexible.

13. Surface Raceways:

    a. Surface metal raceways shall be used where noted on Drawings. Surface metal raceways shall be securely grounded to outlet boxes or to back-plates and fixtures by means of bolts, screws, or other approved means. Ends of raceways shall be provided with bushings at entrances to boxes or canopies. A separate green ground conductor shall be installed in the raceway from the junction box supplying the raceway to receptacle or fixture ground terminals.
    b. Fasten surface raceways to surface in manner similar to methods specified.
    c. Each surface metal raceway outlet box with an attached lighting fixture shall be of sufficient diameter to provide a seat for the fixture canopy.
    d. Where a surface metal raceway is used to supply a fluorescent lighting fixture having central stem suspension with a backplate and a canopy, with or without extension ring, the backplate and canopy will serve as the outlet box and no separate outlet box need be provided.
    e. A surface metal raceway outlet box shall be provided, in addition to the backplate and canopy, at the feed-in location of each fluorescent lighting fixture having end stem suspension.
    f. Where a surface metal raceway extension is made from an existing outlet box on which a lighting fixture is installed, a backplate slightly smaller than the fixture canopy shall be provided and no additional surface mounted outlet box need be installed.

14. Empty Conduits: Where empty conduit or tubing is indicated for wiring to be installed in future by utility company or by separate contract, install conduit or tubing according to previous requirements for conduit and tubing with following additional requirements:

a. No length of run shall exceed 75 feet for 3/4" size and 150 feet for 1 inch or larger sizes.
b. Inside radii of bends in conduits of 1 inch or larger shall be not less than 10 times nominal diameter.
c. Provide pull wire in empty raceways.

15. Painting: Paint exposed conduit to match the surrounding wall or ceiling it is mounted against.

3.03 ADJUSTING AND CLEANING

A. Upon completion of installation of cable trays, inspect trays, fittings, and accessories, remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, and abrasions.

END OF SECTION

SECTION 16120
WIRE AND CABLE

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 16112 - Raceways and Conduit.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements: Materials shall bear Underwriters Laboratories (UL) labels.

1.03 SUBMITTALS

A. Submit product data and descriptive literature before starting work.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Wire and Cable:

1. Wire and cable shall be soft annealed 98 percent conductivity copper with 600 volt A.C. thermoplastic insulation unless otherwise noted.
2. Wire and cable shall be new and manufactured not more than 12 months before installation.
3. Each coil or reel shall bear UL label and wire marked with AWG or circular mil wire size, voltage rating, insulation type, type stranding, and the manufacturer's name.
4. Unmarked wire found installed shall be replaced at no additional cost to the Board.
5. Wiring shall comply with NEMA WC-5, NEMA WC-7, IPCEA S-61-402 and IPCEA S-66-524.

B. Light and Power Wiring Circuit Conductors:

1. Light and power wiring circuit conductors may be stranded in sizes No.10 AWG and smaller, and concentric strand Class B for conductors No.8 AWG and

larger.

2. Stranded copper conductors may be used for final connections to individual recessed lighting fixtures, devices, and for control and signal circuit wiring only with crimp-on type terminations.
3. Do not use stranded wire for wiring to receptacles, unless insulated crimp-on connectors are installed on the wiring ends.

C. Wiring Insulation shall be as follows:

1. For Feeders and Motor and Equipment Power Circuits: Type THWN-75 degrees C. in wet or dry locations, and THHN-90 degrees C. only at dry locations.
2. For Branch Circuit Wiring for Lighting and Power Circuits: Type THWN-75 degrees C. in wet or dry locations, and THHN-90 degrees C. only at dry locations.
3. For Wiring Through Fluorescent Fixtures Where Fixture Is Used As Wireway: Type THHN-90 degrees C.

D. Color Coding:

1. Wire of Size No.8 and smaller shall be factory color coded 600 volt, THWN, or THHN. Sizes larger than No.8 may be factory color coded or color coded with 3M tape or accepted equivalent. Should tape be used, it shall cover not less than 6 inches of cable within enclosure.
2. Colors to be used in coding shall be:

120/208 Volt System	277/480 Volt System
Neutral - White	Neutral - Gray
Phase A - Black	Phase A - Brown
Phase B - Red	Phase B - Orange
Phase C - Blue	Phase C - Yellow
Ground - Green	Ground - Green

Electrical grounding and static - bare wire, where allowed by NEC.

3. All other colors (violet, traced, etc.) shall only be used for switch legs, control, or communication circuits.
4. Conductors for control wiring shall be color coded, using different color coding than the energy conductor coding specified above. Control wires shall

be numbered.

E. Minimum Wire Size: Use No.12 AWG for control over 200 feet, unless otherwise noted. Control wiring may be No.14 AWG if distance is less than 200 feet.

1. Fire alarms, CCTV, intercoms, and intrusion systems shall have cable and wiring according to manufacturer's specifications or as specified.

F. Wire and Cable Connectors and Terminations:

1. For splices in branch circuit conductors solid or stranded size No.10 AWG and smaller, use UL listed soft plastic wire nut with sharp self-cutting interior threads, 3M Scotchlok, Ideal Supernut, or T&B Piggy of the size to match the wire.
2. For terminations of stranded or solid wire in size No.10 AWG and smaller at equipment terminals, use UL listed, tin-plated copper, 600 volt vinyl insulated compression type ring or fork type equivalent to T&B "Sta-Kon" or Burndy "Vinylug".
3. For No.8 AWG and Larger: T&B "Locktite" connectors, Burndy "Versitap" connectors, or OZ-Gedney solderless connectors, with insulating covers, tape or heat shrink insulation system.

    a. Terminations and splices in feeders may be made with solderless pressure type connectors complete with composition insulating covers, field insulating tape, or heat shrink insulation system.
    b. Compression lugs and connectors shall be tin plated wrought copper, of size to match the cable.

4. Splices in underground exterior wiring shall be made fully waterproof by potting or encapsulating.
5. Insulating tapes shall be of a type approved for the application and shall be flame retardant. Tapes shall be as manufactured by 3M or Bishop Electric.
6. Cable Ties: T&B "Ty-Rap" or Burndy "Unirap".
7. Cable Identification: Branch circuits wire markers 3M "Scotch Code" or accepted equivalent. For feeder sizes, non-ferrous metal stencil tags.
8. Thermal Fusion Connections: "Catalytic thermal weld" by Cadweld or accepted equivalent.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Wire and Cable Installation:

1. Wire and cable shall be suitably protected from weather or damage during storage and handling and shall be in first-class condition when installed.
2. Conductors shall not be pulled into conduit until raceway system is substantially complete. Wiring shall be continuous within conduit runs. Splices will be allowed only at outlet and junction boxes. Joints shall be mechanically and electrically secure.
3. Pulling lubricants, if used, shall comply with UL requirements for the type of conduit material and cable insulation being used.
4. Care shall be taken to prevent cutting and abrasion of cable insulation during the pulling of feeders.

    a. Ropes used for pulling of feeders shall be made of polyethylene or other suitable nonmetallic material.
    b. Pulling lines shall be attached to conductor cables by means of either woven basket grips or pulling eyes attached directly to the conductors.
    c. Rope hitches shall not be used.
    d. Cables to be installed in a single conduit shall be pulled in together.
    e. Where polyethylene insulation is used and a pulling lubricant is required, the lubricant shall be certified by the manufacturer to be noninjurious to such insulation.

5. Do not bend cables during installation, either permanently or temporarily, to radii less than 12 times the outer diameters, except where conditions make the specified radius impracticable and shorter radii are allowed by the NEC and NEMA Standards.

6. Neatly and securely bundle conductors located in branch circuit panelboards, cabinets, control boards, switchboards, and motor control centers. Use nylon bundling straps.
7. Provide suitable installation equipment to prevent cutting or distortion of conduits during the pulling of feeders. Use masking or other means to prevent obliteration of cable identification when solid color coating or colored tracers are used.
8. Control wiring color codes, shall be of type as required by its equipment manufacturer. Interconnections of control wiring shall be on numbered terminal strips.
9. Where 2 neutrals are installed in same conduit, their sets of wiring shall be grouped and clearly identified by permanent tags or other means.
10. At each outlet, a loop or end of wire not less than 9 inches long shall be left for connection to lead.
11. Leading end of each conductor pulled shall be carefully examined for damage to jacket. If damage is evident, cable shall be extended and further checked for damage, with good cable only to remain.
12. Cables in junction and pull boxes shall be properly trained and racked.
13. Branch circuit wiring in panelboard gutters shall be installed vertically in the gutter with a 90-degree bend at the supply circuit breaker, wire shall enter the circuit breaker lug horizontally.
14. Install cable supports and boxes at vertical feeders and according to the schedule in the NEC. Boxes shall be built of heavy steel plates not less than No.10 USS gage fastened to an angle iron frame with removable covers secured by brass machine screws. The cable support shall be of the split wedge type that clamps each conductor firmly and tightens due to the weight of the conductor.

B. Wire and Cable Splicing and Terminations:

1. Splices and terminations of conductors shall be made using specified materials and methods installed according to the manufacturer's recommendations.
2. Splices in feeders, not permitted.
3. Splices in branch circuit wiring shall be made by stripping conductor insulation, twisting conductors until mechanically secure, and installing a self-threading insulated type connector. Splices are not

allowed within panelboards.

4. Conductors shall be squarely cut and fully inserted into the lug barrel or connector. Insulation shall be stripped without cutting the conductor or removing strands, exposing the conductor for the minimum distance required for connection. Splice connectors shall be of a type and be so installed that the conductor is fully insulated by a skirt of such design, or taped so cold flow of the conductor insulation will not be induced when the conductor is positioned in its final operating position.
5. Do not combine conductors under the same lug. Provide individual lugs for individual conductors. Re-tighten bolt type connectors 24 to 48 hours after initial installation and before taping.
6. Connectors shall be insulated by approved type, integral or separate cover, or by means of taping with approved plastic or rubber and friction tapes to provide insulating value equal to that of the conductors being joined. The number and size and combinations of conductors allowed by UL as listed on manufacturers' packaging of connector shall be strictly complied with.
7. Terminations at equipment terminal blocks shall be made using compression type connectors suitable to match terminal type.
8. Continuity of neutral on multi-wire branch circuits shall not be made on any device at terminal blocks, but shall be spliced and a tap brought out, thereby assuring no openings of the neutral in the replacement of a device.
9. Feeders shall be identified by means of nonferrous tags or pressure-sensitive labels securely fastened to all cables, feeders, and power circuits in vaults, pull boxes, manholes, switchboard rooms, terminations of cables, etc. Tags or labels shall be stamped or printed to include the feeder number, source and equipment supplied. If suspended type tags are provided, they shall be attached by nylon cables ties or other nonconductive permanent means.
10. Branch circuit conductors shall be identified at supply circuit breakers, with the circuit number using pressure sensitive adhesive wire markers.
11. Branch circuit wiring for lighting and other single phase 277 volt or 120 volt applications shall be multi-wired utilizing common neutrals. Under no circumstances shall any switch break a neutral

conductor. Branch circuit wiring extending more than 100 feet to the nearest outlet from a panel shall be No.10.

12. Circuiting work shall comply with the following:

    a. Loads on panel busses shall be balanced on phases as evenly as possible.
    b. No neutral conductor shall be common to more than 1 circuit conductor connected to the same phase leg of the supply system.
    c. Circuiting of panelboards shall allow breakers to be grouped logically by functions.

C. Voltage Drops at New Construction:

1. Total Allowable Drop for Service Source to Load: Limit to a maximum drop of 5 percent. Increase wire size, where necessary, to comply with this requirement.

    a. Branch Circuits: Limit to a maximum drop of 3 percent.
    b. Service Source to Individual Panelboards: Limit to a maximum drop of 2 percent.

END OF SECTION

SECTION 16131
OUTLET, PULL, AND JUNCTION BOXES

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 16112 - Raceways and Conduits.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements:

1. Materials shall bear Underwriters Laboratories (UL) labels.
2. Box size shall comply with NEC for number and size of conductors in boxes.
3. Box size shall comply with NEC for number and size of conduits entering and exiting each box.

1.03 SUBMITTALS

A. Submit manufacturer's literature and technical data before starting work.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Outlet Boxes:

1. Provide outlet boxes at required locations, where shown on the drawings, and as specified.

a. Fixture studs shall be securely fastened in an acceptable manner.
b. Plaster covers shall have depths suitable to the finish being applied to the walls.
c. Sheet steel boxes shall be properly drilled and tapped.
d. There shall be not more holes in any of the outlet boxes than are required for the entering conduits.
e. Depth of boxes shall allow for easy wire pulling

and proper installation of wiring devices.

2. Outlet boxes shall be galvanized steel or rust resistant malleable iron alloy and comply with ANSI C33.65.

3. Outlet Boxes shall be as follows:

   a. For Recessed Ceiling Fixtures:

      1) 4 inch square sheet steel box with blank cover and suitable hanger bar-box to be fastened to ceiling suspension members in an acceptable manner not more than 1 foot from fixture opening.

   b. For Surface or Stem Mounted Ceiling Fixtures from Slab with Concealed Conduit:

      1) 4 inch sheet steel octagon concrete ring of a depth suitable to the construction and furnished with top cover having a 3/8" fixture stud.

   c. For Ceiling and Wall Bracket Outlets on Exposed Conduit in Dry Locations:

      1) 4 inch octagon sheet steel box with 3/8" fixture stud.

   d. For Surface Mounted Ceiling Fixture or Hung Ceilings:

      1) 4 inch octagon sheet steel hung ceiling box with suitable hanger bars and 3/8" fixture stud. Box to be fastened to ceiling suspension in an acceptable manner.

   e. For Surface Mounted Wall Bracket Fixtures with Concealed Conduit:

      1) 4 inch square sheet box with round opening plaster cover and 3/8" fixture stud.

   f. For Ceiling and Wall Bracket Outlets on Exposed Conduit at Damp or Wet Locations:

1) 4 inch cast iron.

g. For Switches and Receptacles in Tile, Plastered, or Gypsum Board Walls:

1) 4 inch square sheet steel box or multi-gang box with proper plaster covers as required. Two gangs may be provided by means of a 4 inch square box with two gang plaster cover.

h. For Switches and Receptacles in Enameled or Face Brick walls, Unfinished Walls, and Woodwork:

1) Single or multi-gang sheet steel utility boxes as required.

i. For Switches and Receptacles on Exposed Exterior Conduit Work:

1) Type FS or FD conduit.

j. For Telephone or Computer Outlets:

1) 4-11/16" square X 2-1/2" deep.

4. Boxes for fire alarm or signal systems, clocks, pilot lights, and other specialty equipment shall be by the manufacturer of the enclosed equipment.

5. Wet/Damp Locations:

a. Provide gasketed, weathertight, screw covers, code gage galvanized steel pull boxes with weatherproof conduit hubs equivalent to Myers Scru-Hub for pull boxes with multiple conduit entries.
b. Provide cast metal hub type, dipped in rust inhibitor and with gaskets for individual conduit runs.

6. Extension Rings: Do not use to increase the volume of boxes, except where necessary due to multiple conduit run conflicts.

a. Where such conflicts occur, an extension ring may be allowed for changes in direction of conduit to make necessary clearances.

1) Not more than one extension ring may be used for each box where necessary.

B. Pull and Junction Boxes:

1. Where indicated in the plans and specifications or where necessary for compliance with code requirements for cable installation, install junction and pull boxes of the proper size for conduits over 1 inch trade size. Pull and junction boxes shall be of adequate size to accommodate installation of conductors without excessive bending of conductors that could damage insulation.
2. Pull and junction boxes shall comply with Fed.Spec.WJ-800 and be of all steel construction, spot or seam welded at joints, and hot dip galvanized after fabrication.
3. Boxes shall be drip proof with screw attached covers. Each box shall have a turned-in lip welded at joint to develop full strength. Lip shall be drilled and tapped for 1/8" or 3/16" round head screws, symmetrically placed. To provide adequate length of thread, nuts shall be tack welded on inside of lip, or lip shall be made double thickness.
4. Pull and junction boxes shall be sufficiently rigid to withstand moderate twisting strains. Steel boxes shall comply with the following:

    a. 100 cubic inches or less shall be of No.14 gage steel.
    b. Between 101 and 8500 cubic inches shall be No.12 gage steel.
    c. Larger boxes shall be No.10 gage steel.
    d. Barriers and reinforcing angles shall be supplied as required.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work or this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Locations of outlets on electrical drawings are approximate only.

1. Do not scale drawings.
2. Consult architectural plans, sections, elevations, and details for exact locations of outlets and equipment and rooms and spaces having furring or hung ceilings.
3. Verify door swings on architectural drawings for properly locating light switches.
4. Coordinate wall outlet locations with chalkboards, tackboards, cabinets, and equipment.

B. Determine the proper position of outlets and receptacles. Relocate any outlet or receptacle without additional cost to the Board if improperly located.

C. The A/E reserves the right to change the location of any outlet, apparatus, or equipment up to the time of roughing in without additional cost to the owner, provided conduit runs are not substantially increased.

D. Fasten and secure boxes to the building structure independent of the conduit. Provide acceptable plaster stops for boxes to be set in plastered walls and ceilings.

E. Boxes and supports shall be fastened as follows:

1. To concrete or brick: Bolts and expansion shields.
2. To hollow masonry: Toggle bolts, or bolts and expansion shields.
3. To steel work: Machine screws or welded studs.
4. Explosive charge setting devices are not allowed.

F. Recessed wall outlets shall be flush with the wall surface. Install box in wall with cover to allow block or wall surface to fit tight against lip of cover.

G. Where shown together on the plans, switches shall be ganged in one outlet.

1. Switches and receptacles shall be ganged together only where plans specifically indicate such combinations.

H. Outlets for duplex receptacles shall be arranged for

vertical mounting of the receptacles except as specifically indicated on plans.

I. Barriers shall be provided as necessary to isolate voltage classes.

J. Under no circumstances shall outlet boxes for adjoining spaces be placed back to back in partition walls.

K. Circuit breakers and switches shall not be grouped or ganged in outlet boxes unless they can be arranged where the voltage between exposed live metal parts of adjacent switches does not exceed 300 volts. Provide barriers between 120 and 277 volt switches where ganged together.

L. Align rows of outlet boxes for ceiling lights.

M. Unless noted, specified, or directed otherwise, wall outlets shall be centered above finished floor as follows:

1. Convenience outlets: 18 inches to bottom of box.
2. Utility outlets: 18 inches to bottom of box.
3. Exit lights: 6 inches over doorway.
4. Switch outlets: 46 inches to bottom of box.
5. Special purpose outlets: as directed.
6. Telephone/Data outlets: 18 inches to bottom of box.
7. Fire alarm visuals with or without horns: 78 inches to bottom of box.
8. Fire alarm pull station: 46 inches to bottom of box.

Refer to Architectural drawings for additional mounting heights.

N. Pull and junction boxes shall be provided at locations required to reduce length of cable pull or reduce number of elbows between outlets.

O. Provide blank covers for outlet boxes when devices or wiring has been removed or not installed.

P. Paint exposed boxes to match the color of the wall or ceiling to which they are mounted.

Q. Where several feeders pass through a common pull box, tag each feeder to clearly indicate electrical characteristics, circuit number, and panel designation.

R. Color code covers of each box and panel, except for normal power system, for identification as follows:

1. Fire alarm .....Orange
2. Security alarm .....Blue
3. Telephone/Data .....Green
4. Controls .....Purple

END OF SECTION

SECTION 16140
WIRING DEVICES

PART 1 GENERAL

1.01 SUBMITTALS

A. Submit properly identified manufacturer's literature and data before starting work.

1.02 QUALITY ASSURANCE

A. Comply with Florida Building Code (FBC).

1. Convenience outlets installed within 6 feet of water supplies, wet locations, and toilet rooms shall have a ground fault circuit interrupt (GFI) protection device.
2. Outdoor outlets shall be weather proof outdoor GFI.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wiring devices shall be as manufactured by Hubbell, Bryant, Leviton, or Pass and Seymour.

2.02 COMPONENTS

A. Wiring Devices: Comply with NEMA Wd6 and NEC (NFPA 70).

1. Switches:

a. Rated at 20 amps, 277 volts AC, horsepower rated for 1HP at 120 volts.
b. Provide for back (not push-in) or side wiring.
c. Key type switches shall be keyed identically.
d. Manufacturers: Hubbell CSB 120 Series or accepted equivalent by Bryant, Leviton, or Pass and Seymour.

2. Duplex Convenience Receptacles:

a. Comply with NEMA 5-20R as applicable, be of specification grade, back (not push-in) and side wired, U-slotted grounding type, 3-wire, rated 20

amp, l25 volts AC.
b. Double Duplex: Consist of 2 receptacles under a common plate. Single receptacles shall be similar to duplex receptacles.
c. Manufacturers: Hubbell CR20 or accepted equivalent by Bryant, Leviton, or Pass and Seymour.

3. Ground Fault Receptacles:

a. NEMA 5-20R type, rated at 20 amps, 120 volts with 5 ± 1 mA trip threshold, and UL nominal trip time of 0.025 sec.
b. Manufacturers:

1) Hubbell GF5352, Pass and Seymour 2091-FI feed thru type, or accepted equivalent by Bryant or Leviton.

4. Special Purposes Receptacles:

a. Comply with NEMA 5-20R, of specification grade, back (not push-in) or side wired.
b. Provide ratings and type as indicated on Drawings.

5. Wiring devices shall be white color unless noted otherwise.

B. Cover Plates:

1. Impact resistant nylon, by Hubbell or Leviton. Plate design shall be smooth without ornamentation.

2. Underwriters Laboratories (UL) requirements:

a. Metallic Outlet Boxes: UL 514A.
b. Non-metallic Outlet Boxes: UL 514C.

3. Outlets in kitchens, storage and utility areas shall have brushed stainless steel plates.
4. Provide ganged switches to a maximum of three. If more are required on Drawings, provide in multiples of two or three.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Install wiring devices according to manufacturer's recommendations.

B. Verify location of wiring devices before rough-in of outlet boxes and conduit with Architectural Drawings for door swings and furniture details. Duplex receptacles in finished areas shall be vertically mounted.

C. Boxes mounted back-to-back are not allowed.

D. Install devices tightly within box with screws provided. Do not rely upon plate for device alignment and support to assure devices are grounded to box. In receptacles, use self-grounding screws, separate ground conductor or bond wire to box.

END OF SECTION

SECTION 16440
DISCONNECT SWITCHES

PART 1 GENERAL

1.01 SYSTEM DESCRIPTION

A. Performance Requirements: Materials shall bear Underwriters Laboratories (UL) labels. Label for "SERVICE ENTRANCE" where so applied.

1.02 SUBMITTALS

A. Submit manufacturer's literature and technical data before starting work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Disconnect Switches:

1. G.E.
2. Siemens.
3. Square D.
4. Eaton.

2.02 EQUIPMENT

A. Disconnect switches shall comply NEMA KSI-1975 for type HD and shall be of heavy duty type, enclosed, of quick-make, quick-break construction. Rating shall be as indicated on drawings. Switches shall be horsepower and I2t rated, UL labeled.

B. Disconnect Switch Enclosure:

1. NEMA 1 for indoor use.
2. NEMA 3R for outdoor use.

C. Disconnect switch operating handle shall be of insulated box mounted type that directly drives switch mechanism suitable for padlocking in "OFF" position.

D. Defeatable, front accessible, "coin-proof" interlocks shall be provided to prevent opening of cover when switch

is in "ON" position, and prevent turning switch ON when door is open. Securely fastened metallic nameplate shall include highly visible "ON-OFF" indication.

E. Motor Disconnect Means: Provide each motor with an in-sight disconnect means, when required by NEC, and where shown on the drawings.

F. Provide fuses for disconnect switches so indicated. Fuses shall be dual element type.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Install the disconnect switches vertically with top not more than 6 feet above the floor, and rigidly and securely attached to the building. Disconnect switches shall not depend upon conduit for support.

B. Where used as service entrance main disconnects, switches shall be permanently labeled with plastic engraved signs "MAIN SWITCH 1 of 4", "MAIN SWITCH 2 of 4", etc.

C. Optional Mounting:

1. Plywood Panel: Mount panelboards on backboard of 3/4" exterior grade plywood, finished one side, primed all surfaces, painted with one coat gray of fire retardant enamel (finished side) and secure to wall with approved shields or screws as directed by the A/E.
2. Unistrut: Mount disconnect switches on Unistrut P-3000 mounting channels at top and bottom, secured similarly to wall.

D. Label switch covers with plastic engraved signs.

END OF SECTION

SECTION 16470
PANELBOARDS

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 09900 - Painting.
2. 16120 - Wire and Cable.
3. 16475 - Overcurrent Protective Devices.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements: Materials shall bear Underwriter Laboratories (UL) labels.

B. Panelboards used as service entrance equipment shall be UL labeled.

1.03 SUBMITTALS

A. Submit manufacturer's literature and technical data before starting work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Panelboards:

1. G.E.
2. Siemens.
3. Square D.
4. Eaton.

2.02 EQUIPMENT

A. Panelboards:

1. Interiors shall be factory assembled and designed to allow switching and protective devices to be replaced without disturbing adjacent units, without removing the main bus connectors, and allowing circuits to change without machining, drilling, or tapping.

2. Branch circuits shall be arranged using double row construction unless narrow column panels are indicated. A nameplate shall be provided listing panel type and ratings. Circuit breakers shall be bolt-on type.
3. Unless otherwise noted, full size insulated neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection. A ground bus shall be provided in all panels.

B. Boxes and Trim:

1. Boxes shall be at least 20 inches wide made from code gage galvanized sheet steel.

    a. Provide minimum gutter space according to NEC.
    b. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space.
    c. At least 4 interior mounting studs with adjustable nuts shall be provided.

2. Switching device handles shall be accessible.

    a. Doors and panelboard trims shall not uncover any live parts.
    b. Doors shall have flush chrome plated handle with cylinder lock and catch, except doors over 48 inches in height shall have auxiliary fasteners top and bottom of door in addition to the flush type cylinder lock and catch.
    c. Panelboard switching devices with individual dead front doors shall be acceptable instead of standard door in trim design.
    d. Panelboard trim clamps shall be of the indicating type.

3. Door hinges shall be concealed. Locks shall be keyed alike. Furnish directory frame and card having a transparent cover with each door.
4. Exterior and interior steel surfaces of the trim shall be properly cleaned, primed with rust inhibiting phosphatic coating, and finished with

manufacturer's standard gray paint.

a. Trims for flush panels shall overlap the box for at least 3/4" all around.
b. Surface trims shall have the same width and height as the box.
c. Trims shall be mountable by a screwdriver without the need for special tools.
d. After installation, trim clamps shall not be accessible when the panel door is closed and locked.

5. Panelboards exposed to the weather shall have NEMA type 3R raintight enclosure or NEMA 4X in corrosive environments.

C. Electrical Components:

1. Main bus bars shall be copper sized according to UL standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C. above an ambient of 40 degrees C. maximum. Provide main circuit breakers, main lugs, or sub-feed lugs as required.
2. Each panelboard shall incorporate breakers as shown with AIC or higher, at the application voltage, than the available fault at its location along the electrical distribution system, as determined by short circuit study. Minimum rating of breakers shall be:

a. Lighting and power panels for use at 120/208 volts: with circuit breakers rated at 10K AIC symmetrical at 240 volts. Type NQ by Square “D” or accepted equivalent.
b. Lighting and power panels for use at 480/277 volts: with circuit breakers rated at 18K AIC symmetrical at 480 volts. Type NF by Square “D” or accepted equivalent.
c. Distribution panels for use at 120/208 or 277/480 volts: UL listed with minimum integrated assembly rating of 25K AIC. Type Iline by Square “D” or accepted equivalent.

3. Panels tested and listed according to UL 67 and bearing an integrated short circuit rating shall be determined by the short circuit study on the electrical system with 10,000 AIC minimum.

4. Any 2 single pole circuit breaker shall be replaceable by 1 two-pole circuit breaker and any 3 single-pole breaker shall be replaceable by 1 three-pole circuit breaker.
5. Where new circuit breakers are specified to be installed within existing panelboards, they shall be compatible in terms of manufacture, type, and AIC.
6. Distribution panelboards, 250 amperes and over, shall be provided with molded case circuit breakers tested and UL labeled according to UL 489.
7. Breakers 100 ampere through 400 ampere frame sizes shall be thermal-magnetic trip with inverse time current characteristics, unless otherwise noted.
8. Provide ground fault circuit interrupter circuit breakers where indicated.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Install according to manufacturer's recommendations and applicable codes and regulations.

B. Panelboards shall be installed where indicated and with top of cabinet 6'-6" above floor, and shall be rigidly and securely attached to building construction and shall not depend upon conduit for support. Allow at least 1/2" air space behind wall mounted panelboards.

C. Install panelboards according to manufacturer's recommended data. Maintain clearances required by the National Electrical Code, with particular attention to working space around panelboards. Maintain clear space above panelboards, coordinate with other trades to avoid placement of panelboards below piping, ductwork, or other foreign appurtenances. Relocate panels at no additional cost should such interferences occur.

D. Supply panelboards with phenolic nameplate 1 inch x 3 inch on exterior of panels and engraved with panel designation

and voltage rating and feed source. Lighting and power panelboards shall be provided with a clear plastic enclosed typewritten directory inside. Circuit identification shall include load type (lighting, receptacles, etc.) and rooms served.

E. Where flush type panelboards are indicated, provide one 3/4" empty conduit terminated in accessible ceiling above for each 3 spare circuit breakers provided in the panelboard.

F. Install circuit breakers in existing panelboards according to manufacturer's recommendation. Verify tightness of connections including mains. Identify new circuits on the panel directory. If none exists, provide one.

G. Clean and touch up panelboard as required at completion of the project.

END OF SECTION

SECTION 16511
LIGHTING FIXTURES AND LAMPS

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 16112 - Raceways and Conduits.
2. 16120 - Wire and Cable.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements: Materials shall bear Underwriters Laboratories (UL) labels.

1.03 SUBMITTALS

A. Submit manufacturer's literature and technical data before starting work.

B. Furnish certified photometric data for fixtures.

C. Upon request, a sample of each fixture proposed for use and specified unit shall be submitted to the A/E for review.

1.04 QUALITY ASSURANCE

A. Comply with Florida Building Code (FBC).

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Exterior fixture shall be of aluminum or plastic construction.

B. Lighting Fixtures:

1. Provide lighting fixtures as indicated on the drawings and as specified.
2. The schedule and details of lighting fixtures, appearing on the drawings, indicate the type, construction, appearance, quality, and performance of

the fixtures required.

a. Any proposed deviation from the fixtures specified shall equal or be superior to the item specified under these headings.
b. Proposed substitute lighting fixtures will be judged on overall quality on construction.
c. Provide 120V working sample of proposed substitution with cord, plug, and lamp as requested by A/E.
d. The fixture manufacturers products scheduled are considered acceptable, based on the equivalency of individual units as determined by the A/E.

3. Materials used in the manufacture of fixtures shall be new and the best of their respective kind, and shall be formed and assembled in a neat, accurate, and professional manner.

a. Sheet metal shall be of sufficient thickness or shall be ribbed, flanged, or otherwise reinforced so that lighting fixtures and their component parts will withstand the stresses of normal handling and installation and service without undue distortion of shape.
b. Plastering or other installation procedures shall not be relied on to reinforce lighting fixtures or their component parts.
c. Fixture bases shall be metal and fastened to mounting location with metal components.

4. Finishes:

a. Painted steel sheet shall be processed with Bonderize or equal phosphate treatment or shall be Paintlok or Galvanneal.
b. Unpainted sheet steel shall be Galvanneal, by Republic Steel or accepted equivalent.
c. Springs shall be of full hard temper stainless steel.
d. Fasteners of ferrous metal shall be cadmium plated or zinc plated with chromate.
e. Screws mounting fixture housing in plaster ring shall be minimum #8, pointed to facilitate installation.
f. Plaster frame rings shall be of sufficient strength to withstand deformation during

installation, and of suitable materials or finish to prevent corrosion from ceiling plasters and mortars.

1) The contractor shall furnish the fixture manufacturer a complete list of fixtures that will be installed in acoustical plaster ceilings with types and quantities.

g. Painted finishes shall be baked epoxy, polyester powder coated, acrylic or accepted equivalent finish suitable for the service required including temperature and accepted by A/E. Finish shall be applied after fabrication.

5. Fixtures shall be complete with canopies, suspensions of proper lengths, hickeys, casing, sockets, holders, reflectors, hardware, and shall be completely wired and assembled. Each troffers shall have 2 earthquake clips minimum, positive enclosed spring loaded catches, and safety hinges.
6. Furnish suitable plaster rings or plaster stops for fixtures set in plaster ceilings. Consult the "Finish Schedules" on drawings for locations and extent of plaster ceilings. Coordinate the mounting methods of recessed fluorescent lighting fixtures with ceiling suspension system and ceiling trades.
7. Fluorescent and HID ballasts shall be low wattage, high efficiency 480, 277 volt, or 120 volt as noted on Drawings.

a. Ballasts shall be individually fused and shall be high power factor, non-PCB construction UL listed Class P and be listed by Electric Testing Laboratories.
b. Ballasts used outdoors shall be suitable for 32 degrees F. operation.
c. Provide electronic ballasts, with a Total Harmonic Distortion (THD) of not more than 10 percent and a 5-year manufacturer's warranty, for fluorescent fixtures compatible with T-8 lamps OR t-5 lamps.
d. Ballast sound rating shall be ASA "A" for fluorescent ballasts.
e. HID Ballasts shall be constant wattage type.

8. Fluorescent Lampholders shall be General Electric

Leviton or Bryant.

a. Silicone-fiberglass insulated wire rated at 150 degrees or 200 degrees C. or Teflon-fiberglass insulated wire rated at 250 degrees C. shall be provided as required with recessed incandescent and HID fixtures for connection of fixtures to adjacent boxes.
b. Medium and mogul screw base lampholders shall have porcelain bodies.
c. Screw-shell sockets shall be nickel plated and shall have spring contacts wherever possible.

9. Provide a positive device to assure proper axial alignment of lamps with asymmetric distribution when relamping.

   a. This device may be preset or adjustable as required by the specifications.
   b. Axial and angular lamp adjustments shall have provision for locking in adjusted position by hex head or hex socket bolts or nuts with special toothed washers that resist turning in both directions.

10. Fluorescent ballasts and lampholders shall be readily and simply replaceable without demounting the fixture.

    a. Bottom and one side of ballast shall be in full contact with metallic fixture surfaces for maximum heat conductance.
    b. Exposed lamp fluorescent sockets shall be telescoping type or be provided with lamp support brackets.

11. Incandescent and HID reflectors shall be fabricated from minimum 0.050 Alcoa #12 reflector sheet or accepted equivalent, free from forming lines and other visible imperfections.

    a. Black anodized finish shall be minimum 0.001 thick guaranteed against fading and discoloration.
    b. Plain anodized finish used indoors shall be Alcoa MI Alzak or accepted equivalent.
    c. Plain anodized finish used outdoors shall be

Alcoa SI Alzak with fixture protected with glass cover or other means.

12. Fluorescent Specular Reflectors: Specular reflectance shall be 86 percent minimum.

    a. Concealed fluorescent specular reflectors shall be Alcoa MI Alzak finish or accepted equivalent.
    b. Visible reflectors shall be Alcoa reflector sheet type 1 or accepted equivalent.

13. Glass lenses for incandescent and HID fixtures shall be borosilicate glass with maximum coefficient of expansion of $0.33x10^{7}$. Glass lenses for fluorescent fixtures shall be Corning Glass or accepted equivalent.
14. Exposed fixture housings or frames shall have a continuous, smooth surface with no visible seams and a neat and finished quality appearance. Hinges and fastening devices shall be fully concealed except with special permission of the A/E.
15. The thickness of visible edges of mounting frames and rings at the ceiling line shall be between 0.035" and 0.050". Light leaks around trim frame or lens or between any of these are unacceptable.
16. Where fixture type is not indicated on drawings, fixture type used in similar locations shall be provided, as accepted by the A/E.
17. Components of the same type, size, rating, functional characteristics, and make of similar interior lighting fixtures shall be interchangeable.
18. Fixture stems shall be furnished by the manufacturer of the fixture specified or as shown on the drawings.
19. Fixtures for use outdoors or in wet areas shall suitably gasketed to prevent access of moisture or insects into fixture or diffuser.
20. Metal parts of fixtures for use in damp locations, specified as requiring painting, shall be painted with suitable weather and moisture resistant paints exhibiting moisture resisting qualities equal to epoxy based coatings.
21. Aluminum parts of fixtures for use in damp locations specified as requiring an unpainted finish shall be anodized.

C. Lamps:

1. Provide lamps for lighting fixtures. Lamps shall be as specified and indicated on the drawings.
2. Incandescent lamps shall be suitable to operate on 120 volts, 60 Hertz supply, with the following requirements:

    a. Wattage rating as shown on fixture schedule.
    b. Type of lamp as shown on fixture schedule.
    c. Lamps shall be inside frosted unless noted otherwise.
    d. Unless noted otherwise lamps shall be extended service type rated at 130V.

3. Fluorescent lamps shall be suitable to operate with specified ballasts on 277 or 120 volts, 60 Hertz supply as required, with the following requirements:

    a. Wattage rating as shown on fixture schedule.
    b. Lamp shall be rapid start energy saving type.
    c. Color: 3500 degrees Kelvin, 75 CRI.

4. Compact fluorescent "PL" lamps shall be used for down lighting applications and shall be suitable to operate with specified ballasts on 277 volts or 120 volts, 60 hertz supply as required with the following requirements:

    a. High power factor ballasts only.
    b. Wattage rating and lamp type as shown on fixture schedule.
    c. Color: 3500 degrees Kelvin, 75 CRI.

5. HID lamps shall be suitable to operate with specified ballasts on 480 volts, 277 volts or 120 volts, 60 hertz supply as required with the following requirements:

    a. Wattage ratings and lamp designation as shown on fixture schedule.
    b. Lamp base shall be mogul base, whenever possible.
    c. Rated life shall be a minimum of 24,000 hours for high pressure sodium.
    d. Metal halide lamps shall be phosphor coated.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Install fixtures according to manufacturer's recommendations.

B. Install "Lay-In" type fixtures with 6 foot lengths of flexible conduit to enable fixture relocation with minimum inconvenience. Fixture to be securely fastened to ceiling frame members by mechanical means as per the NEC.

C. Exit lights:

1. Install wall or ceiling mounted as shown on drawings.
2. Provide directional arrows required to show correct path to exit.
3. Install exit lights at a location and height to assure a clear line of sight from the egress passageway.
4. Relocate exit lights that are not readily visible at no additional cost to the owner.
5. Internally illuminated exit signs shall have LED light source on normal power.

D. Fixture Supports:

1. Support each fixture securely.
2. Each recessed fluorescent troffer shall be lay-in supported by ceiling suspension system. Provide at least 2 earthquake clips.
3. Where pendant fixtures are mounted in continuous rows, the number of hangers shall equal the number of 4 foot lengths, plus 1.
4. Do not support fixtures to plaster or gypsum board ceilings.
5. Furnish and install steel members and supports to fasten and suspend fixtures.

E. Install lighting fixtures on ceilings or walls of mechanical and electrical equipment rooms after piping, ductwork, and equipment are installed therein.

1. Exact location and switching for such fixtures will be determined at the job site during the work.
2. Fixtures shall be located to give maximum illumination to items of equipment requiring servicing, and moving machinery.
3. Any lighting fixtures blocked, inaccessible, or improperly located shall be relocated at no extra cost.
4. Where fan rooms are used as an air plenum, provide suitable gasketed vaportight lighting fixtures.

END OF SECTION

SECTION 16530
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 16112 - Raceways and Conduits.
2. 16120 - Wire and Cable.

1.02 SYSTEM DESCRIPTION

A. Material shall bear Underwriters Laboratories (UL) labels.

1.03 SUBMITTALS

A. Properly identified manufacturer's literature and technical data before starting work.

B. Photometric data for exterior lighting fixtures and a point by point illumination plan for entire site at same scale as Construction Documents

C. Wind load certification, by a Florida registered structural engineer, for exterior lighting poles.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Exterior Lighting Fixtures:

1. Exterior lighting fixtures shall be furnished as indicated on drawings and fixture schedule. Fixtures shall be complete with necessary wiring, lamps, reflectors, glassware, and mounting accessories.
2. Components of the same type, size, rating, functional characteristic, and make of similar exterior lighting fixtures shall be interchangeable.
3. Fixture bases shall be metal and fastened to mounting locations with metal components.
4. Exterior fixtures shall be of aluminum or plastic construction.

B. Lamps:

1. Provide lamps for exterior lighting fixtures. Lamps shall be as indicated on the lighting fixture schedule.

C. Lighting Poles:

1. Luminaries, pole, base, and sub-base of exterior lighting shall be capable of withstanding wind velocity pressures per Florida Building Code. Supplier shall provide Shop Drawings and calculations, signed and sealed by a Florida registered engineer, as proof of compliance with this requirement.
2. Poles shall be of material, shape, finish, and height as indicated on the drawings. Provide a reinforced handhold and grounding lug on poles.
3. Metal pole base, where indicated, shall be welded to pole and furnished complete with cover and anchorage hardware. Pole and luminare finish shall be as indicated on the drawings and as accepted by the A/E.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Exterior Lighting Fixtures: Exterior lighting fixtures shall be installed according to manufacturer's instructions and according to details as shown on electrical drawings.

B. Lighting Poles:

1. Lighting poles shall be installed according to manufacturer's instructions and according to details shown on electrical drawings. Adjust poles to be set plumb and make final adjustments as required.
2. Build concrete bases for lighting poles to the most stringent requirements as indicated on Construction Documents or submittal based on wind velocity

pressures. Bases shall be complete with reinforcing anchor bolts, ground rod, and conduit entry.

3. Exterior light poles shall be solidly grounded to the conduit or to the circuit ground conductor in the case of nonmetallic conduit and to a local ground rod installed at the fixture base.
4. Provide weatherproof fuse holders in each ungrounded conductor within each lighting pole. Splices between circuit feed conductors and fixture conductors shall be made using molded waterproof connectors equivalent to Buss "Tron" type.
5. Luminaries shall be oriented and aimed to provide the illumination patterns desired. Adjust fixtures, reflectors, or lamps as required to obtain desired results.

END OF SECTION