

operation preventing damage, injury, or death due to an inoperable sensing edge system.

C. Operator Controls:

1. Push-button and key operated control stations with open, close, and stop buttons for surface mounting, for interior installation coordinated with Instrumentation and Security Drawings.

D. Locking: Interior bottom bar slide bolt.

E. Operator Cover: 24-gauge galvanized steel sheet metal to provide weather resistance at coil area of unit. Finish to match door hood

PART 3 EXECUTION

3.01 INSTALLATION

- A. The doors shall be erected by the manufacturer or the manufacturer's authorized representative in compliance with detailed instructions of the manufacturer.
- B. Install assemblies to provide a rigid, permanent attachment to the building according to the supplier's instructions, approved shop drawings, and Engineer's drawings.
- C. After installation, moving parts shall be properly adjusted to give free, effortless operation.
- D. Install an additional hood around gears where exposed to view in their final configuration.
- E. Provide all items and accessories as required for a complete and operating installation in every respect.

END OF SECTION

SECTION 08510
STEEL WINDOWS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section includes the following:
 - 1. Cold-formed, welded steel windows.

1.02 RELATED WORK (NOT USED)

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

- A. Produce Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed finish.
- D. Product test reports.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

- A. ASTM International (ASTM)
 - 1. ASTM A123/A123M—Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM A653/A653M—Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

3. ASTM E330—Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 4. ASTM F588—Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact.
- B. Steel Window Institute (SWI)
- C. Underwriters Laboratories (UL)
1. UL9—Fire Tests of Window Assemblies.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to steel window manufacturer for installation of units required for this Project.
- B. Florida Product Approval: Provide window assemblies that are approved for use in accordance with the Florida Building Code through the Florida Product Approval Process and are designed to withstand the wind pressures indicated on the Structural drawings.

1.07 WARRANTIES

- A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Specification Section 01780, Warranties and Bonds.
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of steel windows that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection.
 - c. Water leakage or air infiltration.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - e. Insulating-glass failure.

2. Warranty Period: Five years from date of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.09 QUALIFICATIONS (NOT USED)

1.10 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide steel windows capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated:
 - 1. Wind Loading Design Pressure: All exterior openings shall meet Florida windload requirements. Windows that are part of the exterior building envelope are to be tested for windloading in accordance with ASTM E330, to the design loads specified. Refer to structural drawings for wind load criteria.
 - a. Window components, including mullions, hardware, and anchors, shall be designed to withstand wind-loading design pressures shown on the contract drawings.
- B. Water Penetration: No leakage for 15 minutes when window is subjected to a rate of flow of 5 gal./h per sq. ft. with a differential pressure across the window of 2.86 lbf/sq. ft. when tested according to ASTM E331.
- C. Crack Tolerances: Test each type and size of required window unit, with ventilators closed and locked, for compliance with the SWI.
- D. Forced-Entry Resistance: Comply with Performance Grade 10 requirements when tested according to ASTM F588.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cold-Formed Steel Windows:
 - a. DV Fyre-Tec, Inc.
 - b. Optimum Window Manufacturing Corp.

2.02 MATERIALS

- A. Cold-Formed Steel Window Members: Provide frame members mechanically formed from metallic-coated, low-carbon, cold-rolled steel sheet complying with ASTM A653.
 - 1. Cold-formed, welded steel windows.
- B. Glazing beads shall be manufacturer's standard.
- C. Fasteners: Provide fasteners of stainless steel or other metal, that are warranted by manufacturer to be noncorrosive and compatible with trim, hardware, anchors, and other components of steel windows.
- D. Anchors, Clips, and Window Accessories: Provide units of stainless steel or hot-dip zinc-coated steel, complying with ASTM A123. Provide units with sufficient strength to withstand design pressure indicated.
- E. Sealant: For sealants required within fabricated windows, provide manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.
- F. Glass: Low-E insulating glass complying with Division 8 Section "Glazing."
- G. Glazing Product for Fire-Protection-Rated Windows: Fire-protection-rated glazing product complying with Division 8 Section "Glazing."

2.03 FABRICATION

- A. General: Fabricate steel windows of type and in sizes indicated to comply with SWI standards. Include a complete system for assembly of components and anchorage of window units.
- B. Window Type: Provide the following type of steel windows:
 - 1. Fixed windows.

2.04 STEEL FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Surface Preparation: Clean surfaces of dirt, oil, grease, scale, and other contaminants; follow with a phosphate pretreatment applied according to window manufacturer's written recommendations.
- C. Shop Prime Coat Finish: After fabrication, provide manufacturer's standard epoxy prime coat.
- D. High-Performance Organic Coating: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, operators, accessories, and other components.
- B. Install windows level, plumb, and true to line, without distortion. Anchor securely to surrounding construction with approved fasteners.
 - 1. Separate corrodible surfaces subject to electrolytic action at points of contact with other materials.

3.02 CLEANING AFTER INSTALLATION

- A. Interior and exterior metal surfaces of windows shall be cleaned of mortar, plaster, paint spattering or spots, and other foreign matter, and washed with soap and water, brushed with a fiber brush, and thoroughly rinsed with clear water. Acid solutions, steel wool, or other harsh abrasives shall not be used.
- B. Stained or discolored windows shall be cleaned in accordance with the window manufacturer's recommendations. Windows that cannot be satisfactorily cleaned and windows with abraded, stained, or defective surface finish that cannot be satisfactorily repaired shall be replaced.

END OF SECTION

SECTION 08710
HARDWARE

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall secure and furnish to the job site all Finish Hardware in accordance with this Section and applicable drawings. It is intended that the following list of hardware cover all items required to complete the project. Omissions and/or discrepancies shall be brought to the Engineer's attention during the bidding period.

1.02 RELATED SECTIONS

- A. Section 08110, Steel Doors and Frames.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

- A. Shop Drawings
 - 1. Hardware schedule shall be submitted for finish hardware in accordance with the paragraph entitled "General Requirements," of this section.
- B. Product Data: Manufacturer's catalog data shall be submitted for the following items:
 - 1. Hinges
 - 2. Locksets
 - 3. Latchsets
 - 4. Exit Devices
 - 5. Push and Pull Bars
 - 6. Thresholds
 - 7. Lever Extension Flush Bolts
 - 8. Coordinating Device
 - 9. Weatherstripping Materials

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCES

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. Aluminum Association (AA)

1. AA DAF-45—Designation System for Aluminum Finishes.

B. Builders Hardware Manufacturers Association (BHMA)

1. ANSI/BHMA A156.1—Butts and Hinges.
2. ANSI/BHMA A156.13—Mortise Locks & Latches, Series 1000.
3. ANSI/BHMA A156.16—Auxiliary Hardware.
4. ANSI/BHMA A156.18—Materials and Finishes.
5. ANSI/BHMA A156.2—Bored and Preassembled Locks and Latches.
6. ANSI/BHMA A156.3—Exit Devices.
7. ANSI/BHMA A156.4—Door Controls – Closers.
8. ANSI/BHMA A156.5—Auxiliary Locks and Associated Products.
9. ANSI/BHMA A156.6—Architectural Door Trim.
10. ANSI/BHMA A156.8—Door Controls - Overhead Stops and Holders.

C. National Fire Protection Association (NFPA)

1. NFPA 101—Life Safety Code, 2006 Edition.
2. NFPA 80—Standard for Fire Doors and Fire Windows.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

- ### A.
- Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Specification Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

- ### A.
- The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

- B. Hardware shall be delivered properly wrapped and sealed in the manufacturer's original cartons complete with the correct fastenings.
- C. Each item of hardware shall be labeled for room and location and identified with the proper doorframe and hardware schedule number.

1.09 QUALIFICATIONS (NOT USED)

1.10 TEMPLATES

- A. Hardware attached to metal shall be made to a template.

1.11 FINISHES

- A. Hardware shall receive the following finishes conforming to ANSI/BHMA A156.18, as indicated:
 - 1. Satin chromium: US26D 626 on brass or bronze metal, 652 on steel
 - 2. Satin corrosion-resistant steel: US32D 630
 - 3. Aluminum Powder Coat: 689
- B. Aluminum hardware items shall be anodized to an Architectural Class 11 natural finish not less than 0.4 mil thick and conforming to AA DAF-45 (designation AA M21 C22 A 31).

1.12 GENERAL REQUIREMENTS

- A. Hardware schedule shall be submitted indicating the door and frame location, type, size, swing, bevel, material, hardware type by Builders Hardware Manufacturer's Association (BHMA) numbers, and the respective manufacturer's type, name, number, finish, and design.
- B. Provide hardware that is part of rated or tested door assembly in accordance with test or respective Miami Dade Notice of Acceptance (NOA).

PART 2 PRODUCTS

2.01 FASTENERS

- A. Fasteners of the proper type, size, quantity, and finish for each hardware item shall be provided. Machine screws and expansion shields shall be used for attaching hardware to concrete, stone, or masonry. All visible fasteners shall be Phillips-head bronze or corrosion-resistant steel finished to match specified

hardware. Screws or bolts for the jamb leaf of half-surface, half-mortise, and full-surface hinges shall be the tamperproof type.

2.02 HINGES

- A. Hinges shall be full mortise bearing five knuckle design button-tip template and nontemplate type conforming to ANSI/BHMA A156.1, finish and type as specified in the hardware schedule.
 - 1. Basis of design:
 - a. Exterior—McKinney, T4A3386 heavy weight series.
 - b. Interior—McKinney, TA2314 standard weight series.
 - 2. Acceptable alternates include: Lawrence, Bommer.
- B. Hinges for exterior doors shall be corrosion-resistant steel unless otherwise specified.
- C. Exterior doors and interior reverse bevel doors shall have hinges with nonremovable pins.
- D. Exterior doors and doors with closers shall have hinges with ball bearings or oil-impregnated bearings.
- E. Doors hung on offset floor hinges shall have an intermediate pivot.
- F. Doors shall have no less than three hinges.
- G. Hinges shall have leaves of sufficient width to clear the trim but not less than the following sizes:

Door Thickness	Hinge Size
1-3/4 inches	4-1/2 inches by 4-1/2 inches

2.03 LOCKSETS

- A. General
 - 1. All door hardware shall be accessible, in accordance with ADA.
 - 2. Cylinder bored locksets and latchsets shall conform to ANSI/BHMA A156.2, plain design and wrought trim.

3. Mortise locksets and latchsets shall conform to ANSI/BHMA A156.13.
 - a. Basis of design: Sargent 8200.
 - b. Acceptable alternates include: Schlage L900, Corbin Russwin ML2200 Series, Yale 8800, Best 40H
4. Locksets and latchsets shall be the product of a single manufacturer except for special-function locks and where indicated otherwise.
5. Lock and latchsets shall have standardized fronts, cases, and strikes so that varying functions will be interchangeable and will require only one mortise for their installation. Locks and latches shall have beveled bronze fronts, bronze bolts and strikes, brass hubs, and cases with the finish specified. Locks shall have cylinders conforming to ANSI/BHMA A156.5.
6. All cylinders shall be 7-pin removable core type and shall be capable of receiving Best Universal Lock Company's core No. 7A7A 1 or No. 7A7A 2. Standard mortise cylinders shall have an outside diameter of 1.150 inches with 32 threads per inch, with depth of threads of 0.027 inch. Cylinders for rim locks shall have an outside diameter of 1.148 inches, adjustable for door thickness of 1-3/8 to 2-7/8 inches.
7. All locks for exterior doors shall be furnished and installed complete with cylinder and construction core. Two keys, properly tagged and designated as to location, shall be furnished for each construction core.
8. All locks for interior doors shall be furnished and installed without cylinder or core and with a temporary wood or metal cylinder opening cover.
9. Notwithstanding the provisions of the General Provisions, all locksets and lock cylinders shall be master keyed to the key system established for the site.
10. Temporary-construction cores shall be furnished, installed, and maintained in locks during construction and removed when directed.

B. Cylinder Bored Locksets

1. Heavy duty usage cylinder bored locksets and latchsets shall be Series 4000, as specified in the hardware schedule.

C. Mortise Locksets

1. Heavy duty usage mortise lock sets shall be UL listed and labeled Series 1000, Grade 1, as specified in the hardware schedule.
2. Medium duty usage mortise latchsets shall be Series 1000, Grade 2, as specified in the hardware schedule.

2.04 THRESHOLDS

- A. Aluminum thresholds shall be provided for the full width of the opening at exterior doors.
- B. Thresholds shall be mill-finish extruded aluminum 6063-T5 alloy conforming to ANSI/BHMA A156.3 or to ANSI/BHMA A156.6, type as specified.

2.05 LEVER EXTENSION FLUSH BOLTS

- A. Flush bolts shall be cast or extruded brass or aluminum, finish as specified, conforming to ANSI/BHMA A156.16, with 12-inch lever extensions.
- B. Flush bolts shall be a type listed in UL "Building Material Directory" for fire-rated doors.
- C. Automatic extension flush bolts shall conform to ANSI/BHMA A156.3.

2.06 CLOSERS

- A. Closers shall conform to ANSI/BHMA A156.4, finish, type, and size as specified in the hardware schedule.
- B. Closers shall be provided on emergency fire exit, UL labeled, exterior, toilet room, and general office doors and where specified in the hardware schedule.
- C. Closers shall be the surface-mounted overhead type and shall be the product of a single manufacturer except where not practicable and where specifically indicated otherwise. Parallel-arm closers shall be used for outswinging exterior doors, doors under 7 feet in height, and when special conditions require parallel-arm operation.
- D. Surface-mounted and concealed overhead closers shall be liquid-controlled rack-and-pinion construction with cast-iron cases and a spindle of not less than 9/16-inch diameter. Closers shall have an adjustable torsion-spring 2-speed closing action and a fully adjustable controlled backcheck valve. Valve controls shall be key regulated.

- E. Closer arms shall be fabricated from forged steel or ductile iron. Ductile-iron arms shall be provided for parallel-arm closer operation. Exposed arms of closers shall have a sprayed-on finish matching the lockset or exit-hardware finish.
- F. Hold-open devices shall be provided on all closers except labeled doors and exterior doors.
- G. Brackets, reinforcing plates, and accessory fittings shall be provided as required.
 - 1. Basis of design: Sargent 351
 - 2. Acceptable alternates include: Norton 7500, Yale 4400, LCN 4040.

2.07 MISCELLANEOUS HARDWARE

A. General

- 1. Miscellaneous hardware shall conform to ANSI/BHMA A156.16, ANSI/BHMA A156.6, and ANSI/BHMA A156.8, and shall match or have the same finish as lockset finish, except when indicated otherwise.

B. Door Holders

- 1. Door holders shall be one of the following types:
 - a. Concealed overhead slide, automatic, Type C01511
 - b. Surface-mounted overhead slide, automatic, Type C02511

C. Door Stops and Roller Bumpers

- 1. Door stops or bumpers shall be provided for all doors to protect the hardware and prevent doors from striking walls and fixtures.
- 2. Wall-mounted door stops Types L12071 or L12111 shall be provided where practicable. Where impossible to install wall-mounted stops, floor-mounted stops, Type L12141 or L12161, shall be provided.

D. Door Silencers

- 1. Door silencers shall be provided except where specifically indicated otherwise.
- 2. Door silencers shall be Type L03011 for metal frames.

3. Three silencers shall be provided for single doors. Two silencers shall be provided for each leaf of pairs of doors for installation in the head rail of the door frame.

2.08 WEATHERSTRIPPING MATERIALS

A. Door-Sill Weatherstripping

1. Weatherstripping shall consist of a 1/8-inch-thick by 1-3/8-inch-high neoprene strip housed in an extruded anodized aluminum housing approximately 0.070 inch thick by 1-1/4 inches high by the full width of the door and attached to the door with countersunk aluminum screws.

B. Meeting Rails

1. Weatherstripping for pairs of single-acting exterior doors shall consist of 1/8-inch-thick by 3/4-inch-wide feather-edged neoprene strips housed in extruded anodized aluminum "Z" shape strips 0.065 inch thick by 1 inch wide by the full height of the opening. There shall be one strip on each leaf overlapping.

PART 3 EXECUTION

3.01 GENERAL

- A. Hardware shall be installed and adjusted in accordance with the manufacturer's printed instructions and to template dimensions.

3.02 HARDWARE LOCATION

- A. Hardware shall be located in accordance with the following except when template dimensions and multiple-item installation require alternate locations:

Hardware Item	Location
Top hinge	Centerline of the hinge shall be not more than 11 inches below the top of the door.
Bottom hinge	Centerline of the hinge shall be not more than 13 inches above the finished floor line.
Intermediate hinge	Equidistant between the top and bottom hinges or pivots.
Knob lock and latch strike	40-5/16 inches above the finished floor to the center of the lock strike.
Exit bolt	Aligned in a horizontal position with the centerline of the strike 40-5/16 inches above the finished floor.

Hardware Item	Location
Door closer	Installed and adjusted in accordance with template dimensions. Except where impracticable, the closer shall be mounted on the room side of doors opening into corridors, halls, and reception areas.
Extension lever flush bolts	Installed in the edge of the door. Bolt fronts shall be centered in accordance with the length of the lever extension.

3.03 LOCKSET FUNCTIONS

- A. Lockset and latch functions shall be provided for doors in accordance with ANSI/BHMA A156.2.

3.04 FINAL ADJUSTMENT

- A. Final hardware adjustment shall be made and the maintenance personnel shall be instructed in adjustment, care, and maintenance of the hardware, and provided with information and lists for Spare Parts.

3.05 ADJUSTMENT WRENCHES

- A. Three sets of hardware adjustment wrenches shall be delivered before completion of the project. Each set shall contain adjustment wrenches for locksets, control valve keys for door closers, dogging devices for exit bolts, and emergency keys for toilet lock sets.

END OF SECTION

SECTION 08800
GLASS AND GLAZING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Extent of glass and glazing work is indicated on drawings and schedules.
- B. Types of work in this section include glass and glazing for:
 - 1. Window units.
 - 2. Vision lights in doors.
- C. Mirror glass is specified in another section.

1.02 RELATED WORK

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each glazing material and fabrication glass product required, including installation and maintenance instructions.
- B. Samples: Submit, for verification purposes, 12-inch square samples of each type of glass indicated except for clear single pane units, and 12-inch long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative of adjoining framing system in color.
- C. Certificate: Submit certificates from respective manufacturers attesting that glass and glazing materials furnished for project comply with requirements.
- D. Separate certification will not be required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authorities having jurisdiction.

- E. Compatibility and Adhesion Test Report: Submit statement from sealant manufacturer indicating that glass and glazing materials have been tested for compatibility and adhesion with glazing sealants and interpreting test results relative to material performance, including recommendations for primers and substrate preparation needed to obtain adhesion.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

- A. American National Standards Institute (ANSI)

- 1. ANSI Z97.1—Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Test.

- B. Associated Laboratories, Inc. (ALI)

- C. ASTM International (ASTM)

- 1. ASTM C509—Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
 - 2. ASTM C542—Standard Specification for Lock Strip Gaskets.
 - 3. ASTM C716—Standard Specification for Installing Lock Strip Gaskets and Infill Glazing Materials.
 - 4. ASTM C864—Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
 - 5. ASTM C920—Standard Specification for Elastomeric Joint Sealants.
 - 6. ASTM C1036—Standard Specification for Flat Glass.
 - 7. ASTM C1048—Standard Specification for Heat Strengthened and Fully Tempered Flat Glass.
 - 8. ASTM C1172—Standard Specification for Laminated Architectural Flat Glass.
 - 9. ASTM E2190—Standard Specification for Insulating Glass Unit Performance and Evaluation.

- D. Code of Federal Regulations (CFR)

- 1. 16 CFR 1201—Safety Standard for Architectural Glazing Materials.

- E. Flat Glass Marketing Association (FMGA)
 - 1. Glazing Manual.
 - 2. Sealant Manual.
- F. Insulating Glass Certification Council (IGCC)
- G. Underwriters Laboratories (UL)
 - 1. UL 9—Fire Door and Fire Window Testing.

1.06 QUALITY ASSURANCE

- A. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FMGA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.
- B. Safety Glazing Standard: Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with ANSI Z97.1 and testing requirements of 16 CFR 1201 for category II materials.
- C. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component pane of units with appropriate certification label of inspecting and testing organization indicated below:
 - 1. Insulating Glass Certification Council (IGCC).
 - 2. Associated Laboratories, Inc. (ALI).
- D. Single Source Responsibility for Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer or fabricator for each kind and condition of glass indicated and composed of primary glass obtained from a single source for each type and class required.

1.07 WARRANTIES

- A. General: Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.
- B. Manufacturer's Special Project Warranty on Insulating Glass: Provide written warranty signed by manufacturer of insulating glass agreeing to furnish f.o.b. point of manufacture, freight allowed project site, within specified warranty period indicated below, replacements for those insulating glass units developing

manufacturing defects. Manufacturing defects are defined as failure or hermetic seal of air space (beyond that due to glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coatings, if any, and other visual indications of seal failure or performance; provided the manufacturer's instructions for handling, installing, protecting and maintaining units have been complied with during the warranty period.

- C. Warranty Period: Manufacturer's standard but not less than 10 years after date of substantial completion.

1.08 DELIVERY, STORAGE, AND HANDLING:

- A. Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

1.09 QUALIFICATIONS (NOT USED)

1.10 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

1.11 SYSTEM DESCRIPTION

- A. Provide glass and glazing that has been produced, fabricated and installed to withstand normal thermal movement, wind loading and impact loading (where applicable), without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glass and glazing materials and other defects in the work.
- B. Normal thermal movement is defined as that resulting from an ambient temperature range of 120°F (67°C) and from a consequent temperature range within glass and glass framing members of 180° F (100°C).
- C. Deterioration of insulating glass is defined as failure of hermetic seal due to other causes than breakage which results in intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating, if any,

resulting from seal failure, and any other visual evidence of seal failure or performance.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Manufacturers of Clear and Tinted Float Glass:

- a. AFG Industries, Inc.
- b. Ford Glass Division.
- c. Guardian Industries Corp.
- d. LOF Glass, Inc.
- e. PPG Industries, Inc.
- f. Saint-Gobain/Euroglass.

2. Manufacturers of Wire Glass:

- a. AFG Industries, Inc.
- b. Guardian Industries Corp.
- c. Hordis Brothers, Inc.
- d. Pilkington Sales (North America) Limited.

3. Manufacturers of Heat-Treated Glass:

- a. AFG Industries, Inc.
- b. Cardinal IG.
- c. Environmental Glass Products.
- d. Falconer Glass Industries.
- e. Ford Glass Division.
- f. Guardian Industries Corp.
- g. Hordis Brothers, Inc.
- h. LOF Glass, Inc.
- i. PPG Industries, Inc.
- j. Saint-Gobain/Euroglass.
- k. Spectrum Glass Prod. Div., H.H. Robertson Co.
- l. Viracon, Inc.

4. Manufacturers of Insulating Glass:

- a. Advanced Coating Technology.
- b. AFG Industries, Inc.
- c. Cardinal IG.
- d. Environmental Glass Products.
- e. Falconer Glass Industries.
- f. Ford Glass Division.
- g. Guardian Industries Corp.
- h. Hordis Brothers, Inc.
- i. Independent Insulating Glass.
- j. PPG Industries, Inc.
- k. Spectrum Glass Prod. Div., H.H. Robertson Co.
- l. Viracon, Inc.

2.02 GLASS PRODUCTS, GENERAL

- A. Primary Glass Standard: Provide primary glass which complies with ASTM C1036 requirements, including those indicated by reference to type, class, quality, and if applicable, form, finish, mesh and pattern.
- B. Heat-Treated Glass Standard: Provide heat-treated glass which complies with ASTM C1048 requirements, including those indicated by reference to kind, condition, type, quality, class, and, if applicable, form, finish, and pattern.
- C. Sizes: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide thicknesses indicated or, if not otherwise indicated, as recommended by glass manufacturer for application indicated.

2.03 PRIMARY GLASS PRODUCTS:

- A. Clear Float Glass: Type I, (transparent glass, flat), Class 1, Quality q3 (glazing select).
- B. Tinted Float Glass: Type I, (transparent glass, flat) Class 2 (tint heated absorbing and light reducing), Quality q3 (glazing select), and as follows:
- C. Gray or Medium Green: Manufacturer's standard tint, with visible light transmittance of 38% or higher and shading coefficient of 0.50 or higher for 1/4-inch-thick glass.

- D. Refer to requirements for sealed insulating glass units for performance characteristics of assembled units composed of tinted glass, relative to visible light transmittance, U-values, shading coefficient and visible reflectance.

2.04 HEAT-TREATED GLASS PRODUCTS

A. Manufacturing Process: As follows:

1. By vertical (tong-held) or horizontal (roller hearth) process, at manufacturer's option, except provide horizontal process where indicated as "tongless" or "free of tong marks".
2. Uncoated Clear Heat-Treated Float Glass: Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), kind as indicated below.
3. Kind FT (fully tempered) where indicated. Uncoated Tinted Heat-Treated Float Glass: Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 2 (tinted heat absorbing and light reducing), Quality q3 (glazing select), with tint color and performance characteristics for 1/4 inch thick glass matching those indicated for non-heat-treated tinted float glass; kind as indicated below:
4. Kind FT (fully tempered) where indicated.

- B. Color: Gray or Green. See float glass specification above for performance characteristics.

2.05 LAMINATED GLASS

- A. General: ASTM C1172, Kind LA fabricated from two pieces of Type I, Class 1, Quality q3, flat annealed transparent glass conforming to ASTM C1036. Flat glass shall be laminated together with a minimum of 0.030 inch thick, clear polyvinyl butyral interlayer. Glass pieces in monolithic laminated lites shall be minimum 1/8 inch thick each for a total minimal nominal thickness of 1/4 inch. Overall thicknesses for laminated lites shall be as required to conform to wind design pressures indicated on drawings.

2.06 SEALED INSULATING GLASS UNITS

- A. General: Provide preassembled impact-resistant units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E2190 as well as with other requirements specified for glass characteristics, air space, sealing system, sealant, spacer material, corner

design and desiccant. Units shall be rated for wind design pressures indicated on drawings.

- B. For properties of individual glass panes making up units, refer to product requirements specified elsewhere in this section applicable to types, classes, kinds and conditions of glass products indicated.
- C. Provide heat-treated panes of kind and at locations indicated or, if not indicated, provide heat-strengthened panes where recommended by manufacturer for application indicated and tempered where indicated or where safety glass is designated or required.
- D. Performance: ASTM E2190.
 - 1. Nominal Thickness of Each Pane: 1/4 inch.
 - 2. Air Space Thickness: 1/2 inch.
 - 3. Sealing System: Manufacturer's standard.
 - 4. Spacer Material: Manufacturer's standard metal.
 - 5. Desiccant: Manufacturer's standard; either molecular sieve or silica gel or blend of both.
 - 6. Corner Construction: Manufacturer's standard corner construction.
- E. Uncoated Insulating Glass Units: Manufacturer's standard units complying with the following requirements:
 - 1. Exterior Pane: Laminated glass.
 - 2. Kind: As indicated.
- F. Color: Gray or Medium Green. See Float Glass specifications above for performance characteristics.
- G. Interior Pane of Glass: Clear float glass.
 - 1. Kind: As indicated.
- H. Performance Characteristics: See Float Glass specifications.

2.07 ELASTOMERIC GLAZING SEALANTS AND PREFORMED GLAZING TAPES

- A. General: Provide products of type indicated and complying with the following requirements:
- B. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials with which they will come into contact, including glass products, seals of

insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.

- C. Suitability: Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants and tapes which have performance characteristics suitable for applications indicated and conditions at time of installation.
- D. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C920 requirements, including those for Type, Grade, Class and Uses.
- E. Colors: Provide color of exposed sealants indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.
- F. Two-Part Polysulfide Glazing Sealant: Type M; Grade NS; Class 25; Uses NT, M, G, A, and, as applicable to uses indicated, O.
- G. Available Products: Subject to compliance with requirements, glazing sealants which may be incorporated in the work include, but are not limited to, the following:
 - 1. Two-Part Polysulfide Glazing Sealant:
 - a. "Chem-Calk 200"; Bostik Construction Products Div.
 - b. "Synthacalk GC-5"; Pecora Corp.

2.08 GLAZING GASKETS

- A. Lock-Strip Gaskets: Neoprene extrusions of size and shape indicated, fabricated into frames with molded corner units and zipper lock strips, complying with ASTM C542; black.
- B. Dense Elastomeric Compression Seal Gaskets: Molded or extruded gaskets of material indicated below, complying with ASTM C864, of profile and hardness required to maintain watertight seal:
 - 1. Neoprene.
 - 2. EPDM.
 - 3. Thermoplastic polyolefin rubber.
 - 4. Any material indicated above.
- C. Cellular Elastomeric Preformed Gaskets: Extruded or molded closed cell, integral-skinned neoprene of profile and hardness required to maintain watertight seal; complying with ASTM C509, Type II; black.

D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Manufacturers of Lock-Strip Gaskets:

- a. Cadillac Rubber & Plastics, Inc.
- b. Maloney Precision Products Co.
- c. The Standard Products Co.

2. Manufacturers of Preformed Gaskets:

- a. D.S. Brown Co.
- b. Maloney Precision Products Co.
- c. Tremco.

2.09 MISCELLANEOUS GLAZING MATERIALS

- A. Compatibility: Provide materials with proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness.
- D. Spacers: Neoprene, EPDM or silicone blocks, or continuous extrusions, as required for compatibility with glazing sealant, of size, shape and hardness recommended by glass and sealant manufacturers for application indicated.
- E. Edge Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.
- F. Compressible Filler Rods: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5 to 10 psi compression strength for 25% deflection.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Require Glazier to inspect work of glass framing erector for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system; for existence of minimum required face or edge clearances; and for effective sealing of joinery. Obtain Glazier's written report listing conditions detrimental to performance of glazing work. Do not allow glazing work to proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Pre-Installation Meeting: At Contractor's direction, Glazier, sealant and gasket manufacturers' technical representatives, glass framing erector and other trades whose work affects glass and glazing shall meet at project site to review procedures and time schedule proposed for glazing and coordination with other work.
- B. Clean glazing channels and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.

3.03 GLAZING, GENERAL

- A. Comply with combined printed recommendations of glass manufacturers, of manufacturers of sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing standards.
- B. Glazing channel dimensions as indicated in details are intended to provide for necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by job conditions at time of installation.
- C. Protect glass from edge damage during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.

- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by proconstruction sealant-substrate testing.

3.04 GLAZING

- A. Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but with edge nearest corner not closer than 6 inches from corner unless otherwise required. Set blocks in thin course of sealant which is acceptable for heel bead use.
- B. Provide spacers inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50 united inches (length plus height), except where gaskets or glazing tapes with continuous spacer rods are used for glazing. Provide 1/8 inch minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.
- C. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.
- D. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.
- E. Provide compressible filler rods or equivalent back-up material, as recommended by sealant and glass manufacturers, to prevent sealant from extruding into glass channel weep systems and from adhering to joints back surface as well as to control depth of sealant for optimum performance, unless otherwise indicated.
- F. Force sealants into glazing channels to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.
- G. Tool exposed surfaces of sealants to provide a substantial "wash" away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel, so as to eliminate dirt and moisture pockets.
- H. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when installation is subjected to movement. Miter-cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent pull away at corners; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

- I. Lock-Strip Gasket Glazing: Comply with ASTM C716 and gasket manufacturer's printed recommendations. Provide supplementary wet seal and weep system unless otherwise indicated.

3.05 PROTECTION AND CLEANING:

- A. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.
- D. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.
- E. Wash glass on both faces not more than 4 days before date scheduled for inspections intended to establish date of substantial completion in each area of project. Wash glass by method recommended by glass manufacturer.

END OF SECTION

SECTION 08910
METAL WALL LOUVERS

PART 1 GENERAL

1.01 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

- A. Air Movement and Control Association International (AMCA)
 - 1. AMCA 500-D—(1998) Laboratory Methods of Testing Dampers for Rating
 - 2. AMCA 511—(1999; R 2004) Certified Ratings Program for Air Control Devices
- B. American Architectural Manufacturers Association (AAMA)
 - 1. AAMA 2603—(2002) Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
- C. ASTM International (ASTM)
 - 1. ASTM B 221—(2006) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

1.02 SUBMITTALS

- A. Shop Drawings
 - 1. Wall louvers
- B. Product Data
 - 1. Metal Wall Louvers
- C. Samples
 - 1. Wall louver colors

1.03 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver materials to the site in an undamaged condition. Carefully store materials off the ground to provide proper ventilation, drainage, and protection against dampness. Louvers shall be free from nicks, scratches, and blemishes. Replace defective or damaged materials with new.

1.04 DETAIL DRAWINGS

- A. Show all information necessary for fabrication and installation of wall louvers. Indicate materials, sizes, thicknesses, fastenings, and profiles.

1.05 COLOR SAMPLES

- A. Colors of finishes for wall louvers shall closely approximate colors indicated. Where color is not indicated, submit the manufacturer's standard wall louver colors to the Engineer for selection.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Extruded Aluminum
 - 1. ASTM B 221, alloy 6063-T5 or -T52.

2.02 METAL WALL LOUVERS

- A. Weather-resistant type, with bird screens and made to withstand a wind load indicated on contract drawings. Wall louvers shall bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D and AMCA 511. The rating shall show a water penetration of 0.20 or less ounce per square foot of free area at a free velocity of 800 feet per minute.
 - 1. Extruded Aluminum Louvers: Fabricated of extruded 6063-T5 or -T52 aluminum with a wall thickness of not less than 0.081 inch.
 - 2. Mullions and Mullion Covers: Same material and finish as louvers. Provide mullions where indicated. Provide mullions covers on both faces of joints between louvers.

2.03 FASTENERS AND ACCESSORIES

- A. Provide stainless steel screws and fasteners for aluminum louvers. Provide other accessories as required for complete and proper installation.

2.04 FINISHES

A. Aluminum

- 1. Provide factory-applied organic coating.
 - a. Organic Coating
 - (1) Clean and prime exposed aluminum surfaces and apply a baked enamel finish conforming to AAMA 2603, 0.8-mil minimum dry film thickness, color to match roofing, basis of design: Firestone UNA-CLAD.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Wall Louvers: Install using stops or moldings, flanges, strap anchors, or jamb fasteners as appropriate for the wall construction and in accordance with manufacturer's recommendations.

3.02 PROTECTION FROM CONTACT OF DISSIMILAR MATERIALS

- A. Copper or Copper-Bearing Alloys: Paint copper or copper-bearing alloys in contact with dissimilar metal with heavy-bodied bituminous paint or separate with inert membrane.
- B. Aluminum: Where aluminum contacts metal other than zinc, paint the dissimilar metal with a primer and two coats of aluminum paint.
- C. Metal: Paint metal in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

END OF SECTION

DIVISION 9

FINISHES

SECTION 09260
GYPSUM WALLBOARD SYSTEM

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Work of this Section includes providing gypsum drywall and accessories where shown on the Drawings, as specified in this Section, and as needed for a complete and proper installation.
- B. Documents affecting work of this Section include but are not necessarily limited to General Conditions and Division 1 of these Specifications.

1.02 RELATED WORK

- A. Section 08110, Steel Doors and Frames.
- B. Section 09990, Painting and Coating.

1.03 SUBMITTALS

- A. The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance.
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - 3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C645—Standard Specification for Nonstructural Steel Framing Members.
- B. Federal Specifications (FS)
 - 1. FS QQ-S-775—Sheet Metal.
 - 2. SS-L-30D—Gypsum Board.
- C. Gypsum Association (GA)
 - 1. GA-214—Recommended Levels of Gypsum Board Finish.
 - 2. GA-505—Glossary of Gypsum Board Terminology.

1.06 QUALITY ASSURANCE

- A. The Contractor shall use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
 - 1. Gypsum board terminology standard: GA-505 by Gypsum Association.
 - 2. Comply with *Gypsum Construction Handbook*, published by U.S. Gypsum Co.
 - 3. Single-source responsibility: Obtain gypsum board products from a single manufacturer of gypsum boards.
- B. Environmental requirements, general: Comply with requirements of referenced gypsum board application standards and recommendations of gypsum board manufacturer for environmental conditions before, during, and after application of gypsum board.
- C. Cold weather-protection: When ambient outdoor temperatures are below 55°F (13°C) maintain continuous uniform, comfortable building working temperatures of not less than 55°F (13°C) for a minimum period of 48 hours before, during, and after application of gypsum board and joint treatment materials or bonding of adhesives.
- D. Ventilation: Ventilate building spaces as required to remove water in excess of that required for drying of joint treatment material immediately after the material is applied. Avoid drafts during dry, hot weather to prevent too rapid drying.

1.07 WARRANTIES

- A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Specification Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storage and protection of the items specified in this Section.
- B. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- C. Store materials inside under cover and in manner to keep them dry and protected from weather, direct sunlight, surface contamination, corrosion, and damage from construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.
- D. Handle gypsum boards to prevent damage to edges, ends, or surfaces. Protect metal corner beads and trim from being bent or damaged.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MOCK-UP (NOT USED)

1.12 PROJECT REQUIREMENTS (NOT USED)

PART 2 PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Provide gypsum wallboard complying with Fed. Spec. SS-L-30D, in 48-inch widths and in such lengths as will result in a minimum of joints.
 - 2. Provide Glass-Mat, Moisture-Resistant Gypsum Wall Panels: ASTM C1177; ASTM D3273, panel score of 10; 5/8-inch thick..

3. Fire-retardant wallboard: Provide type III, grade X, class 1, 5/8-inch thick, or as indicated on the Drawings. Coordinate with the requirements of fire-rated assemblies.
 4. Gypsum wallboard basis of design: U.S. Gypsum Products, Sheetrock Brand Glass-Mat Panels Mold Tough Firecode X.
- B. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
1. Metal support materials:
 - a. Allied Structural Industries
 - b. Gold Bond Building Products Div., National Gypsum Co.
 - c. Milcor Division; Intryco Inc.
 - d. United States Gypsum Co.
 2. Gypsum board and related products:
 - a. Flintkote Products, Genstar Building Materials Co.
 - b. Georgia-Pacific Corp.
 - c. Gold Bond Building Products Div., National Gypsum Co.
 - d. United States Gypsum Co.
 - e. Fry Reglet Corporation
 - f. Superior Metal Trim; Delta Star, Inc.

2.02 METAL TRIM

- A. Form from zinc-coated steel not lighter than 26 gauge, complying with Fed. Spec. QQ-S-775, type 1, class d or e.
- B. Casing beads:
1. Provide channel-shapes with an exposed wing and with a concealed wing not less than 7/8-inch wide.
 2. The exposed wing shall be covered with joint compound and joint reinforcement suitable for the installation.
- C. Corner beads: Provide angle shapes with wings not less than 7/8-inch wide and perforated for nailing and joint treatment, or with combination metal and paper bonded together, not less than 1-1/4 inches wide and suitable for joint treatment.

2.03 JOINTING SYSTEM

- A. Provide a jointing system, including reinforcing tape and compound, designed as a system to be used together and as recommended for this use by the manufacturer of the gypsum wallboard approved for use on this Work. Do not use paper tape.
- B. Jointing compound may be used for finishing if recommended as such by its manufacturer.

2.04 FASTENING DEVICES

- A. For fastening gypsum wallboard in place on metal studs and metal channels, use flat-head screws, shouldered, specially designed for use with power-driven tools, not less than 1 inch long, with self-tapping threads and self-drilling points.

2.05 METAL STUDS, OTHER FURRING MEMBERS

- A. Studs: ASTM C645; 0.0179-inches minimum thickness of base metal unless otherwise indicated, depth of section as shown on Drawings.
- B. Runners: Match studs; type recommended by stud manufacturer for support of studs, ceilings, and abutment of drywall work at other work.
- C. Furring Channels: Hat-shaped sections, 25-gauge, galvanized steel; 7/8-inches high x 2-9/16 inches, as manufactured by U.S. Gypsum Co.

2.06 OTHER MATERIALS

- A. Provide other materials not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 EXECUTION

3.01 INSTALLATION OF METAL STUDS, FURRING

- A. Accurately lay out partition and bulkhead lines from the dimensions shown on the Drawings.
- B. Install metal studs, furring, and accessories in strict accordance with the manufacturer's recommendations as approved by the Engineer, anchoring all components firmly into position.

- C. Align partition and bulkhead assemblies to a tolerance of 1 in 200 horizontally and 1 in 500 vertically.
- D. Coordination:
 - 1. Space as required for compliance with pertinent regulations to give proper support for the covering material and as indicated on the Drawings.
 - 2. Coordinate and provide required backing and other support for items to be mounted on the finished covering.
- E. Anchor studs and furring members in accordance with the manufacturer's recommendations.

3.02 INSTALLATION OF WALLBOARD

- A. General.
 - 1. Install the gypsum wallboard in accordance with the Drawings and with the separate boards in moderate contact but not forced into place.
 - 2. At internal and external comers, conceal the cut edges of the boards by the overlapping covered edges of the abutting boards.
 - 3. Stagger the boards so that corners of any four boards will not meet at a common point except in vertical corners.
- B. Attaching:
 - 1. Drive screws, with clutch-controlled power screwdrivers, spacing the screws 12 inches on centers at ceilings and 16 inches on centers at walls and bulkheads.

3.03 JOINT TREATMENT

- A. General:
 - 1. Inspect areas to be joint treated, verifying that the gypsum wallboard fits snugly against supporting framework.
 - 2. In areas where joint treatment and compound finishing will be performed, maintain a temperature of not less than 55° for 24 hours before beginning the treatment and until joint and finishing compounds have dried.

3. Apply the joint treatment and finishing compound by machine or hand tool.
4. Provide a minimum drying time of 24 hours between coats, with additional drying time in poorly ventilated areas.

B. Embedding compounds:

1. Apply to gypsum wallboard joints and fastener heads in a thin uniform layer.
2. Spread the compound not less than 3 inches wide at joints, center the reinforcing tape in the joint, and embed the tape in the compound. Then spread a thin layer of compound over the tape.
3. After this treatment has dried, apply a second coat of embedding compound to joints and fastener heads, spreading in a thin uniform coat to not less than 6 inches wide at joints and feather edged.
4. Sandpaper between coats as required.
5. When the embedding compound is thoroughly dry, sandpaper it to eliminate ridges and high points.

C. Finishing compounds:

1. After the embedding compound is thoroughly dry and has been completely sanded, apply a coat of finishing compound to joints and fastener heads.
2. Feather the finishing compound to not less than 12 inches wide.
3. When the finishing compound is thoroughly dry, sandpaper it to obtain a uniformly smooth surface, taking care to not scuff the paper surface of the wallboard. Achieve a Level 4 finish as specified in GA-214.

3.04 CORNER TREATMENT

A. Internal comers: Treat as specified for joints, except fold the reinforcing tape lengthwise through the middle and fit neatly into the corner.

B. External corners

1. Install the specified corner head, fitting neatly over the corner and securing with the same type fasteners used for installing the wallboard.

2. Space the fasteners approximately 6 inches on centers and drive through the wallboard into the framing or furring member.
3. After the corner bead has been secured into position, treat the corner with joint compound and reinforcing tape as specified for joints, feathering the joint compound out from 8 inches to 10 inches on each side of the corner.

3.05 CLEANING UP

- A. In addition to other requirements for cleaning, use necessary care to prevent scattering gypsum wallboard scraps and dust and to prevent tracking gypsum and joint finishing compound onto floor surfaces.
- B. At the completion of each segment of installation in a room or space, promptly pick up and remove from the working area all scrap, debris, and surplus material of this Section.

END OF SECTION

SECTION 09511
ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section includes ceilings consisting of acoustical panels and exposed suspension systems.

1.02 RELATED WORK

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

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

- A. Product Data: For each type of product specified.
- B. Samples for Verification: Full-size units of each type of ceiling assembly indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.
 - 1. 6-inch-square samples of each acoustical panel type, pattern, and color.
 - 2. Set of 12-inch-long samples of exposed suspension system members, including moldings, for each color and system type required.

1.04 WORK SEQUENCE

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. ASTM International (ASTM)

1. ASTM A641—Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A653—Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM C635—Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay in Panel Ceilings.
4. ASTM C636—Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
5. ASTM C834—Standard Specification for Latex Sealants.
6. ASTM E84—Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM E90—Standard Specification for Loadbearing Concrete Masonry Units.
8. ASTM E119—Standard Test Methods for Fire Tests of Building Construction and Materials.
9. ASTM E795—Standard Practices for Mounting Test Specimens During Sound Absorption Tests.
10. ASTM E1264—Standard Classification for Acoustical Ceiling Products.

B. Ceilings & Interior Systems Construction Association (CISCA)

1. CISCA Ceiling Systems Handbook.

C. Intertek/Warnock Hersey (ITS/WH)

1. Directory of Listed Products.

D. National Association of Architectural Metal Manufacturers (NAAMM)

1. Metal Finishes Manual for Architectural and Metal Products.

E. Underwriters Laboratories (UL)

1. UL Fire Resistance Directory.

F. Uniform Building Code (UBC)

1. UBC Standard 25-2—Metal Suspension Systems for Acoustical Tile and for Lay-In Panel Ceilings.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations for Ceiling Units: Obtain each acoustical ceiling panel from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- C. Source Limitations for Suspension System: Obtain each suspension system from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
 - 1. Obtain both acoustical ceiling panels and suspension system from the same manufacturer.
- D. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 - 1. Fire-response tests were performed by UL, ITS/Warnock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
 - 2. Surface-burning characteristics of acoustical panels comply with ASTM E1264 for Class A materials as determined by testing identical products per ASTM E84.
 - 3. Fire-resistance-rated assemblies, which are indicated by design designations from UL's "Fire Resistance Directory," from ITS/Warnock Hersey's "Directory of Listed Products," or from the listings of another testing and inspecting agency, are identical in materials and construction to those tested per ASTM E119.
 - 4. Products are identified with appropriate markings of applicable testing and inspecting agency.

1.07 WARRANTIES (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.
- B. Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- C. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- D. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MOCK-UP (NOT USED)

1.12 PROJECT REQUIREMENTS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.13 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size units equal to 2.0% of amount installed.
 - 2. Suspension System Components: Quantity of each exposed component equal to 2.0% of amount installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated for each designation in the Acoustical Panel Ceiling Schedule at the end of Part 3.
- B. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Acoustical Panel Ceiling Schedule at the end of Part 3.

2.02 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING, ACT-1

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the following:
 - 1. USG Interiors, Inc. (800-USG4YOU, www.usg.com). MARS Clima Plus, SLT.
- B. Classification: Provide panels complying with ASTM E 1264 for type and form as follows:
 - 1. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 1, nodular; with washable vinyl-film overlay.
- C. Color: White.
- D. LR: Not less than 0.75.
- E. NRC: Not less than 0.70, Type E-400 mounting per ASTM E 795.
- F. CAC: Not less than 35.
- G. Edge/Joint Detail: Reveal sized to fit flange of exposed suspension system members.
- H. Thickness: 3/4 inch.
- I. Modular Size: 24 by 24 inches.

2.03 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING, ACT-2

- A. Basis of Design Product: Subject to compliance with requirements, provide the following:
1. USG Interiors Inc – (800-USG4YOU, www.usg.com) – SHEETROCK Brand Lay-In Ceiling Tile ClimaPlus, Vinyl.
- B. Classification: Provide panels complying with ASTM E1264 for type and form as follows:
1. Type and Form: Type XX, other types; described as high-density, ceramic- and mineral-base panels with scrubbable finish, resistant to heat, moisture, and corrosive fumes.
 2. Color: White.
 3. LR: Not less than 0.75.
 4. NRC: Not less than 0.50, Type E-400 mounting per ASTM E795.
 5. Edge/Joint Detail: Square.
 6. Thickness: 1/2 inch.

2.04 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C635 requirements.
- B. Metal Suspension System Characteristics: Comply with requirements indicated in the Acoustical Panel Ceiling Schedule at the end of Part 3.
- C. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
- D. Attachment Devices: Size for five times design load indicated in ASTM C635, Table 1, Direct Hung, unless otherwise indicated.
- E. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated Carbon-Steel Wire: ASTM A641, Class 1 zinc coating, soft temper.
 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.
- F. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

2.05 ACOUSTICAL SEALANT

- A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C834 and the following requirements:
1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
- B. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. PL Acoustical Sealant; Chemrex, Inc., Contech Brands.
 - b. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
 - c. SHEETROCK Acoustical Sealant; United States Gypsum Co.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and other conditions affecting performance of acoustical panel ceilings.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.03 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 - 1. Standard for Ceiling Suspension System Installations: Comply with ASTM C636.
 - 2. UBC's "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings": UBC Standard 25-2.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 4. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 - 5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to

structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

6. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches from ends of each member.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. Install panels in a basket-weave pattern.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
 3. Paint cut panel edges remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

4. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.04 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.05 ACOUSTICAL PANEL CEILING SCHEDULE

- A. Nodular, Cast or Molded, Mineral-Base Acoustical Panels for Acoustical Panel Ceiling: Where this designation is indicated, provide fire-resistance-rated acoustical panels complying with the following:
 1. Products: Available products include the following:
 - a. Armstrong "Fireguard" 24-inch-x-24-inch Tegular Fissured Pattern No. 705A or Designer Pattern No. 737.
 2. Classification: Panels fitting ASTM E1264 for type and form as follows:
 - a. Type III, mineral base with painted finish; Form 1, nodular. Form 4, cast or molded.
 3. Color: White.
 4. Light Reflectance Coefficient: Not less than LR 0.60.
 5. Noise Reduction Coefficient: NRC 0.55.
 6. Ceiling Attenuation Class: Not less than CAC 25.
 7. Edge Detail: Square.
 8. Thickness: 3/4 inch.
 9. Size: 24 by 24 inches.

- B. Suspension System for Acoustical Panel Ceiling: Where this designation is indicated, provide fire-resistance-rated acoustical panel ceiling suspension system complying with the following.
- C. Suspension System Available Products:
1. USG Interiors, Inc. DONN Ceiling Grid or equal.
 2. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A653, G01 coating designation, with prefinished 15/16-inch wide metal caps on flanges; other characteristics as follows:
 - a. Structural Classification: Intermediate-duty system.
 - b. End Condition of Cross Runners: Override (stepped) or butt-edge type, as standard with manufacturer.
 - c. Face Design: Flush face.
 - d. Cap Material: Steel or aluminum sheet as standard with manufacturer.
 - e. Cap Finish: Painted white.

END OF SECTION

SECTION 09651
RESILIENT TILE FLOORING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section includes the following:
 - 1. Vinyl composition floor tile.
 - 2. Resilient wall base and accessories.

1.02 RELATED WORK

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

1.03 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors and patterns available for each type of product indicated.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

- A. ASTM International (ASTM)
 - 1. ASTM E648—Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
 - 2. ASTM E662—Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

3. ASTM F710—Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
4. ASTM F1066—Standard Specification for Vinyl Composition Floor Tile.

B. Federal Specifications (FS)

1. FS SS-W-40—Wall Base: Rubber and Vinyl Plastic.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
 1. Critical Radiant Flux: 0.45 W/square cm or greater when tested per ASTM E648.
 2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E662.

1.07 WARRANTIES (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50°F and 90°F.
- C. Store tiles on flat surfaces.

- D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MOCK-UP (NOT USED)

1.12 PROJECT REQUIREMENTS

- A. Maintain a temperature of not less than 70°F or more than 95°F in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After post-installation period, maintain a temperature of not less than 55°F or more than 95°F.
- B. Do not install products until they are at the same temperature as the space where they are to be installed.
- C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.
- D. Install tiles and accessories after other finishing operations, including painting, have been completed.
- E. Where demountable partitions and other items are indicated for installation on top of resilient tile flooring, install tile before these items are installed.
- F. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

1.13 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Furnish not less than one box for each 50 boxes or fraction thereof, of each type, color, pattern, class, wearing surface, and size of resilient tile flooring installed.

2. Furnish not less than 10 linear feet for each 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient accessory installed.
3. Deliver extra materials to Owner.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Manufacturers of Vinyl Composition Tile:
 - a. Amtico Flooring Div., American Biltrite Inc.
 - b. Armstrong World Industries, Inc.
 - c. Azrock Floor Products Div., Azrock Industries, Inc.
 - d. Kentile Floors, Inc.
 - e. Tarkett Inc.
2. Manufacturers of Vinyl Wall Base:
 - a. Armstrong World Industries, Inc.
 - b. Azrock Floor Products Div., Azrock Industries, Inc.
 - c. Flexco Div., Textile Rubber Co.
 - d. Johnson Rubber Co., Inc.
 - e. Kentile Floors, Inc.
 - f. Mercer Plastics Co., Inc.
 - g. Vinyl Plastics, Inc.

2.02 RESILIENT TILE

- A. Vinyl Composition Floor Tile: Products complying with ASTM F1066 and with requirements specified in the Resilient Tile Flooring Schedule.

2.03 RESILIENT ACCESSORIES

- A. Vinyl Wall Base: Products complying with FS SS-W-40, Type II and with requirements specified in the Resilient Tile Flooring Schedule.\

2.04 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
- C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of tiles, and in maximum available lengths to minimize running joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Section 03300, Cast-in-Place Concrete, for slabs receiving resilient flooring.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.03 TILE INSTALLATION

- A. General: Comply with tile manufacturer's written installation instructions.
- B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.
 - 1. Lay tiles square with room axis, unless otherwise indicated.
 - 2. Lay tiles at a 45-degree angle with room axis, unless otherwise indicated.
- C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles in basket-weave pattern with grain direction alternating in adjacent tiles.
- D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- E. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.
- G. Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.

- H. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
 - 1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Hand roll tiles according to tile manufacturer's written instructions.

3.04 RESILIENT ACCESSORY INSTALLATION

- A. General: Install resilient accessories according to manufacturer's written installation instructions.
- B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
 - 1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
 - 2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
 - 3. Do not stretch base during installation.
 - 4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
 - 5. Install premolded outside and inside corners before installing straight pieces.
 - 6. Form outside corners on job from straight pieces of maximum lengths possible, without whitening at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
 - 7. Form inside corners on job, from straight pieces of maximum lengths possible, by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

3.05 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing resilient products:
 - 1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
 - 2. Sweep or vacuum floor thoroughly.
 - 3. Do not wash floor until after time period recommended by flooring manufacturer.
 - 4. Damp-mop floor to remove marks and soil.
- B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.
 - 1. Apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.
 - a. Use commercially available product acceptable to flooring manufacturer.
 - b. Coordinate selection of floor polish with Owner's maintenance service.
 - 2. Cover products installed on floor surfaces with undyed, untreated building paper until Final Inspection.
 - 3. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.
- C. Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish date of Final Acceptance. Clean products according to manufacturer's written recommendations.
 - 1. Before cleaning, strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer.

2. After cleaning, reapply polish to floor surfaces to restore protective floor finish according to flooring manufacturer's written recommendations. Coordinate with Owner's maintenance program.

3.06 RESILIENT TILE FLOORING SCHEDULE

- A. Vinyl Composition Tile: Where this designation is indicated, provide vinyl composition floor tile complying with the following:
 1. Color and Pattern: As selected by Architect from manufacturer's full range of colors and patterns produced for tile complying with requirements indicated.
 2. Class: Class 1 (solid-color tile).
 3. Wearing Surface: Smooth.
 4. Thickness: 1/8 inch.
 5. Size: 12 by 12 inches.
- B. Vinyl Wall Base: Where this designation is indicated, provide vinyl wall base complying with the following:
 1. Color and Pattern: As selected by Architect from manufacturer's full range of colors and patterns produced for vinyl wall base complying with requirements indicated.
 2. Style: Cove with top-set toe.
 3. Minimum Thickness: 1/8 inch.
 4. Height: 4 inches.
 5. Lengths: Cut lengths 48 inches long or coils in lengths standard with manufacturer, but not less than 96 feet.
 6. Outside Corners: Premolded or formed on job.

7. Inside Corners: Premolded or formed on job.
8. Surface: Smooth.

END OF SECTION

SECTION 09670
SEAMLESS FLOORING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment, and incidentals required and install seamless flooring, base, and containment wall coatings, all as shown, as scheduled and as specified in the Section.

1.02 RELATED WORK

- A. Section 07900, Joint Fillers, Sealants, and Caulking.

1.03 SUBMITTALS

- A. The Contractor shall submit shop drawings in accordance with the Contract Documents.
- B. The Contractor shall submit to the Engineer copies of all materials required to establish compliance with this section. Submittals shall include at least the following:
 - 1. Complete shop drawings including materials specifications and properties, chemical resistance data, and complete methods of surface preparation and materials installation and finishing.
 - 2. Three 6-inch-by-6-inch samples of seamless flooring in color with top dressing cut back. Resubmit until approved. No work on site will be allowed until construction methods are approved and samples approved as to color and finish. All materials to be used shall conform to approved samples in all respects.
 - 3. Copies as required of the manufacturer's detailed maintenance requirements and repair criteria.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a

part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Society for Testing and Materials (ASTM)

1. ASTM C109—Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or 50-mm Cube Specimens).
2. ASTM C241—Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.
3. ASTM D2240—Standard Test Method for Rubber Property-Durometer Hardness.
4. ASTM D695—Standard Test Method for Compressive Properties of Rigid Plastics.
5. ASTM D790—Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
6. ASTM D1308—Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
7. ASTM D2794—Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

B. American Concrete Institute (ACI)

1. ACI403—Concrete.

C. Department of Navy - Military Standardization Document (MIL)

1. MIL-D-3134—Deck Covering Materials.

1.06 QUALITY ASSURANCE

- A. Maintain 60°F minimum temperature on the actual surfaces to receive flooring and top dressing systems for 48 hours before, during, and for 72 hours after installation.
- B. After sample approval and before the flooring work is allowed to proceed, the Contractor shall construct a mock-up unit at the site, where directed, of seamless flooring. An area of finished slab may be allowed for mock-ups. Modify and/or reconstruct the mock-up units until approved. The approved units shall become the standard of acceptance for the seamless flooring work on the Project. The mock-up units shall remain on-site for the duration of work. Remove and dispose of the units when directed if they are not allowed to be part of the finished work.
- C. Construct 4-foot-by-4-foot mock-up with integral bases and colors as directed and on an approved substrate.

- D. Application of materials to the mock-up substrate shall use the methods, materials, and color proposed for the Project. Approval will be for colors, surface texture, and finished overall appearance.

1.07 WARRANTIES

- A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and the Contract Documents.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall adhere to the requirements specified in the Contract Documents for storing and protecting the items specified in this Section.
- B. Deliver materials to the project site in manufacturer's original unopened containers with seals unbroken and labels and hallmarks intact. Protect materials from weather and stored under cover in accordance with manufacturer's printed instructions.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MOCK-UP (NOT USED)

1.12 PROJECT REQUIREMENTS (NOT USED)

PART 2 PRODUCTS

2.01 MATERIALS

- A. Seamless flooring shall be a two-component, Novolac-based-epoxy resin formulation.
 - 1. Floor areas shall consist of a 1/4-inch-thick system of Dexotex Chem-Rez N by Crossfield Products Co., with an integral coved base and a top dressing of Dexotex Posi-Tred CR, in the texture selected by the Engineer, or equal product by Fuller/Dur-A-Flex, Inc. Color shall be standard integral color and shall be approved by the Engineer. Provide one color as selected.
 - 2. The floor curbs and bases and walls of the containment area and equipment pads shall receive an epoxy bond coat primer and two coats of Cheminert H, smooth-texture top dressing.

3. Novolac-based-epoxy system with same chemical resistance by Selby, equal products by Dur-A-Flex, Inc. or equal will be considered for approval.
- B. Divider strips shall be 18-gauge zinc angle strips. The strips shall be attached to the concrete subfloor with the manufacturer's recommended adhesive not less than 8 hours before the primer is applied. Strips shall be designed to be concealed in the flooring thickness.
 - C. Slip-resistance to the approved sample texture shall be provided on all seamless flooring surfaces subject to foot traffic.
 - D. Substrate patching and priming compound shall be as recommended by the seamless flooring manufacturer and approved by the Engineer.
 - E. The colored resin/cement matrix when mixed with the approved aggregate and installed according to these Specifications and the manufacturer's instructions shall equal the following test results as set forth by Crossfield Products Corp:

Dextex Chem-Rez N Flooring

<u>Property</u>	<u>Test</u>	<u>Requirements</u>
Compressive Strength	ASTM D695	8,740 psi
Bond Strength	ACI403	400 psi (100% concrete failure)
Flexural Strength	ASTM D790	8,370 psi
Water Absorption	MIL-D-3134	0% (7 days immersion)
Impact Resistance	ASTM D2794	Direct—50-in lb Reverse—15-in lb
Hardness	ASTM D2240 85 (Shore D)	

- F. The installed and finished floor, cove base, and top dressing systems shall be chemically resistant in two specific categories:
 1. Process chemical resistant.
 2. Resistant to miscellaneous chemicals.
- G. Process Chemical Resistance
 1. Floor and base material for the project shall withstand the process chemicals listed below with no chemical attack or appearance change, as

determined by the Engineer. The type of exposure to these chemicals shall involve the puddling of 2 ounces of the listed process chemicals at the concentrations and temperatures given. Repeat this procedure daily for 72 hours without washing the sample.

2. This criterion is intended to simulate service conditions, radical spillage, and pump and pipe leakage in the areas where the flooring is to be applied for the life of the installation.
3. Process chemicals for this project are as follows:

<u>Chemical</u>	<u>Maximum Concentration</u>	<u>Temperature</u>
Sodium Hypochlorite	16%	Ambient
Sodium Hydroxide	50%	Ambient
Aluminum Sulfate	50%	Ambient
Ferric Chloride	45%	Ambient
Sodium Bisulfite	45%	Ambient
Polymer	~	Ambient

H. Miscellaneous Chemical Resistance

1. Floor and base material shall withstand degradation from all petroleum products used in plant operation and the reagents numbered 6.1.1 through 6.1.14 in ASTM D1308 with no chemical attack or appearance change as determined by the Engineer when spot tested, as in ASTM D1308.
2. These criteria are intended to simulate chemical contact encountered in the normal occupancy by the Owner's personnel.

- I. The Engineer may order any or all of the above to be tested for compliance on representative floor and base materials or on the mock-up unit or test floor at no additional cost to the Owner.

PART 3 EXECUTION

3.01 INSTALLATION

- A. In areas scheduled to receive flooring, all other work, except painting, shall be completed before work of this Section may be started.
- B. Concrete shall have been cured for 28 days minimum before the materials are applied. Inspect all surfaces to receive materials described in this Section. It shall be the responsibility of the Contractor to provide substrates acceptable for proper application of materials.

- C. Prepare substrates as required by manufacturer. Use particular care to remove laitance, grease, oil, bonding compounds, and foreign materials in the preparation of surfaces. Abrasive blast horizontal and vertical concrete to receive materials to open air holes and depressions. Dispose of residue by vacuum pickup, containerizing and removing from site, all as approved.
- D. Chipping of concrete required to remove embedded oil and grease and subsequent patching with an approved compound is included in the work of this Section. Only a compound compatible with the flooring to be used will be allowed for patching.
- E. Test substrates for moisture content and adhesion capabilities. Report to the Engineer, as specified above, surfaces not acceptable for flooring.
- F. Failure to notify the Engineer is construed as Contractor acceptance of the substrate as being satisfactory for the proper application of the materials.
- G. Before priming, install the divider strips where required with an approved adhesive, all as approved.
- H. Installation of epoxy resin cement seamless material shall be generally as follows but as approved under Submittals above:
 - 1. Substrate surfaces shall be prepared as specified above.
 - 2. Prime by applying an epoxy bond coat with brush or trowel.
 - 3. Trowel-apply 1/4-inch floor base coat on horizontal surfaces. Form cove at walls where base occurs. Above the cove, start feathering trowel coat to form smooth transition to wall surface.
 - 4. Mix and trowel apply the first coat of top dressing to grout and fill base coat and allow to dry.
 - 5. Trowel apply the second coat of top dressing, add slip-resistant aggregate by trowel or broadcasting, and stipple with a roller to provide the slip-resistant texture and 25- to 30-mil dry film thickness, all as approved.
- I. Installation of epoxy resin cement seamless material for curbs and bases and walls of the containment area and on equipment pads shall be generally as follows but as approved under Submittals above:

1. Surfaces shall be acid etched with 10% muriatic acid as required by the manufacturer to remove laitance, grease, bond-inhibiting concrete curing sealers, and other foreign matter.
2. Prime by applying an epoxy bond coat with brush or trowel.
3. Mix and trowel apply the first coat of top dressing and allow to dry.
4. Trowel apply the second coat of top dressing. Thickness shall be 25- to 30-mil dry film thickness and shall have a smooth profile.

3.02 INSPECTION AND PROTECTION

- A. The Engineer will inspect all seamless systems areas before the areas are covered as specified below. This inspection will determine only what areas if any require repair or other corrective measures. Passage of this inspection will not constitute acceptance of the work.
- B. Provide non-staining protective construction paper as approved over the entire surface area, with joints taped and with boards or planks placed over where the surface is subjected to especially heavy traffic or hazards. Maintain and replenish the paper as required for proper protection until just before final inspection.

3.03 FINAL CLEANING

- A. Remove and dispose of coverings and clean seamless systems as recommended by the manufacturer when and as directed and as approved.

3.04 TESTING (NOT USED)

END OF SECTION

SECTION 09720
DECORATIVE FIBERGLASS REINFORCED WALL PANELS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Prefinished polyester glass reinforced plastic sheets and adhered to unfinished gypsum wallboard.
- B. Products not furnished or installed under this Section:
 - 1. Gypsum substrate board.
 - 2. Resinous Epoxy Base.

1.02 RELATED SECTIONS

- A. Section 09260, Gypsum Wallboard System.
- B. Section 09670, Resinous Epoxy Base.

1.03 REFERENCES

- A. American Society for Testing and Materials: Standard Specifications (ASTM)
 - 1. ASTM D 256—Izod Impact Strengths (ft #/in)
 - 2. ASTM D 570—Water Absorption (%)
 - 3. ASTM D 638—Tensile Strengths (psi) & Tensile Modulus (psi)
 - 4. ASTM D 790—Flexural Strengths (psi) & Flexural Modulus (psi)
 - 5. ASTM D 2583—Barcol Hardness
 - 6. ASTM D 5319—Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
 - 7. ASTM E 84—Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.

- B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.
- C. Selection Samples: Submit manufacturer's standard color pattern selection samples representing manufacturer's full range of available colors and patterns.
- D. Samples for Verification: Submit appropriate section of panel for each finish selected indicating the color, texture, and pattern required.
 - 1. Submit complete with specified applied finish.
 - 2. For selected patterns show complete pattern repeat.
 - 3. Exposed Molding and Trim: Provide samples of each type, finish, and color.
- E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives, sealants and other pertinent materials.

1.05 QUALITY ASSURANCE

- A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
 - 1. ASTM E 84 (Method of Test for Surface Burning Characteristics of Building Materials)
 - a. Wall Required Rating – Class A.
- B. Sanitary Standards: System components and finishes to comply with:
 - 1. United States Department of Agriculture (USDA) requirements for food preparation facilities, incidental contact.
 - 2. Food and Drug Administration (FDA) 1999 Food Code 6-101.11.
 - 3. Canadian Food Inspection Agency (CFIA) requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials factory packaged on strong pallets.
- B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (70°) for 48 hours prior to installation.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Building are to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work.
- B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
 - 1. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

1.08 WARRANTY

- A. Furnish one year guarantee against defects in material and workmanship.

PART 2 PRODUCTS

2.01 BASIS-OF-DESIGN MANUFACTURER

- A. Marlite; 202 Harger Street, Dover, OH 44622. 800-377-1221 FAX (330) 343-4668 Email: info@marlite.com www.marlite.com.
- B. Product:
 - 1. Symmetrix with Sani-Coat.

2.02 PANELS

- A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
 - 1. Coating: Multi-layer print, primer and finish coats or applied over-layer.
 - 2. Dimensions:
 - a. Thickness: 0.090 inch (2.29 mm) nominal
 - b. Width: 4 feet 0 inch (1.22 m) nominal
 - c. Length: 8 feet 0 inch (2.4 m) nominal

3. Tolerance:

- a. Length and Width: $\pm 1/8$ inch (3.175 mm)
- b. Square: Not to exceed $1/8$ inch for 8-foot (2.4 m) panels or $5/32$ inch (3.96 mm) for 10-foot (2.4 m) panels

B. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.

1. Flexural Strength - 1.0×10^4 psi per ASTM D 790. (7.0 kilogram-force/square millimeter)
2. Flexural Modulus - 3.1×10^5 psi per ASTM D 790. (217.9 kilogram-force/square millimeter)
3. Tensile Strength - 7.0×10^3 psi per ASTM D 638. (4.9 kilogram-force/square millimeter)
4. Tensile Modulus - 1.6×10^5 psi per ASTM D 638. (112.5 kilogram-force/square millimeter)
5. Water Absorption - 0.72% per ASTM D 570.
6. Barcol Hardness (scratch resistance) of 35 55 as per ASTM D 2583.
7. Izod Impact Strength of 72 ft. lbs./in ASTM D 256

C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.

D. Front Finish: In accordance with preapproved sample. Information available from the Architect's Office.

E. Basis-of-Design Color:

1. Marlite Symmetrix with Sani-Coat FRP, C151-G44 White with Everglade.

2.03 MOLDINGS

A. Sanitary Trim: Co-extruded, dual-durometer polypropylene/monprene profiles with high-performance pressure sensitive adhesive.

1. Color: White.

2.04 ACCESSORIES

A. Fasteners: Non-staining nylon drive rivets.

1. Match panel colors.
2. Length to suit project conditions.

B. Adhesive: Construction adhesive complying with ASTM C 557.

C. Sealant:

1. White Silicone Sealant.

PART 3 EXECUTION

3.01 PREPARATION

A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean, and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.

1. Verify that stud spacing does not exceed 24 inches (61 cm) on-center.

B. Repair defects prior to installation.

1. Level wall surfaces to panel manufacturer's requirements. Remove protrusions and fill indentations.

3.02 INSTALLATION

A. Comply with manufacturer's recommended procedures and installation sequence.

B. Cut sheets to meet supports allowing 1/8 inch (3 mm) clearance for every 8 feet (2.4 m) of panel.

1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.

2. Pre-drill fastener holes 1/8 inch (3 mm) oversize with high speed drill bit.

a. Space at 8 inches (200 mm) maximum on center at perimeter, approximately 1 inch from panel edge.

b. Space at in field in rows 16 feet (40.64 cm) on center, with fasteners spaced at 12 inches (30.48 cm) maximum on center.

C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.

1. Install panels with manufacturer's recommended gap for panel field and corner joints.

- a. Adhesive trowel and application method to conform to adhesive manufacturer's recommendations.
 - b. Drive fasteners for snug fit. Do not over-tighten.
- D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.
 - 1. All moldings must provide for a minimum 1/8 inch (3 mm) of panel expansion at joints and edges, to insure proper installation.
 - 2. Apply sealant to all moldings, channels, and joints between the system and different materials to assure watertight installation.

3.03 CLEANING

- A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.
- B. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

END OF SECTION

SECTION 09900
PAINTING AND COATING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section includes materials for and application of painting and coating systems for the following surfaces:
 - 1. Exposed metal.
 - 2. Concrete.
- B. It does not include coating steel water tanks and reservoirs.

1.02 RELATED WORK

- A. Section 03300, Cast-In-Place Concrete.
- B. Section 03360, Concrete Finishes.

1.03 SUBMITTALS

- A. The Contractor shall shop drawings in accordance with Section 01330, Submittals and Acceptance.
- B. Submit manufacturer's data sheets showing the following information:
 - 1. Percent solids by volume.
 - 2. Minimum and maximum recommended dry-film thickness per coat for prime, intermediate, and finish coats.
 - 3. Recommended surface preparation.
 - 4. Recommended thinners.
 - 5. Statement verifying that the specified prime coat is recommended by the manufacturer for use with the specified intermediate and finish coats.
 - 6. Application instructions including recommended equipment and temperature limitations.
 - 7. Curing requirements and instructions.

- C. Submit color swatches.
- D. Submit certificate identifying the type and gradation of abrasives used for surface preparation.
- E. Submit material safety data sheets for each coating.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A780—Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - 2. ASTM C501—Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
 - 3. ASTM D520—Standard Specification for Zinc Dust Pigment.
 - 4. ASTM D522—Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
 - 5. ASTM D1002—Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal).
 - 6. ASTM D2240—Standard Test Method for Rubber Property—Durometer Hardness.
 - 7. ASTM D2697—Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings.
 - 8. ASTM D3734—Standard Specification for High-Flash Aromatic Naphthas.
 - 9. ASTM D4060—Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
 - 10. ASTM D4138—Standard Practices for Measurement of Dry Film Thickness of Protective Coating Systems by Destructive, Cross-Sectioning Means.
 - 11. ASTM D4258—Standard Practice for Surface Cleaning Concrete for Coating.
 - 12. ASTM D4260—Standard Practice for Liquid and Gelled Acid Etching of Concrete.

13. ASTM D4261—Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating.
14. ASTM D4263—Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
15. ASTM D4787—Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates.
16. ASTM D6386—Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
17. ASTM D7091—Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals.
18. ASTM E84—Standard Test Method for Surface Burning Characteristics of Building Materials.

B. National Association of Corrosion Engineers International (NACE)

1. NACE SP0188—Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.

C. Steel Structure Painting Council (SSPC)

1. SSPC PA-2—Measurement of Dry Coating Thickness with Magnetic Gauges.
2. SSPC SP-2—Hand Tool Cleaning.
3. SSPC SP-3—Power Tool Cleaning.
4. SSPC SP-5—White Metal Blast Cleaning.
5. SSPC SP-6—Commercial Blast Cleaning.
6. SSPC SP-7—Brush-Off Blast Cleaning.
7. SSPC SP-10—Near-White Blast Cleaning.

D. U.S. Department of Defense (MIL)

1. MIL-P-21035—Paint High Zinc Dust Content, Galvanizing Repair.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

- A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Specification Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MOCK-UP (NOT USED)

1.12 PROJECT REQUIREMENTS (NOT USED)

PART 2 MATERIALS

2.01 PAINTING AND COATING SYSTEMS

The following index lists the various painting and coating systems by service and generic type unless otherwise noted:

PAINT COATINGS SYSTEM INDEX		
No.	Title	Generic Coating
Exposed Metal Coating Systems		
15.	Exposed Metal, Atmospheric Weathering Environment	Acrylic
16.	NOT USED	
17.	NOT USED	
Concrete and Masonry Coating Systems		
32.	Exposed Concrete and Masonry, Atmospheric Weathering Environment	Acrylic
37.	Exposed Masonry or Concrete, Atmospheric Weathering Environment	Cement-based grouting
38.	NOT USED	
39.	NOT USED	
Coating Systems for Miscellaneous Metals		
55.	Repair of Galvanized Steel Surfaces	Cold galvanizing compound

These systems are specified in detail in the following Paragraphs. For each coating, the required surface preparation, prime coat, intermediate coat (if required), topcoat, and coating thicknesses are described. Mil thicknesses shown are minimum dry-film thicknesses.

A. Exposed Metal Coating Systems

1. System No. 15—Exposed Metal, Atmospheric Weathering and Water Condensation Environment:
 - a. Type: One-component acrylic enamel having a minimum volume solids content of 35% with an acrylic primer.
 - b. Service Conditions: For use on interior and exterior metal and piping subject to sunlight, weathering, and water condensation.
 - c. Surface Preparation: Solvent clean per SSPC-SP1 to remove contaminants from the surface. Abrasive blast to a minimum Commercial Blast Cleaning per SSPC-SP6. SSPC SP-10, Near White Metal Blast Cleaning is preferred.
 - d. Prime Coat: Sherwin-Williams Pro-Cryl Universal Primer, B66-310 Series at 2.0 to 4.0 mils DFT; ICI Devoe Devflex 4020 DTM water-borne primer; Carboline 3358; Tnemec Series 1 (aromatic polyurethane zinc rich). Sherwin-Williams Zinc Clad II Plus primer B69VZ12/B69VZ13/B69D11 at 2.5 to 4.0 mils DFT; ICI Devoe Inorganic Zinc 304V; Carboline 11HS; or equal applied to a minimum dry-film thickness of 3 mils.
 - e. Finish Coats: Two or more coats of Sherwin-Williams Sher-Cryl B66 – 300 Series at 2.5 to 4.0 mils DFT/coat; ICI Devoe Devflex 659; Carboline 3359 DTM; Tnemec Series 1028 (gloss) or Tnemec Series 1029 (semi-gloss); or equal. Apply sufficient coats to provide a total minimum dry-film thickness of 8 mils. Thickness of any individual coat shall not exceed 4 mils.

B. Concrete and Masonry Coating Systems

1. System No. 32—Exposed Concrete and Masonry, Atmospheric Weathering Environment:
 - a. Type: Acrylic enamel or acrylic latex having a minimum volume solids of 36%.
 - b. Service Conditions: Exposed concrete or masonry exposed to normal sunlight and weathering.
 - c. Surface Preparation: In accordance with Part 3.04.

- d. Prime Coat: Water-borne acrylic or cementitious acrylic emulsion having a minimum solids volume of 40%. Apply one coat of Carboline "Flexide" Masonry Block Filler to fill all voids, pores, and cracks; ICI Devoe Bloxfill 4000; Amerlock 400 BF; Tnemec 54-562 Masonry Filler single component epoxy; International Intercryl 320WB; Sherwin-Williams Heavy Duty Block Filler B42W46 at 10.0 to 18.0 mils DFT; PPG SPEEDHIDE® Int/Ext Acrylic Masonry Block Filler 6-15; or equal.
 - e. Finish Coat: Two coats of Carboline 3350, two coats of ICI Devoe 4208; two coats of Ameron 220; two coats Tnemec Series 6 at 2.0 to 3.0 mils per coat; two coats of International Intercryl 530WB 520; Sherwin-Williams Metalatex Semi-Gloss B42 series at 2.0 to 4.0 mils DFT/coat; two coats of PPG Int/Ext Semi-Gloss Acrylic Metal Finish 7-374 Series; or equal. Apply to a thickness of 2 mils per coat.
2. System No. 37—Exposed Masonry or Concrete, Atmospheric Weathering Environment:
- a. Type: Cement-base waterproofing grouting for concrete and masonry.
 - b. Service Conditions: For use in waterproofing concrete, block, brick, stone, and other masonry.
 - c. Surface Preparation: In accordance with Part 3.04. Dampen surface immediately ahead of application with clean water. Follow manufacturer's instructions on mixing and application.
 - d. Coatings: Apply two or more coats of Bonsal Sure-Coat to minimum total thickness of 1/16 inch or evenly distribute a base coat of Thoro Systems Products "Thorseal" or equal, minimum 2 pounds per square yard. Then apply another coat at 2 pounds per square yard for a total of 4 pounds per square yard. Sherwin Williams SherCrete Waterproof Coat.
3. System No. 55—Repair of Galvanized Steel Surfaces:
- a. Type: Cold galvanizing compound consisting of paint containing oils, solvents, and zinc dust and complying with MIL-P-21035. Minimum metallic zinc content in the cured coating shall be 90%.

- b. Service Conditions: Repair of damaged galvanized coatings on steel surfaces.
- c. Surface Preparation: Clean damaged surfaces in accordance with SSPC SP-1, Solvent Cleaning and SP-11, Power Tool Cleaning to Bare Metal.
- d. Coating System: Apply Z.R.C. Galvanizing Compound; RAMCO Specialty Products "Zinckit"; NuWave "Galv-Match-Plus"; Devcon "Cold Galvanizing"; Clearco "Cold Galvanizing Spray"; Tnemec Series 90-1K97; or equal; to a minimum dry-film thickness of 3 mils. Apply as specified in ASTM A780, Annex A2.

PART 3 EXECUTION

3.01 WEATHER CONDITIONS

- A. Do not paint in the rain, wind, snow, mist, or fog or when steel or metal surface temperatures are less than 5°F above the dew point.
- B. Do not apply paint when the relative humidity is above 85%.
- C. Do not paint when temperature of metal to be painted is above 120°F.
- D. Do not apply alkyd, inorganic zinc, silicone aluminum, or silicone acrylic paints if air or surface temperature is below 40°F or expected to be below 40°F within 24 hours.
- E. Do not apply epoxy, acrylic latex, and polyurethane paints on an exterior or interior surface if air or surface temperature is below 60°F or expected to drop below 60°F in 24 hours.

3.02 SURFACE PREPARATION PROCEDURES

- A. Remove oil and grease from metal surfaces in accordance with SSPC SP-1. Use clean cloths and cleaning solvents and wipe dry with clean cloths. Do not leave a film or greasy residue on the cleaned surfaces before abrasive blasting. Powerwashing with a biodegradable degreaser is also acceptable.
- B. Remove weld spatter and weld slag from metal surfaces and grind smoothly rough welds, beads, peaked corners, and sharp edges including erection lugs in accordance with SSPC SP-2 and SSPC SP-3. Grind 0.020 inch (minimum) off the weld caps on pipe weld seams. Grind outside sharp corners, such as the outside edges of flanges, to a minimum radius of 1/4 inch.

- C. Do not abrasive blast or prepare more surface area in one day than can be coated in one day; prepare surfaces and apply coatings the same day. Remove sharp edges, burrs, and weld spatter. Prime all areas before rust bloom forms and within the same day.
- D. For carbon steel, do not touch the surface between the time of abrasive blasting and the time the coating is applied. Apply coatings within 2 hours of blasting or before any rust bloom forms.
- E. Surface preparation shall conform to the SSPC specifications as follows:

Solvent Cleaning	SP-1
Hand Tool Cleaning	SP-2
Power Tool Cleaning	SP-3
White Metal Blast Cleaning	SP-5
Commercial Blast Cleaning	SP-6
Brush-Off Blast Cleaning	SP-7
Pickling	SP-8
Near-White Blast Cleaning	SP-10
Power Tool Cleaning to Bare Metal	SP-11
Surface Preparation and Cleaning of Steel and Other Hard Materials by High- and Ultrahigh-Pressure Water Jetting Before Recoating	SP-12
Surface Preparation of Concrete	SP-13

- F. Wherever the words "solvent cleaning," "hand tool cleaning," "wire brushing," or "blast cleaning" or similar words are used in these Specifications or in the paint manufacturer's specifications, they shall be understood to refer to the applicable SSPC (Steel Structure Painting Council), surface preparation specifications listed above.
- G. For carbon steel surfaces, after abrasive blast cleaning, the height of the surface profile shall be 2 to 3 mils. Verify the surface profile by measuring with an impresser tape acceptable to the Owner's Representative. Perform a minimum of one test per 100 square feet of surface area. Testing shall be witnessed by the Owner's Representative. The impresser tape used in the test shall be permanently marked with the date, time, and locations where the test was made. Test results shall be promptly presented to the Owner's Representative.
- H. Do not apply any part of a coating system before the Owner's Representative has reviewed the surface preparation. If coating has been applied without this review, if directed by the Owner's Representative, remove the applied coating by abrasive blasting and reapply the coat in accordance with this Specification.

3.03 ABRASIVE BLAST CLEANING

- A. Use dry abrasive blast cleaning for metal surfaces. Do not use abrasives in automatic equipment that have become contaminated. When shop or field blast cleaning with handheld nozzles, do not recycle or reuse blast particles.
- B. After abrasive blast cleaning and before coating is applied, dry clean surfaces to be coated by dusting, sweeping, and vacuuming to remove residue from blasting. Apply the specified primer or touch-up coating within an 8-hour working day. Do not apply coating over damp or moist surfaces. Reclean any blast-cleaned surface not coated within the 8-hour period before applying primer or touch-up coating.
- C. Keep the area of the work in a clean condition and do not permit blasting particles to accumulate and constitute a nuisance or hazard.
- D. During abrasive blast cleaning, prevent damage to adjacent coatings. Schedule blast cleaning and coating so that dust, dirt, blast particles, old coatings, rust, mill scale, etc., will not damage or fall upon wet or newly coated surfaces.

3.04 PREPARATION OF CONCRETE AND MASONRY SURFACES TO BE COATED

- A. Surface preparation of concrete and masonry surfaces shall be in accordance with SSPC SP-13/NACE 6 and the following.
- B. Do not apply coating until concrete has cured at least 30 days at 75°F and a minimum 50%. Finish concrete surfaces in accordance with Section 03360. Do not use curing compound on surfaces that are to be coated.
- C. Concrete and masonry surfaces on which coatings are to be applied shall be of even color, gray or gray-white. The surface shall have no pits, pockets, holes, or sharp changes of surface elevation. Scrubbing with a stiff-bristle fiber brush shall produce no dusting or dislodging of cement or sand. Sprinkling water on the surface shall produce no water beads or standing droplets. Concrete and masonry shall be free of laitance and slick surfaces.
- D. Detergent clean the concrete or masonry surface with trisodium phosphate in accordance with ASTM D4258. Then sandblast surfaces (brush-off blast). Floor slabs may be acid etched as specified in ASTM D4260 in lieu of sandblasting. After sandblasting, wash surfaces with water to remove dust and salts in accordance with ASTM D4258 or D4261. The grain of the concrete surface to touch shall not be rougher than that of No. 10 mesh sand. Use International Concrete Repair Institute (ICRI) standards for concrete and masonry surface preparation.

- E. Do not apply coatings to concrete when the concrete is outgassing. Apply coatings only when the concrete surface temperature is stable, not rising. Apply concrete coatings when the temperature is falling to reduce the potential of outgassing.

3.05 PROCEDURES FOR ITEMS HAVING SHOP-APPLIED PRIME COATS

- A. After applying primer to surfaces, allow coating to cure for a minimum of 2 hours before handling to minimize damage.
- B. When loading for shipment to the project site, use spacers and other protective devices to separate items to prevent damaging the shop-primed surfaces during transit and unloading. If wood spacers are used, remove wood splinters and particles from the shop-primed surfaces after separation. Use padded chains or ribbon binders to secure the loaded items and minimize damage to the shop-primed surfaces.
- C. Cover shop-primed items 100% with protective coverings or tarpaulins to prevent deposition of road salts, fuel residue, and other contaminants in transit.
- D. Handle shop-primed items with care during unloading, installation, and erection operations to minimize damage. Do not place or store shop-primed items on the ground or on top of other work unless the ground or work is covered with a protective covering or tarpaulin. Place shop-primed items above the ground upon platforms, skids, or other supports.

3.06 FIELD TOUCH-UP OF SHOP-APPLIED PRIME COATS

- A. Remove oil and grease surface contaminants on metal surfaces in accordance with SSPC SP-1. Use clean rags wetted with a degreasing solution, rinse with clean water, and wipe dry.
- B. Remove dust, dirt, salts, moisture, chalking primers, or other surface contaminants that will affect the adhesion or durability of the coating system. Use a high-pressure water blaster or scrub surfaces with a broom or brush wetted with a solution of tri-sodium phosphate, detergent, and water.
- C. Remove loose or peeling primer and other surface contaminants not easily removed by the previous cleaning methods in accordance with SSPC SP-7. Take care that the remaining primers are not damaged by the blast cleaning operation. The remaining primers shall be firmly bonded to the steel surfaces with blast-cleaned edges feathered.

- D. Remove rust, scaling, or primer damaged by welding or during shipment, storage, and erection in accordance with SSPC SP-10. Take care that the remaining primers are not damaged by the blast cleaning operation. Areas smaller than 1 square inch may be prepared in accordance with SSPC SP-11. The remaining primers shall be firmly bonded to the steel surfaces with cleaned edges feathered.
- E. Use repair procedures on damaged primer that protect adjacent primer. Blast cleaning may require the use of lower air pressure, smaller nozzles and abrasive particle sizes, short blast nozzle distance from surface, shielding, and/or masking.
- F. After abrasive blast cleaning of damaged and defective areas, remove dust, blast particles, and other debris by dusting, sweeping, and vacuuming; then apply the specified touch-up coating.
- G. Other surfaces that are shop primed shall receive a field touch-up of the same primer used in the original prime coat.

3.07 PAINTING SYSTEMS

- A. All materials of a specified painting system, including primer, intermediate, and finish coats, shall be produced by the same manufacturer. Thinners, cleaners, driers, and other additives shall be as recommended by the paint manufacturer for the particular coating system.
- B. Deliver paints to the jobsite in the original, unopened containers.

3.08 PAINT STORAGE AND MIXING

- A. Store and mix materials only in areas designated for that purpose by the Owner's Representative. The area shall be well ventilated, with precautionary measures taken to prevent fire hazards. Post "No Smoking" signs. Storage and mixing areas shall be clean and free of rags, waste, and scrapings. Tightly close containers after each use. Store paint at an ambient temperature from 50°F to 100°F.
- B. Prepare multiple-component coatings using all of the contents of the container for each component as packaged by the paint manufacturer. Do not use partial batches. Do not use multiple-component coatings that have been mixed beyond their pot life. Provide small quantity kits for touch-up painting and for painting other small areas. Mix only the components specified and furnished by the paint manufacturer. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

3.09 PROCEDURES FOR THE APPLICATION OF COATINGS

- A. Conform to the requirements of SSPC PA-1. Follow the recommendations of the coating manufacturer, including the selection of spray equipment, brushes, rollers, cleaners, thinners, mixing, drying time, temperature and humidity of application, and safety precautions.
- B. Stir, strain, and keep coating materials at a uniform consistency during application. Power mix components. For multiple component materials, premix each component before combining. Apply each coating evenly, free of brush marks, sags, runs, and other evidence of poor workmanship. Use a different shade or tint on succeeding coating applications to indicate coverage where possible. Finished surfaces shall be free from defects or blemishes.
- C. Do not use thinners unless recommended by the coating manufacturer. If thinning is allowed, do not exceed the maximum allowable amount of thinner per gallon of coating material. Stir coating materials at all times when adding thinner. Do not flood the coating material surface with thinner before mixing. Do not reduce coating materials more than is absolutely necessary to obtain the proper application characteristics and to obtain the specified dry-film thicknesses.
- D. Remove dust, blast particles, and other debris from blast cleaned surfaces by dusting, sweeping, and vacuuming. Allow ventilator fans to clean airborne dust to provide good visibility in working area before applying coating. Remove dust from coated surfaces by dusting, sweeping, and vacuuming before applying succeeding coats.
- E. Apply primer immediately after blast cleaning and before any surface rusting occurs, or any dust, dirt, or any foreign matter has accumulated. Before applying coating, re-clean surfaces that have surface colored or become moist by blast cleaning.
- F. Apply a brush coat of primer on welds, sharp edges, nuts, bolts, and irregular surfaces before applying the primer and finish coat. Apply the brush coat before and in conjunction with the spray coat application. Apply the spray coat over the brush coat.
- G. Before applying subsequent coats, allow the primer and intermediate coats to dry for the minimum curing time recommended by the manufacturer. In no case shall the time between coats exceed the manufacturer's recommendation.
- H. Each coat shall cover the surface of the preceding coat completely and there shall be a visually perceptible difference in applied shade or tint of colors.

- I. Applied coating systems shall be cured at 75°F or higher for 48 hours. If temperature is lower than 75°F, curing time shall be in accordance with printed recommendations of the manufacturer, unless otherwise allowed by the Owner's Representative.
- J. Assembled parts shall be disassembled sufficiently before painting or coating to ensure complete coverage by the required coating.

3.10 SURFACES NOT TO BE COATED

- A. Do not paint the surfaces listed below unless otherwise noted in the drawings or in other Specification sections. Protect the following surfaces during the painting of adjacent areas:
 - 1. Concrete walkways.
 - 2. Mortar-coated pipe and fittings.
 - 3. Stainless steel.
 - 4. Metal letters.
 - 5. Glass.
 - 6. Roofing.
 - 7. Fencing.
 - 8. Electrical fixtures except for factory coatings.
 - 9. Nameplates.
 - 10. Grease fittings.
 - 11. Brass and copper, submerged.
 - 12. Buried pipe, unless specifically required in the piping specifications.
 - 13. Fiberglass items, unless specifically required in the FRP specifications.
 - 14. Aluminum handrail, stairs, and grating.

3.11 PROTECTION OF SURFACES NOT TO BE PAINTED

- A. Remove, mask, or otherwise protect hardware, lighting fixtures, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. Mask openings in motors to prevent paint and other materials from entering the motors.

3.12 SURFACES TO BE COATED

- A. The exact coating to be applied in any location is not designated by the descriptive phrases in the coating system titles such as "corrosive environment,"

“buried metal,” or “submerged metal.” Coat surfaces with the specific coating systems as described below:

1. Coat concrete surfaces where shown in the drawings. Apply System No. 37 on exposed exterior concrete, System No. 32 on exposed interior concrete surfaces on submerged concrete surfaces unless otherwise shown in the drawings.
2. Coat aboveground structural steel or structural steel located in vaults and structures as described in the drawings.

3.13 DRY-FILM THICKNESS TESTING

- A. Measure coating thickness specified for carbon steel surfaces with a magnetic-type dry-film thickness gauge in accordance with SSPC PA-2. Provide certification that the gauge has been calibrated by a certified laboratory within the past 6 months. Provide dry-film thickness gauge as manufactured by Mikrotest or Elcometer.
- B. Test the finish coat of metal surfaces (except zinc primer and galvanizing) for holidays and discontinuities with an electrical holiday detector, low-voltage, wet-sponge type. Provide measuring equipment. Provide certification that the gauge has been calibrated by a certified laboratory within the past 6 months. Provide detector as manufactured by Tinker and Razor or K-D Bird Dog.
- C. Measure coating thickness specified for concrete or masonry surfaces in accordance with ASTM D4138. Test the finish coat of concrete and masonry surfaces in accordance with NACE SP0188 or ASTM D4787. Patch coatings at the points of thickness measurement or holiday detection.
- D. Check each coat for the correct dry-film thickness. Do not measure within 8 hours after application of the coating.
- E. For metal surfaces, make five separate spot measurements (average of three readings) spaced evenly over each 100 square feet of area (or fraction thereof) to be measured. Make three readings for each spot measurement of either the substrate or the paint. Move the probe or detector a distance of 1 to 3 inches for each new gauge reading. Discard any unusually high or low reading that cannot be repeated consistently. Take the average (mean) of the three readings as the spot measurement. The average of five spot measurements for each such 100-square-foot area shall not be less than the specified thickness. No single spot measurement in any 100-square-foot area shall be less than 80% nor more than 120% of the specified thickness. One of three readings which are averaged to

produce each spot measurement may underrun by a greater amount as defined by SSPC PA-2.

- F. For concrete surfaces, make five separate spot measurements spaced evenly over each 100 square feet of area (or fraction thereof) to be measured. The average of five spot measurements for each such 100-square-foot area shall not be less than the specified thickness. No single spot measurement in any 100-square-foot area shall be less than 80% nor more than 120% of the specified thickness.
- G. Perform tests in the presence of the Owner's Representative.

3.14 REPAIR OF IMPROPERLY COATED SURFACES

- A. If the item has an improper finish color or insufficient film thickness, clean and topcoat the surface with the specified paint material to obtain the specified color and coverage. Sandblast or power-sand visible areas of chipped, peeled, or abraded paint, feathering the edges. Then prime and finish the coat in accordance with the Specifications. The work shall be free of runs, bridges, shiners, laps, or other imperfections.

3.15 CLEANING

- A. During the work, remove discarded materials, rubbish, cans, and rags at the end of each day's work.
- B. Thoroughly clean brushes and other application equipment at the end of each period of use and when changing to another paint or color.
- C. Upon completion of painting work, remove masking tape, tarps, and other protective materials, using care not to damage finished surfaces.

END OF SECTION

DIVISION 10
SPECIALTIES

SECTION 10155
TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes solid-polymer units as follows:

1. Toilet Enclosures: Ceiling hung

1.02 RELATED WORK (NOT USED)

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

- A. Produce Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed finish.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.09 QUALIFICATIONS (NOT USED)

PART 2 PRODUCTS

2.01 SOLID-POLYMER UNITS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Accurate Partitions Corporation.
 - 2. Ampco.
 - 3. Bradley Corporation; Mills Partitions.
 - 4. Santana Products, Inc.
- B. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.
 - 1. Color and Pattern Basis of Design: Santana: Moonlight.
- C. Pilaster Trim: Manufacturer's standard design; stainless steel.
- D. Brackets (Fittings):
 - 1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

2.02 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
 - 1. Material: Stainless steel.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

2.03 FABRICATION

- A. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters for structural connection to structure above ceiling. Trim piece at the top of the pilaster shall be 3 inches high and fabricated from not less than 0.030 inch thick stainless steel.
- B. Doors: Unless otherwise indicated, provide 24-inch-wide in-swinging doors for standard toilet compartments and 36-inch-wide out-swinging doors with a minimum 32-inch-wide clear opening for compartments indicated to be accessible to people with disabilities.
 - 1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
 - 2. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.
 - 3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
 - 4. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 - 5. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

- a. Pilasters and Panels: 1/2 inch.
- b. Panels and Walls: 1 inch.

3.02 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION

SECTION 10801
TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes the following:

1. Toilet and bath accessories.

1.02 RELATED WORK

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

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

1.04 WORK SEQUENCE

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. ASTM International (ASTM)

1. ASTM A153—Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
2. ASTM A653—Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.
3. ASTM A666—Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
4. ASTM A1008/A1008M—Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
5. ASTM B16—Standard Specification for Free Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines.
6. ASTM B19—Standard Specification for Cartridge Brass Sheet, Strip, Plate, Bar, and Disks.
7. ASTM B30—Standard Specification for Copper Alloys in Ingot Form.
8. ASTM B456—Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
9. ASTM C1036—Standard Specification for Flat Glass.
10. ASTM F446—Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area.

B. Federation Specifications (FS)

1. FS-DD-M-411—Mirrors, Glass.

1.06 QUALITY ASSURANCE

- A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Engineer.
- B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.
1. Products of other manufacturers with equal characteristics, as judged solely by Engineer, may be provided.

1.07 WARRANTIES (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.09 QUALIFICATIONS (NOT USED)

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering accessories that may be incorporated into the Work include, but are not limited to, the following:

1. Toilet and Bath Accessories:

- a. American Specialties, Inc.
- b. Bobrick Washroom Equipment, Inc.
- c. Bradley Corporation.

- B. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the Toilet and Bath Accessory Schedule at the end of Part 3.

2.02 MATERIALS

- A. Stainless Steel: ASTM A666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Brass: ASTM B19, leaded and unleaded flat products; ASTM B16, rods, shapes, forgings, and flat products with finished edges; ASTM B30, castings.
- C. Sheet Steel: ASTM A1008/A1008M, cold rolled, commercial quality, 0.0359-inch minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A653, G60.
- E. Chromium Plating: ASTM B456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.
- F. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.

- G. Mirror Glass: ASTM C1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
- H. Galvanized Steel Mounting Devices: ASTM A153, hot-dip galvanized after fabrication.
- I. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.03 FABRICATION

- A. General: One, maximum 1-1/2-inch diameter, unobtrusive stamped manufacturer logo, as approved by Engineer, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.
- C. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
 - 1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- D. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:
 - 1. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
- E. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
- C. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F446.

3.02 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.03 TOILET AND BATH ACCESSORY SCHEDULE

- A. Toilet Tissue Dispenser: Where this designation is indicated, provide toilet tissue dispenser complying with the following:
 - 1. Products: Available products include those from Bobrick or equal.
 - 2. Type: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
 - 3. Mounting: Surface mounted with concealed anchorage.
 - 4. Material: Chrome-plated zinc alloy (zamac) or steel.
 - 5. Operation: Noncontrol delivery with manufacturer's standard spindle.
 - 6. Capacity: Designed for 4-1/2- or 5-inch- (114- or 127-mm-) diameter-core tissue rolls.

- B. Combination Towel Dispenser/Waste Receptacle: Where this designation is indicated, provide stainless-steel combination unit complying with the following:
1. Products: Available products include those from Bobrick or equal.
 2. Surface Mounted with concealed anchorage: Continuous, seamless wall flange; towel dispenser in unit's upper compartment designed to dispense minimum of 600 C-fold or 800 multifold paper towels; waste receptacle in unit's lower portion secured by tumbler lockset and with minimum 12-gallon capacity, reusable, vinyl liner; and upper compartment double-panel door with continuous hinge and tumbler lockset.
- C. Soap Dispenser: Where this designation is indicated, provide soap dispenser complying with the following:
1. Products: Available products include those from Bobrick or equal.
 2. Liquid Soap Dispenser, Horizontal-Tank Type: Surface-mounted type, minimum 40-ounce capacity tank with stainless-steel piston, springs, and internal parts designed to dispense soap in measured quantity by pump action; and stainless-steel cover with unbreakable window-type refill indicator.
 - a. Soap Valve: Designed for dispensing soap in liquid form
- D. Grab Bar: Where this designation is indicated, provide stainless-steel grab bar complying with the following:
1. Products: Available products include those from Bobrick or equal.
 2. Stainless-Steel Nominal Thickness: Minimum 0.05 inch.
 3. Mounting: Concealed with manufacturer's standard flanges and anchors.
 4. Gripping Surfaces: Manufacturer's standard slip-resistant texture.
 5. Outside Diameter: 1-1/2 inches for heavy-duty applications.
- E. Mirror Unit: Where this designation is indicated, provide mirror unit complying with the following:
1. Products: Available products include those from Bobrick or equal.
 2. Fixed-Tilt, Stainless-Steel-Framed Mirror Unit: Fabricate frame from minimum nominal 0.0375-inch-thick stainless steel, with all joints mitered,

welded, and ground smooth and constructed so frame tapers not less than 3 inches from top to bottom.

F. Shower Curtain Rod: Where this designation is indicated, provide stainless-steel shower curtain rod with 3-inch stainless-steel flanges designed for exposed fasteners, in length required for shower opening indicated, and complying with the following:

1. Products: Available products include those from Bobrick or equal.
2. Normal-Duty Rod: 1-inch OD; fabricated from nominal 0.0375-inch-thick stainless steel.

G. Shower Curtain: Where this designation is indicated, provide shower curtain complying with the following:

1. Products: Available products include those from Bobrick or equal.
2. Vinyl Shower Curtain: Minimum 0.006-inch-thick, opaque, matte vinyl with hemmed edges and corrosion-resistant grommets at minimum 6 inches o.c. through top hem.
 - a. Size: Minimum 6 inches wider than opening by 72 inches high.
 - b. Color: White.
3. Shower Curtain Hooks: Chrome-plated or stainless-steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.

H. Coat Hook: Where this designation is indicated, provide robe hook complying with the following:

1. Products: Available products include those from Bobrick or equal.
2. Double-Prong Unit: Stainless-steel, double-prong robe hook with rectangular wall bracket and backplate for concealed mounting.

END OF SECTION

DIVISION 11
EQUIPMENT

SECTION 11170
SUPPORT EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section includes all labor, equipment, materials, and services necessary to provide support equipment. This item includes the equipment of the models noted in Part 2 that is currently advertised and produced with all of the manufacturer's standard features. This equipment shall be delivered to the facilities indicated below. The allowance for this equipment is \$1,100,000.

1. (1) Backhus Windrow Turner Model 21.65 (Composting Facility)
2. (2) Volvo L110G Wheel Loaders (Composting Facility and C&D Recycling Facility)

1.02 RELATED WORK

- A. General Conditions
B. Supplementary Conditions

1.03 SUBMITTALS

- A. The Contractor shall provide a manufacturer's build sheet and quote for each piece of equipment. The build sheet shall include all dimensions, standard equipment, and required options as stated in this Section. A copy of the manufacturer's warranty shall be included with each submittal. In addition, the shop drawings shall include the following:
1. Details of construction, outline, and assembly drawings.
 2. Dimensions.
 3. Materials.
 4. Finish.
 5. Ratings.
 6. Accessories.
 7. Trim.
 8. Engineering data.
 9. Manufacturer's warranty, which shall be a minimum of 2 years from date of installation of the pump and controls.

B. Operating Instruction: For the equipment furnished under this Section, the Contractor shall submit two operation and maintenance manuals. At a minimum, these manuals shall include:

1. General—Equipment function, description, and normal and limiting operating characteristics.
2. Operation instructions—Start-up procedure, normal operating conditions, and emergency and normal shut-down procedures.
3. Lubrication and maintenance instructions
4. Troubleshooting guide.
5. Suggested parts that should be held onsite as spares that are mandatory and in addition to the parts listed in Paragraph 2.02C of this specification.
6. Drawings—Cross-sectional views and assembly and wiring diagrams.

C. Factory Performance Test Data: A qualified technician shall be provided for 1 day to instruct the Owner's and Engineer's representatives on proper operation and maintenance. With the permission of the Owner, this work may be conducted in conjunction with the inspection of the equipment and equipment startup per Part 3 of this Section. During start-up, if there is an equipment failure due to the manufacturer's design or fabrication of the equipment, additional services shall be provided at no additional cost to the Owner. A factory technician shall complete the equipment start-up. This technician should be a direct employee of the manufacturer who has had first-hand dealings with the equipment through its production at the factory.

D. Certifications: The Contractor shall furnish the Engineer with a written certification signed by the manufacturer that the equipment has been operated without fault under load conditions and that satisfactory operation has been obtained.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE

A. Factory Tests: The equipment supplier shall perform the following tests on each piece of equipment before shipment from the factory.

1. Perform complete operational functionality tests, including core functions and aftermarket systems (e.g., fire-suppression systems and attachments). Test and adjust all hydraulic pressures and flows to ensure the proper functionality and compatibility with attachments before delivery.

- B. Each submittal for equipment, components, or system components shall be accompanied by an Equipment Warranty and Certification Form. The form shall be duly executed by an authorized principal of the manufacturer warranting and certifying that the equipment and system components proposed meet or exceed the Specifications, is suitable for its intended purpose, and will provide satisfactory performance at the design criteria specified. If the manufacturer is not the supplier, an authorized principal of the supplier shall also execute the Equipment Warranty and Certification Form.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, and this Section for storing and protecting the items specified in this Section.
- B. The Contractor shall deliver the equipment, including all parts listed in the submittal sent to the Engineer.
- C. During delivery, handle equipment in a manner to prevent damage of any nature and in accordance with the manufacturer's delivery, storage, and handling requirements.

1.08 WARRANTIES

- A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds or as otherwise stated in this Section.
- B. The supplier of the equipment will provide all warranty services against defects in material and workmanship for a period of 24 months from the date of start-up and Owner's final inspection and acceptance to the effect that any defective equipment shall be repaired or replaced without cost or obligation to the Owner.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 EQUIPMENT DESCRIPTION (NOT USED)

1.13 OPERATIONS AND MAINTENANCE (O&M) MANUALS

Operations and Maintenance Manuals shall be in accordance with General Conditions, Supplementary Conditions, and Section 01830, Operations and Maintenance Manuals and Training, and shall include the following:

- A. Alarms and fail-safe features.
- B. Interlocked and/or interfaced equipment operation and control.
- C. Exploded-view drawings and illustrations with descriptions for assembly and disassembly of equipment.
- D. Comprehensive parts and materials maintenance and repair list for each equipment element indicating the manufacturer and the manufacturer's identification number. Include name, address, and telephone number of local sales and service office for major equipment items.
- E. Schedules of recommended spare parts to be stocked, including part number, inventory quantity, and ordering information.
- F. Performance rating and nameplate data for each major system component.
- G. Procedures for starting, operating, adjusting, calibrating, testing, and shutting down equipment.
- H. Emergency operating instructions and troubleshooting guide.
- I. Schedule of routine maintenance requirements and procedures, and preventative maintenance instructions required to ensure satisfactory performance and equipment longevity.
- J. Maintenance instructions for extended out-of-service periods.
- K. Field-verified power and control wiring schematics. Submit the approved schematics in each manual. After initial start-up and operation, correct these schematics to reflect any required field changes and submit the required copies for inclusion in the manuals.
- L. Preliminary copies of the O&M manuals shall be submitted to the Owner before the equipment arrives onsite, in accordance with Section 01830, Operations and Maintenance Manuals and Training. The Contractor shall not be compensated for the equipment until the Owner receives the preliminary O&M manuals. Copies of the final O&M Manuals shall incorporate the Engineer's comments and be

submitted with copies of the approved shop drawings and test reports in accordance with Section 01830, Operations and Maintenance Manuals and Training.

- M. Equipment Certificate: Submit a certificate from the manufacturer or from the manufacturer's qualified, factory-authorized representative for each piece of equipment furnished and specified in this Section, stating that the equipment has been inspected and adjusted as required in accordance with the manufacturer's written installation procedures and operating instructions and is ready for acceptance by the Owner.

1.14 PATENTS AND LICENSES (NOT USED)

PART 2 PRODUCTS

2.01 SUMMARY OF SUPPORT EQUIPMENT

The support equipment shall be the following or Engineer-approved equal:

- A. Backhus Windrow Turner Model 21.65.
- B. Volvo L110G Wheel Loader (Compost).
- C. Volvo L110G Wheel Loader (C&D).

2.02 BACKHUS WINDROW TURNER MODEL 21.65

- A. The Contractor shall furnish one Backhus Windrow Turner model 21.65. The unit will be wheeled. The equipment must be the current year production and include all standard options as well as the following non-standard options:
 - 1. Independently operated automatic reversing fans for the engine and hydraulic cooling systems.
 - 2. Two-stage filtration system with turbo air pre-cleaner, located to minimize the introduction of dust- and compost-contaminated air and serviceable without a need for a ladder.
 - 3. Heavy-duty battery safety disconnect switch (Flaming River Big Switch Model No. 1003).
 - 4. Four-wheel-drive unit, equipped with 12.5-inch-by-33-inch puncture-proof tires.
 - 5. Cabin air filtration system with guaranteed filtration efficiency of 96%.
 - 6. AM/FM stereo with two speakers and CD /iPod/MP3 capable.
 - 7. Air ride operator's seat.
 - 8. Two 12-volt power receptacles in cab for charging portable devices.
 - 9. Four Halogen headlights on the cab roof and two halogen lights on the back of the turner.

10. In-cab passenger jump seat
 11. Windshield wiper, motor, washer, and pump.
 12. Aftermarket Heavy Equipment fire-suppression system configured with multiple emergency-activation switches, including one at the base of the ladder and one inside the operator's cabin.
 13. Purchase must include all costs associated with shipping, setup, delivery, and supplier-provided operational and routine maintenance training. Supplier must maintain factory-trained service personnel.
 14. Unit must be compatible with Backhaus hose reel watering system and associated radio control.
- B. Minimum warranty of 3 years or 5,000 hours. Warranty must include parts, shipping, labor, and travel.
- C. Two sets each (in English) of the model-specific operating instructions, maintenance instruction/service manuals, and spare parts lists. One full set of related documentation on CD.

2.03 VOLVO L110G WHEEL LOADER (COMPOST)

- A. The Contractor shall furnish one Volvo L110G Wheel Loader. The equipment must be the current year production and include all standard options as well as the following non-standard options:
1. Equipped with a standard boom with a minimum dump height of 9 feet, 3 inches.
 2. Operating weight of 41,000 pounds with a minimum breakout force of 35,600 lbf.
 3. Must be equipped with automatic bucket positioner with adjustable position indicator and automatic and adjustable boom kick-outs for lift and lowering. Adjustments have to be set from the cab by the operator.
 4. Unit shall be equipped with a torque-parallel-type linkage.
 5. Bucket-cutting edge width shall exceed the tire width.
 6. Include four sets of keys.
 7. Include one complete hard-copy set and one complete CD ROM set of the unit-specific service diagnostic repair and parts manuals.
 8. HD taillight and grease zerks shall be included
- B. Engine:
1. Shall meet all US EPA Tier 4I emissions requirements for diesel engines.
 2. Minimum six-cylinder, four-stroke, inline, turbocharged, high-torque, low-emission, electronically controlled engine developing not less than

255 (190 kW) flywheel horsepower as defined by SAE J1349 net. Include wet replaceable cylinder liners and replaceable valve guides and seats.

3. Main cooling fan shall be hydraulically driven and thermostatically controlled and include an electronically controlled, reversing cooling fan as standard equipment. Max fan speed for Hot Climates shall be included.
4. Turbo II type air pre-cleaner shall be included and mounted to avoid the accumulation of debris around the air intake.
5. Drive speed limiter shall be set at 12 mph.

C. Electrical System:

1. Unit shall be equipped with a computer-controlled monitoring and diagnostics system that alerts the operator when scheduled service work is to be performed.
2. Unit shall be equipped with an alternator capable of 24V/120Amp.
3. Unit must be equipped with exterior lighting, which will include two front 70-watt halogen driving lights with high and low beams. Unit shall also include parking lights, two rear combination stop and tail lights, turn signals with hazard-warning flashers, and two front and two rear 70-watt working lights.
4. Include a rotating warning beacon and/or flashing strobe lights. These must be key or master-switch controlled.

D. Tires:

1. Unit shall be equipped with 23.5R25 Michelin X-Mine L5 tires.
2. Front and rear fenders shall be provided.

E. Hydraulics:

1. Lift circuit will be capable of four functions—raise, hold, lower, and float—as well as an automatic, from-cab-adjustable, automatic boom kick-out with lever detent.
2. Tilt circuit will be capable of three functions—rollback, hold, and dump—as well as an automatic, from-cab-adjustable, bucket-leveling with lever detent.
3. Include third hydraulic function for standard boom.

F. OPERATOR'S ENVIRONMENT:

1. Unit must be equipped with a fully enclosed cab meeting ROPS and FOPS standards per ISO 3471, ISO 3449, ISO 6055, and SAE J386.
2. Cab must be equipped with an air-circulation system capable of heating, defrosting, and pressurizing the cab with a minimum 11-speed fan and an

output level of 51,180 Btu/h (15 kW). The defroster must be effective on all windows.

3. Exterior back-up alarm shall be Ecco Model #850/112DB(a).
4. Filtration system must be >98% efficient with SAE fine dust test (SAE J1533).
5. Unit shall have the following equipment:
 - a. One combination lock kit.
 - b. Steering knob.
 - c. Ashtray.
 - d. Cigarette lighter.
 - e. Cab heating with filter.
 - f. Fresh-air inlet and defroster.
 - g. Floor mat.
 - h. Interior lights.
 - i. Two interior and two exterior rear-view mirrors.
 - j. Left- and right-opening window.
 - k. Tinted safety glass.
 - l. Three-inch (76 mm) retractable seatbelt (SAE J386).
 - m. Adjustable hydraulic lever console.
 - n. ISRI air-suspended operator's seat with high backrest, left and right ISRI arm rests, and heating.
 - o. Storage compartment.
 - p. Sun visor.
 - q. Beverage holder.
 - r. Front and rear windshield washers and wipers.
 - s. Interval function for front and rear windshield wipers.
 - t. Service platforms with anti-slip surfaces and hand rails on rear fenders.
 - u. Speedometer.
 - v. Color rear-view camera with LCD monitor.
6. Unit shall be equipped with radio/CD player with Bluetooth and MP3/iPod compatibility.
7. Include rubber, suspended cab ladder.
8. Include fire extinguisher mounted in the cab.

G. Lubrication System:

1. Complete auto lube system for standard boom-equipped machine. Include all serviceable grease points and lubrication of the attachment bracket

H. Attachments:

1. Locking type quick coupler.
2. Logging counterweight.

3. Volvo or equivalent 118-inch 9.2yd³ H/O STE High Tip bucket.
4. Compatible 118-inch, three-piece, bolt-on edge kit, STE (must be drilled to manufacturer's bolt pattern).

I. Warranty:

1. Unit must carry the manufacturer's standard new-machine warranty. A copy of the warranty must be attached to the bid proposal.
2. Include an additional 5-year/8,000-hour Full Machine extended warranty.

2.04 VOLVO L110G WHEEL LOADER (C&D)

A. The Contractor shall furnish one Volvo L110G Wheel Loader. The equipment must be the current year production and include all standard options as well as the following non-standard options:

1. Equipped with a standard boom with a minimum dump height of 9 feet, 3 inches.
2. Operating weight of 41,000 pounds with a minimum breakout force of 35,600 lbf.
3. Must be equipped with automatic bucket positioner with adjustable position indicator and automatic and adjustable boom kick-outs for lift and lowering. Adjustments have to be set from the cab by the operator.
4. Unit shall be equipped with a torque-parallel-type linkage.
5. Bucket-cutting edge width shall exceed the tire width.
6. Include four sets of keys.
7. Include one complete hard-copy set and one complete CD ROM set of the unit-specific service diagnostic repair and parts manuals.
8. Include HD taillight and grease zerk guards.

B. Engine:

1. Shall meet all US EPA Tier 4I emissions requirements for diesel engines.
2. Minimum six-cylinder, four-stroke, inline, turbocharged, high-torque, low-emission, electronically controlled engine developing not less than 255 (190 kW) flywheel horsepower as defined by SAE J1349 net. Including wet replaceable cylinder liners and replaceable valve guides and seats.
3. Main cooling fan shall be hydraulically driven and thermostatically controlled and include an electronically controlled, reversing cooling fan as standard equipment. Max fan speed for Hot Climates shall be included.
4. Turbo II type air pre-cleaner shall be included and mounted to avoid the accumulation of debris around the air intake.
5. Drive speed limiter shall be set at 12 mph.

C. Frame/Guarding:

1. Shall include all standard equipment guarding and protecting cover plates, with additional guarding to include:
 - a. HD taillight guards.
 - b. Grease zerk guards.
 - c. Front belly guard.
 - d. Rear belly guard.
 - e. HD main valve cover and differential lock guard.
 - f. Center hinge and rear frame guard.
 - g. Radiator grille guard.
 - h. Wheel/axle seal guards.
 - i. Boom cylinder hose and tube guards.
 - j. Windshield forestry/solid-waste guard.
 - k. Window guards—side and rear windows.
 - l. Shortened headlight brackets.

D. Electrical System:

1. Unit shall be equipped with a computer-controlled monitoring and diagnostics system that alerts the operator when scheduled service work is to be performed.
2. Unit shall be equipped with an alternator capable of 24V/120Amp.
3. Unit must be equipped with exterior lighting, which will include two front 70-watt halogen driving lights with high and low beams. Unit shall also include parking lights, two rear combination stop and taillights turn signals with hazard warning flashers, and two front and two rear 70-watt working lights.
4. Include a rotating warning beacon and/or flashing strobe lights, which must be key or master-switch controlled.

E. Tires:

1. Unit shall be equipped with 23.5R25 TY CUSHION, P2A SOLID TIRES mounted on manufacturer's OEM equipment rims.
2. Front and rear fenders shall NOT be included.

F. Hydraulics:

1. Lift circuit will be capable of four functions—raise, hold, lower, and float—as well as an automatic, from-cab-adjustable, automatic boom kick-out with lever detent.

2. Tilt circuit will be capable of three functions—rollback, hold, and dump—as well as an automatic, from-cab-adjustable, bucket-leveling with lever detent.
3. Include third hydraulic function for standard boom.
4. Aftermarket Hydraulic attachments must be compatible with OEM system and include any/all dampening or portioning valves and/or controls.

G. Operator's Environment:

1. Unit must be equipped with a fully enclosed cab meeting ROPS and FOPS standards per ISO 3471, ISO 3449, ISO 6055 and SAE J386.
2. Cab must be equipped with an air-circulation system capable of heating, defrosting, and pressurizing the cab with a minimum 11-speed fan and an output level of 51,180 Btu/h (15 kW). The defroster must be effective on all windows.
3. Exterior back-up alarm shall be Ecco Model #850/112DB(a).
4. Filtration system must be >98% efficient with SAE fine dust test (SAE J1533).
5. Unit shall have the following equipment:
 - a. One combination lock kit.
 - b. Steering knob.
 - c. Ashtray.
 - d. Cigarette lighter.
 - e. Cab heating with filter.
 - f. Fresh-air inlet and defroster.
 - g. Floor mat.
 - h. Interior lights.
 - i. Two interior and two exterior rear-view mirrors.
 - j. Left- and right-opening window.
 - k. Tinted safety glass.
 - l. Three-inch (76 mm) retractable seatbelt (SAE J386).
 - m. Adjustable hydraulic lever console.
 - n. ISRI air-suspended operator's seat with high backrest, left and right ISRI arm rests, and heating.
 - o. Storage compartment.
 - p. Sun visor.
 - q. Beverage holder.
 - r. Front and rear windshield washers and wipers.
 - s. Interval function for front and rear windshield wipers.
 - t. Service platforms with anti-slip surfaces and hand rails on rear fenders.
 - u. Speedometer.
 - v. Color rear-view camera with LCD monitor.

6. Unit shall be equipped with radio/CD player with Bluetooth and MP3/iPod compatibility.
7. Include rubber, suspended cab ladder.
8. Include fire extinguisher mounted in the cab.

H. Attachments:

1. Locking-type quick coupler.
2. TAG or equivalent (as approved by Owner) 4.1-yd³ hydraulic grapple-type bucket compatible with the OEM Hydraulic systems.
3. Compatible three-piece, bolt-on edge kit, STE (must be drilled to manufacturer's bolt pattern).

I. Warranty:

1. Unit must carry the manufacturer's standard new-machine warranty. A copy of the warranty must be attached to the bid proposal.
2. Include an additional 5-year/8,000-hour Full Machine extended warranty.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 11300 LEACHATE PUMPS

PART 1 GENERAL

1.01 SCOPE OF WORK

The work included under this section consists of furnishing, installing, and testing:

- A. The work included under this Section consists of furnishing, installing, and testing leachate collection and removal, leak detection, and stormwater sump pumping systems including horizontal, side-slope riser submersible pumps for the Ash Monofill Expansion and related equipment as shown on the Drawings and Specifications. Each pump station requires two leachate collection pumps and one leak detection pump and all related equipment, control system, and instrumentation necessary for complete leachate collection and removal and leak detection systems.

1.02 RELATED WORK

- A. General Conditions
- B. Supplementary Conditions
- C. Section 15146, High-Density Polyethylene (HDPE) Pipe
- D. Section 16401, Low-Voltage Electrical Work-General

1.03 SUBMITTALS

- A. The Contractor shall provide shop drawings in accordance with Section 01330, Submittals and Acceptance. The shop drawings shall be prepared by the manufacturer and submitted to the Consultant for review prior to the manufacture of the proposed equipment. The shop drawings shall include outline dimensions and external connection diagrams. A list of components, pump performance curve showing performance from shutoff to run out as well as a copy of the manufacturer's warranty shall be included with each submittal. In addition the shop drawings shall include the following:
 - 1. Full description and schematic of mechanical seal design, operation and protection devices, including oil lifter design and operation. A mechanical seal oil lifter must be included in the seal design.
 - 2. Full description and schematic of motor cable entrance. Must indicate anti-wicking device as well as cable strain relief design.

3. Comprehensive two dimensional CAD drawing of the pump station control panel exterior as viewed from the front and side. Submittal shall also include complete control panel interior layout showing location of panel component parts as well as full electrical schematic of control panel operation.
 4. Layout drawings of a riser pump assembly that includes wheeled pump details, pump discharge, and riser connections and materials, installation notes, and other pertinent details.
 5. The Contractor shall submit a complete list of materials and equipment to be incorporated in the control panel. The list shall include catalog numbers, cut sheets, diagrams, and other descriptive data required to demonstrate conformance with the Specifications. Partial lists will not be acceptable. The basis of acceptance shall be the manufacturer's published ratings for the equipment. The manufacturer shall be regularly engaged in the manufacture of products specified.
 6. Contents of the shop drawings shall include the following:
 - a. Details of construction, outline and assembly drawings
 - b. Dimensions
 - c. Materials
 - d. Finish
 - e. Ratings
 - f. Accessories
 - g. Trim
 - h. Engineering data
 - i. Ladder type schematic control diagrams and wiring diagrams. Transient voltage surge suppressor submittals shall include the following:
 - (1) UL 1449 peak let-through voltage documentation.
 - (2) Category C3 peak let-through voltage test results.
 7. Submittals shall include manufacturer's warranty, which shall be a minimum of 2 years from date of installation of the pump and controls.
- B. Operating Instruction: For the pump furnished under this Section, the Contractor shall submit operation and maintenance manuals. At a minimum these manuals shall include:
1. General—Equipment function, description, normal and limiting operating characteristics.

2. Installation instructions.
 3. Operation instructions—start-up procedure, normal operating conditions, and emergency and normal shut-down procedures.
 4. Lubrication and maintenance instructions
 5. Troubleshooting guide.
 6. Suggested parts that should be held on site as spares that are mandatory and in addition to the parts listed in Part 1.02C of this specification.
 7. Drawings—Cross-sectional views, assembly and wiring diagrams.
 8. Pump performance curves.
- C. Factory Performance Test Data: A qualified technician shall be provided for one (1) day to instruct representatives of the Owner and the Consultant on proper operation and maintenance. With the permission of the Owner, this work may be conducted in conjunction with the inspection of the installation and system start up per Part 3 of this Section. If during start up there is an equipment failure due to the pump manufacturers design or fabrication of the equipment, additional services shall be provided at no additional cost to the Owner. System start up shall be completed by a factory technician. This technician should be a direct employee of the manufacturer who has had first hand dealings with the equipment through its production at the factory.
- D. Certifications: The Contractor shall furnish the Consultant with a written certification signed by the manufacturer that the equipment has been properly installed and is free from stress imposed by piping or mounting bolts. The form should indicate that all equipment has been operated without fault under load conditions and that satisfactory operation has been obtained.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

- A. American Iron and Steel Institute (AISI)
 - 1. ANSI C2—National Electrical Safety Code (NESC).
 - 2. ANSI C62.41—Guide on Surge Voltages in AC Power Circuits Rated up to 600V.
 - 3. ANSI C62.45—Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000V and less) AC Power Circuits.
- B. American Society for Testing and Materials (ASTM)
- C. Federal Specifications and Standards (FSS)
 - 1. FSS W-C-596G(2)—Connector, Electrical Power (General Specification).
 - 2. FSS W-P-115C—Panel, Power Distribution.
- D. Hydraulic Institute (HI)
 - 1. HI-01—Standards for Centrifugal, Rotary and Reciprocating Pumps
- E. Institute of Electrical and Electronics Engineers (IEEE)
 - 1. IEEE 112—Standard Test Procedure for Polyphase Induction Motors and Generators.
 - 2. IEEE 117—Standard Test Procedure for Evaluation of Systems of Insulating Materials for Random-Wound AC Electric Machinery.
- F. International Standards Organization (ISO)
 - 1. ISO 5199—Technical Specifications for Centrifugal Pumps, Class II
 - 2. ISO 7005-2—Metallic Flanges Part 2: Cast Iron Flanges
- G. National Electrical Manufacturer's Association (NEMA)
 - 1. NEMA ICS 1—Industrial Control and Systems: General Requirements.
 - 2. NEMA ICS 6—Industrial Controls and Systems: Enclosures.
 - 3. NEMA MG 1—Motors and Generators.
 - 4. NEMA PB 1—Panelboards.
 - 5. NEMA ST 20—Dry-Type Transformers for General Applications.
 - 6. NEMA WD 1—General Color Requirements for Wiring Devices.
- H. National Fire Protection Association (NFPA)
 - 1. NFPA 70—National Electrical Code (NEC).
 - 2. NFPA 101—Life Safety Code.

I. Underwriters Laboratories (UL)

1. UL 50—Enclosures for Electrical Equipment.
2. UL 67—Panelboards.
3. UL 83—Thermoplastic-Insulated Wires and Cables.
4. UL 467—Grounding and Bonding Equipment.
5. UL 508—Industrial Control Equipment.
6. UL508A—Industrial Control Panel
7. UL 698A—Standard for Safety Industrial Control Panels Relating to Hazardous (Classified) Locations

1.06 QUALITY ASSURANCE

- A. Unit Responsibility: The pumps and primary control elements shall be supplied by the pump supplier. The pump supplier shall have experience in providing equipment for leachate removal.
- B. Factory Tests: The pump supplier shall perform the following tests on each pump before shipment from the factory.
1. Megger the pump to check for insulation breaks or moisture.
 2. Run the pump dry for a minimum of 5 minutes to ensure integrity of mechanical seal and oil lifter. Also check the rotation of electric motor in both directions.
- C. Each submittal for equipment, components or system components shall be accompanied by an "Equipment Warranty and Certification Form." The form shall be duly executed by an authorized principal of the manufacturer warranting and certifying that the equipment and system components proposed meet or exceed the specifications, is suitable for its intended purpose, and will provide satisfactory performance at the design criteria specified. In the event that the manufacturer is not the supplier, an authorized principal of the supplier shall also execute the equipment warranty and certification form.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling and this Section for storing and protecting the items specified in this Section.

- B. The Contractor shall deliver a complete system including all parts listed in the submittal sent to the Engineer
- C. Store in a weather-tight building or suitable covering to protect against damage of any nature.
- D. Handle during delivery, storage, and installation in a manner to prevent damage of any nature and in accordance with the Manufacturer's deliver, storage, and handling requirements.

1.08 WARRANTIES

- A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.
- B. The supplier of the leachate removal system will provide all warranty services against defects in material and workmanship for a period of 24 months from the date of start up and Owner's final inspection and acceptance to the effect that any defective equipment shall be repaired or replaced without cost or obligation to the Owner.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS

- A. Testing shall be performed as specified in Part 3 of these Specifications.

1.11 MAINTENANCE (NOT USED)

1.12 SYSTEM DESCRIPTION

1.13 OPERATIONS AND MAINTENANCE (O&M) MANUALS

Operations and Maintenance Manuals shall be in accordance with General Conditions, Supplementary Conditions, and Specification Section 01830, Operations and Maintenance Manuals and Training, and shall include the following:

- A. Installation instructions.
- B. Functional description of the pumping control system for each mode of operation of equipment.
- C. Automatic and manual operation.

- D. Alarms and fail-safe features.
- E. Interlocked and/or interfaced equipment operation and control.
- F. Exploded view drawings and illustrations with descriptions for assembly and disassembly of equipment.
- G. Comprehensive parts and materials maintenance and repair list for each equipment element indicating the manufacturer and the manufacturer's identification number. Include name, address, and telephone number of local sales and service office for major equipment items.
- H. Schedules of recommended spare parts to be stocked, including part number, inventory quantity, and ordering information.
- I. Performance rating and nameplate data for each major system component.
- J. Procedures for starting, operating, adjusting, calibrating, testing, and shutting down system equipment.
- K. Emergency operating instructions and trouble-shooting guide.
- L. Schedule of routine maintenance requirements and procedures, and preventative maintenance instructions required to ensure satisfactory performance and equipment longevity.
- M. Maintenance instructions for extended out-of-service periods.
- N. Field-verified power and control wiring schematics. Submit the approved schematics in each manual. After initial start-up and operation, correct these schematics to reflect any required field changes and submit the required copies for inclusion in the manuals.
- O. Preliminary copies of the O&M manuals shall be submitted to the Owner before arrival of the equipment to the site in accordance with Section 01830, Operations and Maintenance Manuals and Training. The Contractor shall not be compensated for the pumping equipment until the Owner receives the preliminary O&M manuals. Copies of the final O&M Manuals shall incorporate the Engineer's comments and be submitted with copies of the approved shop drawings and test reports in accordance with Section 01830, Operations and Maintenance Manuals and Training.
- P. Installation Certificate: Submit a certificate from the manufacturer or from the manufacturer's qualified, factory-authorized representative for each pump

furnished and installed and specified in this Section, stating that the installed equipment has been installed, inspected, and adjusted as required in accordance with the manufacturer's written installation procedures and operating instructions and is ready for acceptance by the Owner.

1.14 PATENTS AND LICENSES (NOT USED)

PART 2 PRODUCTS

2.01 SUMMARY OF PUMPS

The pumps shall be the following or Engineer approved equal:

- A. Leachate Collection Submersible Pumps
 - 1. Low-Flow Leachate Collection Submersible Pumps:
3 EPG WSDPT SurePump Wheeled Sump Drainer, Series 2-2
 - 2. High-Flow Leachate Collection Submersible Pumps:
3 EPG WSDPT SurePump Wheeled Sump Drainer, Series 12-5
- B. Leak Detection Submersible Pumps:
 - 1. 3 EPG WSDPT SurePump Wheeled Sump Drainer, Series 2-2
- C. Stormwater Sump Pumps
 - 1. 3 Water Ace 1/3 HP Submersible Sump Pumps, Model# R3S/S2400A

2.02 SUBMERSIBLE PUMPS

- A. The Contractor shall furnish and install three complete leachate pumping systems including one lead low-flow Leachate Collection pump, one lag high-flow Leachate Collection pump and one Leak Detection pump for each pump station. All systems shall include flow meters, level sensors, retrieval cables, breakout boxes, and control panel. Retrieval cable shall be a minimum of 3/8 inch diameter, made of stainless steel and of sufficient length to secure pump at the top of the sump while the pump is in operating position at the sump bottom. Contractor shall confirm length.
- B. The submersible pumps shall be capable of handling raw leachate.
- C. The pump must be capable of running dry without damaging the rotating assembly, seal, bearings, or motor.

- D. The pump must be capable of ingesting and passing at least 3/8 inch solids without damaging the pump or causing a reduction in pump flow/head performance. Solids include but are not limited to silt, sand, sediment, HDPE shavings and rock particles.
- E. The pump shall include a motor cable entrance with an anti-wicking block created by a break in the power cable insulation to prevent liquid migration into the motor housing in the event that the power cable is damaged. Power cable shall be of sufficient length to connect to the control panel when the pump is in operating position at the sump bottom. Contractor shall confirm length.
- F. All materials coming in contact with leachate shall be 300 series stainless steel, teflon, or viton.
- G. The pump shall permit the unit to "pump down" to within 8 inches of the sump bottom without any loss of performance or damage to the pump.
- H. External "priming" shall not be required.
- I. The motor shall not require the use of oil or grease for lubrication.
- J. Dual inside mechanical seals with silicon carbide faced shall be used to prevent pumped liquid from entering the motor. No contact with the pumped liquid is permitted. With the pump running dry, the seals must be capable of operating for at least one hour without damage.
- K. The pump shaft shall be supported by double shielded, permanently lubricated, high temperature C3 ball bearings with a minimum B10 life of 60,000 hours. Shaft bearing designs that require lubrication via the pumped liquid are not acceptable.
- L. The pump shall be fabricated for use in a riser pipe application. The pumping unit shall be able to slide down the riser pipe and negotiate bends without hanging up on seams or any riser pipe imperfections. The pumps shall be horizontal, roller-mounted submersible pumps.
- M. No built in check valve inside the pump will be permitted. Check valves shall be located on the discharge hose assembly and easily accessible for maintenance. If a check valve is to be located at the pump discharge, the valve should be bored with a 3/16 inch bleed hole that will allow the discharge line to be emptied prior to removing the pump for maintenance.

- N. Motor assemblies shall be air filled and spark free. With the pump running dry, the motor must be capable of operating for at least one hour without damage.
- O. Pump shall be capable of delivering the following liquid flow rates:
1. Lead Low-Flow Leachate Collection Pump:
13 gpm @ 20 feet tdh for Primary Leachate System (3 pumps)
 2. Lag High-Flow Leachate Collection Pump:
52 gpm @ 120 feet tdh for Primary Leachate System (3 pumps)
 3. Leak Detection Leachate Collection Pump:
13 gpm @ 20 feet tdh for Primary Leachate System (3 pumps)
- No exceptions to these design points will be accepted.
- P. Pump discharge size shall be 1 ¼ inches NPT.
- Q. Pump shall operate off 460 V/3 ph/60 hz electric service.
- R. All hose fittings shall be 300 series stainless steel and shall be suitable for the application. All hose bands shall be hi-torque 300 series stainless construction.

2.03 STORMWATER SUMP PUMP

- A. Pump shall be a Water Ace 1/3 HP Submersible Sump Pump Model #R3S/S2400A or Engineer-approved equal. Pump shall operate off 120V/1ph/60 hz electric service.

2.04 MOTOR

- A. The motor and its integral protective controls shall be explosion-proof and rated and labeled for use in a Class I, Division 1, Group D area under submerged and un-submerged conditions.
- B. The motors shall be for submersible application and conform to NEMA standards.
- C. The pump shall include a motor cable entrance with an anti-wicking block created by a break in the power cable insulation to prevent liquid migration into the motor housing in the event that the power cable is damaged. Power cable shall be of sufficient length to connect to the electrical breakout box at the top of the HDPE riser when the pump is in operating position at the sump bottom. No cable splices within the HDPE riser will be permitted. The Contractor shall confirm actual cable length required in the field before pump is delivered.

- D. Motor assemblies shall be hermetically sealed. No contact with the pumped liquid is permitted. With the pump running dry, the seals must be capable of operating for at least 1 hour without damage.
- E. The motor shall not require the use of oil or grease for lubrication.
- F. The motor shall have a Kingsbury type thrust bearing capable of handling the maximum thrust load of the pump.
- G. Motor pressure equalizing diaphragm assembly shall be viton.
- H. The pump must be capable of running dry without damaging the rotating assembly, seal, bearings, or motor.

2.05 CONTROL PANELS

- A. The control panels will provide level control and include motor starters, overload protection devices and circuit breakers (fuses will not be used as primary protection devices). Panel will provide protection against phase loss and rapid pump cycling. The panel will include a TVSS system as well as additional lightning protection as deemed appropriate. A low voltage control circuit and power transformer shall be provided. A thermostat will be included for interior temperature control of the panel body. Controller shall be equipped with loss of phase protection.
 - 1. A single control panel shall operate the two Leachate Collection pumps in lead/lag mode and the single Leak Detection Leachate Collection pump in simplex mode. Power feed to the panel will be, 480 VAC, 3 phase, 60 Hz.
- B. Control shall be accomplished relay control.
- C. The system shall monitor the following alarm conditions:

Alarm	Action	Beacon
High Sump Level	-	Red
Over/Under Voltage	Stop Pumps Until Corrected	Red
Loss Of Phase	Stop Pumps Until Corrected	Red
Pump Failure	Take Pump Out Of Lead/Lag Logic	Red
Level Sensor Failure	Stop Pumps Until Corrected	Blue
Low Flow	-	Blue
No Flow	Stop Pump. Retry A User Defined Number Of Times At A User Defined Interval. If No Response Take Pump Out Of Lead/Lag Logic.	Blue Then Red

Alarm	Action	Beacon
Force Main Pressure Over Limit	Stop Pumps Until Corrected	Blue
Motor amp draw over maintenance limit	-	Blue

D. Control sequence for duplex sump pumps:

1. The lead pump will start when the sump level reaches the "lead pump start level."
2. The lag pump will start when the sump level reaches the "lag pump start level."
3. The leak pump will stop when the sump level reaches the "lag pump start level."
4. All pumps will stop when the sump drops to the "pumps off level."
5. The manual switch position will run the pump except when sump drops to the "pump off level."

E. Control sequence for simplex sump pump:

1. The pump will start when the sump level reaches the "pump start level."
2. The pump will stop when the sump drops to the "pump off level."
3. The manual switch position will run the pump except when sump drops to the "pump off level."

F. The control panel shall be designed, constructed, and tested in accordance with applicable NEMA, UL, and ISA standards. The latest edition of the NEC as well as all state and local codes and regulations shall govern the materials, fabrication, and installation of the control panel. Panel shall be manufactured and registered by a UL certified UL508, UL913 and UL698 panel shop permitted to make industrial control panels for hazardous locations and intrinsically safe apparatus and associated apparatus for use in Class I, Division 1, Hazardous Locations

G. The control panel shall be manufactured out of 14 gauge, 304 stainless steel and meet NEMA 4X standards. The enclosure door shall be hinged along its length allowing the door to open out 180 degrees. The door shall have a gasket with a rubber composition material around the perimeter and shall be installed with a retainer to assure a positive weatherproof seal. A stainless steel drip shield shall be included. The panel must be capable of being padlocked. The main power

disconnect shall be located on the right front side flange of the panel adjacent to the door opening. The inner door should not be capable of being opened unless the power is cut off to the panel. The back plate shall consist of 12-gauge sheet steel and finished with a primer coat and two coats of baked on enamel. All hardware mounted to the sub-panel shall be accomplished with machine thread tapped holes. Sheet metal screws are not acceptable.

- H. Control panel shall include a viewing window to allow the components mounted on the inner door to be seen without the need to open the front of the enclosure. A NEMA 4X momentary on reset / acknowledge push button shall be mounted on the side of the enclosure.
- I. The following devices shall be mounted on the inner door:
 - 1. HOA switches
 - 2. Pump run lights
 - 3. Low / No flow lights
 - 4. Motor amp draw maintenance limit lights
 - 5. Pump fail lights
 - 6. Motor overload lights
 - 7. AGLS System fail light
 - 8. Three setpoint controllers for level control
 - 9. Flow totalizers
 - 10. Elapsed time meters
 - 11. Power disconnect
 - 12. Simulator controls
 - 13. GFCI Duplex Outlet
- J. All circuit breakers for pumps and panel main shall be thermal magnetic molded case breakers 18,000 amp interrupting rating (minimum at 480 VAC), Square D—FHL; GE—THED; or Eaton FD. Receptacle, Control Power, and Flowmeter Circuit Breaker shall be Heinemann—JA1S Series, Carlingswitch—CA1 Series or approved equal.
- K. Motor starters shall be open form, across the line, UL/HP rated with individual overload protection built in each leg. Motor starter contact and coil shall be replaceable from the front of the starter without removing it from its position. Adjustable overloads will not be used. The motor overloads shall be sized per motor nameplate data per the manufacturer's requirements. They shall provide visual trip indication on the overload itself as well as illuminate a motor trip light on the panel inner door. The overload shall be sized for the full load amperage draw of the pump motor. Motor Starter shall be full voltage (with auxiliary contacts), Allen Bradley—Bulletin 509 (with hand reset overload relays

Type W), Square D—8536(with hand reset overload relays Class 9065), or GE—CR306 (with hand reset overload relays CR123 Series)

L. Pump Run Lights

1. Each pump shall have a pilot light to indicate the pump is in a running status. When the pump is on, the pilot light will illuminate.
2. Pilot lights located on the front of the inner control panel door will operate off 120 vac control voltage.
3. The pilot lights shall be NEMA 4 (watertight) LED type, Square D—Class 9001KP, Allen Bradley—800T, or GE—CR104.

M. The HOA switch that will control the pump will remain in the Auto or off position when placed in that position by the operator. It will not be able to remain in the Hand mode unless physically held in that position by the operator. Square D—Class 9001, Allen Bradley—800T, or GE—CR104.

N. The elapsed time meters shall be non reset type which will indicate total hours that the pump has run. The run time will be measured up to 99,999.9 hours.

O. The panel mounted setpoint controller must indicate inches of leachate in the sump to one tenth of an inch. The indicator must have a bar graph showing actual inches of liquid in the sump as well as where the programmed set points are in relation to the liquid level. As each setpoint (pump off, on and high level alarm) is met, a LED on the same display should illuminate to show how many set points are activated at any one time. Pump set points should be programmed via pushbuttons on the front of the setpoint controller. A simple liquid level shown in inches of leachate will not suffice. The setpoint controller will receive a 4 to 20 mA signal from the AGLS which will convert the signal to display inches of liquid in the sump. The setpoint controller will indicate liquid levels from 0 to 50 inches. The controller shall come standard with “Level Simulator” that allows simulation of the input signal and a 4 to 20 mA output signal that is proportional to and independent from the input signal.

P. The control panel shall be equipped with a NEMA 4 (watertight), LED type amber power on light on the inner door. Red and blue alarm beacons are to be located on top of the panel. These lights will be of a ‘strobe’ design. Rotating beacons are not accepted. The panel Alarm Horn—shall be 120V, Federal—350WB, Edwards—876-N5 or approved equal.

Q. Provision will be made on the side of the panel to switch on the area lights where applicable. This area light switch should be watertight and not compromise the NEMA 4X rating of the panel.

- R. Pilot lights, bush buttons, switches, circuit breakers, components, and devices shall all be labeled with nameplates. Internal panel control components shall also be labeled identifying the component function. Cabinets must be sized to provide adequate internal working clearances and wire bending radii per NFPA-70 and NFPA-79. Plastic wiring trough shall be used for routing internal control wiring.
- S. All nameplates shall be three ply phenolic, engraved through the first layer. Lettering shall be 0.5 cm (3/16 inch) minimum in height.
- T. All nameplates should be securely fixed to the respective panel location.
- U. A pocket shall be provided on the inner door to house operations manuals. The control cabinet electrical schematic shall be permanently affixed to the center top of the inside of the outer door. Schematic shall be laminated to prevent removal and discoloration from heat, gasses, and ultraviolet light.
- V. All control devices leading from the panel shall be intrinsically safe. Intrinsic barrier shall be Stahl—9250/01-40 or approved equal
- W. Alternators shall be MPE Alternator #008, ATC Diversified Electronics ARA, or approved equal

2.03 LEVEL TRANSDUCER

- A. A submersible level transducer with adequate sized cable shall be provided for each collection pump and each detection pump. The transducers shall be constructed of 300 series stainless steel and shall be mounted to the pump carriage. Transducers shall provide a 4 to 20 mA output signal and come equipped with built-in surge protection. Static accuracy shall be no less than 1.0%.
- B. A submersible level transducer with adequate sized cable shall be provided for each collection pump and each detection pump. The transducers shall be constructed of 300 series stainless steel and shall be mounted to the pump carriage. Transducers shall provide a 4 to 20 mA output signal and come equipped with built-in surge protection. Static accuracy shall be no less than 1.0%.

2.06 FLOW METER

- A. The Contractor shall supply and install flow meters in all the pump discharge lines. Two flow meters are required for the primary pumps and one for the secondary pump at each station. The flow meters will record rate and totals of liquid transfer from the sump. The flow meters shall fit into the line and be a self contained unit with readout display attached directly to the flow meter body. Flow

meter must meet NEMA 4X standards. The flow meter shall be Endress + Hauser Promag 50W or approved equal.

- B. The flow meters shall be magnetic type have NO moving parts inside the unit. Paddle wheel or turbine type flow meters are not acceptable.
- C. A 4 to 20 mA control signal proportional to the discharge flow rate shall be output for use by the pump controller.
- D. Flow meters must be capable of handling and passing solids of up to 3/8 inch in diameter, or the solids passing size of the pumps used for the project, without clogging.
- E. Flow meter will insert into the discharge line and be secured there by flanged connections.
- F. Flow meter must be grounded and bonded through its own grounding system.
- G. Flow meter must possess the following characteristics:
 - 1. Minimum of 150 lb flanges
 - 2. Forward, reverse and net totals
 - 3. 4 to 20 mA scaled analog output
 - 4. RS232 digital ports
 - 5. Self-diagnoses to include current ramp, coil drive check and input simulator.
 - 6. Non-volatile EEPROM memory
 - 7. 2 line, 16 character backlit display
 - 8. 77-277 VAC powered

2.07 PUMP RETRIEVAL CABLE

- A. Retrieval cable should be a minimum of 3/8 inch diameter, made of stainless steel and of sufficient length to secure pump at the top of the sump when the pump is in operating position at the sump bottom. (Contractor shall confirm length.) All cable retaining hardware shall be made of stainless steel.
- B. Cable shall be attached to the top of the pump in a secure manner as to facilitate its removal from the riser pipe assembly.

2.08 BREAKOUT BOXES

- A. Contractor shall supply separate electrical breakout boxes to ensure no gas migration occurs from the sump into the control panel. These breakout boxes will

meet NEMA 4X standards. All breakout boxes will have a hinged front door and padlockable quick release latches to facilitate easy access. Screws to secure the front of the breakout box will not be acceptable. All exposed fittings and fixtures will be stainless steel. Electrical terminal connections inside the box must be DIN rail mounted. Multiple terminal strips will not be acceptable. Each terminal must be able to be separated from the rest without the need to replace the complete connector strip. All conduit connections from the breakout boxes to the control panel must be completely 'sealed off' using sealing fittings and an epoxy based potting compound to prevent gas migration into the control panel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All materials and equipment shall be installed as shown on the Drawings and as recommended by the manufacturer. All electrical work shall conform to NFPA 70 and the requirements of Division 16.

3.02 INSPECTION AND TESTING

- A. Field supervisor: The manufacturer will furnish a suitably qualified technician to inspect the completed installation, make necessary adjustments and instruct operating personnel in the proper care and operation of the equipment, prior to the final acceptance of the pumping station. No distributor, representative, or agent acting on behalf of the manufacturer shall be approved to complete start up services. This task must be reviewed and completed by a direct employee of the manufacturer.
- B. Field Test: When the pumping facility is complete and ready for operation, then the station shall be inspected and tested for compliance to the contract documents. Test of equipment shall be made by the Contractor in the presence of the Consultant, electrical sub-Contractor, equipment manufacturer and the Owner. The equipment tests shall include, but will not be limited to the following:
 - 1. Pumps and motors: Pumps shall be run dry to ensure their run dry compatibility as well as being run in the sump under 'wet' conditions. A determination shall be made of the pumping capacity. Performance of the pumps shall meet the specified criteria when field tested.
 - 2. Electrical: Readings shall be made of the voltage and amperage draw and recorded on the manufacturers start up form. This form should be kept by the manufacturer, Consultant, Contractor, and Owner for future reference.

3. Controls: Control primary elements shall be tested to determine satisfactory performance for starting and stopping at the proper liquid levels. Pump sequence and alarm functions will also be tested.
4. Equipment: Equipment shall be operated to determine that the pump is located in the correct position in the riser assembly. A check will be conducted to ensure that there is no overloading of the pump or any overheating in any of the controls. A check will be conducted for any abnormal vibration that may be evident in the discharge plumbing. Pump will be raised and reset to ensure correct placement in riser pipe.
5. Inspection: An inspection of all mechanical and electrical equipment, controls, piping, valves, fittings, brackets, mountings, seals, conduit, painting, and component features shall be made while the station is being tested to determine performance and compliance with design requirements and the specification.
6. Structure: The station shall be inspected for performance, structural soundness and water tightness.
7. Repairs, adjustments, and replacement: The Contractor shall make any and all necessary repairs, adjustments and replace any component parts until performance has been demonstrated to the satisfaction of the Consultant. The Contractor shall bear the cost of any repair, adjustment and replacement.
8. Pump and Controls manufacturer must submit to the Consultant for review a full synopsis outlining occasions where the pump assembly has been:
 - a. Run dry without damage.
 - b. Operated under conditions whereby solids at least 3/8 inch have been passed through the pump assembly without degrading the pump performance or damaging the pump or motor assembly.
9. The pumps, control panels, flow meters, and break out boxes shall be supplied by the same supplier. Coordination of manufacturer representatives for the inspection and startup services shall be provided by the supplier.

10. The Contractor shall provide qualified manufacturer's representative(s) for a minimum of one 8-hour day to provide complete instruction of the Owner's personnel in the operation and maintenance of all systems provided in this section.

END OF SECTION

SECTION 11350
HIGH-DENSITY CROSS-LINKED POLYETHYLENE STORAGE TANKS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall provide a vertical, high-density cross-linked polyethylene tanks and accessories per Article 2.05, complete and in place, in accordance with the Contract Documents.
- B. Unit Responsibility: The Contractor shall be responsible for furnishing the vertical tank(s) and its accessories as indicated.

1.02 SUBMITTALS

- A. Shop Drawings: Shop drawings shall be approved by the Engineer or Contractor prior to the manufacturing of the vertical tank(s). Submit the following as a single complete initial submittal. Sufficient data shall be included to show that the product conforms to Specification requirements. Provide the following additional information:
 - 1. Vertical Tank and Fitting Material:
 - a. Resin manufacturer data sheet.
 - b. Fitting material.
 - c. Gasket style and material.
 - d. Bolt material.
 - 2. Dimensioned Tank Drawings:
 - a. Location and orientation of openings, fittings, accessories, restraints, and supports.
 - b. Details of manways, flexible connections, and vents.
 - 3. Calculations shall be stamped and signed by a registered, third-party engineer where required.
 - a. Wall thickness. Hoop stress shall be calculated using 600 psi @ 100 degrees F.
 - b. Tank restraint system. Show seismic and wind criteria.

- B. Manufacturer's warranty.
- C. Manufacturer's unloading procedure.
- D. Manufacturer's installation instructions.
- E. Supporting documentation of Manufacturer's certification to NSF/ANSI Standard 61 – Drinking Water System Components for water treatment chemicals.
- F. Supporting information of Quality Management System.
- G. Manufacturer's Qualifications: Submit to engineer a list of five installations in the same service as proof of manufacturer's qualifications.
- H. Factory Test Report:
 - 1. Material, specific gravity rating at 600 psi @ 100 degrees F design hoop stress.
 - 2. Wall thickness verification.
 - 3. Fitting placement verification.
 - 4. Visual inspection.
 - 5. Impact test.
 - 6. Gel test.
 - 7. Hydrostatic test.

1.03 REFERENCES, CODES AND STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

- A. American Society of Testing Materials (ASTM).
 - 1. ASTM D638—Standard Test Method for Tensile Properties of Plastics.
 - 2. ASTM D746—Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
 - 3. ASTM D790—Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - 4. ASTM D883—Standard Terminology Relating to Plastics.
 - 5. ASTM D1505—Standard Test Method for Density of Plastics by the Density-Gradient Technique.

6. ASTM D1525—Standard Test Method for Vicat Softening Temperature of Plastics.
7. ASTM D1693—Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.
8. ASTM D1998—Standard Specification for Polyethylene Upright Storage Tank: Section 11.3: Low Temperature Impact Test and Section 11.4: Oxylene-Insoluble Fraction (Gel Test).

B. American Society of Mechanical Engineers

1. ANSI/ASME B16.5—Pipe Flanges and Flanged Fittings

C. NSF International

1. NSF/ANSI Standard 61, AWWA – Drinking Water System Components.

D. Occupational Safety and Health Administration

1. 1910.27—Fixed ladders.

1.04 MANUFACTURER'S WARRANTY

1.05 QUALITY ASSURANCE

- A. The vertical tanks of the same material furnished under this Section shall be supplied by Poly Processing Company or approved equal that has been regularly engaged in the design and manufacture of chemical storage tanks for over 10 years.
- B. Tanks shall be manufactured from virgin materials.
- C. Tanks shall be manufactured from materials certified to NSF/ANSI Standard 61 for chemical storage.

1.06 WARRANTY

- A. The warranty shall be a 5-year full replacement warranty.
- B. The warranty shall cover replacement/repair of equipment, materials, and parts for the full warranty period.

1.07 SHOP QUALITY CONTROL AND TESTING

- A. The tank manufacturer shall have quality control procedures adequate to ensure that all fabrications comply with these Specifications. Quality control shall include in-process inspections as well as a final inspection by the manufacturer and written record of these inspections. The objective of manufacturer's quality control and inspection procedure shall be to have each tank comply with the Specifications and Drawings at the time of its first inspection.
- B. Inspection records shall be made for each tank. Tank inspection records shall be available to the Engineer upon request.
- C. Final acceptance by the Owner may be contingent on satisfactory inspection upon delivery and installation at the job site.
- D. The tank manufacturer shall perform the tests described below before shipping. Test samples shall be taken from the cut-out areas of where fittings are inserted in the tank. The Engineer or representative shall have the option of witnessing these factory tests.
- E. Impact Test: ASTM 1998-Section 11.3 shall be used for this test. Sample shall not shatter at 120 foot-pounds with sample at minus 20 degrees F for a 1/2-inch wall thickness. For a wall thickness less than 1/2-inch, the sample shall not shatter at 100 foot-pounds and minus 20 degrees F.
- F. Degree of Crosslinking Test: ASTM 1998-Section 11.4 shall be used in this test. A minimum of 70-percent Gel must be obtained.
- G. Hydrostatic Test: The tank shall be completely filled with water and checked to confirm no leaks no less than 30 minutes after filling.
- H. Wall Thickness: The tank shall have an actual wall thickness measurement taken at every 90 degrees, at each 1-foot elevation, up to 3 feet from the bottom of the tank.

PART 2 PRODUCTS

2.01 GENERAL

- A. Tanks shall be rotationally-molded, vertical, high-density cross-linked polyethylene, one-piece seamless construction, cylindrical in cross-section, and vertical with flat bottoms. Tanks shall have vertical Integrally Molded Flanged Outlets (IMFO®). Tanks shall be adequately vented. Where indicated, tanks shall be provided with ancillary mechanical fittings and accessories. Tanks shall have

the manufacturer, date of manufacture and serial numbers must be permanently embossed into the tank.

2.02 MANUFACTURER

- A. Poly Processing Company
- B. Approved Equal

2.03 POLYETHYLENE STORAGE TANKS

- A. High-density cross-linked polyethylene resin used in the tank manufacture shall be by Exxon Mobil Chemicals or equal and shall contain ultraviolet stabilizer as recommended by resin manufacturer. The tank material shall be rotationally molded and meet or exceed the following properties:

Property	Type I XLPE	ASTM Test
Environmental Stress Cracking Resistance, F50, hours, 10% Igepal	>1,000	D1693
Tensile Strength, Ultimate psi, 2-inch/minimum	2,830	D638 Type IV Specimen
Elongation at Break, %, 2-inch minimum	700	D638 Type IV Specimen
Flexural Modulus, psi	86,780	D790

- B. Wall thickness for a given hoop stress is to be calculated in accordance with ASTM D1998. Tanks shall be designed using a hoop stress no greater than 600 psi. In no case shall the tank thickness be less than design requirements per ASTM D1998.
 - 1. The wall thickness of any cylindrical portion at any fluid level shall be determined by the following equation:

$$T = P \times OD/2SD \text{ or } 0.433 \times SG \times H \times OD/2SD$$

Where:

T	=	wall thickness, in
P	=	pressure, psi
SG	=	specific gravity, gm/cc
H	=	fluid head, ft
OD	=	outside diameter, ft
SD	=	hydrostatic design stress, 600 psi

- a. The minimum wall thickness shall be sufficient to support its own weight in an upright position without external support but shall not be less than 0.187 inch thick.
2. On closed-top tanks, the top head shall be integrally molded with the cylindrical wall. Its minimum thickness shall be equal to the thickness of the top of the straight sidewall. In most cases, flat areas shall be provided for attachment of large fittings on the dome of the tank.
3. The bottom head shall be integrally molded with the cylindrical wall. Knuckle radius shall be:

Tank Diameter, ft	Min Knuckle Radius, in
greater than 6	1-1/2

4. Tanks with 3,000-gallon capacity or larger shall have at least three lifting lugs. Lugs shall be designed for lifting the tank when empty.
 - a. Unless otherwise indicated, manways shall be 24 inches in diameter or greater and equipped with an emergency pressure relief device or SAFE-Surge™ Manway.
 - b. Unless otherwise indicated, a bolted, sealed top manway shall be located in locations easily accessible from the nearest worker access position. The sealed manway shall be constructed of polyethylene material. The bolts shall be 300 series stainless steel. Gaskets shall be closed cell, cross-linked polyethylene foam, Viton, or EPDM materials.

- C. Tank colors shall be natural (unpigmented) or opaque colors as specified by the Engineer with written agreement by the tank manufacturer.

2.04 TANK ACCESSORIES

A. Ladder

1. Galvanized carbon steel access ladders shall be provided with the polyethylene storage tanks. Use proper chemical-resistant materials when anchoring to the tank dome or sidewall. Safety cages shall be added to ladders as required. Ladders must be designed to OSHA standard 2206; 1910.27.
2. Ladders must be secured to the tank and to the concrete to allow for tank expansion/contraction due to temperature and loading changes.

3. All ladders shall be designed to meet applicable OSHA standards.
Reference: OSHA 2206; 1910.27.

B. Restraint System

1. Provide complete restraint system, including cables, turnbuckles, thimbles, clips, epoxy adhesive type anchor bolts, and all other necessary hardware to secure tank to concrete support pad. All items shall be 300 series stainless steel construction.
2. Seismic system to be designed to meet the proper seismic zone and specified wind load. PE-stamped calculations and or drawings may be required based on individual project requirements.

2.05 TANKS

A. Tanks shall have the following specifications:

Tank # by Service	Liquid Stored	Fluid Operating Temp.	Tank Specific Gravity	Resin	Fitting Material	Gasket Material	Bolt Material
1	Water	ambient	1.65	XLPE	PVC	EPDM	316 SS

Tank #	Qty	Working Capacity	Nominal Diameter	Overall Height (see note 1)	Location: Indoors / Outdoors	Color
1	1	5,000 gal	7 feet 10 inches	16 feet	Outdoors	White

Note 1: Approximate overall height is measured along the straight cylindrical portion of the tank and does not include the dome top.

Note 2: The UV Rating on the 5,000-gallon tank mentioned above shall be 16.

2.06 TANK FITTINGS

- A. All tank fittings specified herein shall be furnished by the tank manufacturer. These tank fittings are not necessarily shown in the Drawings. The Contractor shall coordinate the location of the following accessories with the Drawings before submitting shop drawings for the tank:

1. Nozzles:
 - a. Provide IMFO fittings; other fittings shall be constructed of Schedule 80 PVC. All flanged joints shall be furnished with EPDM gaskets 300 series stainless steel bolts, nuts, and washers. Threaded fittings are not acceptable on the lower side wall. IMFO back-up rings shall be split and constructed of 316 stainless steel.

- b. All nozzles shall be furnished with a 150# ANSI flange constructed of PVC with 300 series stainless steel bolts, nuts, washers. Gaskets shall be EPDM.
- 2. U-Vents:
 - a. Provide one PVC U-vent per tank located at the peak of the tank dome.
 - b. Provide a non-metallic insect screen compatible with the sodium hypochlorite on each tank vent.
 - c. Vents should be sized by the tank manufacturer.
 - d. Vents should comply with OSHA standards.
- 3. Manways:
 - a. Provide one 24-inch (minimum inside diameter) tank dome manway per tank. The manway cover shall be manufactured out of HDPE.
 - b. Provide an EPDM gasket.
 - c. All bolts used to mount the manway cover shall be 300 series stainless steel.
 - d. Manway assembly shall include a surge-relief feature to provide additional protection against over-pressurizing the tank during pneumatic filling operations.
- 4. Fill Dip/Drop Pipes:
 - a. Provide one Schedule 80 PVC fill dip/drop pipe per tank. Each dip/drop pipe shall discharge 6 inches above the tank floor and be fitted with a wear plate or baffle assembly to prevent erosion of tank surface. Each dip/drop pipe shall be furnished with a non-obtrusive (no tank, wall penetrations) pipe support system. Each dip/drop pipe shall be a 3/8-inch-diameter vent hole located at the overflow crown elevation and oriented to face away from the tank's manway, vent, overflow, and level element locations.
 - b. Pipes shall be supported at 6-foot maximum intervals.

5. Flexible Couplings/Connections:

- a. Provide flexible coupling/connection assemblies for connection of piping to the lower sidewall fitting of the tanks in accordance with the tank manufacturer's requirements and recommendations. Flange bolting shall be 300 series stainless steel.

2.07 LEVEL INDICATION

- A. Float Indication: The level indicator shall be assembled to the tank and shall consist of PVC float, indicator, polypropylene rope, perforated interior pipe, PVC roller guides, clear PVC sight tube, and necessary pipe supports. The level indicator shall act inversely to the tank contents and shall not allow entrance of tank contents into the sight tube at any time.

PART 3 EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING

- A. The tanks shall be shipped in such a manner so as to protect them from damage and in accordance with the tank manufacturer's requirements and recommendations. Loose objects on trailers shall not be present.
- B. All fittings and other components shall be factory installed and, if necessary, subsequently removed for shipping and shipped separately as recommended by the tank manufacturer.
- C. All flange faces shall be protected from damage. All openings shall be covered to prevent the entrance of dirt, debris, and water.
- D. Nozzles or other fittings not intended for tank lifting shall not be used for lifting. The Contractor shall not lift tank unless it is completely empty.
- E. Upon arrival at the project site, the tanks and accessories shall be inspected for damage.

3.02 INSTALLATION

- A. The tanks shall be installed in accordance with the Contract Documents and tank manufacturer's written instructions and recommendations.
- B. All items damaged during tank delivery and installation shall be replaced at no expense to the Owner.

3.03 FIELD TESTING

- A. After installation, the tank and connecting pipe fittings and valving shall be field-tested by being completely filled with potable water. The tank and fittings shall hold water without loss, evidence of weeping or capillary action for a period of 24 hours prior to acceptance. The Engineer may also inspect the tank for defects, damage, and conformance with the Specifications.
- B. If any defects become evident during inspection and testing, the Contractor shall repair or replace the defective tank or component in accordance with the tank manufacturer's written instructions and recommendations.
- C. The tank manufacturer/supplier shall inspect the completed tank installation and provide written certification that the tank has been installed in accordance with the manufacturer's recommendations and that the warranty is valid and in force.

3.04 CLEANING

- A. After successful field testing, the tank shall be drained, thoroughly cleaned, and dried.

3.05 COORDINATION

- A. The Contractor shall verify tank concrete support pad dimensions, including block-out dimensions for integrally molded flanged outlet and its connecting piping system, suit each tank and piping system being provided, and comply with the tank manufacturer's requirements before forming and pouring concrete pads. The Contractor's failure to verify dimensions before construction of these pads shall require new concrete pads to be constructed at the Contractor's sole expense.
- B. The blocked-out/notched portion of the concrete pad to accommodate the integrally molded flanged outlet fitting and its connecting piping system, including supports/anchors, shall provide adequate clearance to facilitate proper installation, operation, and maintenance.

END OF SECTION

SECTION 11540
END-SUCTION CENTRIFUGAL PUMPS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section includes provisions for the supply and complete installation of one water pump and appurtenances as shown on the Contract Drawings and as specified herein.

1.02 RELATED SECTIONS

The Specification sections listed below are an integral part of this equipment specification, and the Contractor shall be responsible for providing these sections to the equipment suppliers.

- A. Section 01330, Submittals and Acceptance.
- B. Section 01600, Materials and Equipment.
- C. Section 01770, Project Closeout.
- D. Section 16401, Low-Voltage Electrical Work—General Requirements.

1.03 SUBMITTALS

Submit to the Engineer, in accordance with Section 01330, copies of all materials required to establish compliance with this Section. Submittals shall include at least the following:

- A. Shop drawings.
- B. Manufacturer's certificates.
- C. Operation and maintenance manuals and manufacturer's instructions.
- D. Pump Test Reports: Submit certified copies of factory-run pump performance test curves. Factory-certified performance test curves shall indicate the following:
 - 1. Flow in gallons per minute.
 - 2. Pressure in feet of water.
 - 3. Horsepower.
 - 4. Pump efficiency in percent of input shaft horsepower.
 - 5. Pump data:
 - a. Model number.
 - b. Serial number.
 - c. Impeller diameter and type.
 - d. Impeller speed.

6. Test condition data:
 - a. Date of test.
 - b. Mean water temperature.

1.04 REFERENCES

Design, manufacturing, and assembly of elements of the products herein specified shall be in accordance with the standards of these organizations:

- A. American Society for Testing Materials (ASTM)
 1. ASTM A48—Standard Specification for Gray Iron Castings
 2. ASTM B584—Standard Specification for Copper Alloy Sand Castings for General Applications
- B. American Water Works Association (AWWA)
- C. Hydraulic Institute Standards (HI)
- D. International Standards Organization (ISO)
- E. National Electrical Manufacturer's Association (NEMA)

Where reference is made to a standard of one of the above, or other organizations, the version of the standard in effect at the time of bid opening shall apply.

1.05 SYSTEM DESCRIPTION

- A. The end-suction centrifugal pump shall be clear-liquid-handling, horizontal frame-mounted type designed for continuous operation. One constant-speed compost water supply pump shall be installed to pump water to the four post-type flushing hydrants on the site as shown in Contract Drawings.

1.06 PERFORMANCE REQUIREMENTS OR CONDITIONS

Pump Characteristics	Plant Water
Number of pumps	2
Maximum Motor Speed, rpm	3,600
Primary Design Point Secondary Design Point	132 gpm @ 163 feet
Minimum Shut-Off Head, ft	180 feet
Min. Efficiency at Design, %	72
Maximum Motor Horsepower	10
Maximum Discharge Size, in	2.5
Electrical Service	240 V, 60 Hz, 1 phase

1.07 QUALITY ASSURANCE

- A. All the equipment specified under this Section shall be furnished by a single manufacturer and shall be standard units of proven ability as manufactured by a competent organization that is fully experienced, reputable, and qualified in the manufacture of the equipment to be furnished. The equipment shall be designed, constructed, and installed in accordance with the best practice and methods and shall operate satisfactorily when installed.
- B. All equipment furnished under this Section shall be new and unused and shall be the standard products of manufacturers having a successful record of manufacturing and servicing the equipment and systems specified herein for a minimum of 5 years.
- C. These Specifications are intended to give a general description of what is required but do not cover all details, which may vary in accordance with the exact requirements of the equipment as offered. They are, however, intended to cover the furnishing, delivery, installation, field testing, and field calibration of all materials and apparatus as required. Any additional equipment necessary for the proper operation of the proposed installation not specifically mentioned in these Specifications or shown on the Drawings shall be furnished and installed at no change in Contract Price or Time.

1.08 DELIVERY AND STORAGE

- A. All equipment delivered and placed in storage shall be stored with protection from the weather, humidity, and temperature variations; dirt and dust; or other contaminants in accordance with the manufacturer's recommendations.

1.09 SPARE PARTS

- A. The Contractor shall furnish the following spare parts in clearly identified containers:
 - 1. One set of mechanical seals.
 - 2. One set of impeller wear rings.
 - 3. One set of case wear rings.
 - 4. One set of bearings.
 - 5. One shaft sleeve.
 - 6. One complete set of gaskets and O-rings.

1.10 WARRANTY

- A. The Contractor shall provide 1-year warranty for the pump from the date of Substantial Completion.
- B. All work, equipment, and materials furnished and installed shall be warranted against defective design, materials, and workmanship for a period of 1 year. The warranty period shall begin at the date of final acceptance. During warranty period, the Contractor shall repair or replace any defective part or workmanship and restore the system to service at no additional cost to the Owner or change to the project schedule.
- C. The manufacturer shall warrant all parts free from defective material and workmanship for a period of 1 year. During the 1-year warranty period, the manufacturer shall repair or replace any defective material and workmanship at no additional cost to the Owner. The 1-year warranty period re-starts after the repair or replacement work is complete.
- D. The warranty shall cover replacement equipment, materials, parts, and/or repair, including labor, travel time, shipping costs, incidentals, and other miscellaneous expenses, at no additional cost to the Owner for the full warranty period. If any repair or replacement work is done before the warranty period expires, the warranty period re-starts again from the date of the repair or replacement work is done.
- E. The manufacturer's warranty period shall run concurrently with the Contractor's warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. The Plant water pump manufacturer and model shall be Cornell Pump Company or approved equal.

2.02 MANUFACTURED UNITS

- A. The pump and motor base shall be fabricated of steel components, with sufficient rigidity and strength to support the pump and motor during all pumping conditions, and shall be designed to facilitate mounting and grouting. The base shall be constructed to include holes for anchor bolts, grout hole(s), and a vent hole at each end of the base for venting entrapped air from the base during grout pouring in mounting the base to its cast-in-place concrete support pads. A rubber spacer in shear-type flexible coupling shall be furnished.

- B. Pump and motor shafts and couplings shall be covered with a removable OSHA-style coupling guard securely bolted to the base.
- C. The pump casing, volute, and back plate shall be a heavy-duty casting made of gray cast iron, ASTM A48, Class 30. All mating parts shall be machined with registered fit to ensure proper alignment. Pump casing, volute, and backplate shall be capable to withstand in excess of 150 percent of the pump shutoff head pressure.
- D. The impeller shall be keyed to the shaft and secured with a stainless steel washer and impeller stainless steel lock screw. The impeller shall be constructed of ASTM B584 Bronze (SAE 40) and fully machined on all exterior surfaces.
- E. Stuffing box shall be integral to the backplate and constructed of ASTM A48 Class 30 cast iron. Single mechanical seal shall be no external water flush. The seal faces shall be constructed of tungsten carbide or silicon carbide or a combination of these two materials.
- F. Suction casing and impeller wear rings shall be included on each pump supplied. The wear rings shall be mechanically secured into position to prevent rotation during operation and shall be replaceable in the field. The rings shall be constructed of bronze (SAE 660).
- G. Shaft shall be heavy-duty steel (SAE 1144) with bronze shaft sleeve, accurately machined and polished and of sufficient size to transmit full driver output. The shaft sleeve shall extend through the stuffing box. The sleeve shall be grooved on the inside for an O-ring or gasket to prevent leakage along the shaft and shall be positively locked to prevent rotation on the shaft. The steps in the shaft shall be properly proportioned to reduce stress concentrations. The shaft deflection shall be minimized to promote longer seal and bearing life. Shaft deflection information shall be supplied, documented, and certified by the pump manufacturer.
- H. Bearing frame shall be of one-piece ASTM A48 Class 30 cast iron with end covers at both ends of bearing frame. Bearing frames shall be designed so that complete rotating element can be removed from the casing without disturbing the piping. Bearings shall be of the roller or ball type and of sufficient size to withstand the radial and axial thrust loads incurred during service. The pump end and drive end bearings shall have in excess of 50,000 hours B-10 bearing life. The B-10 bearing life shall be calculated, documented, and certified by the manufacturer.

- I. The bearings shall be grease-lubricated with fittings provided to facilitate lubrication.

2.03 ACCESSORIES

- A. Pump base anchor bolts shall be AISI Type 316 stainless steel epoxy grouted anchors designed for embedment in cast-in-place concrete. The pump manufacturer shall recommend anchor bolt size and embedment depth and positioning templates. Anchor bolts shall be supplied by the Contractor.

2.04 MOTORS AND DRIVERS

- A. The motors shall be single phase, 230-volt, premium efficient, total enclosed and fan-cooled, non-overloading, squirrel cage induction type motors suitable for use and operation exposed and outdoors and shall conform to the requirements of Sections 16401, Low-Voltage Electrical Work—General Requirements.
- B. The motors shall have a 1.15 service factor and the pump, operating at the future design condition, and shall not use this service factor or operate above the pump motor name plate rating during any present or future pumping condition.

2.05 CONTROL PANEL

- A. The compost water supply pump will be constant speed and run as required. The pump will have a local control panel equipped with an ON/OFF switch. The operator can manually start/stop the pump. The control panel shall be NEMA 4X suitable for outdoor installation stainless steel control panel with 3-point lockable door, air vents, and rain shield. The control panel shall possess a surge arrester, thermal terminals, and TD relays. All control panel components shall possess minimum NEMA 4X rating. The control panel shall be provided by the pump manufacturer. For each pump, provide a pump run indication pilot light, pump run time meter, general alarm strobe light, and alarm horn. The audible alarm horn duration will be limited to 30 minutes. An alarm reset button will be available to silence any alarm. All electrical components shall meet the electrical requirements as listed in Section 16401.

2.06 SHOP TESTING

- A. Factory Testing
 - 1. All pumping units shall be tested in water as a complete unit (this includes pump, motor, and drive) at the manufacturer's plant before shipment. The testing shall be a complete performance test and is to include head and capacity, horsepower, and efficiency to show conformance to the

requirements of the performance specifications. All testing shall conform to the Hydraulic Institute standards and be certified by a Professional Engineer. The test can be witnessed at the Owner's option.

2. The pump curves obtained from these tests shall be submitted to the Engineer for approval before shipment.

2.07 PAINTING

Surface preparation, shop painting, field painting, and other pertinent detailed painting specifications shall be in accordance with the following:

- A. The manufacturer shall prime equipment as recommended by the manufacturer.
- B. The Contractor shall apply intermediate and finish coats as recommended by the pump manufacturer for external installation.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The equipment shall be installed in accordance with the instructions of the manufacturer and the Contract Documents.

3.02 TESTING

- A. Field tests shall be made in conformance with manufacturer's instructions.
- B. Preliminary field tests shall be made after installation of the compost water supply pump. Final field tests shall demonstrate the following:
 1. That the units have been properly installed and are in proper alignment.
 2. That the units operate without overheating or overloading any parts and without objectionable vibration.
 3. That no parts have mechanical defects.

C. Field-testing shall demonstrate that the systems perform as specified and meet all operating criteria. Additional testing requested by the Owner or Engineer shall be performed at no additional expense to the Owner. The field test shall demonstrate that under all conditions of operation, each component within each pumping station system:

1. Has not been damaged by transportation or installation.
2. Has been properly installed.
3. Has no mechanical defects.
4. Is in proper alignment.
5. Has been properly connected.
6. Is free of overheating of any parts.
7. Is free of all objectionable vibration.
8. Is free of overloading of any parts.

D. Final acceptance will depend on the satisfactory operation and performance after installation.

3.03 MANUFACTURER'S SERVICES AND CERTIFICATES(S)

- A. The Contractor shall arrange for the manufacturer to furnish the services of a qualified representative as necessary to check and supervise the equipment installation; to supervise the final acceptance test and the initial operation; and to instruct the Owner's operator in operations, proper maintenance, and repairs. One day for each of the manufacturer's services shall be included.
- B. The equipment manufacturer shall provide a written report covering his findings and installation approval. The report shall include descriptions of all inspections and any deficiencies noted and shall be mailed directly to the Engineer.

END OF SECTION

DIVISION 13
SPECIAL CONSTRUCTION

SECTION 13120
PRE-ENGINEERED METAL BUILDING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment, and incidentals required to design, fabricate, deliver to the project site, and erect the pre-engineered building as shown on the Drawings and as specified in this Section.
- B. Material furnished shall include the structural framing, connections, anchor bolts, framed openings for roof penetrations, and framed openings for doors; metal roofing, metal siding, metal curbs, pipe flashing, gutters, downspouts, gable trim, flashing, closures, fasteners, sealants, and all other component parts for a complete Pre-Engineered Metal Building.
- C. All materials shall be new, fabricated in a workmanlike manner, and free of defects.

1.02 RELATED WORK

- A. Section 02230, Site Preparation.
- B. Section 02300, Earthwork.
- C. Section 03100, Concrete Formwork.
- D. Section 03200, Concrete Reinforcement.
- E. Section 03300, Cast-In-Place Concrete.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

- A. Submit to the Engineer complete drawings showing superstructure column lines set to coordinate with concrete dimensions shown. Indicate anchor bolt size and locations and foundation reactions in KIPS at all columns.
- B. Submit product information, specifications, and installation instructions for all components and accessories proposed.

- C. Submit shop drawings and complete erection drawings for review, including:
1. Anchor bolt and base plate settings.
 2. Sidewall, end wall, roof framing, and bracing.
 3. Transverse cross-sections and details of openings, covering, and trim.
- D. Records
1. Furnish the Engineer with the following records:
 - a. A letter signed and sealed by a Professional Engineer registered in the Florida certifying that the structural framing and covering panels proposed meet the design criteria set forth by the Engineer.
 - b. Two sets of design calculations signed and sealed by a Professional Engineer registered in Florida.
 - c. One set of reproducible record erection drawings.
- E. Samples
1. Two each of the following samples shall be submitted for approval of materials, finish, color, and texture:
 - a. Full panel width by a minimum 12-inch-long roofing and wall panels in proposed colors and finish.
 - b. Minimum 12-inch-long formed sections of gutter, gutter tailpiece, gable trim, and flashings in proposed colors and finish.
 - c. Each proposed fastener.
 - d. Sealants and closures.
- F. Color Charts
1. Submit standard the manufacturer's color charts for initial color selection.
 2. Colors shall be selected by the Engineer and the Owner.
- G. Signed and sealed drawings and design calculations shall be submitted to the Engineer for approval before erection.
- H. Submit the building manufacturer's welder certifications.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Society for Testing and Materials (ASTM)

1. ASTM A792—Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

- A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Specification Section 01780, Warranties and Bonds.
- B. Provide a 1-year warranty for all furnished components except provide a 20-year warranty for wall and roof panels. Provide a 20-year extended-life endorsement and a 10-year weathertightness endorsement for furnished metal curbs, and provide a full 20-year weathertightness endorsement for roof panels.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.
- B. Deliver, store, and handle prefabricated components, sheets, panels, and other manufactured items so they will not be damaged or deformed. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight ventilated covering. Store metal sheets or panels so that water accumulations will drain freely. Do not store sheets or panels in contact with other materials which might cause staining.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 RECORD DRAWINGS (NOT USED)

1.13 SYSTEM DESCRIPTIONS (NOT USED)

1.14 OPERATIONS AND MAINTENANCE (O&M) MANUALS

- A. Operations and Maintenance Manuals shall be in accordance with General Conditions, Supplementary Conditions, and Specification Section 01830, Operations and Maintenance Manuals and Training.

1.15 PATENTS AND LICENSES (NOT USED)

PART 2 PRODUCTS

2.01 GENERAL

- A. The Specification is for a pre-engineered metal building by Butler Manufacturing Company, Kansas City, Missouri; Dean Steel Buildings, Fort Meyers, Florida; Allied Steel Buildings, Fort Lauderdale, Florida; or equal. All components listed are those manufactured by Butler Manufacturing Company and are used as a basis for the design. All components provided shall meet or exceed the requirements of the Specification.
- B. The design of the structural system for the Building is to be clear-span rigid-frame with tapered columns, tapered roof beams, and a gable roof (Butler Type LRF).
- C. The actual building length and building width shall be structural line to structural line, incorporating nominal bays and widths in the manufacturer's standard sizes.
- D. The roof shall be sloped as shown on the Drawings.
- E. All components and parts of the structural system shall be as indicated on the Drawings and in this Section of the Specifications.
- F. All components and parts shall be clearly marked.
- G. Erection Drawings, signed and sealed by a Professional Engineer registered in Florida, shall be supplied for identifying and assembling parts.
- H. Field modification shall be in accordance with the best standard procedures and to be the responsibility of the building erector.

- I. All reactions for the foundation design are to be supplied by the pre-engineered building manufacturer before the building foundation shop drawing is submitted.
- J. Anchor bolts shall conform to ASTM F 1554, Grade 36, and hot-dip galvanized in accordance with ASTM A153/A153M. Anchor bolt locations, size, and quantity shall be designed by the building manufacturer and supplied by the Contractor.

2.02 DESIGN CRITERIA

- A. Primary and secondary members and covering shall be designed for the listed design criteria in the Contract Drawings. Roof system shall have a U.L. wind uplift Class 90 rating.
- B. The design shall allow for concentrated loads for equipment attached to the building structure as shown on the Drawings and for the dead load of the structure itself.
- C. Column reactions shall be vertical and horizontal only. No bending moments will be allowed at the column bases.
- D. The design, fabrication, and erection of the building shall conform to the applicable sections of the latest edition or revision of the following codes and standards:
 - 1. American Institute of Steel Construction
 - a. Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings
 - 2. American Iron and Steel Institute
 - a. Specifications for the Design of Cold-Formed-Steel Structural Members
 - b. Design of Light-Gauge-Steel Diaphragms
 - 3. American Welding Society
 - a. Structural Welding Code
 - 4. Metal Building Manufacturer's Association
 - a. Recommended Design Practices Manual

5. American Society of Testing and Materials

- a. Material designation as specified in this Section by ASTM number.

2.03 MATERIAL (FRAMING)

A. Primary Framing

1. Rigid Frames:

- a. Frames shall consist of welded-up plate section columns and roof beams complete with necessary splice plates for bolted field assembly.
- b. Welding shall be done in accordance with the American Welding Society Code for Building Construction.
- (1) Certification of welder qualifications are to be supplied.
- c. All base plates, cap plates, compression plates, and stiffener plates shall be factory welded into place and have the connection holes shop fabricated.
- d. All splice plates shall be shop fabricated complete with bolt connection holes.
- e. Columns and roof beams shall be fabricated complete with holes in webs and flanges for the attachment of secondary structural members and bracing.

2. All bolts for field assembly of frame members shall be high-strength bolts as indicated on erection Drawings.

3. Endwall Structurals:

- a. Endwall frames shall consist of endwall corner posts, endwall roof beams, and endwall posts as required by the design criteria.
- (1) All splice plates and connection clips shall be shop fabricated complete with bolt connection holes.
- (2) Beams and posts shall be shop fabricated complete with holes for the attachment of secondary structural members.

B. Secondary Structural Members

1. Purlins and Girts:

- a. Purlins and girts shall be 9-1/2-inch (minimum) deep "Z" sections, precision roll formed.
- b. Outer flange of all purlins and girts shall contain factory-punched holes for panel connections.

2. Eave Struts:

- a. Eave struts shall be 9-1/2-inch-deep (minimum) "C" sections.
- b. Outer flange of all eave struts shall contain factory-punched holes for panel connections.

3. Bracing:

- a. Diagonal bracing shall be designed by the building manufacturer and attached to columns and roof beams.
- b. Flange braces, sag angles, etc., when required, shall be supplied by the building manufacturer.
- c. All bracing locations shall be coordinated with ductwork, piping, door openings, and ventilation openings.

C. Structural Painting:

- 1. Primary Frames: Clean all steel in accordance with SSPC-SP6. Apply one coat of Tnemec Series 90-97 Tneme-zinc at a dry film thickness of 2.5 to 3.5 mils.
- 2. Secondary Structurals: Clean all steel in accordance with SSPC-SP8. Apply one coat of coil-applied polyester primer to a minimum coating thickness of 0.5 mil (purlins and girts).
- 3. Finish Paints System (Primary Frames and Secondary Structurals)
 - a. 1st Coat: Tnemec Series 66HB Epoxoline (or equal) with a dry film thickness of 3.0 to 5.0 mils.

- b. 2nd Coat: Tnemec Series 1075 Endurashield (or equal) with at dry film thickness of 2.5 to 4.0 mils.

2.04 MATERIAL (ROOF AND WALL SYSTEM)

A. General

1. The building roof and wall panels shall be precision roll formed Butlerib II roof systems furnished by Butler Manufacturing Company or approved equal PBR panels defined by MBCI. MBCI is the metal roof and wall panel manufacturer at 14031 West Hardy Road, Houston, TX 77060.
2. Details shall be in accordance with the manufacturer's drawings.
3. Installation shall be in accordance with the manufacturer's drawings.

B. Panel Description

1. Panels shall be roll formed to provide a width coverage of 36 inches.
 - a. There shall be four major corrugations, 1-1/4 inches high (minimum), spaced 12 inches on center.
 - b. There shall be minor corrugations, spaced 4 inches on center between and perpendicular to the major corrugations.
2. The panel endlaps shall be 6 inches.
 - a. Panels shall be of maximum length so as to minimize panel endlaps.
 - b. Endlaps shall be engineered to occur over and be fastened to a secondary structural member.
 - c. The upper end of all panels shall be marked for the proper location of endlap sealant.
3. Ridge assembly shall be designed to allow for expansion and contraction.
4. Eave panels shall extend beyond the building structural line.
5. Panels shall be factory pre-punched at panel ends to match pre-punched holes in the eave structural members. Panel end splices shall be factory

pre-punched and pre-notched. Panel end splices shall allow for expansion and contraction of the panels.

6. Panel Material and Finish

- a. 24 gauge steel, coated both sides with a layer of Galvalume aluminum-zinc alloy (approximately 55% aluminum, 45% zinc) applied by the continuous hot dip method. Minimum 0.55-ounce coated weight per square foot as determined by the triple-spot test according to ASTM A792.

C. Panel Design

1. Panel design shall be in accordance with Paragraph 2.02 of this Section.
2. Panel design shall provide for expansion and/or contraction as caused by an ambient temperature range of 120°F without causing harmful buckling, opening of joints, and other detrimental effects.

D. Fasteners

1. Bearing plates and panel clips shall be fastened to structural members with fasteners as in the manufacturer's erection drawings, using factory pre-punched holes in structural members.
2. All connections of panels to structural members or between panels shall be designed and constructed by the building manufacturer.
3. Panels or clips shall be fastened to structural members with fasteners according to the manufacturer's erection drawing, using factory pre-punched holes in structural members.
4. Fasteners shall be self-tapping fastener hot-dip galvanized or with 3/8-inch zinc-aluminum cast head and 3/4-inch-diameter EPDM washers.

E. Accessories

1. Accessories to be standard with Butler Manufacturing Company, unless otherwise noted and furnished as specified. Location of standard accessories on the erection drawings as furnished by the manufacturer. Accessories shall be installed in accordance with the manufacturer's instructions and as shown on the Drawings.

- a. Metal curbs and pipe flashings shall be Butler standard except that interior faces of curbs must be fully enclosed also.
- b. Gutters, downspouts, and trim pieces shall be standard Butler Manufacturing products installed in accordance with manufacturer's instructions and as shown on the erection drawings.
- c. All miscellaneous trim, gutters, downspouts, and accessories are to match adjacent panel colors.

F. Panel Application

1. All panels shall be factory cut-to-length according to the erection drawings as furnished by Butler Manufacturing Company.
2. All panels shall be positioned and aligned to hold the 36-inch module throughout the building length.
3. Pre-punched panels shall be positioned and aligned by matching the pre-punched holes in the panel with the pre-punched roof structurals.
4. Panel sidelaps shall be field seamed; all sidelap sealant shall be factory applied.
5. All endlaps will be at least 6 inches and fastened together over and to structural members.
6. All panel sidelaps and endlaps shall be sealed with weather sealing compound to prevent the entry of capillary moisture.
7. Fasteners shall be installed with proper tools in a workmanlike manner according to the recommendations of the manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The pre-engineered building shall be erected on the site as indicated on the Drawings.
- B. The pre-engineered building shall not be fabricated or erected until:
 1. Structural loadings required in this Section supplied by the building manufacturer have been approved by the Engineer.

2. The foundation design and details based on the structural loadings have been approved by the Engineer.
- C. The pre-engineered building shall not be erected until the foundation work, the concrete floor slab, plumbing, and other incidentals required to be built before the building installation have been approved by the Engineer.
- D. The pre-engineered building shall not be erected until sufficient components of the building to enable a stable structure to be erected are on site.
- E. The Contractor is responsible for ensuring that all safety procedures for the erection of the building are strictly enforced and that any required ties, stays, and temporary works are positioned as necessary to keep the structure stable and secure at all times.
- F. All installation of the building shall be to the manufacturer's instructions and requirements.
- G. The building manufacturer shall provide all necessary framing details to the openings in the walls, roofing, and other components where shown on the Drawings. The cost of all such framing shall be included in the installed cost of the pre-engineered building.
- H. The building manufacturer shall provide, at no additional cost to the Owner, all necessary repair and touch-up work required as a result of damage to building components due to required cut-outs, penetrations, or by mishandling before and during erection.

END OF SECTION

SECTION 13125
PRE-ENGINEERED FABRIC COVER BUILDING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor and materials required and design and install a total of three completed structural steel and fabric structures including steel framing, purlins, connection cables, base plates, anchor bolts, foundation, and appurtenances required to erect the structural framing and secure the fabric to the structure in accordance with the manufacturer's recommendations.
- B. All materials shall be new, fabricated in a workmanlike manner, and free of defects.
- C. Requirements listed in this Section are the minimum basis of design. Signing and sealing of the building and foundation designs by a licensed Professional Engineer in Florida will be required.

1.02 RELATED WORK

- A. Section 02230, Site Preparation.
- B. Section 02300, Earthwork.
- C. Section 03100, Concrete Formwork.
- D. Section 03200, Concrete Reinforcement.
- E. Section 03300, Cast-In-Place Concrete.

1.03 SUBMITTALS

- A. All submittals shall be in accordance with Section 01330.
- B. Submit to the Engineer:
 - 1. The Contractor shall provide the following information within 10 days of contract award:
 - a. Overall project layout accounting for changes in building dimensions.
 - b. Plan views and sections of proposed buildings.
 - c. Foundation type and conceptual sketch.
 - d. Fabric material cut sheet information.

- e. Structure frame coating material.
 - f. Warranty information.
- 2. Site-specific detailed shop drawings, schedules, and product data for all components of the fabric cover building system. Review will be for building concept only and shall not relieve the Contractor of responsibility for proper fit of members, of connections not detailed on the Drawings, or for meeting the requirements of the Contract Documents.
 - 3. Erection drawings; Numbers painted on the shop-assembled pieces of steel shall be the same mark numbers used on the shop drawings and erection drawings, if applicable.
 - 4. Letter signed and sealed by a Professional Engineer licensed in Florida certifying that the structural system is in compliance with Florida Building Codes and meets the criteria set forth by the Engineer.
 - 5. Design calculations signed and sealed by a Professional Engineer licensed in Florida.
 - 6. Final drawings signed and sealed by a Professional Engineer licensed in Florida. Final drawing shall include:
 - a. All design assumptions.
 - b. All base plate reactions.
 - 7. Submit design calculations and drawings signed and sealed by a Professional Engineer licensed in Florida. Foundation design shall be coordinated and incorporate the reaction loads from the fabric cover building system.
 - 8. Record Drawings depicting actual installation conditions.
 - 9. Color charts shall be submitted for the Owner's color selection.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

- A. American Institute of Steel Construction (AISC)

B. American Society for Testing and Materials (ASTM)

1. ASTM A36—Standard Specification for Carbon Structural Steel
2. ASTM A123—Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
3. ASTM A153—Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
4. ASTM A307—Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
5. ASTM A325—Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
6. ASTM A490—Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
7. ASTM A500—Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
8. ASTM A513—Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
9. ASTM A573—Standard Specification for Structural Carbon Steel Plates of Improved Toughness
10. ASTM A615—Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
11. ASTM A687—Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
12. ASTM D751—Standard Test Methods for Coated Fabrics
13. ASTM D2136—Standard Test Method for Coated Fabrics—Low-Temperature Bend Test
14. ASTM D3786—Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
15. ASTM D2261—Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
16. ASTM D5799—Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
17. ASTM D5034—Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
18. ASTM D5035—Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
19. ASTM E84—Standard Test Method for Surface Burning Characteristics of Building Materials
20. ASTM E903—Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres
21. ASTM F1554—Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

- C. American Welding Society (AWS)
 - 1. AWS A5.1—Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
 - 2. AWS D1.1—Structural Welding Code Steel.
- D. International Organization for Standardization (ISO)
 - 1. ISO 2076—Textiles—Man-made fibres—Generic names
- E. National Fire Protection Association (NFPA)
 - 1. NFPA 701—Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
- F. Research Council on Structural Connections of the Engineering Foundation (RCSCEF)
 - 1. Specification for Structural Joints using ASTM A325 or ASTM A490 Bolts.
- G. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.06 QUALITY ASSURANCE

- A. Structural steel shall be in accordance with the AISC Standard for Structural Steel Buildings and the Code of Standard Practice for Steel Buildings and Bridges, unless otherwise specified herein.
- B. Welding shall be in accordance with AWS D1.1 unless otherwise specified herein or in the AISC Standard.

1.07 WARRANTIES

- A. Warranty shall be in accordance with Section 01780 and requirements listed in this Section.
 - 1. Provide 15-year warranty for the complete building system including steel frame, coatings, fabric covering, mechanical tensioning system, and other appurtenances necessary for the completed system. Warranty shall not make exclusions for high-humidity environment and presence of ammonia.

2. Addition of fans or other appurtenances shall not void the building warranty.
3. Pre-Engineered Fabric Cover Building Warranty to be provided using the document included as Attachment 1 to this Section. If the supplied structure system is comprised of aluminum or some other approved material, the Attachment shall be updated to reflect such substitution.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Storage and handling of all materials shall be in accordance with manufacturer's specifications.
- B. Materials shall be stored on skids and not on the ground. Pile and block materials so that they will not become bent or otherwise damaged.
- C. Handle materials with cranes or derricks as far as practicable. Do not dump steel off cars or trucks or handle in any other manner likely to cause damage.

1.09 QUALIFICATIONS

- A. The manufacturer shall have at least 10 years of successful experience designing and manufacturing/supplying fabric cover buildings of the type, size, and service conditions required for this project. The manufacturer shall have supplied buildings for similar facilities on not less than 5 projects. The building systems shall have been in successful operation for at least 10 years.
- B. The Contractor is responsible for evaluating proposed buildings to determine that all requirements of the Contract Documents are met. Subject to compliance with the requirements of the Contract Documents, the following is a list of manufacturers capable of meeting the project requirements:
 1. Shelter Structures, Inc., Philadelphia, PA.
 2. ClearSpan Fabric Structures International, South Windsor, CT.
 3. Big Top Manufacturing, Perry, FL.
 4. Legacy Building Solutions, South Haven, MN.

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MOCK-UP (NOT USED)

1.12 PROJECT REQUIREMENTS

A. System Description

1. The superstructure shall consist of a series of two-dimensional structural steel truss frames with a fabric-covered roof. The structure shall have open end walls and side walls and have no interior columns. The structure shall be stabilized with the use of purlins and cables. No supports or cables shall intrude in the clear span area.

The fabric shall be tensioned over the framework and be connected to the framework with a mechanical tensioning system. The fabric shall be continuous between sidewalls of the structure to provide a weather-tight seal.

2. The building system shall be designed for a minimum 15-year life for conditions of high humidity and ammonia presence.
3. All building connections shall be designed by a Professional Engineer licensed in Florida.
4. The superstructure will be supported by a foundation meeting the reaction requirements of the building system.

B. Design Criteria

1. Working Area: Height, width, and length required for facility equipment to operate. This area is defined on the Drawings. There shall be no obstructions within this area.
2. Fabric shall terminate at a minimum height of 15 feet above finished grade on the sides of the building and 18 feet on the ends of the building.
3. Loading: The structure shall be designed in accordance with Florida Building Code, Lee County requirements, Hendry County requirements, and all other applicable codes and standards. The framing shall comply with AISC, AISI, NEMA, and ASTM specifications. Appropriate safety factors shall be used.
 - a. Minimum Roof Loads: The structure shall be capable of supporting a roof live load of a minimum of 12 pounds per square foot and a collateral load of 3 pounds per square foot over any portion of the roof area. Loading from the HVLS fans shall be accounted for in the design.

- b. Minimum Wind Loads: The structure shall be capable of withstanding wind loads required by the Florida Building Code and any other local ordinances. The structure shall be designed to withstand a 3-second gust of 120 mph using an Importance Factor of 1.0 and Exposure C as a minimum.

4. Foundation

- a. Foundation shall be designed, signed, and sealed by a Professional Engineer licensed in Florida.
- b. Foundation sizing shall be coordinated with the fabric cover building system manufacturer.
- c. An industry standard factor of safety shall be used but shall not be less than 3.0.
- d. The cost for any required amendments to the foundation material quantities as shown on the Drawings shall not result in any additional cost to the Owner.

5. Structural Frame

- a. The structural frame shall not rely on the fabric membrane for building stability. The building frame alone shall meet all code requirements listed above.
- b. The structural frame shall have provisions for current or future installation of fans and/or louvers in the end wall.

6. Fabric Covering

- a. The fabric shall be sectional sheets stretched over the framework between the main structural frame members. The fabric cover shall provide a water-tight seal by overlapping or joining fabric sections with a mechanical tensioning system. The mechanical tensioning system shall be designed to minimize maintenance and the need for re-tensioning of the fabric cover. All roofs, end walls, and connecting sections shall be weather-tight.
- b. Each side of the fabric shall have a UV protective coating.