SECTION 06 1636 - WOOD PANEL PRODUCT SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install wood panel product sheathing required for gable ends and roofs of the restroom/shower buildings as described in Contract Documents.

B. Related Requirements:

1. Section 01 1200: 'Multiple Contracts Summary'.
2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
3. Section 06 1100: 'Wood Framing' for:

    a. Pre-installation conference held jointly with Section 06 1636.

1.2 REFERENCES

A. Association Publications:

1. National Institute of Standards and Technology (NIST), U. S. Department of Commerce:

    a. Voluntary Product Standard DOC PS 1-09. 'Structural Plywood'.
    b. Voluntary Product Standard DOC PS 2-04. 'Performance Standard for Wood-Based Structural-Use Panels'.

2. The Engineered Wood Association (APA), Tacoma, WA www.apawood.org.

    a. Performance Rated Panels, 'Product Guide' (for products bearing the APA trademark) December 2011.
    b. Voluntary Product Standard:

        1) PS 1-09. 'Structural Plywood'.
        2) PS 2-04. 'Performance Standard for Wood-Based Structural-Use Panels'.

    c. PRP-108 'Performance Standards and Policies for Structural-Use Panels'.

3. TECO, Cottage Grove, WI www.tecotested.com.

    a. TECO PRP-133: ('Fire Rated Assemblies – OSB substitution for plywood in UL fire-rated assemblies that specify plywood).

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:

1. Participate in pre-installation conference as specified in Section 06 1100.
2. In addition to agenda items specified in Section 01 3100 and Section 06 1100, review following:

    a. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control inspection required of this section.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Suppliers:

a. Licensed by American Institute of Timber Construction, or American Wood Systems.

1) Submit documentation to Architect or Owner.

B. Testing and Inspection:

1. Owner will provide Testing and Inspection for inspection of sheathing:

a. Owner will employ testing agencies to perform inspection for sheathing as specified in Field Quality Control in Part 3 of this specification.

1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
2) See Section 01 1200: 'Multiple Contract Summary'.

b. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control.

1) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Do not deliver material unduly long before it is required.
2. Protect sheathing and keep under cover in transit and at job site.

B. Storage And Handling Requirements:

1. Store sheathing on level racks and keep free of ground.
2. Stack to insure proper ventilation and drainage.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Performance:

1. Design Criteria:

a. Meet requirements of PS 1, PS 2, or PRP-133 (TECO). Except where plywood is specifically indicated on Contract Drawings, oriented strand board (OSB) is acceptable.

B. Sheathing:

1. Wood framing list:

a. Provide VMR Suppliers with wood framing list.

2. Sheathing:

    a. Sheathing shall bear grade stamp from American Plywood Association (APA) or equal grading organization.
    b. Sheathing shall not exceed 18 percent moisture content when fabricated or more than 19 percent when installed in Project.
    c. Sheathing 23/32 inch thick and thicker used for single-layer subflooring shall be tongue and groove.
    d. Sheathing used for same purpose shall be of same thickness. In all cases, thickness specified is minimum required regardless of span rating.
    e. Minimum span ratings for given thicknesses shall be as follows:

Thickness	Span Rating
15/32 inch actual	32 / 16
1/2 inch nominal	32 / 16
23/32 inch actual	48 / 24
3/4 inch nominal	48 / 24

2.2 ACCESSORIES

A. Nails:

1. As indicated on Contract Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Top of nail heads shall be flush with sheathing surface.
2. Use of edge clips to provide spacing between sheathing panels is acceptable.

B. Roof Sheathing:

1. Placing:

    a. Lay face grain at right angles to supports. Provide blocking for support if framing turns at roof overhang.
    b. Provide 1/8 inch space between sheets at end and side joints.
    c. Stagger panel end joints.
    d. Sheathing shall be continuous of two spans minimum.

2. Edge Bearing and Blocking:

    a. As indicated on Contract Drawings.

3. Nail Spacing:

    a. As indicated on Contract Drawings.
    b. Place nails at least 3/8 inch in from edge.

4. Thickness:

    a. As indicated on Contract Drawings.

5. Do not install any piece of roof sheathing with shortest dimension of less than 24 inches unless support is provided under all edges.

3.2 FIELD QUALITY CONTROL

A. Field Inspections:

1. Sheathing:

a. General:

1) Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
2) Quality Control is sole responsibility of Contractor as specified in Section 01 4523 'Testing And Inspection Services'.

b. For roof areas where nail spacing is 4 inches and less on center, Inspector shall verify wood panel sheathing, grade, thickness and nominal size of framing members, adjoining panel edges, nail size and spacing, bolting and other fastening of other components.

3.3 PROTECTION

A. Protect sheathing from moisture until roofing is installed.

END OF SECTION

SECTION 06 1753 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section:

1. Metal plate connected wood trusses.
2. Trussed blocking for wood trusses.

B. Related Requirements:

1. Section 01 1200: 'Multiple Contract Summary'.
2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
3. Section 06 1100: 'Wood Framing' for:

    a. Storage and handling of trusses on Project site.
    b. Installing, securing, bracing, etc.
    c. Required blocking other than trussed blocking.

1.2 REFERENCES

A. Association Publications:

1. Structural Building Components Association (SBCA) www.sbcindustry.com.
2. Truss Plate Institute (TPI):

    a. DSB-89, 'Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses'.

3. Truss Plate Institute (TPI) / Structural Building Components Association (SBCA):

    a. TPI/SBCA Structural Building Components Association Components Safety Information BCSI 'Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses' (2013 Edition with 2015 Update).

B. Definitions:

1. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

C. Reference Standards:

1. American National Standards Institute (ANSI) / Truss Plate Institute (TPI):

    a. ANSI/TPI 1-2014, 'National Design Standard for Metal Plate Connected Wood Truss Construction.

2. ASTM International:

    a. ASTM A641M-09a(2014), 'Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire'.
    b. Drawings.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Sequencing:

1. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work follow erection of trusses.

1.4 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

a. Truss design drawings:

1) Base truss design drawings on truss configurations and truss loads and requirements of Contract Documents. Joint configurations may be modified to allow double cut webs. Determine member forces from exact analysis method as defined by TPI.
2) Include following information:

a) Allowable loads in lbs per effective nail or lbs per sq inch for lumber and plates used as allowed by ICBO and current ICBO report number.
b) Stress reduction factors used for plates and lumber.
c) Top and bottom chord design loads in psf.
d) Size, thickness, and exact location by dimension of plates.
e) Lumber species and grades used.
f) Combine stress index for each member.
g) Stamp and signature of Engineer responsible for preparation of drawings.
h) Name and trademark of Plate Manufacturer if metal plates are used.
i) Name and address of Truss Fabricator and Project name and address.

B. Informational Submittals:

1. Certificates:

a. Complete and provide copy of certification "Truss Plant Certification Requirements Form" to Architect before bid.
b. Provide attachment copy of truss plant certification with completed "Truss Plant Certification Requirements Form" to Architect and Testing Agency before commencing fabrication of Wood Trusses.

2. Test And Evaluation Reports:

a. Copies of previous four quarterly inspection reports verifying compliance with TPI regulations unless the Truss Fabricator provides proof that they are certified and in good standing with the In-Plant WTCA QC program certification.

1.5 QUALITY ASSURANCE

A. Qualifications. Requirements of Section 01 4301 applies, but is not limited to the following:

1. Metal Connector-Plate Manufacturer Qualifications:

a. Member of TPI and complies with quality-control procedures in TPI 1 for manufacturer of connector plates.

1) Fabricator's responsibility includes providing professional engineering services needed to assume engineering responsibility.

2) Engineering responsibility: Preparation of shop drawings and comprehensive engineering analysis by qualified professional engineer registered in location of jurisdiction.

2. Fabricator Qualifications:

a. Fabricator must have a letter providing evidence that they are certified and in good standing with their third party accredited Quality Assurance business.
b. Fabricator shall have in place a program requiring fabrication plant to be inspected four times each year by an independent testing laboratory in accordance with TPI regulations.

1.6 DELIVERY, HANDLING, AND STORAGE

A. Delivery And Acceptance Requirements:

1. Notify Architect two (2) days minimum before arrival of trusses to allow for scheduling of truss inspection on site before unloading and for monitoring of unloading procedure.
2. Unload trusses by one of following methods.

a. As outlined in TPI / SBCA Booklet BCSI, 'Guide to Good Practice For Handling, Installing & Bracing of Metal Plate Connected Wood Trusses'.
b. Trusses may be unloaded by dumping if trusses are shipped horizontally, are rolled off low profile roller bed trailer, and if no part of any truss is required to drop more than 18 inches.

3. After delivery of trusses:

a. Inspect for damage before installing trusses.
b. Inspect for "gaps" between framing members.
c. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Wood Truss Fabricators:

1. Type Two Acceptable Fabricator:

a. Meet following requirements:

1) Wood Truss fabricator whose products meet quality requirements of this Section.
2) Wood Truss fabricator shall be certified and submit copy of the truss plant certification with 'Truss Plant Certification Requirements Form' the Architect and Testing Agency before commencing fabrication of Wood Trusses.

2.2 MANUFACTURED UNITS

A. Performance:

1. Design Criteria:

a. Top and Bottom Chords and Web Members:

1) 2 inch by 4 inch nominal minimum size unless noted otherwise by Contract Documents.
2) Sizes, species, and grades of members shall be as required to provide combined stress indexes of less than one.
3) Designed in accordance with ANSI/TPI 1 for given design loads.

4) Of quality to meet or exceed stress grade requirements given in table below for each lumber classification and to meet requirements for dimension lumber in Section 06 1100. Truss members not called out on Drawings shall meet or exceed stresses of classification C.

a) Of quality to meet minimum stress grade requirements given below:

	Class A, 2x6	Class B, 2x6	Class C, 2x4	Class C, 2x6
Fb Bending	1720	1495	1510	1310
Ft Tension	1010	880	825	725
Fv Shear	75	75	75	75
Fc Perpendicular	405	405	405	405
Fc Parallel	1650	1485	1495	1430
E	$1.6x10^6$	$1.5x10^6$	$1.5x10^6$	$1.5x10^6$

b) Allowable stresses shown are for normal duration of load and repetitive member use.
c) Following machine stress rated lumbers may be substituted for the above lumbers provided the combined stress ratio for each member is less than 1.0 by National Design Specification for Wood formulas, 2001. Total load deflection is less than L/240 and live load deflection is less than L/360.

A	B	C
2100f - 1.8E	1800f - 1.6E	1650f - 1.5E

b. Metal Gusset Plates:

1) Plate design and manufacture shall be as approved by 'The Research Committee for the ICC'.
2) Truss plates for symmetrical trusses shall be same size on both sides of truss. Determine size to be used by highest loading value on either side of truss.

B. Materials:

1. Wood framing list:

a. Provide VMR Suppliers with wood framing list.

2. Top And Bottom Chords And Web Members:

a. Douglas Fir-Larch #2 or better, Hem Fir #1 or better, MSR 1650F-1.5E or better, Southern Pine #2 or better, or Spruce Pine Fir #2 or better.

3. Metal Gusset Plates:

a. Connector plates to comply with TPI 1 from hot-dip galvanized steel sheet complying with ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.

1) Use for interior locations.

b. Manufacturer's name or trademark shall be visible on plates.
c. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:

1) Eagle Metal Products, Dallas, TX www.eaglemetal.com.
2) ITW Building Components Group, Glenview, IL www.itwbcg.com.
3) MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc. Chesterfield, MO www.mii.com or MiTek Canada, Bradford ON www.mii.com/canada.
4) Simpson AS Truss Connector Plates; Simpson Strong-Tie Company Inc. Pleasanton, CA www.strongtie.com.

C. Fabrication:

1. General:

a. Fabrication of trusses shall be as approved by ICC except that this Specification shall govern when it exceeds ICC requirements.
b. Fabricate trusses from approved shop drawings.
c. Fabricate trusses in jigs with members accurately cut to provide good bearing at joints. Joints shall be acceptable if the average opening between ends of members immediately after fabrication is less than 1/16 inch.
d. Each chord section shall be involved in two (2) panel points before being spliced.

2. Metal Gusset Plates:

a. No panel point shall have more than one (1) plate per truss side.
b. Plates shall have minimum bite of 2-1/2 inches on members. Measure bite along center line of webs and perpendicular to chord axes. Orient plate axis parallel with truss chord axis except where chords change pitch or terminate. Plates may be placed parallel with webs at single web joints.

1) Minimum bite requirements are waived for non-structural webs parallel to top chords added for insulation backing and for other non-structural members.
2) Minimum bite requirements are waived for truss blocking.

c. Plate Sizes:

1) Minimum width of plates shall be 3 inches.

a) Minimum bite requirements are waived for non-structural webs parallel to top chords added for insulation backing.
b) Minimum width requirements are waived for truss blocking.

2) For flat bottom chord trusses, size plates for 110 percent of member forces. For scissor trusses, size plates for 150 percent of member forces. If webs are double cut, plates are to be sized for additional 10 percent of the member forces.
3) Size plates, nail and steel section for 110 percent of member forces.
4) No increase in plate values will be allowed for duration of loading or other factors.

d. Press plates into members to obtain full penetration without crushing outer surface of wood. Plate embedment is acceptable if opening between plate and wood surface is less than 1/32 inch.
e. Lumber defects and plate misplacement, in combination, shall not reduce plate area or number of effective teeth, prongs, or nails by more than ten percent.
f. Do not apply metal gusset plates after shop fabrication.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Prefabricated Metal Plate Connected Wood Trusses:

    a. Testing Agency will obtain "Truss Plant Certification Requirements Form" attachment copy from Architect as per requirements of Section 06 1753 Shop-Fabricated Wood Trusses: Trusses Rafters.
    b. Where truss clear span is 60 feet or greater, Inspector shall verify that temporary installation restraint/bracing and permanent individual truss member restraint/bracing are installed in accordance with approved truss submittal package.

END OF SECTION

SECTION 06 2001 - COMMON FINISH CARPENTRY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install sealants required for items installed under this Section, as described in Contract Documents.
2. Furnish and install following items as described in Contract Documents:

    a. Coat and Hat Hooks.

B. Products Installed But Not Furnished Under This Section:

1. Selected Building Specialties.
2. Selected Equipment.
3. Miscellaneous as specified elsewhere.

C. Related Requirements:

1. Section 06 2210: 'Miscellaneous Wood Trim'.

    a. Wood Trim.

2. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants, submittal and installation requirements.
3. Sections in Division 10: Furnishing of Specialties.
4. Sections in Division 11: Furnishing of Equipment.

1.2 REFERENCES

A. Association Publications:

1. Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA www.awinet.org.

    a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.

B. Reference Standards:

1. ASTM International:

    a. ASTM C578-15, 'Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation'.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturers:

1. Manufacturer Contact List:

    a. Blum Inc, Stanley, NC www.blum.com.
    b. Bommer Industries, Landrum, SC www.bommer.com.
    c. CompX National, Mauldin, SC www.nclnet.com.
    d. Dow Chemical, Midland, MI www.dow.com.

e. Flynn & Enslow, San Francisco, CA www.flynnenslow.com.
f. Grass America Inc, Kernersville, NC www.grassusa.com.
g. Hafele America Co., Archdale, NC hafele.com.
h. Hillside Wire Cloth Co., Inc., Bloomfield, NJ www.hillsidewirecloth.com.
i. Ives, Indianapolis, IN www.iveshardware.com.
j. Knape & Vogt, Grand Rapids, MI www.knapeandvogt.com or Knape & Vogt Canada, Mississaugua, ON (905) 676-8972.
k. Olympus Lock Co, Seattle, WA www.olympus-lock.com.
l. Owens Corning, Toledo, OH www.owens-corning.com.
m. Salice America Inc, Charlotte, NC www.saliceamerica.com.
n. SOSS Door Hardware (Division of Universal Industrial Products Company) Pioneer OH www.soss.com.
o. Stanley, New Britain, CT www.stanleyhardware.com or Oakville, ON (800) 441-1759.
p. TWP Inc., Berkley, CA www.twpinc.com.
q. Wire Cloth Manufacturers Inc., Mine Hill, NJ www.wireclothman.com.

B. Glue: Waterproof and of best quality.

C. Coat And Hat Hooks:

1. Type Two Acceptable Manufacturers:

a. 581 by Ives.
b. Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

1. Verify walls, ceilings, floors, and openings are plumb, straight, in-line, and square before installing Architectural Woodwork.
2. Report conditions that are not in compliance to Architect before starting installation.

3.2 PREPARATION

A. Surface Preparation:

1. Install Architectural Woodwork after wall and ceiling painting is completed in areas where Architectural Woodwork is to be installed.

B. Items Installed But Not Furnished Under This Section: Install in accordance with requirements specified in Section furnishing item.

3.3 INSTALLATION

A. Special Techniques:

1. AWS Custom Grade is minimum acceptable standard, except where explicitly specified otherwise, for installation of architectural woodwork.

B. Installation for Accessories:

1. Coat And Hat Hooks:

a. As shown in Contract Drawings.

END OF SECTION

SECTION 06 2024 - DOOR, FRAME, AND FINISH HARDWARE INSTALLATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install sealants for caulking door frames as described in Contract Documents.

B. Products Installed But Not Furnished Under This Section:

1. Hollow metal doors.
2. Hollow metal door frames.
3. Finish hardware.

C. Related Requirements:

1. Section 07 9213: ' Elastomeric Joint Sealants' for quality of sealants.
2. Sections under 08 1000 heading: Furnishing of doors and metal frames.
3. Sections under 08 7000 heading: Furnishing of finish hardware.
4. Sections under 04 2000 heading: Frame installation in masonry walls.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference.

1. Participate in pre-installation conference.
2. In addition to agenda items specified in Section 01 3100, review following:

a. Schedule conference after hardware has been delivered to site and organized into hardware groups by door, but before installation of hardware.
b. Check for appropriate blocking and for correct hardware models and fasteners for substrates.
c. Review submittals and set of Manufacturer's installation, adjustment, and maintenance instructions submitted under Section 08 7101.
d. Review use of crowbar or other prying devices are not permitted to be used to set door frame into wall opening.

1.3 SUBMITTALS

A. Informational Submittals:

1. Installer Report:

a. Report verifying correct operation and adjustment of installed hardware.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Metal Frames:

a. Examine door frames and note damage upon acceptance.

B. Storage And Handling Requirements:

1. Metal Frames:

    a. Protect metal frames from damage before and during installation.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow Metal Frames:

1. Site Tolerances:

    a. Squareness: 1/16 inch from top edge to opposite top edge.
    b. Plumbness: 1/16 inch from top of jamb to bottom of jamb.
    c. Alignment: 1/16 inch from plane of left side face of jamb to right side face of jamb.
    d. Twist: 1/16 inch across throat of jamb plane measured across each face to plane of opposite jamb throat.
    e. Finished Clearance Between Door And Frame:

        1) 1/16 inch at head and hinge jamb plus 1/16 inch maximum
        2) 1/8 inch at strike jamb plus or minus 1/16 inch maximum.
        3) 1/2 inch to top of finished floor surface or 1/4 inch to top of threshold, plus or minus 1/16 inch maximum.

2. Set frame in location and level head.

    a. Use of crowbar or other prying device to set door frame into wall opening will damage door frames and are not permitted to be used.

3. Equalize with adjustable floor anchor.
4. Set spreaders and fasten jambs to floor and wall.

    a. Wood spreaders shall be square, fabricated from lumber one inch minimum thick, be same length as door opening at header, and same depth as frame.
    b. Cut notches for frame stops.
    c. Do not remove spreaders until frames are permanently anchored in wall.
    d. Use one spreader at base of frame and another at strike level.
    e. Do not use temporary spreaders welded to base of jambs during installation of frame.

5. Caulking:

    a. Caulk around both sides of frames of doors receiving acoustical seals with specified sealant.

B. Doors:

1. When Project is completed, doors shall not bind, stick, or be mounted so as to cause future hardware difficulties.
2. Do not impair utility or structural strength of door in fitting of door, applying hardware, or cutting and altering door louvers, panels, or other special details.

C. Hardware:

1. General:

    a. Install using set of Manufacturer's installation, adjustment, and maintenance instructions submitted with hardware under Section 08 7101. Follow as closely as possible.

3.2 FIELD QUALITY CONTROL

A. Field Tests:

1. Arrange to have keys brought to Project site and, in meeting attended by local representatives and Architect, test every new key and locking mechanism.

B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:

1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.
2. Door frames:

a. Door frames damaged by use of crowbar or other prying devices to set door frames shall be repaired or replaced at no additional cost to Owner.

3.3 CLOSEOUT ACTIVITIES

A. Instruction of Owner:

1. Using Owner's Operations And Maintenance Manual, explain keying systems at same time keys and locking mechanisms are tested.

END OF SECTION

SECTION 06 2210 - MISCELLANEOUS WOOD TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install wood trim not specified elsewhere as described in Contract Documents.

B. Related Requirements:

1. Section 06 2001: 'Common Finish Carpentry Requirements':

a. Installation of Wood Trim.

1.2 REFERENCES

A. Association Publications:

1. Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA www.awinet.org.

a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.

B. Definitions:

1. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade:

a. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Design Criteria:

1. General:

a. Meet requirements of Section 06 4001 for general standards for materials and fabrication of Architectural Woodwork.

2. Clear Finished Hardwood:

a. Match materials specified in Section 06 4512.
b. Match finish specified in Section 06 4512 and match Owner selected sample as specified in Section 09 9324.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 06 2710 - SHELVING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install adjustable shelving not part of casework, including mounting hardware, as described in Contract Documents.

B. Related Requirements:

1. Section 06 4001: 'Common Architectural Woodwork Requirements'.

1.2 REFERENCES

A. Association Publications:

1. Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA www.awinet.org.

a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Shelves:

1. Design Criteria:

a. Conform to applicable requirements of Sections 06 4001.
b. Fabricate the work of this section to AWS 'Custom Grade'.
c. Species as acceptable for AWS 'Custom Grade'.

2. Material:

a. Panel Product:

1) Glues (adhesives) used in manufacture and fabrication of panel products shall be Type I or II.
2) Moisture content shall be same as specified for lumber.
3) Cores:

a) All Other: Industrial grade particle board with minimum density of 45 lbs per cu ft (721 kg per cu meter).

4) Facings:

a) All facings shall be Melamine or Kortron.

5) Thickness:

a) 30 Inch (750 mm) Span And Less: 3/4 inch (19 mm) thick.
b) Spans Over 30 Inches (750 mm) To 42 Inches (1 050 mm): One inch (25 mm) thick.
c) Spans Over 42 inches (1 050 mm): One inch (25 mm) thick and provide equal center supports.

b. Edgings:

1) Use 3/4 inch (19 mm) Kortron or Melamine faced Panel Product with hot glued 3 mm thick PVC with eased edges. Apply banding on all four edges of adjustable shelving and on exposed edges of fixed shelving, with one-inch return onto unexposed edges. Edge banding color to match Panel Product.

2.2 ACCESSORIES

A. Manufacturer:

1. Manufacturer Contact Information:

a. Knape & Vogt, Grand Rapids, MI www.knapeandvogt.com or Knape & Vogt Canada Inc, Mississuaga, ON (905) 676-8166.

B. Shelf Brackets And Standards:

1. Brackets:

a. Size according to shelf width, end of bracket to be within 2 inches (50 mm) of front edge of shelf.
b. Category Four Approved Product. See Section 01 6200 for definitions of Categories.

1) 187WH extra heavy duty brackets by Knape & Vogt.

2. Standards:

a. Category Four Approved Product. See Section 01 6200 for definitions of Categories.

1) 87WH extra heavy duty standard by Knape & Vogt.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Attach metal standards by screws into framing members or special blocking. Utilize all available pre-drilled screw holes in standards.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION:

07 4616	Aluminum Siding
07 6113	Standing Seam Sheet Metal Roofing
07 6210	Galvanized Steel Flashing And Trim
07 6312	Perforated Metal Soffit
07 6321	Aluminum Fascia
07 9213	Elastomeric Joint Sealants

SECTION 07 4616 - ALUMINUM SIDING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install siding as described in Contract Documents.

1.2 SUBMITTALS

A. Informational Submittals:

1. Manufacturer Instructions:

a. Manufacturer's published installation instructions.

B. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Warranty Documentation:

1) Final, executed copy of Warranty.

b. Record Documentation:

1) Manufacturers documentation:

a) Manufacturer's literature.
b) Color selection.

1.3 WARRANTY

A. Manufacturer Warranty:

1. Manufacturer's written 20-year guarantee for finishes.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Manufacturers:

1. Vertical Siding:

a. Type One Acceptable Manufacturers:

1) AEP / Span, Dallas, TX www.aep-span.com.
2) ATAS Aluminum Products, Allentown, PA www.atas.com.
3) Fabral, Lancaster, PA www.fabral.com.
4) Fashion Inc, Ottawa, KS www.fashioninc.com.
5) Firestone Metal Products, Anoka, MN www.unaclad.com
6) MBCI, Houston, TX www.mbci.com.
7) Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.

8) Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com
9) Ryerson, Chicago, IL www.ryerson.com.
10) Equal as approved by Architect before bidding. See Section 01 6200.

B. Materials:

1. Description:

a. Aluminum: 0.032 inch thick, complete with accessories recommended by Manufacturer for proper installation.
b. Configuration: Vertical Siding.

2. Color:

a. As selected by Architect from Manufacturer's standard colors.

C. Fabrication:

1. Design shall be equal to Reynolds Metals Planewall or Kivaline as approved by Architect before bidding.
2. Siding may either be shop-fabricated using metal from a specified manufacturer, or a factory-fabricated standard system from a specified manufacturer.

D. Finishes:

1. Polyvinyledene Fluoride (PV_2) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing 70 percent minimum PVF_2 in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and topcoat factory applied over properly pre-treated metal.

2.2 ACCESSORIES

A. Fasteners: Unpainted one inch aluminum screws or 1-1/2 inch ring-shanked nails.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Isolate dissimilar metals to prevent electrolytic action.

B. Paint exposed fasteners to match siding.

END OF SECTION

SECTION 07 6113 - STANDING SEAM SHEET METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install metal roofing system as described in Contract Documents:

a. Roof system includes all components and labor required for complete metal roofing system including but not limited to:

1) Roof metal panels.
2) Panel clips.
3) Trim / flashing.
4) Fascia.
5) Fillers.
6) Closures.
7) Sealants.
8) Ridge caps.
9) Any other required items.

B. Related Requirements:

1. Section 07 9213: 'Elastomeric Joint Sealant'.
2. Division 22: 'Plumbing' for vent piping.

1.2 REFERENCES

A. Association Publications:

1. American Lumber Standard Committee:

a. PS 20-10, 'National Institute of Standards & Technology Voluntary Product Standard'.

2. FM Global Resource Catalogue by FM Global, Norwood, MA www.fmglobal.com.

a. Approval Guide:

1) Factory Mutual Standard 4470 - Approval Standard for Class 1 Roof Covers.

b. Property Loss Prevention Data Sheet 1-28, 'Wind Design' (latest edition).
c. Property Loss Prevention Data Sheet 1-29, 'Roof Deck Securement and Above-Deck Components' (latest edition).
d. Property Loss Prevention Data Sheet 1-31, 'Metal Roof Systems' (latest edition).
e. Property Loss Prevention Data Sheet 1-49, 'Perimeter Flashing' (latest edition).

3. Metal Building Manufacturers Association (MBMA):

a. Metal Roofing Systems Design Manual (August 2012).

B. Definitions:

1. Base Flashing: That portion of flashing attached to or resting on roof deck to direct flow of water onto roof covering.

2. Cap Flashing: Material used to cover top edge of base flashings or other flashings to prevent water seepage behind base flashing. Cap flashing overlaps base flashing.
3. Collar: Pre-formed flange placed over vent pipe to seal roof around vent pipe opening. Also called vent sleeve.
4. Deck: Structural component of roof of building which provides substrate to which roofing system is applied.
5. Drip Edge: Non-corrosive, non-staining material used along eaves and rakes to allow water run-off to drip clear of underlying building.
6. Flame Spread Classification: Categories as per ASTM E84/UL 723 or ULC 102:

    a. Class A: Highest fire-resistance rating for roofing as per ASTM E108. Indicated roofing is able to withstand severe exposure to fire exposure to fire originating from sources outside building.
    b. Class B: Fire-resistance rating indicating roofing materials are able to withstand moderate exposure to fire originating from sources outside of building.
    c. Class C: Fire-resistance rating indicating roofing materials are able to withstand light exposure to fire originating from sources outside of building.

7. Flange: Metal pan extending up and down roof slope around flashing pieces. Usually at plumbing vents.
8. Flashing: Components used to prevent seepage of water into a building around any intersection or projection in a roof such as vent pipes, chimneys, adjoining walls, dormers and valleys.
9. Galvalume: Trade name for protective coating composed of aluminum zinc.
10. Ice Dam: Condition formed at lower roof edge by thawing and re-freezing of melted snow on roof overhang. Ice dams force water to 'back up' under shingles, causing leakage.
11. Lap: Part of roofing material that overlaps section of adjacent material.
12. Life Safety Code Classes (NFPA 101):

    a. Class A: rating 0-25.
    b. Class B: rating 26-75.
    c. Class C: rating 76-200.
    d. Class D: rating 201-500.
    e. Class E: rating over 500.

13. Metal Flashing: Roof components made from sheet metal that is used to terminate roofing membrane or other material alongside roof perimeters as well as at roof penetrations.
14. Penetration: Any object that pierces surface of roof.
15. Pipe Boot: Prefabricated flashing piece used to flash around circular pipe penetrations. Also known as Roof Jack.
16. Roof Assembly: System of interacting roof components (including roof deck) designed to weatherproof, and normally, to insulate building's top surface.
17. Roof Jack: Term used to describe Pipe Boot or Flashing Collar.
18. Valley: Internal angle formed by intersection of two sloping roof planes to provide water runoff.
19. Vent: Any outlet for air that protrudes through roof deck such as pipe or stack. Any device installed on roof, gable or soffit for purpose of ventilating underside of roof deck.
20. Vent Sleeve: See collar.
21. Wind Uplift: Wind-induced forces on roof system or components in roof system. Wind uplift generally includes negative pressure component caused by wind being deflected around and across surfaces of building and positive pressure component from air flow beneath roof deck.

C. Reference Standards:

1. American Society of Civil Engineers (SEI/ASCE):

    a. ASCE 7-10, 'Minimum Design Loads for Buildings and Other Structures'.

2. ASTM International:

    a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    b. ASTM B209-10, 'Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate'.
    c. ASTM C473-12, 'Standard Test Methods for Physical Testing of Gypsum Panel Products'.

d. ASTM C1177/C1177M-13, 'Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing'.
e. ASTM C1289-14, 'Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board'.
f. ASTM D1970/D1970M-15, 'Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection'.
g. ASTM D3273-12, 'Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber'.
h. ASTM E84-15b, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
i. ASTM E108-11, 'Standard Test Methods for Fire Tests of Roof Coverings'.
j. ASTM E136-12, 'Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C'.
k. ASTM E1592-05(2012), 'Standard Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference'.
l. ASTM E1646-95(2011), 'Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference'.
m. ASTM E1680-11, 'Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems'.

3. International Building Code (IBC):

a. Chapter 15, 'Roof Assemblies And Rooftop Structures':

1) Section 1503, 'Weather Protection'.

a) 1503.2, 'Flashing'.

2) Section 1507, 'Requirements for Roof Coverings':

a) 1507.4, 'Metal Roof Panels':

4. National Fire Protection Association:

a. NFPA 101: 'Life Safety Code' (2015 edition).

5. Underwriters Laboratories (UL):

a. UL 580: 'Tests for Uplift Resistance of Roof Assemblies' (5th Edition).
b. UL 723, 'Tests for Safety Test for Surface Burning Characteristics of Building Materials' (10th Edition).
c. UL 790, 'Standard Test Methods for Fire Tests of Roof Coverings' (8th Edition).
d. UL 1897, 'Uplift Tests for Roof Covering Systems' (6th Edition).
e. UL 2218, 'Standard for Impact Resistance of Prepared Roof Coverings Materials' (2nd Edition).

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:

1. Participate in mandatory pre-installation conference:

a. Schedule pre-installation conference before application of any roofing system component.
b. Roofing Installer's Foreman and those responsible for installation of roofing to be in attendance. Include Roofing Manufacturer's Representative if available.

2. In addition to agenda items specified in Section 01 3100, review following:

a. Review Project high wind area requirements.
b. Review any items affecting issuance of roofing system warranty.
c. Review proper valley, flashing, penetrations, secondary underlayment, and sealants requirements.
d. Review Ridge Vent installation.
e. Review Cleaning and Disposal requirements.

f. Review Special Procedure Submittal for Warranty Information to be given to Roofing Manufacturer before Manufacture will issue Roof Warranty by Installer.
g. Review safety issues.

1.4 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Roofing Manufacturer to provide following:

1) Manufacturer's literature or cut sheet for each element of system.
2) Manufacturer's published preparation and installation instructions and recommendations for each element of system.
3) Manufacturer's literature for maintaining of roof panels including precautions relating to cleaning, access and methods to protect roof panels and finishes.
4) Color and style selection.

2. Shop Drawings:

a. Show all aspects of installation and accessories.
b. Provide drawings prepared especially for this project for all relevant conditions, including plans and elevations, sections and details, specified loads, flashings, roof edges, terminations, expansion joints, curbs, penetrations, and drainage. Specifically include interfaces with materials not supplied by Roofing Manufacturer and identify each component and its finish.
c. All fastening patterns shall be clearly designated to meet specified wind speed and warranty requirements:

1) Include details for forming, joining, and securing sheet metal roofing, including pattern of panel locations, termination points, expansion joints, roof penetrations, edge conditions, special conditions, connections to adjoining work, and accessory items.

3. Samples:

a. 12 inch long roof panel.
b. Roof attachment clips.
c. Color chips for selection of finish color and sheen.
d. After selection of finish color, provide two (2) 3 inch by 5 inch metal samples finished in color selected.

B. Informational Submittals:

1. Certificates:

a. Manufacturer's letter stating Installer has received training and licensing for installation of specified roof system.
b. Installer's signed certificate stating roofing system complies with Contract Documents performance requirements and work only performed by trained and authorized personnel in those procedures.

2. Test And Evaluation Reports:

a. Provide test reports showing that metal roof panel system complies with specified criteria including:

1) Test report showing that metal panels have a UL 580, Class 90 rating.
2) Test report showing metal panels have UL 2218, Class 4 hail rating.

b. For UL or FM requirements, provide documentation that shows that roofing system to be installed is UL-Classified or FM-approved, as applicable; include data itemizing components of classified or approved system.
c. Manufacturer's installation reports of installed roof including underlayment, substrate and installation of roof system components.

3. Manufacturer Instructions:

a. Provide instructions to installer, marked up to show exactly how all components will be installed; where instructions allow installation options, clearly indicate which option will be used.

4. Manufacturer Reports:

a. Installation reports:

1) Manufacturer shall inspect installation at any time to apprise installer of their compliance with manufacturer's requirements. Typical inspections will include:

a) Prior to installation of metal roofing panels to inspect underlayment.
b) Installer is responsible for assuring that substrate is in suitable condition for installation of metal roofing components to substrate.

2) Intermediate inspections to ensure proper installation of metal roofing panels (if required).
3) At final completion of all metal roofing system work.

5. Special Procedure Submittals:

a. Contact Owner's Representative (FM Group or Project Manager) for following information:

1) Installer to include following mandatory information to be added to 'Roofing Manufacturer System Warranty' submitted with Closing Documents.

a) Name of Owner (name of FM Group): _____
b) Mailing Address (FM office address): _____
c) Building Property ID (unique 7-digit identifier): _____
d) Project site address: _____
e) Roof Completion Date: _____
f) Any addition data required from Manufacturer.

6. Qualification Statement:

a. Installer:

1) Provide Qualification documentation as specified.

C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Operations and Maintenance Data:

1) Maintenance, cleaning, and protection of finish instructions including:

a) Information describing methods of maintaining installed products and precautions regarding cleaning materials and methods relating to maintenance of appearance and performance of finishes.

b. Warranty Documentation:

1) Final, executed copy of 'Roofing Manufacturer System Warranty' including wind speed coverage and required Owner mandatory information.
2) Verify mandatory information as specified in Special Procedure Submittal has been included in Final Warranty.

c. Record Documentation:

1) Manufacturer's documentation:

a) Manufacturer's literature.
b) Color selection.
c) Testing and evaluation reports.

2) Roofing Inspection Documentation:

a) Include copy of each roof inspection report.

D. Regulatory Agency Sustainability Approvals:

1. Building Codes:

a. Meet requirements for NFPA 101 Class A roof assembly.
b. Roof system will meet requirements of all federal, state, and local codes having jurisdiction.

2. Fall Protection: Meet requirement of fall protection as required by federal, state, and local codes having jurisdiction.
3. Fire Characteristics:

a. Provide metal roof panels and related roofing materials with fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL / ULC or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency:

1) Exterior Fire-Test Exposure: Class A; UL 790 or ASTM E108, for application and roof slopes indicated.

a) Materials shall be identified with appropriate markings of applicable testing agency.

4. Impact Resistance:

a. Meet UL 2218 impact resistant testing.
b. Meet UL 2218 Class 4 impact resistant rating for hail.

5. Wind Resistance:

a. Installation shall comply with IBC Table 1507.4.4, 'Attachment'.

6. Wind Speed:

a. As required to meet local codes having jurisdiction.

7. Wind Uplift Resistance:

a. Meet UL 580 wind uplift of roof assemblies.
b. Meet UL 1897 uplift test for roof covering systems.
c. Meet ASTM D7158/D7158M for wind resistance for uplift force/uplift resistance.

E. Qualifications:

1. Manufacturer:

a. Minimum of ten (10) years experience in manufacturing metal roofing systems.
b. Roof panels produced under quality control program with inspections by Underwriter Laboratories, Inc. (AA-668) or Roofing Manufacturer's own quality control program.

2. Installers:

a. Requirements of Section 01 4301 applies but not limited to following:

1) Provide documentation of the following:

a) Approved and authorized by Metal Roofing Manufacturer to install Manufacturer's product and eligible to receive Manufacturer's warranty before bid.
b) Current license for city, county, and state where project is located and license for specific type of roofing work to be performed.
c) Minimum of at least one (1) qualified and authorized installer must be present at all times during all stages of roofing system installation.
d) Roofing Installer's foreman shall be skilled in his trade and qualified to lay out and supervise the Work.
e) Flashing installation shall be performed by personnel trained and authorized by Roofing Manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Make no deliveries to Project until installation is about to commence, or until approved storage area is provided.
2. Deliver products at job site in original unopened containers or wrappings bearing all seals and approvals.
3. Exercise extreme care in unloading, storing, and installing metal panels to prevent bending, warping, twisting, and surface damage.
4. Deliver materials in sufficient quantities to allow continuity of work.
5. Remove any material not approved from job site.

B. Storage And Handling Requirements:

1. Storage Requirements:

a. General:

1) Follow Manufacturer's instructions and precautions for storage of materials.
2) Protect roof materials from physical damage, moisture, soiling, and other sources in clean, dry, protected location above grade.
3) Store materials protected from exposure to harmful conditions.
4) Store material above ground on well-supported platforms that provide minimum 1:5 slope.
5) Stack materials to prevent bending, abrasion, scratching and denting.
6) Prevent contact with materials that may be corrosive, discolor or stain.

b. Underlayment:

1) Store materials protected from exposure to harmful weather conditions at temperatures within tolerances allowed.

c. Protection:

1) Protect roof materials from physical damage, moisture, soiling, and other sources in clean, dry, protected location.
2) Provide proper ventilation of metal components to prevent condensation build-up between metal components.

d. Unacceptable Material:

1) Remove from job site materials that are determined to be damaged by Architect or by Metal Shingle Manufacturer and replace at no additional cost to Owner.

2. Handling Requirements:

a. Handle rolled goods so as to prevent damage to edge or ends.

1.6 WARRANTY

A. Manufacturer Warranty:

1. Provide Roofing Manufacturer System Warranty' for thirty (30) year minimum no dollar limit (NDL) warranty for material and labor and workmanship for weather tightness of roof system for roof panels and accessories, underlayment, and all fasteners required.

a. Roof system is subject to inspection at Manufacturer's option, at completion of installation.

2. Finish:

a. Manufacturer's written thirty five (35) year anti-weathering finish warranty for humidity resistance, chalk resistance, color change, abrasion resistance and salt spray resistance.

1) Color selected for project must meet warranty requirements before bid.

3. Special Warranty:

a. Provide manufacturers standard wind warranty or as required by local codes and AHJ for roof system components and substrates.

4. Warranty Period: Commencing on date of substantial completion.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:

1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:

a. ATAS International, Inc., Allentown PA www.ATAS.com.

1) Contact Information (USA and Canada):

a) Contact: Amy Lockrem Office: (480)-558-7210, (800) 879-8382 ext. 302.

b. Firestone Building Products Co., Indianapolis, IN www.firestonebpco.com.

1) Contact Information (USA and Canada):

a) Primary Contact: Linda Kops - Strategic Account Executive, office (800) 428-4442 ext. 53236 cell (919) 272-3331 kopslinda@firestonebp.com.
b) Secondary Contact: Terry Orchard - Commercial Building Solutions, 801-831-2100. terryorchard@cbs-utah.com or Chris Booth - Commercial Building Solutions, (801) 550-6886. chrisbooth@cbs-utah.com.

B. Sheet Metal Roofing:

1. Basis of Design Product:

a. Basis of design for this project is Firestone/ Style Standard: UC-6RS System Product by Firestone.

2. Equivalents Approved Products:

a. Approved products only by following Manufactures: FLR 2'' Field-Lok by ATAS.

C. Description:

1. Mechanically seamed, double-locked structural panel with single fold for weather tight roof.

D. Design Criteria:

1. Design Loads:

a. In accordance with ASCE 7 current edition and meeting IBC 2012 or current edition standards.
b. Maximum deflection under snow load: Not more than L/180 or as recommended by ASCE 7, whichever is less.
c. Wind Pull-Off Resistance:

1) No failure of roof panel or fasteners when tested in accordance with ASTM E1592 for negative loading equal to negative design wind load; for assemblies not tested, capacity for gauge, span, or loading may be determined by interpolating between test values only.

d. Wind Uplift Resistance: Class 90 rating, minimum, when tested in accordance with UL 580.

2. Air Infiltration:

a. Maximum of 0.007 cfm/sq ft at pressure differential of 6.24 psf, when tested in accordance with ASTM E1680.

3. External Fire Resistance: Class A, when tested in accordance with ASTM E108 or UL 790.
4. Impact Resistance:

a. Minimum of Class 4, when tested in accordance with UL 2218.

5. Thermal Effects:

a. Design roof panels and their attachment to allow free movement in response to expansion and contraction forces resulting from temperature variation, as specified in MBMA Metal Roofing Systems Design Manual.

6. Water Leakage:

a. No uncontrollable water leakage at pressure differential of 2.86 psf, when tested in accordance with ASTM E1646.

7. Accessories and Their Fasteners:

a. Capable of resisting specified design wind uplift forces and allowing for thermal movement of roof panel system, not restricting free movement of roof panel system resulting from thermal forces except at designed points of roof panel fixity.

8. Provide all necessary members and connections, whether indicated in manufacturer's standard detail drawings or not.
9. Roof slope: 3 in 12 minimum.

E. Components:

1. General:

a. Provide all components of system supplied or specified by same manufacturer and compatible with roof panels of not less than minimum thickness required by Roof Manufacturer.
b. Roof System: (Basis of Design Product):

1) Metal roofing panels and trim.
2) Firestone CladGard SA FR underlayment.
3) Cover Board: Gypsum-based cover board.
4) Flashing, anchorage, and accessories.

2. Roof Panels:

a. Steel Sheet: ASTM A653/A653M, G90 (lock-forming quality), extra smooth, tension-leveled, galvanized steel, minimum spangle.
b. 24 ga (0.025).
c. Fluorocarbon carbon finish.
d. Form roofing panels in longest practical lengths, true to shape, accurate in size, square, and free from distribution or manufacturing defects.
e. Seams:

1) Seam height: 2 inches.
2) Seam spacing: 16 inches
3) Seams shall be mechanically locked in the field with a mechanical seamer
4) Seams shall have a factory applied integral seam sealant in leg of panel.

f. Accessories include valleys, copings, scuppers, downspouts, and edge flashings.

3. Trim, Flashing and Accessories:

a. Components of roof system supplied or specified by same manufacturer and compatible with roof panels of not less than minimum thickness required by Roof Manufacturer.
b. Fabricate trim, flashing, and accessories to roofing manufacturer's specified or approved profiles.
c. Exposed metal components of same finish as roof panels.
d. Color: To match roof panels.

F. Fabrication:

1. Roof Panels shall be produced by Manufacturer meeting Manufacturer Qualification requirements as specified in Quality Assurance in Part 1 of this specifications (field fabrication not allowed).
2. Fabricate trim, flashing, and accessories to Manufacturer's specified or approved profiles.

a. Exposed metal components of same finish as roof panels.
b. Color same as roof panels.

G. Finishes:

1. Fluorocarbon Carbon:

    a. Polyvinyledene Fluoride (PVDF) Resin-base finish (Kynar 500 or Hylar 5000) containing seventy (70) percent minimum (PVDF) in resin portion of formula and providing pencil hardness of 3H. Thermo-cured two-coat system consisting of corrosion inhibiting epoxy primer and topcoat factory-applied over properly pre-treated metal.
    b. Reverse side coating thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.
    c. Color as selected by Architect from Manufacturer's standard colors that meet Manufacturer's Finish Warranty requirements. Verify color before bid.

2.2 ACCESSORIES

A. Underlayment:

1. Description:

    a. Self-adhering rubberized sheet waterproof membrane.

2. General:

    a. Meet requirements of ASTM D1970/D1970M and UL 790 Class A Fire Resistance.
    b. Resistance to Direct Exposure: At least forty two (42) days.
    c. Minimum High Temperature Resistance: 230 deg F
    d. Water Vapor Permeance: 0.1 perm, maximum.

        1) Type Two Acceptable Products:
        2) Firestone CladGard SA.

B. Equal as acceptable to Roofing Manufacturer and approved by Architect before installation. See Section 01 6200.

C. Fasteners:

1. Minimize exposed fasteners where possible.
2. Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate, and acceptable to Roofing Manufacturer.

    a. Installation Clips: Stainless steel clips for concealed securement of panels.
    b. Clip Fasteners: Galvanized Steel or Stainless Steel.

3. Fasteners Exposed to Weather:

    a. Sealed or with sealed washers on exterior side of covering to waterproof fastener penetration.
    b. Washer material compatible with screw head; minimum 3/8 inch diameter washer for structural connections; gasket portion of fasteners or washers made of EPDM, neoprene, or other equally durable elastomeric material.

4. Fasteners Exposed to View: Head of color matching panel or component in which installed.

D. Molded Closure Strips: Metal pre-molded to match configuration of covering; configuration to prevent retention of water.

E. Roof Jacks (Pipe Flashings):

1. Weathertight joint at projections through roof, designed for thermal movement and temperature of roof. Provide aluminum-flanged base ring.

F. Sealant:

1. Elastomeric Joint Sealant:

a. Description:

1) Premium-grade, high-performance, moisture-cured, 1-component, polyurethane-based, non-sag elastomeric sealant.

b. Design Criteria:

1) Meet following standards for Sealant:

a) ASTM C920: Type S Grade NS, Class 35 Use T, NT, O, M, G, I.
b) Federal specification TT-S-00230C, Type II, Class A.

2) Maximum depth of sealant will not exceed 1/2 inch.
3) Suitable for vertical and horizontal joints.
4) Application temperature: 40 deg F to 100 deg F.

c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

1) Sikaflex-1a by Sika Sarnafil, Canton, MA www.sikacorp.com.
2) Sonolastic NP1 by BASF, Shakopee, MN www.buildingsystems.basf.com.
3) Equal as approved by Roofing Manufacturer.

2. Tape Sealant:

a. Pressure sensitive, one hundred (100) percent solid, sealing tape with release paper backing. Provide permanently elastic, non-sagging, non-toxic, non-staining tape sealant.

G. Wood Nailers: PS 20 dimension lumber, Structural Grade No. 1 or better, Douglas Fir; pressure preservative treated:

1. Width: 3-1/2 inch, nominal minimum, unless shown or noted otherwise.
2. Thickness: Same thickness of roof insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

1. Examine deck to determine if it is satisfactory for installation of roofing system:

a. Inspect for protruding deck fasteners and defects that will adversely affect quality of work and issuance of roofing warranty.
b. Verify that roof openings, curbs, pipes, sleeves, ducts, vents, and other penetrations through roof substrate are complete and properly located.
c. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and nailers match thicknesses of insulation to be installed.
d. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.
e. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.
f. Verify that the substructure installation is in accordance with the approved shop drawings and Roofing Manufacturer's requirements, that the fasteners are correct for the substrate, and substrate is installed to accommodate and support appropriate clip spacing and attachment.

2. Notify Architect in writing of unsuitable conditions or in event of discrepancy.

    a. Do not proceed with installation until unsuitable conditions or discrepancies have been resolved.
    b. Commencement of Work by installer is considered acceptance of substrate.
    c. Stop work immediately if any unusual or concealed condition is discovered and immediately notify Architect in writing, with letter copy to Roofing Manufacturer.

3.2 PREPARATION

A. General:

1. Do not start work until Pre-Installation Notice has been submitted to Roofing Manufacturer as notification that this project requires Roofing Manufacturer's warranty.
2. Obtain all relevant instructions and maintain copies at project site for duration of installation period.
3. Until ready for use, keep materials in their original containers as labeled by manufacturer.
4. Consult manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all sealants and cleaning materials away from all sources of ignition.

B. Surface Preparation:

1. Clean roof deck, including removal of dirt and debris:
2. Install roofing only when surfaces are clean, dry, smooth and free of moisture; do not apply roofing during inclement weather or when ambient conditions will not allow proper application; consult Roofing Manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside range of 60 deg F to 80 deg F.
3. Following Manufacturer's recommendations for placing materials on roof:

    a. Prevent material from sliding off roof.

3.3 INSTALLATION

A. Interface With Other Work:

1. Verify that installed work of other trades that such work is complete to point where roofing system installation may commence.

B. General:

1. Follow Manufacturer's published installation instructions and approved shop drawings.
2. Install roofing, valleys, coping, flashings, and accessories in accordance with Roofing Manufacturer's published instructions and recommendations for roofing system.

    a. Where Roofing Manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards.
    b. Comply with federal, state, and local regulations and applicable codes.
    c. Do not allow roof panels or trim to come into contact with dissimilar materials.

3. Install roof system to allow for thermal movements.

C. Underlayment Installation:

1. General:

    a. Follow Roofing Manufacturer's recommendations for installation of underlayment, particularly at eaves, rakes, and penetrations, unless specified installation procedures and Contract Drawing details are more stringent.
    b. Weather conditions:

1) Do not leave underlayment exposed to weather more than thirty (30) days after beginning of underlayment installation.
2) If moisture is deposited on exposed underlayment, obtain written approval from Roofing Manufacturer's Representative before roofing.

c. Install valley underlayment and valley metal after installation of general underlayment.

2. Underlayment:

a. Install underlayment in accordance with Underlayment Manufacturer's instructions.
b. Install self-adhered underlayment over entire roofing surface and apply additional layer at all eaves.
c. Eaves and Rakes:

1) Apply continuous 12 inches wide strip at edge of eaves and rakes before installing drip edge.
2) Apply two (2) 36 inch wide sheets along eaves and rakes as described in Contract Documents.

a) Lap end joints 6 inches and side joints 3 inches.

D. Roof Panel Installation:

1. Install the metal roof panel system in accordance with Roofing Manufacturer's instructions, installation drawings, and approved shop drawings, so that it is weathertight and allows for thermal movement.
2. Locate and space all fasteners in accordance with Roofing Manufacturer's recommendations. For required exposed fasteners, use proper torque settings to obtain controlled uniform compression for positive seal without rupturing sealing washers.
3. Do not place utility penetrations through roof panel seams.
4. Do not allow roof panels or trim to come into contact with dissimilar materials (i.e. copper, lead, graphite, treated lumber, mortar, etc). Protect from water run-off from these materials.
5. Perform field cutting of panels and related sheet metal components by means of hand or electric shears. At no time shall hot/friction saw be used.
6. Remove protective film immediately after installation.

E. Roof Vents:

1. Install system manufacturer's standard Ridge Vent.

F. Roof Jacks (Pipe Flashings):

1. Install as recommended by Roofing Manufacturer.
2. Install in accordance with IBC Section 1503.2 'Flashing'.

G. Flashings And Accessories Installation:

1. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by Roofing Manufacturer's recommendations and details.
2. Install metal trim, accessories, and edgings in locations indicated on Contract Drawings.

a. Follow Roofing Manufacturer's instructions.
b. Remove protective plastic surface film immediately before installation.

3. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that roofing membrane abuts to; extend flashing at least 8 inches high above membrane surface.

a. Use longest practical flashing pieces.

4. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration:

    a. Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical.
    b. Where pre-molded pipe flashings are not practical, provide flashing detail as recommended by Roofing Manufacturer.

5. Sealant / Roof Cement:

    a. Install and at temperatures recommended by Sealant Manufacturer at locations recommended by Manufacturer.

3.4 FIELD QUALITY CONTROL

A. Field Inspection:

1. Interim Inspections by Roofing Manufacturer:

    a. Provide interim (one every two weeks) of roofing system by Technical or Local Representative employed by Roofing Manufacturer specifically to inspect installation for warranty purposes.

2. Final Inspection:

    a. Mandatory inspection required for system warranty prior to acceptance of roof by Owner by Roofing Manufacturer with Installer, Architect, and Owner's Representative.

        1) Correct any problems identified by inspection before acceptance of roof by Owner.
        2) Perform all corrections necessary for issuance of warranty.

B. Non-Conforming Work:

1. Correct any work found defective or not complying with Contract Document requirements at no additional cost to Owner:

    a. Touch-up repair or replace damaged materials as per Roofing Manufacturer's specified procedures.
    b. Repair panels having minor damage.
    c. Remove panels damaged beyond repair and replace with new panels to match adjacent undamaged panels.
    d. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of Roofing Manufacturer of components and surfaces.

3.5 CLEANING

A. General:

1. All tools and unused materials must be collected at end of each workday and stored properly off finished roof surface and protected from exposure to elements.
2. Leave metals clean and free of defects, stains, and damaged finish.

    a. Replace fascia metal that is scratched through finish to base metal.

3. Properly clean finished roof surface after completion.
4. Verify drains and gutters are not clogged.
5. Clean exposed roof panel surfaces promptly after installation in accordance with recommendations of roofing and coating manufacturer.

6. Clean all contaminants generated by roofing work from building and surrounding areas, including adhesives, sealants, and coatings.
7. Clean and restore all damaged surfaces to their original condition.

B. Waste Management:

1. Disposal:

a. All work areas are to be kept clean, clear and free of debris at all times.
b. Do not allow trash, waste, or debris to collect on roof. These items shall be removed from roof on daily basis.
c. Remove debris resulting from work of this Section from roof and site. Dispose of or recycle all trash and excess material in manner conforming to current EPA regulations and local laws.

3.6 PROTECTION

A. General Contractor's Responsibility:

1. Protect installed roof from damage.
2. Do not permit traffic over finished roof surface and traffic by other trades:

a. Where construction traffic must continue over finished roof panels, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION

SECTION 07 6210 - GALVANIZED STEEL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install miscellaneous flashing associated with CMU walls as described in Contract Documents and not specified to be of other material.

B. Related Requirements:

1. Section 07 9213: 'Elastomeric Joint Sealant'.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International:

a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
b. ASTM A792/A792M-10(2015), 'Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process'.

2. Federal Specifications:

a. TT-S-00230C(2) Sealing Compound, Elastomeric Type, Single Component, (For Caulking, Sealing, and Glazing in Buildings and Other Structures).

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:

1. Type Two Acceptable Manufacturers Of Metal:

a. CMG – Coated Metals Group, Denver, CO www.cmgmetals.com.
b. Drexel Metals, LLC, Ivyland, PA www.drexmet.com.
c. Fabral, Lancaster, PA www.fabral.com.
d. Firestone Metal Producdts, Anoka, MN www.unaclad.com.
e. MBCI, Houston, TX www.mbci.com.
f. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
i. Ryerson, Chicago, IL www.ryerson.com.
j. Equal as approved by Architect before installation. See Section 01 6200.

B. Materials:

1. Sheet Metal:

a. Galvanized iron or steel meeting requirements of ASTM A653/A653M, G 90 or Galvalume steel meeting requirements of ASTM A792/A792M AZ50, 50 ksi.

1) 24 ga.

C. Fabrication:

1. Form accurately to details.
2. Profiles, bends, and intersections shall be even and true to line.
3. Fold exposed edges 1/2 inch to provide stiffness.

D. Finish:

1. Exposed to view:

a. Provide face coating of polyvinyledene Fluoride (PVF_2) Resin-base finish (Kynar 500 or Hylar 5000) containing seventy (70) percent minimum PVF_2 in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
b. Reverse side coating shall be thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.

2. Color as selected by Architect from Manufacturer's standard colors.

2.2 ACCESSORIES

A. Sealants: Rubber base type conforming to Fed Spec TT-S-00230C.

B. Fasteners:

1. Of strength and type consistent with function.
2. Nails: Hot-dipped galvanized.
3. Screws, Bolts, And Accessory Fasteners: Galvanized or other acceptable corrosion resistant treatment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install with small, watertight seams.

B. Provide sufficient hold down clips to insure true alignment and security against wind.

C. Provide 4 inch minimum overlap.

D. Allow sufficient tolerance for expansion and contraction.

E. Insulate work to prevent electrolytic action.

3.2 CLEANING

A. Leave metals clean and free of defects, stains, and damaged finish.

END OF SECTION

SECTION 07 6312 - PERFORATED METAL SOFFIT

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install perforated metal soffit system as described in Contract Documents.

1.2 REFERENCES

A. Association Publications:

1. American Architectural Manufacturers Association:

a. AAMA 1402-09, 'Standard Specification for Aluminum Siding Soffit and Fascia'.

B. Reference Standards:

1. ASTM International:

a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
b. ASTM A792/A792M-10(2015), 'Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process'.
c. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.

1.3 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's literature or cut sheet for products furnished.

B. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Warranty Documentation:

1) Final, executed copy of Warranty.

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Fire Characteristics Performance Requirement:

a. Meet requirements of ASTM E84 Class A fire rating.

B. Qualifications:

1. Installer:

a. Minimum three (3) years experience with installations of comparable quality, scope, similar size, and complexity before bidding.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Materials shall be delivered in original, unopened packages with labels intact.
2. Inspect delivered material for damage.

B. Storage And Handling Requirements:

1. Stack panels on pallets or above ground, covered with weathertight and ventilated covering. Prevent condensation build-up or moisture entrapment in materials.
2. Store panels not in contact with other materials that might cause staining, denting or other surface damage.

1.6 WARRANTY

A. Manufacturer Warranty:

1. Manufacturer's written 20-year guarantee for finish.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Manufacturers

1. Type One Acceptable Manufacturers:

a. Alcoa Architectural Products, Eastman, GA www.alcoaarchitecturalproducts.com.
b. Alside Inc, Cuyahoga Falls, OH www.alside.com.
c. ATAS Aluminum Products, Allentown, PA www.atas.com.
d. Gentek Building Products, Akron, OH and Burlington, ON www.gentekinc.com.
e. Kaycan Ltd, Montreal, QB www.kaycan.com.
f. Norandex/Reynolds, Macedonia, OH www.norandexreynolds.com.
g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
i. System 3-12L by Rollex, Elk Grove Village, IL www.rollex.com.
j. Equal as approved by Architect before bidding. See Section 01 6200.

B. Performance Requirements:

1. Capacities: Installed soffit system shall meet minimum required structural loading conditions when tested in accordance with Test Method No. 4 of AAMA Specification 1402-86.

C. Materials:

1. 0.019 inch thick minimum.
2. 'V' groove design complete with matching trim.
3. Panels shall be interlocked full length of panel.
4. Perforated full width of panel with holes designed so one dimension does not exceed 1/8 inch.

D. Finish:

1. Face finish shall meet performance requirements of Test Method No. 6 of AAMA Specification 1402-86. Reverse side coating shall pass requirements of paragraphs 1.1 through 1.4 of Test Method No. 6.

2. Double baked enamel to meet or exceed specifications of MIL-DTL-5541F with protective coating on back side.
3. Color as selected by Architect from Manufacturer's standard colors.

2.2 ASSESSORIES

A. Fastening Devices:

1. 1-1/4 inch galvanized staples or as recommended by Soffit Manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

1. Examine substrate and verify framing is suitable for installation of soffit system.
2. Notify Architect of unsuitable conditions in writing.

a. Do not install soffit over unsuitable conditions.
b. Commencement of Work by installer is considered acceptance of substrate.

3.2 INSTALLATION

A. Conceal fasteners where possible. Paint heads of exposed fasteners to match background.

B. Isolate from dissimilar metals to prevent electrolytic action.

3.3 FIELD QUALITY CONTROL

A. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:

1. Correct any work found defective or not complying with contract document requirements including buckling or bowing due to improper installation and touch up of minor scratches and spots at no additional cost to the Owner.

3.4 CLEANING

A. General:

1. Clean exposed panel surfaces promptly after installation in accordance with manufacturer's instructions.

B. Waste Management:

1. Dispose of waste in provided waste receptacles (dumpsters) as specified in Section 01 7400.

END OF SECTION

SECTION 07 6321 - ALUMINUM FASCIA

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install aluminum fascia as described in Contract Documents.

B. Reference Standards:

1. ASTM International:

a. ASTM B209-14, 'Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate'.
b. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.

1.2 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's literature or cut sheet for products furnished.

B. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Warranty Documentation:

1) Final, executed copy of Warranty.

b. Record Documentation:

1) Manufacturers documentation:

a) Manufacturer's literature.
b) Color selection.

1.3 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Fire Characteristics Performance Requirement:

a. Meet requirements of ASTM E84 Class A fire rating.

B. Qualifications:

1. Installer:

a. Minimum three (3) years experience with installations of comparable quality, scope, similar size, and complexity before bidding.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Materials shall be delivered in original, unopened packages with labels intact.
2. Inspect delivered material for damage.

B. Storage And Handling Requirements:

1. Stack panels on pallets or above ground, covered with weathertight and ventilated covering. Prevent condensation build-up or moisture entrapment in materials.
2. Store panels not in contact with other materials that might cause staining, denting or other surface damage.

1.5 WARRANTY

A. Manufacturer Warranty:

1. Manufacturer's standard warranty against manufacturer defects.
2. Manufacturer's written thirty-five (35) year warranty on paint finish against cracking, peeling, blistering, chalk, and color change.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Manufacturers:

1. Type One Acceptable Manufacturers Of Metal:

a. AEP / Span, Dallas, TX www.aep-span.com.
b. ATAS Aluminum Products, Allentown, PA www.atas.com.
c. Fabral, Lancaster, PA www.fabral.com.
d. Firestone Metal Products, Anoka, MN www.unaclad.com.
e. Hunter-Douglas Canada Ltd, Brampton, ON www.hunterdouglas.com.
f. Jenisys Engineered Products, Goodlettsville, TN www.jenisysep.com.
g. Kaycan Ltd, Montreal, PQ www.kaycan.com.
h. MBCI, Houston, TX www.mbci.com.
i. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
j. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
k. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
l. Ryerson, Chicago, IL www.ryerson.com.
m. VicWest, Oakville, ON www.vicwest.ca.
n. Equal as approved by Architect before bidding. See Section 01 6200.

B. Materials:

1. Aluminum: 0.032 inch thick minimum complete with accessories recommended by Manufacturer for proper installation.

C. Finishes:

1. Face coating polyvinyledene Fluoride (PVF_2) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing 70 percent minimum PVF_2 in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
2. Color as selected by Architect from Manufacturer's standard colors.

D. Fabrication: Fascia may either be shop-fabricated using metal from a specified manufacturer, or a factory-fabricated standard system from a specified manufacturer.

2.2 ACCESSORIES

A. Fastening Devices: One inch zinc or cadmium plated screws.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

1. Examine substrate and verify framing is suitable for installation of fascia.
2. Notify Architect of unsuitable conditions in writing.

a. Do not install fascia over unsuitable conditions.
b. Commencement of Work by installer is considered acceptance of substrate.

3.2 INSTALLATION

A. Conceal fasteners except where details might require a minimum number to be exposed. Paint heads of exposed fasteners to match background.

B. Install with slip joints at each end. Screw to substrate through pre-drilled, over-size holes.

C. Isolate from dissimilar metals not part of fascia system to prevent electrolytic action.

3.3 FIELD QUALITY CONTROL

A. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:

1. Correct any work found defective or not complying with contract document requirements including buckling or bowing due to improper installation and touch up of minor scratches and spots at no additional cost to the Owner.

3.4 CLEANING

A. General:

1. Clean exposed panel surfaces promptly after installation in accordance with manufacturer's instructions.

B. Waste Management:

1. Dispose of waste in provided waste receptacles (dumpsters) as specified in Section 01 7400.

END OF SECTION

SECTION 07 9213 - ELASTOMERIC JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install sealants not specified to be furnished and installed under other Sections.
2. Quality of sealants to be used on Project not specified elsewhere, including submittal, material, and installation requirements.

1.2 REFERENCES

A. Definitions:

1. Sealant Types and Classifications:

a. ASTM Specifications:

1) Type:

a) Type S: Single-component sealant.
b) Type M: Multi-component sealant.

2) Grade:

a) Grade P: Pourable or self-leveling sealant used for horizontal traffic joints.
b) Grade NS: Non-sag or gunnable sealant used for vertical and non-traffic joints.

3) Classes: Represent movement capability in percent of joint width.

a) Class 100/50: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand of at least 100 percent increase and decrease of at least 50 percent of joint width as measured at time of application.
b) Class 50: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand increase and decrease of at least 50 percent of joint width as measured at time of application.
c) Class 25: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand increase and decrease of at least 25 percent of joint width as measured at time of application.
d) Class 12: Sealant that, when tested for adhesion and cohesion under cyclic movement shall withstand increase and decrease of at least 12 percent of joint width as measured at time of application.

4) Use:

a) T (Traffic): Sealant designed for use in joints in pedestrian and vehicular traffic areas such as walkways, plazas, decks and parking garages.
b) NT (Non-Traffic): Sealant designed for use in joints in non-traffic areas.
c) I (Immersion): Sealant that meets bond requirements when tested by immersion (Immersion rated sealant applications require primer).
d) M (Mortar): Sealant that meets bond requirements when tested on mortar specimens.
e) G (Glass): Sealant that meets bond requirements when tested on glass specimens.
f) A (Aluminum): Sealant that meets bond requirements when tested on aluminum specimens.

g) O (Other): Sealant that meets bond requirements when tested on substrates other than standard substrates, being glass, aluminum, mortar.

2. Silicone: Any member of family of polymeric products whose molecular backbone is made up of alternating silicon and oxygen atoms and which has pendant hydrocarbon groups attached to silicon atoms. Used primarily as a sealant. Offers excellent resistance to water and large variations in temperature minus 100 deg F to + 600 deg F

B. Reference Standards:

1. ASTM International:

a. ASTM C920-14a, 'Standard Specification for Elastomeric Joint Sealants'.
b. ASTM C1193-16, 'Standard Guide for Use of Joint Sealants'.
c. ASTM C1330-02(2013), 'Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants'.
d. ASTM C1481-12(2017) 'Standard Guide for Use of Joint Sealants with Exterior Insulation & Finish Systems (EIFS)'.
e. ASTM D5893/D5893M-16, 'Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements'.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience.
2. Applicator Qualifications:

a. Company specializing in performing work of this section.
b. Provide if requested, reference of projects with minimum three (3) years documented experience, minimum three (3) successfully completed projects of similar scope and complexity and approved by manufacturer.
c. Designate one (1) individual as project foreman who shall be on site at all times during installation.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:

1. Deliver and keep in original containers until ready for use.
2. Inspect for damage or deteriorated materials.

B. Storage and Handling Requirements:

1. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).
2. Handle to prevent inclusion of foreign matter, damage by water, or breakage.
3. Store in a cool dry location, but never under 40 deg F or subjected to sustained temperatures exceeding 90 deg F or as per Manufacturer's written recommendations.
4. Do not use sealants that have exceeded shelf life of product.

1.5 FIELD CONDITIONS

A. Ambient Conditions:

1. Do not install sealant during inclement weather or when such conditions are expected. Allow wet surfaces to dry.
2. Follow Manufacturer's temperature recommendations for installing sealants.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Manufacturers:

1. Manufacturer Contact List:

a. Dow Corning Corp., Midland, MI www.dowcorning.com.
b. Franklin International, Inc. Columbus, OH www.titebond.com.
c. GE Sealants & Adhesives (see Momentive Performance Materials Inc.).
d. Laticrete International Inc., Bethany, CT www.laticrete.com.
e. Momentive Performance Materials Inc. (formally GE Sealants & Adhesives), Huntersville, NC www.ge.com/silicones.
f. Sherwin-Williams, Cleveland, OH www.sherwin-williams.com.
g. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com or Sika Canada Inc, Pointe Claire, QC www.sika.ca.
h. Tremco, Beachwood, OH www.tremcosealants.com or Tremco Ltd, Toronto, ON (800) 363-3213.

B. Materials:

1. Design Criteria:

a. Compliance: Meet or exceed requirements of these standards:

1) ASTM C920: Elastomeric joint sealant performance standard.
2) ASTM D5893/D5893M: Silicone Joint Sealant for Concrete Pavements.

b. Comply with Manufacturer's ambient condition requirements.
c. Sealants must meet Manufacturer's shelf-life requirements.
d. Sealants must adhere to and be compatible with specified substrates.
e. Sealants shall be stable when exposed to UV, joint movements, and environment prevailing at project location.
f. Primers (Concrete, stone, masonry, and other nonporous surfaces typically do not require a primer. Aluminum and other nonporous surfaces except glass require use of a primer. Installer Option to use Adhesion Test to determine if primer is required or use primer called out in related sections):

1) Adhesion Test:

a) Apply silicone sealant to small area and perform adhesion test to determine if primer is required to achieve adequate adhesion. If necessary, apply primer at rate and in accordance with Manufacturer's instructions. See 'Field Quality Control' in Part 3 of this specification for Adhesive Test.

2) If Primer required, shall not stain and shall be compatible with substrates.
3) Allow primer to dry before applying sealant.

2. Sealants At Exterior Building Elements:

a. Description:

1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:

a) Thresholds.
b) Columns.
c) Connections.

d) Door frames.
e) Masonry.
f) Wall penetrations.
g) Other joints necessary to seal off building from outside air and moisture.

b. Design Criteria:

1) Meet following standards for Sealant:

a) ASTM C920: Type S, Grade NS, Class 50 Use NT, M, G, A.

2) Limitations:

a) Do not use below-grade applications.
b) Do not use on surfaces that are continuously immersed or in contact with water.
c) Do not use on wet, damp, frozen or contaminated surfaces.
d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.

3) Color:

a) Architect to select from Manufacturer's standard colors.

c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

1) Dow Corning:

a) Primer: 1200 Prime Coat.
b) Sealant: 791 Silicone Weatherproofing Sealant.

2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):

a) Primer: SS4044 Primer.
b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.

3) Tremco:

a) Primer:

(1) Metal surface: No. 20 primer.
(2) Porous surfaces: No. 23 primer.

b) Sealant: Spectrum 1 Silicone Sealant.

3. Sealants At Exterior Sheet Metal And Miscellaneous:

a. Description:

1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:

a) Flashings.
b) Gutters.
c) Penetrations in soffits and fascias.
d) Roof vents and flues.
e) Lightning protection components.

b. Design Criteria:

1) Meet following standards for Sealant:

a) ASTM C920: Type S Grade NS, Class 25 (min) Use NT, M, G, A and O.

2) Limitations:

a) Do not use below-grade applications.
b) Do not use on surfaces that are continuously immersed or in contact with water.
c) Do not use on wet, damp, frozen or contaminated surfaces.
d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.

c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

1) Dow Corning: 790 Silicone Building Sealant.
2) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2350 Silicone Elastomeric Sealant.
3) Tremco: Tremsil 600 Silicone Sealant.

4. Sealants At Expansion Joints in Exterior Concrete:

a. Expansion Joints:

1) Design Criteria:

a) Meet following standards for Sealant:

(1) ASTM C920: Type S, Grade NS, Class 100/50 Use T, NT, M, G, A, and O.

2) Sealant required at expansion for following areas:

a) Between sidewalks and building foundations.

3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a) Dow Corning:

(1) Primer: 1200 Prime Coat.
(2) Sealant: 790 Silicone Building Sealant.

b) Sika:

(1) Primer: Sikasil Primer-2100.
(2) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.

b. Penetrations thru Concrete Walls:

1) Design Criteria:

a) Meet following standards for Sealant:

(1) ASTM C920: Type S, Grade NS, Class 100/50 Use T, NT, M, G, A, and O.

2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a) Dow Corning:

(1) Primer: 1200 Prime Coat.
(2) Sealant: 790 Silicone Building Sealant.

b) Sika:

(1) Primer: Sikasil Primer-2100.
(2) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.

5. General Interior Sealants:

a. General:

1) Inside jambs and heads of exterior door frames.
2) Both sides of interior door frames.
3) Miscellaneous gaps between substrates.

b. Design Criteria:

1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.
2) 100 percent silicone sealant.

c. Non-Paintable Sealant (Installer Option A):

1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:

a) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
b) Laticrete: Latasil Silicone Sealant.
c) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2800 SilGlaze II Silicone Sealant.
d) Sherwin Williams: White Lightning Silicone Ultra Low Odor Window and Door Sealant.
e) Tremco: Tremsil 200 Silicone Sealant.
f) Franklin International: Titebond 2601 (White) 2611 (Clear) 100% Silicone Sealant.

d. Paintable Sealant (Installer Option B):

1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:

a) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS7000 Paintable Silicone Sealant.

6. Sealants For Interior Joints:

a. General:

1) Countertops and backsplash to wall.
2) Sinks and lavatories to countertops.
3) Joints between plumbing fixtures and other substrates.

b. Description:

1) One-part acetoxy cure silicone sealant with fungicides to resist mold and mildew.

c. Design Criteria:

1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.

2) 100 percent silicone sealant.

d. Color: As selected by Architect from Manufacturer's standard colors.
e. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

1) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
2) Laticrete: Latasil Tile and Stone Silicone Sealant.
3) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS1700 Sanitary Silicone Sealant.
4) Tremco: Tremsil 200 Silicone Sealant.

2.2 ACCESSORIES

A. Bond Breaker Tape:

1. Pressure sensitive tape as by Sealant Manufacturer to suit application.
2. Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.

B. Joint Backing:

1. Comply with ASTM C1330.
2. Flexible closed cell, non-gassing polyurethane or polyolefin rod or bond breaker tape as recommended by Sealant Manufacturer for joints being sealed.
3. Oversized 25 to 50 percent larger than joint width.

C. Joint Cleaner:

1. Non-corrosive and non-staining type as recommended by Sealant Manufacturer, compatible with joint forming materials.

D. Masking Tape:

1. Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

1. Examine substrate surfaces and joint openings are ready to receive Work.

a. Verify each sealant is compatible for use with joint substrates.
b. Verify joint surfaces are clean and dry.
c. Ensure concrete surfaces are fully cured.

2. Sealants provided shall meet Manufacturer's shelf-life requirements.
3. Notify Architect of unsuitable conditions in writing.

a. Do not proceed until unsatisfactory conditions are corrected.

4. Commencement of Work by installer is considered acceptance of substrate.

3.2 PREPARATION

A. Surface Preparation:

1. Surfaces shall be clean, dry, free of dust, oil, grease, dew, frost or incompatible sealers, paints or coatings that may interfere with adhesion. Prepare substrates in accordance with Manufacturer's instructions:

    a. Porous surfaces: Clean by mechanical methods to expose sound surface free of contamination and laitance followed by blasting with oil-free compressed air.
    b. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193. Allow solvent to evaporate prior to sealant application.
    c. High-pressure water cleaning: Exercise care that water does not enter through failed joints.
    d. Primers:

        1) Primers enhance adhesion ability.
        2) Use of primers is not a substitution for poor joint preparation.
        3) Primers should be used always in horizontal application where there is ponding water.

2. Field test joints in inconspicuous location.

    a. Verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.
    b. When test indicates sealant adhesion failure, modify joint preparation primer, or both and retest until joint passes sealant adhesion test.

3. Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.

B. Joints:

1. Prepare joints in accordance with ASTM C1193.

    a. Clean joint surfaces of contaminates capable of affecting sealant bond to joint surface using Manufacturer's recommended instructions for joint preparation methods.
    b. Remove dirt, dust, oils, wax, paints, and contamination capable of affecting primer and sealant bond.
    c. Clean concrete joint surfaces to remove curing agents and form release agents.

C. Protection:

1. Protect elements surrounding the Work of this section from damage or disfiguration.

3.3 APPLICATION

A. General:

1. Apply silicone sealant in accordance with Manufacturer's instructions.
2. Do not use damaged or deteriorated materials.
3. Install primer and sealants in accordance with ASTM C1193 and Manufacturer's instructions.
4. Apply primer where required for sealant adhesion.
5. Install sealants immediately after joint preparation.
6. Do not use silicone sealant as per the following:

    a. Apply caulking/sealant at temperatures below 40 deg F.
    b. Below-grade applications.
    c. Brass and copper surfaces.
    d. Materials bleeding oils, plasticizers, and solvents.
    e. Surfaces to be immersed in water for prolonged time.

B. Joint Backing:

1. Install joint backing to maintain sealant joint ratios recommended by Manufacturer.

2. Install without gaps, twisting, stretching, or puncturing backing material. Use gage to ensure uniform depth to achieve correct profile, coverage, and performance.
3. Rod for open joints shall be at least 1-1/2 times width of open joint and of thickness to give solid backing. Backing shall fill up joint so depth of sealant bite is no more than 3/8 inch deep.

C. Bond Breaker:

1. Install bond breaker where joint backing is not used or where backing is not feasible.

a. Apply bond-breaker tape in shallow joints as recommended by Sealant Manufacturer.

D. Sealant:

1. Apply sealant with hand-caulking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint. Apply sealants in vertical joints from bottom to top.
2. Fill joint opening to full and proper configuration.
3. Apply in continuous operation.
4. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface. Tool joints in opposite direction from application direction, i.e., in vertical joints, from the top down. Do not 'wet tool' sealants.
5. Depth of sealant bite shall be 1/4 inch minimum and 1/2 inch maximum, but never more than one half or less than one fourth joint width.

E. Caulk gaps between painted or coated substrates and unfinished or pre-finished substrates. Caulk gaps larger than 3/16 inch between painted or coated substrates.

3.4 TOLERANCES

A. Provide joint tolerances in accordance with Manufacturer's printed instructions.

3.5 FIELD QUALITY CONTROL

A. Adhesion Test (Installer Option to use adhesion test to determine if primer is required).

1. Perform adhesion tests in accordance with Manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant joint Hand-Pull Tab:

a. Perform five (5) tests for first 1,000 linear feet of applied silicone sealant and one (1) test for each 1,000 linear feet seal thereafter or perform one (1) test per floor per building elevation minimum.
b. For sealants applied between dissimilar materials, test both sides of joints.

2. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
3. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

3.6 CLEANING

A. Remove masking tape and excess sealant.

B. Clean adjacent materials, which have been soiled, immediately (before setting) as recommended by Manufacturer.

C. Waste Management: Dispose of products in accordance with manufacturer's recommendation.

END OF SECTION

DIVISION 08 – OPENINGS:

08 0601	Hardware Group And Keying Schedules
08 1213	Hollow Metal Frames
08 1313	Hollow Metal Doors
08 3110	Access Doors And Panels
08 3300	Overhead Coiling Door
08 5113	Aluminum Windows
08 7101	Common Finish Hardware Requirements
08 7102	Hanging Devices
08 7103	Securing Devices
08 7106	Closing Devices
08 7108	Stops And Holders
08 7109	Accessories
08 8100	Glass Glazing

SECTION 08 0601 - HARDWARE GROUP AND KEYING SCHEDULES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install door hardware and keying as described in Contract Documents.

1.2 REFERENCES

A. Definitions:

1. Builders Hardware Manufacturer's Association (BHMA) Hardware Functions:

a. F75 Passage Latch: Latch bolt operated by lever from either side at all times.
b. F76 Privacy Lock: Latch bolt operated by lever from either side. Outside lever locked by push button inside and unlocked by emergency key from outside or rotating lever from inside.
c. F81 Office Door Lock: Dead locking latch bolt operated by lever from either side, except when outside lever is locked by turn button in inside lever. When outside lever is locked, latch bolt is operated by key in outside lever or by rotating inside lever. Turn button must be manually rotated to unlock outside lever.
d. F84 Classroom Deadlock: Dead locking latch bolt operated by lever from either side, except when outside lever is locked, latch bolt is operated by key in outside lever or by rotating inside lever.
e. F86 Utility Space Door Lock: Dead locking latch bolt operated by key in outside lever or by rotating inside lever. Outside lever is always fixed.
f. F91 Store Door Lock: Deadlocking latch operated by either lever. Key in either lever locks / unlocks both levers.
g. F109 Entrance Lock: Turn/push button locking: Pushing and turning button disengages outside lever, requiring using of key until button is manually unlocked. Push-button locking: Pushing button disengages outside lever until unlocked by key or by turning inside lever. Disengages outside spindle from latch when locked.
h. E2142 Deadbolt: Dead bolt operated by key from either side. Bolt automatically dead locks when fully thrown.
i. E2152 Deadbolt: Dead bolt operated by key from outside and turn unit from inside. Bolt automatically dead locks when fully thrown.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Materials shall be delivered in original, unopened packages with labels intact.

PART 2 - HARDWARE GROUPS – RESTROOMS/SHOWER BUILDINGS (2 BUILDINGS)

2.1 EXTERIOR DOORS

A. Single Exterior Doors:

1. **Group RR/S 1**:

a. 1 set: Weatherstrip.
b. 3 each: Hinges.
c. 1 each: Deadbolt, Function E2152.
d. 1 each: Push/pull.
e. 1 each: Closer

f. 1 each: Stop.
g. 1 each: Sweep.

2. **Group RR/S 2**:

a. 1 set: Weatherstrip.
b. 3 each: Hinges.
c. 1 each: Closer.
d. 1 each: Lockset Function F84.
e. 1 each: Stop and holder.
f. 1 each: Threshold.
g. 1 each: Sweep.

B. Double Exterior Doors:

1. Group RR/S 10:

a. General:

1) 1 set: Weatherstrip.

b. Active Leaf:

1) 3 each: Hinges.
2) 1 each: Lockset Function F84.
3) 1 each: Closer.
4) 1 each: Stop and Holder
5) 1 Each: Sweep

c. Inactive Leaf:

1) 1 each: Dust proof strike.
2) 2 each: Flush Bolts (top and bottom).
3) 3 each: Hinges.
4) 1 each: Closer.
5) 1 each: Stop and Holder.
6) 1 each: Sweep.

PART 3 - HARDWARE GROUPS – PAVILION (1 BUILDING)

3.1 EXTERIOR DOORS

A. Single Exterior Doors:

1. Group P1:

a. 1 set: Weatherstrip.
b. 3 each: Hinges.
c. 1 each: Closer.
d. 1 each: Lockset Function F84.
e. 1 each: Stop.
f. 1 each: Threshold.
g. 1 each: Sweep.

3.2 INTERIOR DOORS

A. Single Interior Doors:

1. Group P22:

a. 1 set: Smoke Gaskets.
b. 3 each: Hinges.
c. 1 each: Lockset Function F86.
d. 1 each: Stop.

PART 4 - KEYING SCHEDULE for FINISH HARDWARE

4.1 KEYING SCHEDULE

A. Key to existing camp master key system. Keying to be determined by Facilities Manager. Provide 5 keys for each new door.

END OF SECTION

SECTION 08 1213 - HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:

1. Hollow metal frames.

B. Related Requirements:

1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for installation.

1.2 REFERENCES

A. Reference Standards:

1. American Architectural Manufacturers Association / Window & Door Manufacturers Association / Canadian Standards Association:

a. AAMA/WDMA/CSA 101/I.S.2/A440-11, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.

2. ASTM International:

a. ASTM A568/A568M-13a, 'Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
b. ASTM A653/A653M-13, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.

3. Steel Door Institute:

a. SDI A250.8-2003(R2008), 'Standard Steel Doors and Frames'.
b. SDI A250.11-2012, 'Recommended Erection Instructions for Steel Frames'.

1.3 SUBMITTALS

A. Informational Submittals:

1. Copy of SDI A250.11.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Suppliers:

1. Category One Approved VMR Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:

a. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:

1) Contact Information: Russ Farley: phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.

b. Beacon Metals Inc, Salt Lake City, UT www.beacon-metals.com:

1) Contact Information: Jared Butler: phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail Jared@beacon-metals.com.

B. Manufacturers:

1. Category One Approved Manufacturers. See Section 01 6200 for definitions of Categories.

a. Any current member of Steel Door Institute.

C. Frames:

1. Cold rolled furniture steel.

a. Frames: 14 ga.

2. Provide labeled frame to match fire rating of door.
3. Finish:

a. Galvanize.

4. Anchors: 16 US ga minimum meeting UL or other code acceptable requirements for door rating involved.

D. Fabrication:

1. General Requirements:

a. Frames shall be welded units. Provide temporary spreader on each welded frame.
b. Provide Manufacturer's gauge label for each item.
c. Make breaks, arises, and angles uniform, straight, and true. Accurately fit corners.

2. Frame width dimension:

a. Fabricate frame 1/8 inch wider than finished wall thickness as described in Contract Documents.

3. Provide mortar guards at strikes and hinges.
4. Anchors:

a. Provide three jamb anchors minimum for each jamb. On hinge side, install one anchor at each hinge location. On strike side, install one anchor at strike level and anchors at same level as top and bottom hinges.
b. Frames installed before walls are constructed shall be provided with extended base anchors in addition to other specified anchors.
c. Anchor types and configurations shall meet wall conditions.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 08 1313 - HOLLOW METAL DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:

1. Hollow metal doors.

B. Related Requirements:

1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for door installation.

1.2 REFERENCES

A. Association Publications:

1. National Association of Architectural Metal Manufacturers (NAAMM):

a. HMMA 810-09, 'Hollow Metal Manual'.
b. HMMA 860-09, 'Hollow Metal Door and Frames'.

2. Steel Door Institute:

a. SDI-108, 'Recommended Selection and Usage Guide for Standard Steel Doors.

B. Reference Standards:

1. American Architectural Manufacturers Association / Window & Door Manufacturers Association / Canadian Standards Association:

a. AAMA/WDMA/CSA 101/I.S.2/A440-11, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.

2. ASTM International:

a. ASTM A568/A568M-15, 'Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
b. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
c. ASTM C1036-16, 'Standard Specification for Flat Glass'.
d. ASTM C1048-12e, 'Standard Specification for Heat-Treated Flat Glass–Kind HS, Kind FT Coated and Uncoated Glass'.

3. Steel Door Institute:

a. SDI A250.8-2003(R2008), 'Standard Steel Doors and Frames'.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Suppliers:

1. Category One Approved VMR Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:

    a. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:

        1) Contact Information: Russ Farley: phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.

    b. Beacon Metals Inc, Salt Lake City, UT www.beacon-metals.com:

        1) Contact Information: Jared Butler: phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail Jared@beacon-metals.com.

B. Manufacturers:

1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:

    a. Any current member of Steel Door Institute.

C. Doors:

1. Meet one of following requirements:

    a. Meet requirements of Steel Door Institute ANSI / SDI A250.8.
    b. Commercial grade steel meeting requirements of ASTM A568/A568M, Class 1:

        1) Grade II.
        2) Model 1 Full Flush or Model 2 Seamless designs at Manufacturer's option.
        3) Type F as required.
        4) Finish:

            a) Galvanized and primed as per ASTM A653/A653M.

D. Fabrication:

1. General:

    a. Mortise and reinforce doors for hinges and locks.
    b. Reinforce doors for closers and other surface applied hardware.
    c. Drill and tap on job.
    d. Seams along vertical edges of door need not be filled.
    e. Do not extend hinge cut out full width of door unless fill strip is inserted, weld filled, and ground smooth so no seam appears on back face plate.

2.2 SOURCE QUALITY CONTROL

A. Tests:

1. Verification of Performance:

    a. Label each door as conforming to above required standards.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 08 3110 - ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:

1. Manufactured access doors.

B. Related Requirements:

1. Section 06 2001: 'Common Finish Carpentry Requirements' for Installation.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Acceptable Manufacturers:

1. Babcock-Davis, Minneapolis, MN www.babcock-davis.com.
2. The Bilco Company, New Haven, CT www.bilco.com or Bilco Canada, London, ON (519) 659-7331.
3. Dur-Red Products, Cudahy, CA www.dur-red.com.
4. Elmdor Stoneman, City of Industry, CA www.elmdorstoneman.com.
5. Jensen Industries, Los Angeles, CA www.jensen-ind.com.
6. Karp Associates Inc, Maspeth, NY www.karpinc.com.
7. Larsen's Manufacturing Co, Minneapolis, MN www.larsensmfg.com.
8. Mifab Manufacturing Co, Minneapolis, MN www.mifab.com.
9. Milcor, Bensenville, IL www.milcorinc.com.
10. Nystrom Inc, Brooklyn Park, MN www.nystrom.com.
11. Williams Brothers Corporation of America, Reno, NV www.wbdoors.com.
12. Equal as approved by Architect before bidding. See Section 01 6200.

B. Standard Ceiling Access Doors:

1. Manually operated with single key operated lock, interior latch release, and continuous piano hinge hardware.
2. Factory powder-coated prime finish.
3. Non-Fire-Rated, Class Two Quality Standards:

a. Drywall: KDW or Sesame (KSTDW or KSTE) by Karp.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 08 3300 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Non-Insulated Overhead Coiling Service Doors

1.3 RELATED SECTIONS

A. Section 05 1000 - Structural Metal Framing.

B. Section 06 1000 - Rough Carpentry.

C. Section 09 9001 – Common Painting and Coating Requirements.

D. Section 26 0501 - Common Electrical Requirements.

1.4 REFERENCES

A. ASTM A480/A480M-04; 2004 - Standard Specification for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

B. ASTM A653/A653M-03; 2003 - Standard Specification for Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 3000 - Administrative Requirements.

B. Product Data: For each type and size of overhead coiling door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
3. Include description of automatic closing device and testing and resetting instructions.

C. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details
2. Include details of equipment assemblies and indicate dimensions, required clearances, and components.
3. Show controls, locking devices, and other accessories.

D. Samples for Initial Selection: Upon request, provide manufacturer's finish charts showing full range of colors and textures available for units with factory applied finishes.

1. Include similar samples of accessories involving color selection

E. Samples for Verification: Upon request, provide for each type of exposed finish on the following components in manufacturer's standard sizes.

1. Curtain slats.
2. Bottom bar.

F. Closeout Submittals:

1. Operation and maintenance data.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Company specializing in the manufacturing of products specified in this section and with a minimum of five years' experience.

B. Installer Qualifications: Installer shall be authorized and qualified to install overhead door systems on the type and scope of project specified.

1. Maintenance Proximity: Not more than 2 hours normal travel time from installers place of business to project site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of all materials in accordance with federal, state and local laws.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 COORDINATION

A. Coordinate with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

A. Warranty: Manufacturer's warranty that all parts and components are to be free from defects in materials and workmanship for 1 year.

B. Warranty: Manufacturer's warranty that all parts and components, except counterbalance spring and finish, are to be free from defects in materials and workmanship for 5 years. Counterbalance springs to be warrantied for 1 year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: C.H.I. Overhead Doors, which is located at: 1485 Sunrise Dr. ; Arthur, IL 61911; Toll Free Tel: 800-590-0559; Fax: 217-543-4454; Email: AIA@chiohd.com; Web: www.chiohd.com.

B. Substitutions: As approved by Architect. Must meet Design Standards.

2.2 PERFORMANCE REQUIREMENTS

A. Non-Insulated Overhead Coiling Service Doors

1. Wind Loads: Design door assembly to withstand a minimum of 20 psf in accordance with ASTM E330 using a 1.0 factor of safety.

2. Windborne-Debris Impact Resistance: Design door assembly to pass missile impact and cyclic pressure tests in accordance with ANSI/ DASMA 108 and/or ANSI/DASMA 115 and to withstand wind load pressures indicated.
3. Seismic Performance: Overhead coiling doors shall be evaluated for seismic performance to withstand the effect of earthquake motions determined according to ASCE/SEI 7.
4. Operation: Design complete door assembly including operator for use of not less than 100,000 cycles.

B. Source Limitations: Provide overhead coiling doors from one manufacturer for each type of door. Provide operators and other accessories from source acceptable to overhead coiling door manufacturer.

2.3 MATERIALS

A. Galvanized Steel Sheet:

1. Galvanized commercial steel, (CS type) per ASTM A653/A653M, G90 and G60 coating class.

2.4 DOOR ASSEMBLY

A. Non-Insulated Overhead Coiling Service Doors.

1. Basis of Design: C.H.I. Overhead Doors model 6221
2. Construction:

a. Curtain: Constructed from interlocking slats formed from the following.

1) Material:

a) 22 gauge galvanized steel.

i. Finish: Hot-dipped galvanized in accordance with ASTM A653 and with baked on enamel primer coat and polyester finish coat.

Powder Coat: Custom Color.

2) Profile:

a) Flat, non-insulated, 2-1/2 inches high by 3/4 inch deep.

3) End locks: Galvanized malleable iron, attached to every other slat to act as wearing surface and prevent lateral movement.
4) Wind locks: Per design and wind load requirements
5) Bottom bar:

a) Two steel angles bolted back-to-back, with adjustable tubular compression weather seal.

i. Bottom Bar Finish:
Powder Coat to match curtain

b. Guides: Structural angles bolted together to form guide and mounting surface.

1) Guide Material:

a) Steel:

i. Guide Finish:
Powder Coat to match curtain

c. Head Plate: Rectangular steel plate, with precision sealed ball bearings supporting drive side

axle.

d. Barrel Assembly: Steel pipe sized for maximum deflection under full load not to exceed 0.03″ per foot of span with threaded rings or lugs welded to barrel assembly for curtain attachment.

e. Springs: Spring tension assembly supported within barrel by precision ball bearings. Curtain weight counterbalanced by oil tempered, helically wound torsion springs; grease packed and mounted on steel torsion shafts with cast spring plug.

1) Designed for minimum 100,000 cycles.

f. Hood: Shaped to fit within the head plates and with intermediate supports as required.

1) Hood Material:

a) Minimum 24 gauge galvanized steel

i. Hood finish:
Polyester Finish: Gray.

g. Weather Seal:

1) Tubular vinyl bottom seal.
2) Vinyl guide seal with rubber hood baffle.
3) Guide brush seal.
4) Header brush seal.

h. Locking Mechanism:

1) Cylinder lock mounted to double angle bottom bar.

a) Keyed on exterior of door with thumb turn on interior.
b) Key to match FM master key system.

3. Mounting:

a. Face of wall and above lintel.

4. Manual Operation:

a. Chain Hoist.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for substrate construction and other conditions affecting performance of the work.

B. Examine locations of electrical connections.

C. Proceed with installation only after all unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Anchor to adjacent construction without distortion or stress.

C. Fit and align door and shutter assembly including hardware, plumb, level and square to ensure smooth operation.

D. Complete wiring from operator to controls and components.

E. Coordinate installation of electrical service from power supply to operator.

F. Complete wiring from operator to controls and components.

G. Coordinate installation of electrical service from power supply to operator.

3.3 ADJUSTING

A. Adjust hardware and moving parts so that doors operate smoothly throughout full operating range.

B. Adjust seals to provide a tight fit around the entire perimeter.

3.4 DEMONSTRATION

A. Demonstrate proper operation to Owner.

END OF SECTION

SECTION 08 5113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:

1. Install window units as described in Contract Documents.

B. Related Requirements:

1. Section 06 2001: 'Common Finish Carpentry Requirements' for Installation of window units.
2. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants and backer rods.
3. Section 08 8100: 'Glass Glazing' for quality of glass.

1.2 REFERENCES

A. Association Publications:

1. American Architectural Manufacturers Association:

a. AAMA 611-14, 'Voluntary Standards for Anodized Architectural Aluminum'.
b. AAMA 701/702-11, 'Voluntary Specifications for Pile Weatherstripping and Replaceable Fenestration Weatherseals'.
c. AAMA 711-13, Voluntary Specification for Self-Adhering Flashing Used for Installation of Exterior Wall Fenestration Products, American Architectural Manufacturers Association.
d. AAMA 851-09, 'Fenestration Sealants Guide for Windows, Window Walls and Curtain Walls'.
e. AAMA 902-14, 'Voluntary Specification for Sash Balances',
f. AAMA 910-16, 'Life Cycle Specifications and Test Methods for AW Class Architectural Windows and Doors'.
g. AAMA 1302.5-76, 'Voluntary Specifications for Forced-Entry Resistant Aluminum Prime Windows'.
h. AAMA 1503-09, 'Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections'.
i. AAMA 2603-15, 'Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels'.
j. AAMA 2604-13, 'Voluntary Specification, Performance Requirements and Test Procedures for High Performing Organic Coatings on Aluminum Extrusions and Panels'.
k. AAMA 2605-13, 'Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels'.

2. American National Standards Institute / National Fenestration Rating Council, Greenbelt, MD:

a. ANSI/NFRC 100-2014, 'Procedure for Determining Fenestration Product U-factors.
b. ANSI/NFRC 200-2014, 'Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence'.

3. Fenestration Manufacturers Association / American Architectural Manufacturers Association:

a. FMA/AAMA100-12, 'Standard Practice for the Installation of Windows with Flanges or Mounting Fins in Wood Frame Construction'.

B. Reference Standards:

1. American Architectural Manufacturers Association / Window & Door Manufacturers Association / Canadian Standards Association:

a. AAMA/WDMA/CSA 101/I.S.2/A440-11, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.

2. ASTM International:

a. ASTM E90-09(2016), 'Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements'.
b. ASTM E331-00(2016), 'Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference'.
c. ASTM E1996-17, 'Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes'.
d. ASTM E2112-07(2016), 'Standard Practice for Installation of Exterior Windows, Doors and Skylights'.
e. ASTM F588-17, 'Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact'.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:

1. Participate in pre-installation conference.
2. Schedule conference before scheduled installation of aluminum windows.
3. In addition to agenda items specified in Section 01 3100, review following:

a. Review Installation scheduling, coordination, and placement of windows.
b. Review Manufacturer's installation requirements to assure issuance of Manufacturer's warranty.
c. Before installing windows, review Manufacturer's submitted installation requirements and install first window, including flashing and sealant, to demonstrate standard for installation of remaining windows.

1.4 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's literature or cut sheet.
b. Literature on glazing.
c. Color and finish selection.
d. Manufacturer's published installation instructions for windows, flashing, and sealants.

2. Shop Drawings: Submit before beginning framing. Show rough opening requirements.

B. Informational Submittals:

1. Manufacturer Instructions:

a. Manufacturer's published installation instructions for windows, flashing, and sealants.

C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Warranty Documentation:

1) Include copy of final, executed warranty.

1.5 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Materials shall be delivered in original, unopened packages with labels intact.
2. Examine and report damaged materials to Architect and/or Owner immediately.

B. Storage And Handling Requirements:

1. Provide secure location protected from the weather and other trades.
2. Store window units in an upright position in clean and dry storage area above ground and protect from weather.

1.7 WARRANTY

A. Special Warranty:

1. Provide written non-prorated Manufacturer's warranty including:

a. Ten (10) years for seal failure.
b. Two (2) years for failure of operating hardware.
c. Two (2) years on stress cracks related to fabrication or installation problems.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Manufacturers:

1. Type One Acceptable Manufacturers:

a. Thermal Windows, Inc., Tulsa, Oklahoma:

1) Contact Information:

a) General: Phone (918) 663-7580, www.thermalwindows.com.
b) Primary Contact: Seth Patterson (800) 259-7580 extension 1232 www.spatterson@thermalwindows.com.

b. Equal as approved by Architect before bidding. See Section 01 6200.

B. Manufactured Window Units:

1. Performance Standard (Sliding Window):

a. Sliding: Series 525H.

C. Design Criteria (Sliding):

1. Performance:

a. Comply with minimum test requirements of AAMA/WDMA/CSA 101/I.S.2/A440 for classification of specified window in following:

1) Meet AAMA/WDMA/CSA 101/I.S.2/A440:

a) Minimum Test Size: 56 x 91 inches (1400 x 2300 mm).
b) Minimum Design Pressure: 30 lbf/sq ft (0.133 kn/sq ft).
c) Deflection at Design Pressure: (Reported).
d) Minimum Structural Pressure: 45 lbf/sq ft (0.200 kn/sq ft).
e) Minimum Water Pressure: 4.5 lbf/sq ft (0.020 kn/sq ft).
f) Air Leakage Resistance: 0.3 cfm/sq ft (1.524 L/s/sq m) at 1.6 lbf/sq ft (0.007kn/sq ft).

b. Structural: Meet requirements of AAMA/WDMA/CSA 101/I.S.2/A440 DH-C45 specification.
c. Thermal: Meet the requirements of AAMA 1503 CRF 57/50.
d. NFRC: Meet requirements of ANSI/NFRC 100 and ANSI/NFRC 200.
e. Forced Entry: Meet requirements for AAMA 1302.5 and ASTM F588 Load Identification Level 30.
f. Sound Transmission Class: Meet requirements of ASTM E90.

2. Material:

a. Aluminum to be of proper alloy for commercial window construction.
b. Extruded sections to be 6063-T5 aluminum alloy.

3. Frame:

a. Main frame and sash members to be nominal thickness as required by AAMA/WDMA/CSA 101/I.S.2/A440.

1) Main frame to be 2-5/8 inch (67 mm) in depth.

b. Horizontal sash members to be hollow extrusions.
c. Main frames and sash members to be extruded aluminum with a structural thermal barrier of high density low thermal conductivity polyurethane, poured and de-bridged.

4. Locks:

a. Consist of cam latch at interlocking meeting rail along with an independent spring loaded latch for sash.

5. Weatherstripping:

a. Weatherstripping shall be 0.250 polypile with mylar fins conforming to AAMA 701/702, Specification for Pile Weatherstrip.
b. Weatherstripping shall be doubled at all points of contact of the sash and main frames and at the interlocking meeting rail.
c. A dual vinyl bulb seal will be used at the sill.

6. Assembly:

a. Main frame to be a mechanically joined construction.
b. Corner joints to be "seam sealed" with quality grade of sealant meeting requirements of AAMA 851.
c. The sash shall be assembled with two screws at each corner.
d. All screws at joints of sash and main frame shall be secured into integral screw ports.

7. Glazing:

a. Glass in the operable sash to be factory glazed with marine (wrap around) reusable vinyl glazing channel.
b. Fixed lite to be inside glazed, using rigid vinyl glazing bead.
c. Insulated glass units to be 7/8 inch (22 mm) overall thickness with two panes of double strength glass, separated by 5/8 inch (16 mm) air space.
d. Insulated glass units shall meet requirements of ASTM E2190, Class "A".

8. Screens:

    a. Screen frame to be of hollow extruded aluminum frames.
    b. Finish matching main frame and sash.
    c. Insect screening shall be 18 x 14 mesh with 0.013 inch diameter aluminum wire or fiberglass and secured with vinyl spline.
    d. Screens to be half length.

9. Operation:

    a. The operable sash will slide for ventilation.

10. Finish:

    a. Meet requirements of AAMA 611 (Class I) dark bronze anodized.

11. Approved Color:

    a. White.

D. Glazing Requirements:

1. Glazing Characteristics:

    a. Obscure interior pane with pattern on surface 3 and Clear tempered exterior pane with Low E treatment on surface 2.

2. Glazing Beads: Manufacturer's standard.

2.2 ACCESSORIES

A. Anchoring Devices:

1. Aluminum or stainless steel.
2. Other corrosion-resistant or insulated anchors as specifically approved by Architect in writing before use.

2.3 SOURCE QUALITY CONTROL

A. Identification:

1. When delivered to Project site, windows shall bear permanent label stating model of window and Manufacturer's name, or AAMA label.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Evaluation And Assessment:

1. Openings:

    a. Examine openings for adequacy in allowing successful installation and operation.
    b. Verify openings are prepared to specified dimensions and are plumb and level.

2. Notify Architect in writing of inadequate conditions.

    a. Do not install windows until conditions have been corrected.

3. Commencement of Work by installer is considered acceptance of substrate.

3.2 PROTECTION

A. Protect aluminum window surfaces from adjacent work as necessary.

3.3 INSTALLATION

A. Review Manufacturer's printed installation instructions before installing windows and flashing.

B. Set window frame plumb, level, and in alignment.

1. Secure window properly in opening.

C. Apply specified sealant between window frame and building wall as specified in Section 07 9213.

1. Trim off excess sealant.

D. Avoid direct contact between aluminum and adjacent steel work by insulating with materials equal to 3M's EC 1202 tape if materials are in pressure contact or with bituminous paint if pressure between surfaces cannot be maintained.

3.4 FIELD QUALITY CONTROL

A. Field Inspections:

1. Notify Architect when windows are to be delivered to Project site to allow opportunity for Architect's inspection before installation.

B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:

1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.

3.5 ADJUSTING

A. Sliding Windows:

1. After windows are in place, installer shall adjust hardware and ventilators to operate smoothly and be weather tight when closed.

3.6 CLEANING

A. After installation, clean interior and exterior metal surfaces of windows and accessories of mortar, plaster, paint, and other contaminants. Maintain protection and provide final cleaning.

END OF SECTION

SECTION 08 7101 - COMMON FINISH HARDWARE REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. General requirements for finish hardware related to hollow metal doors.

B. Related Requirements:

1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for installation of hardware.
2. Section 08 0601: 'Hardware Group and Keying Schedules'.

1.2 REFERENCES

A. Association Publications:

1. Builders Hardware Manufacturers Association (BHMA), 355 Lexington Avenue, 15th Floor, New York, NY 10017-6603, Tel: 212-297-2122 Fax: 212-370-9047, www.buildershardware.com.

B. Reference Standards:

1. International Code Council / American National Standards Institute:

a. ICC / ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.

2. Underwriters Laboratories (UL):

a. UL 10B, 'Fire Tests of Door Assemblies'.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Hardware Templates:

a. Provide hardware templates to Sections 08 1213 and 08 1313 within fourteen (14) days after Architect approves hardware schedule.
b. Supply necessary hardware installation templates to Section 06 2024 before pre-installation conference.

1.4 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's cut sheets.
b. Two (2) copies of Manufacturer's installation, adjustment, and maintenance instructions for each piece of hardware. Include one (1) set in 'Operations And Maintenance Manual' and send one (1) set with hardware when delivered.
c. Copy of hardware schedule.
d. Written copy of keying system explanation.

2. Shop Drawings:

a. Submit hardware schedule indicating hardware to be supplied.
b. Schedule shall indicate details such as proper type of strikeplates, spindle lengths, hand, backset, and bevel of locks, hand and degree opening of closer, length of kickplates, length of rods and flushbolts, type of door stop, and other necessary information necessary to determine exact hardware requirements.

B. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Operations and Maintenance Data:

1) Manufacturer's installation, adjustment, and maintenance instructions for each piece of hardware.

b. Record Documentation:

1) Manufacturers documentation:

a) Manufacturer's literature and/or cut sheets.
b) Include keying plan and bitting schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage And Handling Requirements:

1. Neatly and securely package hardware items by hardware group and identify for individual door with specified group number and set number used on Supplier's hardware schedule.
2. Include fasteners and accessories necessary for installation and operation of finish hardware in same package.

PART 2 - PRODUCTS

2.1 SUPPLIERS

A. Category One VMR Approved Suppliers. See Section 01 6200 for definitions of Categories:

1. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:

a. Contact Information: Russ Farley, phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.

2. Beacon Metals Inc, Salt Lake City, UT www.beacon-metals.com:

a. Contact Information: Jared Butler, phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail Jared@beacon-metals.com.

3. Midwest D-Vision Solutions, Salt Lake City, UT www.mwdsutah.com.

a. Contact information: Dan Mercer, office (801) 377-4355, cell(801) 618-9456, e-mail danm@mwdsutah.com

2.2 FINISHES

A. Hardware Finishes:

1. Finishes for brass or bronze hardware items shall be:

a. ANSI / BHMA Finish Code 626.

1) Description: Satin Chromium Plated.
2) Base Metal: Brass. Bronze.

2. Finishes for flat goods items may be:

a. ANSI / BHMA Finish Code 630.

1) Description: Satin Stainless Steel.
2) Base Metal: Stainless Steel (300 Series).

3. Materials other than steel, brass, or bronze shall be finished to match appearance satin chromium plated, except flat goods which shall be satin stainless steel.

2.3 FASTENERS

A. Fasteners shall be of suitable types, sizes and quantities to properly secure hardware. Fasteners shall be of same material and finish as hardware unless otherwise specified. Fasteners exposed to weather shall be non-ferrous or corrosion resisting steel.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before ordering materials, examine Contract Documents to be assured that material to be ordered is appropriate for thickness and substrate to which it is to be secured and will function as intended.

END OF SECTION

SECTION 08 7102 - HANGING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:

1. Hinges for hollow metal doors.

B. Related Requirements:

1. Section 08 7101: 'Common Hardware Requirements'.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Manufacturers:

1. Manufacturer Contact List:

a. Hager Companies, St Louis, MO www.hagerhinge.com.
b. Ives, New Haven, CT www.iveshardware.com.
c. McKinney, Scranton, PA www.mckinneyhinge.com.
d. PBB, Ontario, CA www.pbbinc.com.
e. Stanley, New Britain, CT www.stanleyworks.com.

B. Hinges:

1. Doors:

a. Sizes:

1) 1-3/4 inch doors in metal frames:

a) Standard: 4-1/2 inches by 4-1/2 inches.
b) Wide Throw: 4-1/2 inches by width required.

2. Use non-removable pins on exterior opening doors.
3. Hinges shall be solid brass, plated to achieve specified finish.
4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a. Hager: BB 1191.
b. Ives: 5BBI.
c. McKinney: TA 2314.
d. PBB: BB21.
e. Stanley: FBB 191.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 08 7103 - SECURING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:

1. Items for architectural wood or hollow metal doors:

a. Flush bolts.
b. Locksets and latchsets.
c. Deadbolts.

B. Related Requirements:

1. Section 08 7101: Common Hardware Requirements.

1.2 REFERENCES

A. Definitions:

1. Grade 2 Standard Duty Key-In Lever Cylindrical Lockset:

a. Performance Features:

1) Exceeds 400,000 ANSI cycles.
2) Single motion egress provides easy emergency exit.
3) Full 1 inch (25 mm) throwbolt with saw resistant hardened steel roller pin.
4) Anti-drill design deadbolt. Two (2) ball bearings inserted to prevent drill attacks.
5) ADA-compliant thumbturn.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Standard Key Delivery:

a. Include change keys with hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Manufacturers:

1. Manufacturer List:

a. Hager, St Louis, MO www.hagerhinge.com.
b. Ives, New Haven, CT www.iveshardware.com.
c. Marks USA, Amityville, NY www.marksusa.com.
d. Rockwood, Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
e. Sargent, New Haven, CT www.sargentlock.com.
f. Schlage, Colorado Springs, CO www.schlage.com.
g. Yale Commercial Locks, Lenoir City, TN www.yalecommercial.com.

B. General:

1. Backsets shall be 2-3/4 inches (70 mm).
2. Furnish lead shields where required.

C. Flush Bolts:

1. Rod length: 12 inch (300 mm) minimum.
2. Type Two Acceptable Products:

a. Manual UL Fire-Rated Flush Bolts (Metal Doors):

1)	Hager	282D.
2)	Ives	FB458.
3)	Rockwood	555.

b. Equal as approved by Architect before installation. See Section 01 6200.

3. Dust Proof Strike:

a. Floor and/or threshold.
b. Type Two Acceptable Products:

1)	Hager:	280X.
2)	Ives:	DP2.
3)	Rockwood	570.
4)	Equal as approved by Architect before installation. See Section 01 6200.	

D. Locksets And Latchsets:

1. Design Criteria:

a. Grade 2 Standard Duty Key-In Lever Cylindrical Lockset:

1) ANSI/BHMA A156.02 Series 4000 Grade 2.
2) Meet UL 3 hour fire rating.
3) Meet ADA Compliant ANSI A117.1 Accessibility Code.
4) Door Lever:

a) Meet California code for 1/2 inch or less return to door.

2. Lever Operated:

a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

1) Grade 2 Standard Duty Key-In Lever Cylindrical Locksets:

a) 175 Series with American Lever by Marks USA.
b) 7 Line Series with L Lever by Sargent.
c) AL Series with Saturn (SAT) Lever by Schlage.
d) 5300LN Series with Augusta (AU) Lever by Yale.

E. Deadbolts:

1. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a. Match manufacturer of locksets.

F. Standard Cylinders:

1. Other Cylinders: Provide cylinders for coiling counter doors.
2. Category Four Approved Products. See Section 01 6200 for definitions of Categories.

a. Match Manufacturer of locksets.

PART 3 - EXECUTION

3.1 CLOSE-OUT ACTIVITIES

A. Owner's Instructions:

1. Before Final Acceptance Meeting, send master keys to Facilities Manager.

END OF SECTION

SECTION 08 7104 - OPERATING TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:

1. Push / pulls.

B. Related Requirements:

1. Section 08 7101: Common Hardware Requirements and VMR Suppliers.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Standard Door Push / Pulls:

1. Size: 15 inches (380 mm) by 3-1/2 inch (89 mm).
2. Type Two Acceptable Products:

a. PS3515, PL3515 / 80301 by Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
b. 39E, 30S by Hager, St Louis, MO www.hagerhinge.com.
c. 8200, 8302 by Ives, Wallingford, CT www.iveshardware.com.
d. 70B, 105x70B by Rockwood Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
e. Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 08 7106 - CLOSING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:

1. Closers for hollow metal doors.

B. Related Requirements:

1. Section 08 7101: 'Common Finish Hardware Requirements'.
2. Section 08 7108: 'Stops And Holders'.

1.2 SUBMITTALS

A. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Warranty Documentation:

1) Manufacturer's final, executed copy of warranty.

1.3 WARRANTY

A. Manufacturer Warranty:

1. Manufacturer's Standard Warranty, five (5) years minimum.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Manufacturers:

1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:

a. 7900 Series by Dorma Architectural Hardware, Reamstown, PA www.dorma.com/usa.
b. 1461 Series by LCN Closers, Princeton, IL www.lcnclosers.com.
c. 8501 Series by Norton Door Controls, Charlotte, NC www.nortondoorcontrols.com.
d. 1431 Series by Sargent, New Haven, CT www.sargentlock.com.
e. D-3550/D-3551 Series by Stanley, Indianapolis IN www.stanlesecuritysolutions.com.

B. Surface-Mounted Overhead Door Closers:

1. Closers provided under this Section shall be from same Manufacturer.
2. Provide parallel arms on closers unless door position in relation to adjacent wall requires otherwise. Provide covers.
3. Door Closers on doors that swing 180 degree as shown on Contract Documents:

a. Closers shall allow for 180 degree opening without engaging stop function. Wall stop or Floor stop is specified in Door Schedule and Section 08 7108, 'Stops And Holders'.
b. Closers shall have following features:

1) Adjustable sweep speed.
2) Adjustable backcheck.
3) Non-handed, non-sized.
4) Hold open arm function (Friction Hold Open) (Non-Fire-Rated Corridors).

4. Door Closers on doors that swing 90 degree as shown on Contract Documents:

a. Closers shall allow for 100 degree opening with engaging stop function.
b. Closers shall have following features:

1) Adjustable sweep speed.
2) Adjustable backcheck.
3) Non-handed, non-sized.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount closers on stop side of door wherever conditions permit.

B. Through-bolt hardware-to-door connections.

3.2 ADJUSTING

A. Adjust closers to provide maximum opening force as required by governing code authority and proper backcheck and sweep speed.

END OF SECTION

SECTION 08 7108 - STOPS AND HOLDERS

PART 1 - GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section:

1. Door stops.
2. Door stops and holders.

B. Related Sections:

1. Section 08 7101: Common Hardware Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Manufacturers:

1. Manufacturer Contact List:

a. Hager, St Louis, MO www.hagerhinge.com.
b. Ives, Wallingford, CT www.iveshardware.com.
c. Rockwood Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.

B. Stops:

1. Use wall type stops unless indicated otherwise on Door Schedule.
2. Provide model appropriate for substrate. Wall stops may be either cast or wrought.
3. Type Two Acceptable Products:

		Exterior Wall
a.	Hager	255W
b.	Ives	WS447
c.	Rockwood	474/475
d.	Equal as approved by Architect before Installation. See Section 01 6200.	

C. Door Stops And Holders:

1. Type Two Acceptable Products:

a. Hager: 268F, 268S or 256S, 256W.
b. Ives: WS444, WS449, FS446, FS450.
c. Rockwood: 472, 473, 476, 477.
d. Equal as approved by Architect before Installation. See Section 01 6200.

PART 3 - EXECUTION: NOT USED

END OF SECTION

SECTION 08 7109 - ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:

1. Smoke Gaskets.
2. Thresholds (metal) where required for hollow metal doors.
3. Weatherstripping for exterior hollow metal doors.
4. Door bottoms/door sweeps.

B. Related Requirements:

1. Section 08 7101: 'Common Finish Hardware Requirements' for general finish hardware requirements and Approved Suppliers.

1.2 REFERENCES

A. Association Publications:

1. American Architectural Manufacturers Association (AAMA:

a. AAMA 609 & 609-09, 'Cleaning and Maintenance Guide for Architecturally Finished Aluminum' (combined document).
b. AAMA 611-12, 'Voluntary Standards for Anodized Architectural Aluminum'.
c. AAMA 701/702-11, 'Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals'.

2. National Association of Architectural Metal Manufacturers (NAAMM):

a. AMP 500-06, 'Metal Finishes Manual' for Architectural and Metal Products.

B. Reference Standards:

1. American National Standards Institute / Builders Hardware Manufacturers Association:

a. ANSI / BHMA A156.18-2012, 'Materials and Finishes'.
b. ANSI / BHMA A156.21-2014, 'American National Standard for Thresholds'.

2. International Code Council / American National Standards Institute:

a. ICC / ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Manufacturers:

1. Manufacturer Contact List:

a. Hager, St Louis, MO www.hagerhinge.com.
b. NGP - National Guard Products, Memphis, TN www.ngpinc.com.
c. Pemko Manufacturing, Ventura, CA www.pemko.com.

B. Smoke Gaskets:

1. Color as selected by Architect.
2. Type One Acceptable Products:

a. 726 by Hager.
b. 5050 by NGP.
c. PK 55 by Pemko.
d. Equal as approved by Architect before bidding. See Section 01 6200.

C. Sweepstrip (metal door bottom):

1. Clear anodized aluminum with black neoprene insert.
2. Reduce infiltration of air, wind, dust, rain, and snow.
3. Meet UL requirements.
4. For use with saddle thresholds.
5. Type One Acceptable Products:

a. 750S CLR by Hager.
b. 198N A by NGP.
c. 321 CN by Pemko.
d. Equal as approved by Architect before bidding. See Section 01 6200.

D. Thresholds:

1. Type One Acceptable Products:

a. Design Criteria:

1) Meet handicap accessibility requirements (ADA):

b. In-swinging Exterior Doors, Approved Products:

1) 602A with 770S Rain Drip and 713SA Surface Hook by Hager.
2) 345 with 15D Rain Drip and 81A Surface Hook by NGP.
3) 110A with 345 Rain Drip and 66A Surface Hook by Pemko

c. Equals as approved by Architect before bidding. See Section 01 6200.

E. Weatherstripping:

1. Type One Acceptable Products:

a. Finish: clear anodized aluminum.
b. Perimeter:

1) 800S by Hager.
2) A625 A by NGP.
3) 35041 CP by Pemko.

c. Equal as approved by Architect before bidding. See Section 01 6200.
d. Bottom (see Sweepstrip):

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install smoke gaskets in manner to give continuous air-tight fit.

1. Install smoke gaskets as per Manufacturer's installation requirements:

a. Hinge Jamb: Install smoke gaskets on jamb face of door frame so door will compress smoke gasket.
b. Header and Strike Jamb: Install smoke gaskets on face of stop of door frame so door will compress smoke gasket.

END OF SECTION

SECTION 08 8100 - GLASS GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Quality of glazing used in windows.

B. Related Requirements:

1. Section 08 5313: Aluminum Windows' for furnishing and installing of glazing in windows.

1.2 REFERENCES

A. Definitions:

1. Glass Surface:

a. Insulated glass unit:

1) Surface 1: Exterior surface of outer lite.
2) Surface 2: Interspace-facing surface of outer lite.
3) Surface 3: Interspace-facing surface of inner lite.
4) Surface 4: Interior surface of inner lite.

2. Heat-Strengthened Glass: Glass which is reheated, after forming, just below melting point and then cooled. Compressed surface is formed which increases its strength. Used for spandrel glass.
3. Insulated Glass: Two pieces of glass spaced apart and hermetically sealed to form single-glazed unit with air space between. Heat transmission through this type of glass may be as low as half that without air space. Also called double glazing, double pane, insulated unit, and thermal pane.
4. Low-Emissivity Glass (Low-E): Reduces wintertime heat loss from interior with thin, almost colorless metallic coating that reflects heat back inside structure. Allows moderate solar heat gain while reducing harmful ultraviolet light in any season. Minimizes summertime air conditioning loss by reflecting radiated heat to outside. May be tempered for where safety glass is required. Available in single strength clear, gray and bronze (brown) color.
5. Obscure Glass: Adds privacy where window coverings are impractical or undesirable. Various colors and texture patterns provide translucent or semi-opaque effect. May be tempered for use where safety glass is required.
6. Shading Coefficient: Ratio of solar heat gain passing through a glazing system to solar heat gain that occurs under the same conditions if the window was made of clear, unshaded double strength glass. Lower SC number, the better solar control efficiency of glazing system.
7. Solar Heat Gain Coefficient (SHGC): Ratio of total solar heat passing through a given window relative to the solar heat incident on the projected window surface at normal solar incidence. (Percentage of solar energy directly transmitted or absorbed and re-radiated into a building). Lower SHGC, the better it is able to reduce heat.
8. Solar Reflectance (R): Percent of incident solar radiation that is reflected by window film/glass system. Lower the number, the less solar radiation reflected.
9. Tempered Glass: Glass strengthened through process of heating, creating tensile strength that causes glass to resist breakage, yet disintegrate into small pieces if break occurs. Tempered glass is type of safety glass.
10. U-Value: Measurement of heat transfer through film due to outdoor/indoor temperature differences. Lower U-value, less heat transfers. When using performance data, the lower U-value, better insulating qualities of window film/glass system.
11. Visible Light Transmitted (VLT): Percent of total visible light (380-780 nanometers) that passes through glass. Lower the number, the less visible light transmitted.

B. Reference Standards:

1. American National Standards Institute:

    a. ANSI Z97.1-2009, 'Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test'.

2. ASTM International:

    a. ASTM C1036-16, 'Standard Specification for Flat Glass'.
    b. ASTM C1048-18, 'Standard Specification for Heat-Treated Flat Glass - Kind H, Kind FT Coated and Uncoated Glass'.
    c. ASTM C1172-14, 'Standard Specification for Laminated Architectural Flat Glass'.
    d. ASTM C1281-16, 'Standard Specification for Preformed Tape Sealants for Glazing Applications'.
    e. ASTM E2190-10, 'Standard Specification for Insulating Glass Unit Performance and Evaluation'.

3. Consumer Products Safety Commission (CPSC):

    a. 16 CFR, Part 1201 CAT 1 and 11, 'Safety Standard for Architectural Glazing Materials'.

1.3 SUBMITTALS

A. Action Submittals:

1. Product Data:

    a. Manufacturer's data sheets for each glass product and glazing material.

B. Informational Submittals:

1. Qualification Statement:

    a. Installer:

        1) Provide Qualification documentation if requested by Architect or Owner.

C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

    a. Warranty Documentation:

        1) Final, executed copy of Warranty.

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Glazing shall meet applicable requirements of Federal Consumer Product Safety Standard 16 CFR 1201.
2. Comply with published recommendations of glass product Manufacturers and organizations, except where more stringent requirements are indicated.

B. Qualifications:

1. Installer: Requirements of Section 01 4301 applies, but not limited to following:

    a. Satisfactorily completed at least three (3) installations of similar size, scope, and complexity in each of past two (2) years and be approved by glass product Manufacturer before bidding.
    b. Upon request, submit documentation.

C. Certifications:

1. Labels showing strength, grade, thickness, type, and quality are required on each piece of glass.
2. Manufacturers/Fabricators certifying products furnished comply with project requirements.
3. Insulating-Glass Certification Program: Indicate compliance with requirements of Insulating Glass Certification Council on applicable glazing products.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Follow Manufacturer's instruction for receiving, handling, and protecting glass & glazing materials to prevent breakage scratching, damage to seals, or other visible damage.
2. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Storage And Handling Requirements:

1. Follow Manufacturer's instruction for storing and protecting glass & glazing materials.
2. Store materials protected from exposure to harmful environmental conditions and at temperatures and humidity conditions recommended by Manufacturer.
3. Protect edge damage to glass, and damage/deterioration to coating on glass.

1.6 FIELD CONDITIONS

A. Ambient Conditions:

1. 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.

1.7 WARRANTY

A. Manufacturer Warranty:

1. Insulating Glass Warranty:

a. Manufacturer's standard form, signed by insulating-glass product Manufacturer/Fabricator, agreeing to replace insulating-glass units that exhibit failure of hermetic seal under normal use evidenced by obstruction of vision by dust, moisture, or film on interior surfaces of glass, for ten [10] years of date of installation.

2. Installer's Warranty:

a. Form acceptable to Owner, signed by glass product Installer, agreeing to replace glass products that deteriorate, or that exhibit damage or deterioration of glass or glazing products due to faulty installation, for two (2) years from date of installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturers:

1. Manufacturer Contact List for Low E Glazing:

a. AGC Flat glass North America, Kingsport, TN www.us.agc.com.
b. Carlex (subsidiary of Central Glass Co., Ltd., Nashville, TN www.carlex.com.
c. Guardian Industries Corp., Auburn Hills, MI www.guardian.com.

d. Oldcastle BuildingEnvelope, Santa Monica, CA www.oldcastlebe.com.
e. Pilkington North America Inc., Toledo, OH www.pilkington.com.
f. Vitro Architectural Glass (formerly PPG glass), Cheswick, PA www.ppgglass.com or PPG Canada Ltd, Glass Division, Toronto, ON (416) 789-3331.

B. Exterior Window Glazing:

1. Thickness: 1/8 inch (3 mm) minimum, Double Strength (Insulated Glass).
2. Glazing shall have following characteristics:

a. Low-Emissivity (or Low E):

1) Design Criteria:

a) Clear:
b) Meet requirements of ASTM C1036, Type I, Class I, Quality Q3.
c) Location: Surface 2.

2) Type Two Low-Emissivity (or Low E) Acceptable Product:

a) Performance Standard:

(1) 70 percent Visible Light Transmission (VLT).
(2) 0.29 U-value winter.
(3) 0.27 U-value summer.
(4) 0.38 Solar Heat Gain Coefficent (SHGC).
(5) 0.44 Shading Coefficient.
(6) 11 percent Visible Light Reflectance.

b) Quality Standard:

(1) Cardinal LoE^{3}-366.
(2) Solarban 70 XL.
(3) Other low E glazing system standard with window manufacturer that meets or exceeds performance characteristics of specified glazing is acceptable as approved by Architect before bidding. See Section 01 6200.

3) Acceptable Manufacturers:

a) AGC.
b) Guardian.
c) Vitro Architectural Glass.
d) Equal as approved by Architect before bidding. See Section 01 6200.

b. Obscure:

1) Design Criteria:

a) Meet requirements of ASTM C1036, Type II, Class I, Form 3, Quality Q8, Pattern - #62.

c. Glazing in Windows :

1) Design Criteria:

a) Tempered.
b) Meet requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality Q3.

3. Sealed, Insulating Glazing Units:

    a. Double pane, sealed insulating glass units. Install at exterior windows.
    b. Unit Thickness: 5/8 inch (16 mm) minimum, one inch (25 mm) maximum.
    c. Insulated obscure units shall consist of one pane of specified obscure glass and one pane of standard glass.
    d. Type Seal:

        1) Metal-to-glass bond and separated by 1/2 inch (12.7 mm) dehydrated air space.
        2) Use non-hardening sealants.

    e. Category Four Approved Fabricators. See Section 01 6200 for definitions of Categories.

        1) Members of Sealed Insulating Glass Manufacturer's Association.

2.2 ACCESSORIES

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Glazing Tape: Butyl-based elastomeric tape with integral resilient tube spacer, 10 to 15 Shore A durometer hardness, black color, coiled on release paper; widths required for specified installation, complying with ASTM C1281 and AAMA 800 for application.

PART 3 - EXECUTION: Not Used

END OF SECTION

DIVISION 09 - FINISHES

09 9001	Common Painting And Coating Requirements
09 9112	Exterior Painted Ferrous Metal
09 9113	Exterior Painted Galvanized Metal
09 9121	Interior Painted Poured Concrete
09 9122	Interior Painted CMU
09 9123	Interior Painted Gypsum Board, Plaster
09 9124	Interior Painted Metal

SECTION 09 9001 - COMMON PAINTING AND COATING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Common procedures and requirements for field-applied painting and coating.

B. Related Requirements:

1. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of shop priming of steel and iron.
2. Section 07 9213: 'Elastomeric Joint Sealants' for quality of Elastomeric Joint Sealants.
3. Sections under 09 9000 heading 'Paints and Coatings'.

a. Pre-Installation conferences held jointly with Section 09 9001.

1.2 REFERENCES

A. Definitions:

1. Damage Caused By Others: Damage caused by individuals other than those under direct control of Painting Applicator (MPI(a), PDCA P1.92).
2. Gloss Levels:

a. Specified paint gloss level shall be defined as sheen rating of applied paint, in accordance with following terms and values, unless specified otherwise for a specific paint system.

Gloss Level '1'	Traditional matte finish - flat	0 to 5 units at 60 degrees to 10 units maximum at 85 degrees.
Gloss Level '2'	High side sheen flat -'velvet-like' finish	10 units maximum at 60 degrees and 10 to 35 units at 85 degrees.
Gloss Level '3'	Traditional 'eggshell-like finish	10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
Gloss Level '4'	'Satin-like' finish	20 to 35 units at 60 degrees and 35 units minimum at 85 degrees.
Gloss Level '5'	Traditional semi-gloss	35 to 70 units at 60 degrees.
Gloss Level '6'	Traditional gloss	70 to 85 units at 60 degrees.
Gloss Level "7'	High gloss	More than 85 units at 60 degrees.

3. Properly Painted Surface:

a. Surface that is uniform in appearance, color, and sheen and free of foreign material, lumps, skins, runs, sags, holidays, misses, strike-through, and insufficient coverage. Surface free of drips, spatters, spills, and overspray caused by Paint Applicator. Compliance will be determined when viewed without magnification at a distance of 5 feet minimum under normal lighting conditions and from normal viewing position (MPI(a), PDCA P1.92).

4. Latent Damage: Damage or conditions beyond control of Painting Applicator caused by conditions not apparent at time of initial painting or coating work.

B. Reference Standards:

1. The latest edition of the following reference standard shall govern all painting work:

    a. MPI(a), 'Architectural Painting Specification Manual' by Master Painters Institute (MPI), as issued by local MPI Accredited Quality Assurance Association having jurisdiction.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:

1. Schedule painting pre-installation conference after delivery of paint or coatings and before or at same time as application of field samples.

    a. Coordinate pre-installation conferences of all related painting and coating Sections under 09 9000 heading 'Paints and Coatings'.
    b. Schedule conference before preparation of control samples as specified in Sections under 09 9000 heading 'Paints and Coatings'.

2. In addition to agenda items specified in Section 01 3100, review following:

    a. Review Quality Assurance for Approval requirements.
    b. Review Quality Assurance Field Sample requirements.
    c. Review Submittal requirements for compliance for MPI Approved Products.
    d. Review Design Criteria requirements.
    e. Review Cleaning requirements.
    f. Review painting schedule.
    g. Review safety issues.

3. Review additional agenda items from Sections under 09 9000 heading 'Paints and Coatings'.

1.4 SUBMITTALS

A. Action Submittals:

1. Product Data:

    a. Include following information for each painting product, arranged in same order as in Project Manual.

        1) Manufacturer's cut sheet for each product indicating ingredients and percentages by weight and by volume, environmental restrictions for application, and film thicknesses and spread rates.
        2) Provide one (1) copy of 'MPI Approved Products List' showing compliance for each MPI product specified.

            a) MPI Information is available from MPI Approved Products List using the following link: http://www.paintinfo.com/mpi/approved/index.shtml.

        3) Confirmation of colors selected and that each area to be painted or coated has color selected for it.

2. Samples: Provide two 4 inch by 6 inch (100 mm by 150 mm) minimum draw-down cards for each paint or coating color selected for this Project.

B. Informational Submittals:

1. Manufacturer Instructions:

    a. Manufacturer's substrate preparation instructions and application instruction for each painting system used on Project.

2. Qualification Statement:

a. Applicator:

1) Provide Qualification documentation if requested by Architect or Owner.

C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Record Documentation:

1) Manufacturer's documentation:

a) Manufacturer's cut sheet for each component of each system.
b) Schedule showing rooms and surfaces where each system was used.

1.5 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approval:

1. Conform to work place safety regulations and requirements of those authorities having jurisdiction for storage, mixing, application and disposal of all paint and related hazardous materials.
2. Paint and painting materials shall be free of lead and mercury, and have VOC levels acceptable to local jurisdiction.
3. Master Painters Institute (MPI) Standards:

a. Products: Comply with MPI standards indicated and listed in 'MPI Approved Products List'.
b. Preparation and Workmanship: Comply with requirements in 'MPI Architectural Painting Specification Manual' for products and coatings indicated.

B. Qualifications:

1. Applicator: Requirements of Section 01 4301 applies, but not limited to following:

a. Minimum five (5) years' experience in painting installations.
b. Minimum five (5) satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
c. Maintain qualified crew of painters throughout duration of the Work.
d. Upon request, submit documentation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Deliver specified products in sealed, original containers with Manufacturer's original labels intact on each container.
2. Deliver amount of materials necessary to meet Project requirements in single shipment.

B. Storage And Handling Requirements:

1. Store materials in single place.
2. Keep storage area clean and rectify any damage to area at completion of work of this Section.
3. Maintain storage area at 55 deg F minimum.

1.7 FIELD CONDITIONS

A. Ambient Conditions:

1. Perform painting operations at temperature and humidity conditions recommended by Manufacturer for each operation and for each product for both interior and exterior work.
2. Apply painting systems at lighting level of 540 Lux (50 foot candles) minimum on surfaces to be painted.

    a. Inspection of painting work shall take place under same lighting conditions as application.
    b. If painting and coating work is applied under temporary lighting, deficiencies discovered upon installation of permanent lighting will be considered latent damage as defined in MPI Manual, PDCA P1-92.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Performance:

1. Design Criteria:

    a. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
    b. All materials, preparation and workmanship shall conform to requirements of 'Architectural Painting Specification Manual' by Master Painters Institute (MPI).
    c. All paint manufacturers and products used shall be as listed under Approved Product List section of MPI Painting Manual.
    d. Provide Premium Grade systems (2 top coats) as defined in MPI Architectural Painting Specification Manual, except as otherwise indicated.
    e. Where specified paint system does not have Premium Grade, provide Budget Grade.
    f. Provide products of same manufacturer for each coat in coating system.

B. Materials:

1. Materials used for any painting system shall be from single manufacturer unless approved otherwise in writing by painting system manufacturers and by Architect. Include manufacturer approvals in Product Data submittal.
2. Linseed oil, shellac, turpentine, and other painting materials shall be pure, be compatible with other coating materials, bear identifying labels on containers, and be of highest quality of an approved manufacturer listed in MPI manuals. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on Project.

PART 3 - EXECUTION

3.1 APPLICATORS

A. Approved Applicators:

1. Meet Quality Assurance Applicator Qualifications as specified in Part 1 of this specification.

3.2 EXAMINATION

A. Verification Of Conditions:

1. Directing applicator to begin painting and coating work will indicate that substrates to receive painting and coating materials have been previously inspected as part of work of other Sections and are complete and ready for application of painting and coating systems as specified in those Sections.

B. Pre-Installation Testing:

1. Before beginning work of this Section, examine, and test surfaces to be painted or coated for adhesion of painting and coating systems.
2. Report in writing to Architect of conditions that will adversely affect adhesion of painting and coating work.
3. Do not apply painting and coating systems until party responsible for adverse condition has corrected adverse condition.

C. Evaluation And Assessment:

1. Report defects in substrates that become apparent after application of primer or first finish coat to Architect in writing and do not proceed with further work on defective substrate until such defects are corrected by party responsible for defect.

3.3 PREPARATION

A. Protection Of In-Place Conditions:

1. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following:

    a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.

B. Surface Preparation:

1. Prepare surfaces in accordance with MPI requirements and requirements of Manufacturer for each painting system specified, unless instructed differently in Contract Documents. Bring conflicts to attention of Architect in writing.
2. Fill minor holes and cracks in wood surfaces to receive paint or stain.
3. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.
4. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting. Moisture content of materials to be painted shall be within tolerances acceptable to Paint Manufacturer.
5. Sand woodwork smooth in direction of grain leaving no sanding marks. Clean surfaces before proceeding with stain or first coat application.

3.4 APPLICATION

A. Interface With Other Work:

1. Coordinate with other trades for materials and systems that require painting before installation.
2. Schedule painting and coating work to begin when work upon which painting and coating work is dependent has been completed. Schedule installation of pre-finished and non-painted items, which are to be installed on painted surfaces, after application of final finishes.

B. Paint or finish complete all surfaces to be painted or coated as described in Contract Documents, including but not limited to following items.

1. Paint mechanical, electrical, and audio/visual items that require field painting as indicated in Contract Documents. These include but are not limited to:

    a. Mechanical flues and pipes penetrating roof.

C. Apply sealant in gaps 3/16 inch and smaller between two substrates that are both to be painted or coated. Sealants in other gaps furnished and installed under Section 07 9213.

D. In multiple coat paint work, tint each succeeding coat with slightly lighter color, but approximating shade of final coat, so it is possible to check application of specified number of coats. Tint final coat to required color.

E. Spread materials smoothly and evenly. Apply coats to not less than wet and dry film thicknesses and at spreading rates for specified products as recommended by Manufacturer.

F. Touch up suction spots after application of first finish coat.

G. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.

H. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.

I. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.

J. Finished work shall be a 'Properly Painted Surface' as defined in this Section.

3.5 FIELD QUALITY CONTROL

A. Non-Conforming Work:

1. Correct deficiencies in workmanship as required to leave surfaces in conformance with 'Properly Painted Surface,' as defined in this Section.
2. Correction of 'Latent Damage' and 'Damage Caused By Others,' as defined in this Section, is not included in work of this Section.

3.6 CLEANING

A. General:

1. As work proceeds and upon completion of work of any painting Section, remove paint spots from floors, walls, or other surfaces and leave work clean, orderly, and in acceptable condition.

B. Waste Management:

1. Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.
2. Paint, stain and wood preservative finishes and related materials (thinners, solvents, caulking, empty paint cans, cleaning rags, etc.) shall be disposed of subject to regulations of applicable authorities having jurisdiction.
3. Remove debris caused by work of paint Sections from premises and properly dispose.
4. Retain cleaning water and filter out and properly dispose of sediments.

END OF SECTION

SECTION 09 9112 - EXTERIOR PAINTED FERROUS METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Preparing and painting new exterior ungalvanized iron and steel surfaces as described in Contract Documents.

B. Related Requirements:

1. Section 09 9001: 'Common Painting And Coating Requirements'.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:

1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:

a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved.

B. Description:

1. New Surfaces: Use MPI(a) EXT 5.1M Waterborne Light Industrial Coating system .

C. Design Criteria:

1. Systems specified are in addition to prime coats provided under other Sections of Project Manual.
2. Finish Requirements: Use MPI Premium Grade finish requirements for work of this Section.
3. Gloss / Sheen Level Required: Gloss Level 5.

D. Materials:

1. All paints and coatings.

a. Primer Coat: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
b. Finish Coats: MPI Product 163, 'Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5).

PART 3 - EXECUTION

3.1 APPLICATION

A. General: See appropriate paragraphs of Section 09 9001.

B. New Surfaces: Clean metal to be painted of rust, mill scale, grease, oil, and welding spatters, burrs, flux, slag, and fume. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying primer coat.

END OF SECTION

SECTION 09 9113 - EXTERIOR PAINTED GALVANIZED METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Preparing and painting new exterior exposed galvanized metal surfaces as Described in Contract Documents.

B. Related Requirements:

1. Section 09 9001: 'Common Painting And Coating Requirements':

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:

1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories.

a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.

B. Description:

1. Exposed Miscellaneous Structural Steel:

a. New Surfaces: Use MPI(a) EXT 5.3D Pigmented Polyurethane Finish system.

2. All Other:

a. New Surfaces: Use MPI(a) EXT 5.3H Latex Finish system.

C. Performance:

1. Design Criteria:

a. New Surfaces: MPI Premium Grade finish requirements.
b. Gloss / Sheen Level Required: Gloss Level 5.

D. Materials:

Polyurethane:

a. Vinyl Wash Primer Coat: MPI Product 80: 'Primer, Vinyl Wash'.
b. Finish Coats:

1) Epoxy MPI Product 101: 'Primer, Epoxy, Anti-Corrosive, for Metal'.
2) Polyurethane MPI Product 72: 'Polyurethane, Two-Component, Pigmented, Gloss (MPI Gloss Level 6-7)'.

2. Latex:

a. Waterborne Primer Coat: MPI Product 134: 'Primer, Galvanized, Water Based'.

b. Finish Coats: MPI Product 11: 'Latex, Exterior Semi-Gloss (MPI Gloss Level 5)'.

PART 3 - EXECUTION

3.1 APPLICATION

A. General: See appropriate paragraphs of Section 09 9001.

B. New Surfaces:

1. Clean 'passivated' or 'stabilized' galvanized steel as specified in SSPC-SP1.
2. After removal of 'passivated' or 'stabilized' coating or for surfaces without coating, clean surfaces to be painted with mineral spirits or product recommended by Paint Manufacturer. Change to clean rags or wiping cloths regularly to reduce possibility of re-contamination of surface.
3. Apply prime coat.
4. Apply finish coats.

END OF SECTION

SECTION 09 9121 - INTERIOR PAINTED POURED CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Preparing and painting of new concrete floors to be left exposed in finished building, as described in Contract Documents.

B. Related Requirements:

1. Section 09 9001: 'Common Painting And Coating Requirements':

a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:

1. Participate in pre-installation conference as specified in Section 09 9001.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:

1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories.

a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.

B. Description:

1. New Surfaces: Use MPI(a) INT 4.2F Waterborne Epoxy Finish system
2. Finish Requirements: Use MPI Custom Grade finish requirements.

C. Performance:

1. Design Criteria:

a. Gloss / Sheen Level Required: Semi-Gloss.

D. Materials:

1. MPI Product 4.2F: 'Floor Paint, Epoxy, Semi-Gloss'.

PART 3 - EXECUTION

3.1 APPLICATION

A. General: See appropriate paragraphs of Section 09 9001.

END OF SECTION

SECTION 09 9122 - INTERIOR PAINTED CMU

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Preparing and painting new interior CMU walls as described in Contract Documents.

B. Related Requirements:

1. Section 09 9001: 'Common Painting And Coating Requirements':

a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:

1. Participate in pre-installation conference as specified in Section 09 9001.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturer:

1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:

a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.

B. Description:

1. All Rooms:

a. New Surfaces: Use MPI(a) INT 4.2F Waterborne Epoxy Finish system.

C. Performance:

1. Design Criteria:

a. New Surfaces: MPI Premium Grade finish requirements.
b. Gloss / Sheen Level Required: Gloss Level 5.

D. Materials:

1. Block Filler, Over New Masonry Only: MPI Product 4: 'Block Filler, Latex, Interior/Exterior'.
2. Finish Coats: MPI Product INT 4.2F Waterborne Epoxy Finish System, Semi-Gloss (MPI Gloss Level 5)'.

PART 3 - EXECUTION

3.1 APPLICATION

A. General: See appropriate paragraphs of Section 09 9001.

END OF SECTION

SECTION 09 9123 - INTERIOR PAINTED GYPSUM BOARD, PLASTER

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Preparing, priming, and finish painting new interior gypsum board and plaster surfaces as described in Contract Documents.

B. Related Requirements:

1. Section 09 9001: 'Common Painting And Coating Requirements':

a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:

1. Participate in pre-installation conference as specified in Section 09 2900.

a. In addition to agenda items specified in Section 01 3100 and Section 09 2900, review following:

1) Review finish level requirements of gypsum wallboard as specified in Section 09 2900.

2. Participate in pre-installation conference as specified in Section 09 9001.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:

1. Category Four Approved Manufacturers and Products. See Section 01 6200 for definitions of Categories.

a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.

B. Description:

1. All Rooms:

a. New Surfaces: Use MPI(a) INT 9.2F Waterborne Epoxy Finish system.

C. Performance:

1. Design Criteria:

a. New Surfaces: MPI Premium Grade finish requirements.
b. Gloss / Sheen Required:

D. Materials:

1. Primers:

a. MPI Product 50, 'Primer Sealer, Latex, Interior'.

2. Finish Coats:

a. All Rooms:

1) Buildings with CMU and Gypsum Board surfaces in same rooms:

a) MPI Product 77, 'Epoxy, Gloss'.

PART 3 - EXECUTION

3.1 APPLICATION

A. General: See appropriate paragraphs of Section 09 9001.

B. New Surfaces:

1. Primer: Apply primer to be covered with other paint coats with roller only, or with spray gun and back-rolled.

END OF SECTION

SECTION 09 9124 - INTERIOR PAINTED METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Preparing and painting new interior metal surfaces as described in Contract Documents.

B. Related Requirements:

1. Section 05 5871: 'Metal Brackets'.
2. Section 09 9001: 'Common Painting And Coating Requirements':

a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.

3. Section 23 0553: 'I. D. For HVAC Piping And Equipment' for field painting requirements of HVAC piping and equipment.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:

1. Participate in pre-installation conference as specified in Section 09 9001.

B. Sequencing:

1. Paint brackets furnished under Section 05 5871 before installation of bracket.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:

1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories.

a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.

B. Description:

1. Ferrous Metal:

a. New Surfaces: Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system.

2. Galvanized Metal:

a. New Surfaces: Use MPI(a) INT 5.3J Latex Finish system

3. Aluminum:

a. New Surfaces: Use MPI(a) INT 5.4E Waterborne Light Industrial Finish system.

C. Performance:

1. Design Requirements:

    a. New Surfaces: MPI Premium Grade finish requirements.
    b. Gloss / Sheen Level Required: Gloss Level 5.

D. Materials:

1. Primers:

    a. Ferrous Metal: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
    b. Galvanized Metal: MPI Product 134: 'Primer, Galvanized, Water Based'.
    c. Aluminum: MPI Product 95: 'Primer, Quick Dry, for Aluminum'.

2. Finish Coats: MPI Product 153: 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.

PART 3 - EXECUTION

3.1 APPLICATION

A. General:

1. See appropriate paragraphs of Section 09 9001.
2. Systems specified are in addition to prime coats furnished under other Sections.

B. New Surfaces: Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.

END OF SECTION

DIVISION 10 – SPECIALTIES:

10 2813 Commercial Toilet Accessories

SECTION 10 2813 - COMMERCIAL TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Included But Is Not Limited To:

1. Selected accessories for Rest Rooms and Dressing Areas:

a. Grab Bars.
b. Mirrors.
c. Shower Rods and Curtains.
d. Robe Hooks.
e. Folding Seats.
f. Hook Strips.

B. Related Requirements:

1. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.

C. Products Furnished By Owner But Installed Under This Section:

1. Selected accessories for Rest Rooms:

a. Paper towel dispensers.
b. Soap dispensers.
c. Toilet tissue dispensers.
d. Sanitary Napkin Disposal Containers.

1.2 REFERENCES

A. Association Publications:

1. United States Access Board:

a. Americans with Disabilities Act (ADA):

1) ADA Standards:

a) ADA Accessibility Guidelines (ADAAG) (2004 or latest version).

B. Reference Standards:

1. ASTM International:

a. A153/A153M-16a, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
b. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
c. ASTM A666-15, 'Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar'.
d. ASTM C1036-16, 'Standard Specification for Flat Glass'.
e. ASTM F446-85(2009), 'Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area'.

2. International Code Council / American National Standards Institute:

a. ICC/ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.

3. International Standard Organization:

a. ISO 25537:2008, 'Glass in Building - Silvered Flat Glass Mirror.

1.3 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's product data sheets indicating operating characteristics, materials and finishes.
b. Mounting requirements and rough-in dimensions.

2. Shop Drawings:

a. Schedule showing items used, location where installed, and proper attaching devices for substrate.

B. Informational Submittals:

1. Manufacturers' Instructions:

a. Provide operation, care and cleaning instructions.

C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Operations and Maintenance Data:

1) Folding Bench:

a) Manufacturer's service and parts manual.

b. Warranty Documentation:

1) Final, executed copy of Warranty for each product.

c. Record Documentation:

1) Manufacturers documentation:

a) Manufacturer's literature or cut sheets.

1.4 QUALITY ASSURANCE

A. Source Limitations:

1. For products listed together in same Part 2 articles, obtain products from single source from single manufacturer.

1.5 WARRANTY

A. Manufacturer Warranty:

1. Manufacturer's standard warranty.

B. Special Mirror Warranty:

1. Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage or frame corrosion defects within specified warranty period:

a. Warranty Period: fifteen (15) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 OWNER FUNISHED PRODUCTS

A. Furnish by Owner and Installed by Contractor:

1. Paper Towel Dispensers:
2. Soap dispensers.
3. Toilet tissue dispensers.
4. Sanitary napkin disposal containers.

2.2 MANUFACTURED UNITS

A. Manufacturers:

1. Manufacturer Contact List:

a. AJW Architectural Products, A&J Washroom Accessories, Inc., New Windsor, NY www.ajwashroom.com.
b. American Specialties Inc (ASI), Yonkers, NY www.americanspecialties.com.
c. Bobrick Washroom Equipment Inc, North Hollywood, CA www.bobrick.com or Bobrick Washroom Equipment of Canada Ltd, Scarborough, ON (416) 298-1611.
d. Bradley Corp, Menomonee Falls, WI www.bradleycorp.com.
e. General Accessory Manufacturing Co (GAMCO), Durant, OK www.gamcousa.com.

B. Materials:

1. Design Criteria:

a. Stainless Steel: ASTM A666 Type 304 (18-8); satin finish exposed surfaces unless otherwise indicated.
b. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
c. Fasteners:

1) Exposed: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant.
2) Concealed: Galvanized Steel.

2. Rest Rooms:

a. Mirrors:

1) Channel-Frame Mirror:

a) Frame: Type 304 or Type 430, 20 gauge stainless steel channel frame.
b) Roll-formed one-piece construction.
c) Glass: 1/4 inch silver coated and hermetically sealed. Guaranteed for 15 years against silver spoilage. Mirrors meet ASTM C1036 requirements.

2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a) Bobrick: Model B-165.

b) Bradley: Model 781.

b. Robe Hook:

1) Surface mounted type 304, 22 gauge stainless steel with #4 satin finish.
2) Concealed mounting bracket.
3) Stainless steel locking setscrew on bottom.
4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a) AJW Architectural Products: Model UX110SF.
b) American Specialties (ASI): Model 7340-S.
c) Bobrick: Model B6717.
d) Bradley: Model 9114.
e) General Accessory (GAMCO): Model 76717.

c. Grab Bars:

1) Configuration shown on Contract Drawings. Include center support for longer lengths when required:
2) Design Criteria:

a) Comply with ADA guidelines and ADAAG accessible design for structural strength and local and state codes.
b) Concealed mount.
c) 18 ga type 304 stainless steel tubing.
d) 1-1/2 inch diameter.
e) Provide center support when required.
f) Snap-on flange covers.
g) Peened (non-slip) finish.
h) Sustain loads in excess of 900 lbs.

3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a) AJW Architectural Products: Model UG3 Series.
b) American Specialties (ASI): Model 3800 Series.
c) Bobrick: Model B-6806 Series.
d) Bradley: Model 812 Series.
e) General Accessory (GAMCO): Model 150 Series.

3. Folding Bench at Showers:

a. Design Criteria:

1) Reversible solid phenolic folding shower seat.
2) Frame constructed of type 304, satin-finish stainless steel.
3) Comply with barrier-free ADA accessibility guidelines.

b. Type Two Acceptable Product:

1) Bobrick: Model B-5191.
2) Equal as approved by Architect before installation. See Section 01 6200.

4. Shower Curtains:

a. Design Criteria:

1) Vinyl .2 mil.

2) 72 inches high x 42 inches or 84 inches as required.
3) HDPE grommets at 6 inch spacing along top.
4) Opaque, matte white.
5) Stainless steel shower curtain hooks.

b. Type Two Acceptable Product:

1) Bobrick: Model 204 curtain and model 204-1 curtain hooks.
2) Equal as approved by Architect before installation. See Section 01 6200.

5. Shower Curtain Rods:

a. Design Criteria:

1) Heavy Duty, 20-guage stainless steel tubing with satin finish.
2) 1-inch outside diameter.
3) 18-8, type 304, 20-guage flanges.

b. Type Two Acceptable Products:

1) Bobrick: Model B-6107.
2) Equal as approved by architect before installation.

6. Hook Strips:

a. Design Criteria:

1) 18-8, type 304, 18 guage stainless steel mounting strip with satin finish.
2) 24 inch length.
3) 18-8, type 304, 12 guage stainless steel hooks, 3 hooks.

b. Type Two Acceptable Products:

1) Bobrick: Model B232 x 24.
2) Equal as approved by architect before installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with ADA Accessibility Guidelines and installation heights as shown on Contract Drawings.

B. Assemble fixtures and associated fittings and trim in accordance with manufacturer's instructions.

C. Install using mounting devices proper for base structure.

D. Install equipment level, plumb, and firmly in place in accordance with manufacturer's rough-in drawings.

E. Folding Bench:

1. Secure unit to wall as per Manufacturer instructions.

F. Grab Bars:

1. Install as per Manufacturers written installation instructions.
2. Install grab bars to withstand downward force of not less than 250 lbf per ASTM F446.

3.2 REPAIR

A. Repair or replace defective work, including damaged equipment and components.

B. Repair or replace malfunctioning equipment, or equipment with parts that bind or are misaligned.

3.3 CLEANING

A. Clean unit surfaces and leave in ready-to-use condition.

3.4 ADJUSTING

A. Test each piece of equipment provided with moving parts to assure proper operation, freedom of movement, and alignment. Install new batteries in battery-powered items.

3.5 CLOSEOUT ACTIVITIES

A. Turn over keys, tools, maintenance instructions, and maintenance stock to Owner.

END OF SECTION

DIVISION 22 – PLUMBING:

22 0501	Common Plumbing Requirements
22 0529	Hangers And Supports For Plumbing, Piping, And Equipment
22 0553	Identification For Plumbing Pipes And Equipment
22 0719	Plumbing Piping Insulation
22 1116	Domestic Water Piping
22 1119	Domestic Water Piping Specialties
22 1313	Facility Sanitary Sewers
22 1319	Facility Sanitary Sewer Specialties
22 3305	Electric Domestic Water Heaters
22 4213	Commercial Water Closets
22 4216	Commercial Lavatories And Sinks
22 4223	Commercial Showers And Shower Valves

SECTION 22 0501 - COMMON PLUMBING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Common requirements and procedures for plumbing systems.
2. Responsibility for proper operation of electrically powered equipment furnished under this Division.
3. Furnish and install sealants relating to installation of systems installed under this Division.
4. Furnish and install Firestop Penetration Systems for plumbing systems penetrations as described in Contract Documents.

B. Products Furnished But Not Installed Under This Section:

1. Sleeves, inserts, supports, and equipment for plumbing systems installed under other Sections.

C. Related Requirements:

1. Section 07 9213: 'Elastomeric Joint Sealant' for quality at building exterior.
2. Sections Under 09 9000 Heading: Painting of plumbing items requiring field painting.
3. Division 26: Raceway and conduit, unless specified otherwise, and line voltage wiring.
4. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.
5. Division 33: Piped utilities.

1.2 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's catalog data for each manufactured item.

1) Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
2) Include name, address, and phone number of each supplier.

B. Informational Submittals:

1. Qualification Statement:

a. Plumbing Subcontractor:

1) Provide Qualification documentation if requested by Architect or Owner.

b. Installer:

1) Provide Qualification documentation if requested by Architect or Owner.

C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Operations and Maintenance Data (Modify and add to requirements of Section 01 7800):

1) At beginning of PLUMBING section of Operations And Maintenance Manual, provide master index showing items included:

a) Provide name, address, and phone number of Architect, Architect's Mechanical Engineer, General Contractor, and Plumbing subcontractor.
b) Identify maintenance instructions by using same equipment identification used in Contract Drawings. Maintenance instructions shall include:

(1) List of plumbing equipment used to indicate name, model, serial number, and nameplate data of each item together with number and name associated with each system item.
(2) Manufacturer's maintenance instructions for each piece of plumbing equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance instructions.

b. Warranty Documentation:

1) Include copies of warranties required in individual Sections of Division 22.

1.3 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Perform work in accordance with applicable provisions of Plumbing Codes applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.
3. Identification:

a. Motor and equipment name plates as well as applicable UL / ULC and AGA / CGA labels shall be in place when Project is turned over to Owner.

B. Qualifications. Requirements of Section 01 4301 applies, but not limited to following:

1. Plumbing Subcontractor:

a. Company specializing in performing work of this section.

1) Minimum five (5) years experience in plumbing installations.
2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.

b. Upon request, submit documentation.

2. Installer:

a. Licensed for area of Project.
b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
c. Upon request, submit documentation.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Accept valves on site in shipping containers with labeling in place.
2. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

B. Storage And Handling Requirements:

1. In addition to requirements specified in Division 01, stored material shall be readily accessible for inspection by Architect until installed.
2. Store items subject to moisture damage in dry, heated spaces.

1.5 WARRANTY

A. Manufacturer Warranty:

1. Provide certificates of warranty for each piece of equipment made out in favor of Owner.

B. Special Warranty:

1. Guarantee plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
2. If plumbing sub-contractor with offices located more than 150 miles from Project site is used, provide service / warranty work agreement for warranty period with local plumbing sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.

B. Pipe And Pipe Fittings:

1. Weld-O-Let and Screw-O-Let fittings are acceptable.
2. Use domestic made pipe and pipe fittings on Project, except non-domestic made cast iron pipe and fittings by MATCO-NORCA are acceptable.

C. Sleeves:

1. General:

a. Two sizes larger than bare pipe or insulation on insulated pipe.

2. In Concrete And Masonry:

a. Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.

3. In Framing:

a. Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 ga galvanized sheet metal.

D. Valves:

1. Valves of same type shall be of same manufacturer.

PART 3 - EXECUTION

3.1 INSTALLERS

A. Acceptable Installers. See Section 01 4301:

1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.2 EXAMINATION

A. Drawings:

1. Plumbing Drawings show general arrangement of piping, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing Drawings.
3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

B. Verification Of Conditions:

1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which plumbing work is dependent for efficiency and report work that requires correction.
2. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.
3. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.
4. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

3.3 PREPARATION

A. Changes Due To Equipment Selection:

1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings showing proposed installations.
2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
3. Provide additional motors, valves, controllers, fittings, and other equipment required for proper operation of systems resulting from selection of equipment.
4. Be responsible for proper location of rough-in and connections provided under other Divisions.

3.4 INSTALLATION

A. Interface With Other Work:

1. Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.

2. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and confirm that they are properly installed.

B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.

C. Locating Equipment:

1. Arrange pipes and equipment to permit ready access to valves, cocks, unions, traps, and to clear openings of doors and access panels.
2. Adjust locations of pipes, equipment, and fixtures to accommodate work to interferences anticipated and encountered.
3. Install plumbing work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
4. Determine exact route and location of each pipe before fabrication.

a. Right-Of-Way:

1) Lines that pitch shall have right-of-way over those that do not pitch. For example, plumbing drains shall normally have right-of-way.
2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.

b. Offsets, Transitions, and Changes in Direction:

1) Make offsets, transitions, and changes in direction in pipes as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.

D. Penetration Firestops:

1. Install Penetration Firestop System appropriate for penetration at plumbing systems penetrations through walls, ceilings, roofs, and top plates of walls.

E. Sealants:

1. Seal openings through building exterior caused by penetrations of elements of plumbing systems.
2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.

F. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus:

1. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper installation of plumbing systems.
2. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings:

a. Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.

1) Make connections of dissimilar metals with di-electric unions.

b. Do not use reducing bushings, bull head tees, close nipples, or running couplings. Street elbows are allowed only on potable water pipe 3/4 inch in diameter and smaller.
c. Place valves and specialties to permit easy operation and access.

3. Do not install piping in shear walls.
4. Cut piping accurately to measurements established at site. Remove burr and cutting slag from pipes.
5. Work piping into place without springing or forcing.
6. Make changes in direction with proper fittings.
7. Expansion of Thermoplastic Pipe:

    a. Provide for expansion in every 30 feet of straight run.
    b. Provide 12 inch offset below roof line in each vent line penetrating roof.

G. Sleeves:

1. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete slabs on grade.
2. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Seal sleeves with specified sealants.
3. Sleeves through floors shall extend 1/4 inch above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
4. Sleeves through floors and foundation walls shall be watertight.

H. Escutcheons:

1. Provide spring clamp plates where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.

3.5 REPAIR / RESTORATION

A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it:

1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
2. Surface finishes shall exactly match existing finishes of same materials.

3.6 FIELD QUALITY CONTROL

A. Field Tests:

1. Perform tests on plumbing piping systems. Furnish devices required for testing purposes.

B. Non-Conforming Work:

1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
2. Repeat tests on new material, if requested.

3.7 CLEANING

A. Remove dirt, grease, and other foreign matter from each length of piping before installation:

1. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
2. Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.
3. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.

B. Clean exposed piping, equipment, and fixtures. Remove stickers from fixtures and adjust flush valves.

3.8 CLOSEOUT ACTIVITIES

A. Instruction of Owner:

1. Instruct building maintenance personnel and Stake Physical Facilities Representative in operation and maintenance of plumbing systems utilizing Operation And Maintenance Manual when so doing.
2. Conduct instruction period after Substantial Completion inspection when systems are properly working and before final payment is made.

3.9 PROTECTION

B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.

END OF SECTION

SECTION 22 0529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Common hanger and support requirements and procedures for plumbing systems.

B. Related Requirements:

1. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
2. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
3. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.
4. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.
5. Section 23 0529: 'Hangers And Supports For HVAC Piping And Equipment' for gas piping used with HVAC equipment.
6. Section 23 0553: 'Identification For HVAC Piping And Equipment' for paint identification of gas piping used with HVAC equipment.

1.2 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's catalog data for each manufactured item.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Manufacturers:

1. Manufacturer Contact List:

a. Anvil International, Portsmouth, NH www.anvilintl.com.
b. Cooper B-Line, Highland, IL www.b-line.com.
c. Unistrut, Wayne, MI www.tyco-unistrut.com.

B. Materials:

1. Hangers, Rods, And Inserts

a. Galvanized and UL approved for service intended.
b. Support horizontal piping from hangers or on roller assemblies with channel supports, except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.

1) Support insulated pipes 2 inches in diameter and smaller with adjustable swivel ring hanger with insulation protection shield. Gauge and length of shield shall be in accordance with Anvil design data.

a) Type Two Acceptable Products:

(1) Swivel Ring Hanger: Anvil Fig. 69.
(2) Insulation Protection Shield: Anvil Fig. 167.
(3) Equals by Cooper B-Line.

2) Support insulated pipes 2-1/2 inches in diameter and larger with clevis hanger.

a) Type Two Acceptable Products:

(1) Clevis Hanger: Anvil Fig. 260.
(2) Equals by Cooper B-Line.

3) Support uninsulated copper pipe 2 inches in diameter and smaller from swivel ring hanger, copper plated and otherwise fully suitable for use with copper tubing. Support non-copper uninsulated pipes from swivel ring hanger.

a) Type Two Acceptable Products:

(1) Swivel Ring Hanger For Copper Pipe: Anvil Fig. CT-69.
(2) Swivel Ring Hanger For Other Pipe: Anvil Fig. 69.
(3) Equals by Cooper B-Line.

4) Support uninsulated copper pipe 2-1/2 inches in diameter and larger from clevis hanger, copper plated hangers and otherwise fully suitable for use with copper tubing. Support non-copper uninsulated pipes from clevis hanger.

a) Type Two Acceptable Products:

(1) Clevis Hanger For Copper Pipe: Anvil Fig. CT-65.
(2) Clevis Hanger For Other Pipe: Anvil Fig. 260.
(3) Equals by Cooper B-Line.

c. Support rods for single pipe shall be in accordance with following table:

Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller
1/2 inch	2-1/2 to 3-1/2 inches
5/8 inch	4 to 5 inches
3/4 inch	6 inches
7/8 inch	8 to 12 inches

d. Support rods for multiple pipe supported on steel angle trapeze hangers shall be in accordance with following table:

Rods		Number of Pipes per Hanger for Each Pipe Size						
Number	Diameter	2 Inch	2.5 Inch	3 Inch	4 Inch	5 Inch	6 Inch	8 Inch
2	3/8 Inch	Two	0	0	0	0	0	0
2	1/2 Inch	Three	Three	Two	0	0	0	0
2	5/8 Inch	Six	Four	Three	Two	0	0	0
2	5/8 Inch	Nine	Seven	Five	Three	Two	Two	0
2	5/8 Inch	Twelve	Nine	Seven	Five	Three	Two	Two

1) Size trapeze angles so bending stress is less than 10,000 psi.

e. Riser Clamps For Vertical Piping:

1) Type Two Acceptable Products:

a) Anvil Fig. 261.
b) Equals by Cooper B-Line.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Piping:

1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.

a. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using Unistrut and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
b. Supports For Horizontal Piping:

1) Support metal piping at 96 inches on center maximum for pipe 1-1/4 inches or larger and 72 inches on center maximum for pipe 1-1/8 inch or less.
2) Support thermoplastic pipe at 48 inches on center maximum.
3) Provide support at each elbow. Install additional support as required.

c. Supports for Vertical Piping:

1) Place riser clamps at each floor or ceiling level.
2) Securely support clamps by structural members, which in turn are supported directly from building structure.
3) Provide clamps as necessary to brace pipe to wall.

d. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.

END OF SECTION

SECTION 22 0553 - IDENTIFICATION FOR PLUMBING PIPES AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install identification of plumbing piping and equipment as described in Contract Documents.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Materials:

1. Labels:

a. Equipment Identification:

1) Black formica, with white reveal when engraved.
2) Lettering to be 3/16 inch high minimum.

2. Paint:

a. One Coat Primer:

1) 6-2 Quick Drying Latex Primer Sealer over fabric covers.
2) 6-205 Metal Primer under dark color paint.
3) 6-6 Metal Primer under light color paint.

b. Finish Coats: Two coats 53 Line Acrylic Enamel.
c. Performance Standard: Paints specified are from Pittsburgh Paint & Glass (PPG), Pittsburgh, PA www.pittsburghpaints.com or PPG Canada Inc, Mississauga, ON (800) 263-4350 or (905) 238-6441.
d. Type Two Acceptable Products. See Section 01 6200.

1) Paint of equal quality from following Manufacturers may be submitted for Architect's approval before use. Maintain specified colors, shades, and contrasts.

a) Benjamin Moore, Montvale, NJ www.benjaminmoore.com or Toronto, ON (800) 304-0304 or (416) 766-1176.
b) ICI Dulux, Cleveland, OH or ICI Paints Canada Inc, Concord, ON www.dulux.com.
c) Sherwin Williams, Cleveland, OH www.sherwin-williams.com.

PART 3 - EXECUTION

3.1 APPLICATION

A. Labels:

1. Identify following items with specified labels fastened to equipment with screws (unless noted otherwise):

a. Water Heaters.

2. Engrave following data from Equipment Schedules on Drawings onto labels:

a. Equipment mark.
b. Panel and breaker from which unit is powered.

B. Painting:

1. Only painted legends, directional arrows, and color bands are acceptable.
2. Locate identifying legends, directional arrows, and color bands at following points on exposed piping of each piping system:

a. Adjacent to each item of equipment.
b. At point of entry and exit where piping goes through wall.
c. On each riser and junction.
d. Every 25 feet on long continuous lines.
e. Stenciled symbols shall be one inch high and black.

3.2 ATTACHMENTS

A. Schedules:

1. Pipe Identification Schedule:

a. Apply stenciled symbols as follows:

Pipe Use	Abbreviation
Domestic Cold Water	CW
Domestic Hot Water	HW

END OF SECTION

SECTION 22 0719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install insulation on hot and cold water lines, fittings, valves, and accessories concealed in walls and exposed in mechanical room as described in Contract Documents.

B. Related Requirements:

1. Section 22 1116: 'Domestic Water Piping'.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Materials:

1. Above Grade Metal Piping:

a. Insulation For Piping:

1) Snap-on glass fiber or melamine foam pipe insulation, or heavy density pipe insulation with factory vapor jacket.
2) Insulation Thickness:

Service Water Temperature	Pipe Sizes		
	Up to 1-1/4 In	1-1/2 to 2 In	Over 2 In
170 - 180 Deg F	One In	1-1/2 In	2 In
140 - 160 Deg F	1/2 In	One In	1-1/2 In
45 - 130 Deg F	1/2 In	1/2 In	One In

3) Performance Standards: Fiberglas ASJ by Owens-Corning.
4) Type One Acceptable Manufacturers:

a) Childers Products.
b) Knauf.
c) Manson.
d) Owens-Corning.
e) Johns-Manville.
f) Equal as approved by Architect before bidding. See Section 01 6200.

b. Fitting, Valve, And Accessory Covers:

1) PVC.
2) Performance Standard: Zeston by Johns-Manville.
3) Type One Acceptable Manufacturers:

a) Knauf.
b) Speedline.
c) Johns-Manville.
d) Equal as approved by Architect before bidding. See Section 01 6200.

2. Below Grade Metal Piping:

a. Insulation:

1) 1/2 inch thick.
2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:

a) SS Tubolit by Armacell.
b) ImcoLock by Imcoa.
c) Nomalock or Therma-Cel by Nomaco.

b. Joint Sealant:

1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:

a) Armacell 520.
b) Nomaco K-Flex R-373.

PART 3 - EXECUTION

3.1 APPLICATION

A. Above Grade Piping:

1. Apply insulation to clean, dry piping with joints tightly butted.
2. Install insulation in manner to facilitate removal for repairs. Place sections or blocks so least possible damage to insulation will result from inspection or repairs of piping or equipment.
3. Piping up to 1-1/4 inch Diameter:

a. Adhere 'factory applied vapor barrier jacket lap' smoothly and securely at longitudinal laps with white vapor barrier adhesive.
b. Adhere 3 inch wide self-sealing butt joint strips over end joints.

4. Piping 1-1/2 inches Diameter And Larger:

a. Use broken-joint construction in application of two-layer covering.
b. Fill cracks and depressions with insulating cement mixed to thick plastic paste.

1) Apply by hand in several layers to make up total specified thickness.
2) Final layer shall have smooth uniform finish before application of covering.

5. Fittings, Valves, And Accessories:

a. Do not apply insulation over flanged joints or victaulic couplings until piping has been brought up to operating temperature and flange bolts have been fully tightened. Insulate valves so wheel, stem, and packing nut are exposed.
b. Insulate with same type and thickness of insulation as pipe, with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
c. Piping Up To 1-1/4 Inch Diameter:

1) Cover insulation with one piece fitting cover secured by stapling or taping ends to adjacent pipe covering.
2) Alternate Method:

a) Insulate fittings, valves, and accessories with one inch of insulating cement and vapor seal with two 1/8 inch wet coats of vapor barrier mastic reinforced with glass fabric extending 2 inches onto adjacent insulation.

d. Piping 1-1/2 inches To 2 Inches:

1) Insulate with hydraulic setting insulating cement or equal, to thickness equal to adjoining pipe insulation.
2) Apply final coat of fitting mastic over insulating cement.

e. Piping 2-1/2 inch And Larger:

1) Insulate with segments of molded insulation securely wired in place and coated with skim coat of insulating cement.
2) Apply fitting mastic, fitting tape and finish with final coat of fitting mastic.

6. Pipe Hangers:

a. Do not allow pipes to come in contact with hangers or structure.
b. Pipe Shield:

1) Provide schedule 40 PVC by 6 inch long at each clevis and/or unistrut type hanger.
2) Provide 16 ga by 6 inch long galvanized shields at each pipe hanger to protect pipe insulation from crushing by clevis hanger.

3) Provide 22 ga by 6 inch long galvanized shield at each pipe hanger to protect insulation from crushing by Unistrut type hanger.

c. At Pipe Hangers:

1) Provide rigid calcium silicate insulation 100 psi compressive strength) at least 2 inches beyond shield.

B. Below Grade Piping:

1. Slip underground pipe insulation onto pipe and seal butt joints.
2. Where slip-on technique is not possible, slit insulation, apply to pipe, and seal seams and joints.

END OF SECTION

SECTION 22 1116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Perform excavating and backfilling required by work of this Section.
2. Furnish and install potable water piping complete with necessary valves, connections, and accessories inside building and connect with outside utility lines 5 feet from building perimeter as described in Contract Documents.

B. Related Requirements:

1. Section 03 3111: 'Normal Weight Structural Concrete'.

    a. Pre-installation conference held jointly with other concrete related sections.

2. Section 22 0501: 'Common Piping Requirements'.
3. Section 22 0719: 'Plumbing Piping Insulation'.
4. Section 31 2316: 'Excavation' for criteria for performance of excavation.
5. Section 31 2323: 'Fill' for criteria for performance of backfill.
6. Section 33 1116: 'Site Water Utility Distribution Piping' for domestic water piping from 5 feet from building perimeter to main.

1.2 REFERENCES

A. Reference Standards:

1. American National Standards Institute / American Society of Sanitary Engineers:

    a. ANSI/ASSE 1017-2009, 'Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems'.
    b. ANSI/ASSE 1070-2004, 'Performance Requirements for Water Temperature Limiting Devices'.

2. ASTM International:

    a. ASTM B88-09, 'Standard Specification for Seamless Copper Water Tube'.
    b. ASTM E84-13a, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
    c. ASTM F2389-10, 'Standard Specification for Pressure-rated Polypropylene (PP) Piping Systems'.

3. NSF International Standard:

    a. NSF P171, 'Protocol for Chlorine Resistance of Plastic Piping Materials' (1999).

4. NSF International Standard / American National Standards Institute:

    a. NSF/ANSI 14-2013, 'Plastic Piping System Components and Related Materials'.
    b. NSF/ANSI 61-2012, 'Drinking Water System Components - Health Effects'.
    c. NSF/ANSI 372-2011, 'Drinking Water System Components - Lead Content'.

1.3 SUBMITTALS

A. Informational Submittals:

1. Test And Evaluation Reports:

    a. Written report of sterilization test.

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Manufacturers:

1. Manufacturer Contact List:

    a. Cash Acme, Cullman, AL www.cashacme.com
    b. Cla-Val Company, Costa Mesa, CA or Cla-Val Canada Ltd, Beamsville, ON www.cla-val.com.
    c. Conbraco Industries Inc, Matthews, NC www.conbraco.com or Conbraco (Honeywell Ltd), Scarborough, ON (416) 293-8111.
    d. Hammond Valve, New Berlin, WI www.hammondvalve.com.
    e. Handy & Harmon Products Div, Fairfield, CT www.handyharmon.com or Handy and Harmon of Canada Ltd, Rexdale, ON (800) 463-1465 or (416) 675-1860.
    f. Harris Products Group, Cincinnati, OH www.harrisproductsgroup.com.
    g. Honeywell Inc, Minneapolis, MN www.honeywell.com.
    h. Milwaukee Valve Co, New Berlin, WI www.milwaukeevalve.com.
    i. Nibco Inc, Elkhart, IN www.nibco.com.
    j. Spence Engineering Co, Walden, NY www.spenceengineering.com.
    k. Uponor Inc, Apple Valley, MN www.uponor-usa.com.
    l. Viega ProPress, Wichita, KS www.viega-na.com.
    m. Watts Regulator Co, Andover, MA www.wattsreg.com.
    n. Wilkins (Zurn Wilkins), Paso Robles, CA www.zurn.com.

B. Materials:

1. Design Criteria:

    a. All drinking water products, components, and materials above and below grade used in drinking water systems must meet NSF International Standards for Lead Free.
    b. No CPVC allowed.

2. Pipe:

    a. Copper:

        1) Above-Grade:

            a) Meet requirements of ASTM B88, Type L.

        2) Below-Grade:

            a) Meet requirements of ASTM B88, Type K. 3/4 inch minimum under slabs.
            b) 2 inches And Smaller: Annealed soft drawn.

c) 2-1/2 inches And Larger: Hard Drawn.

3. Fittings:

a. For Copper Pipe: Wrought copper.

4. Connections For Copper Pipe:

a. Above-Grade:

1) Sweat copper type with 95/5 or 96/4 Tin-Antimony solder, Bridgit solder, or Silvabrite 100 solder. Use only lead-free solder.
2) Viega ProPress System

b. Below Grade:

1) Brazed using following type rods:

a) Copper to Copper Connections:

(1) AWS Classification BCuP-4 Copper Phosphorus (6 percent silver).
(2) AWS Classification BCuP-5 Copper Phosphorus (15 percent silver).

2) Copper to Brass or Copper to Steel Connections: AWS Classification BAg-5 Silver (45 percent silver).
3) Do not use rods containing Cadmium.
4) Brazing Flux:

a) Approved Products:

(1) Stay-Silv white brazing flux by Harris Product Group.
(2) High quality silver solder flux by Handy & Harmon.

5) Joints under slabs acceptable only if allowed by local codes.

5. Ball Valves:

a. Use ball valves exclusively unless otherwise specified. Ball valves shall be by single manufacturer from approved list below.
b. Valves shall be two-piece, full port for 150 psi SWP.

1) Operate with flow in either direction, suitable for throttling and tight shut-off.
2) Body: Bronze, 150 psig wsp at 350 deg F and 400 psig wog.
3) Seat: Bubble tight at 100 psig under water.

c. Class One Quality Standard: Nibco T585 or S585.

1) Equal by Conbraco 'Apollo,' Hammond, Milwaukee, or Watts.

6. Combination Pressure Reducing Valve / Strainer:

a. Integral stainless steel strainer, or separate 'Y' strainer installed upstream of pressure reducing valve.
b. Built-in thermal expansion bypass check valve.
c. Class One Quality Standard: Watts LFU5B:

1) Equal by Cash Acme, Cla-Val Hi Capacity, Conbraco 36C, Honeywell-Braukmann, Spence Hi Capacity, Watts, or Wilkins. See Section 01 6200.

7. Mixing Valve MV-1:

    a. Solid brass construction and CSA B125 certified.
    b. Includes integral check valves and inlet screen. Features advanced paraffin-based actuation technology.
    c. Flow of 9.5 GPM with maximum 10 psi pressure drop. Perform to minimum flow of 0.5 GPM in accordance with ASSE 1017.
    d. Set for 110 deg F Service.
    e. Match Construction Drawings for connection sizes.
    f. Class One Quality Standard: Powers LFLM490. See Section 01 6200.
    g. Acceptable Manufacturers: Lawler, Leonard, Powers, Sloan, Symmons, and Watts.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate cold water lines a minimum of 6 inches from hot water line.

3.2 FIELD QUALITY CONTROL

A. Field Tests:

1. Before pipes are covered, test systems in presence of Architect/Engineer at 125 psig hydrostatic pressure for four (4) hours and show no leaks.
2. Disconnect equipment not suitable for 125 psig pressure from piping system during test period.

3.3 CLEANING

A. Sterilize potable water system with solution containing 200 parts per million minimum of available chlorine and maintaining pH of 7.5 minimum. Introduce chlorinating materials into system in manner approved by Architect/Engineer. Allow sterilization solution to remain for twenty four (24) hours and open and close valves and faucets several times during that time.

B. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.

C. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.

END OF SECTION

SECTION 22 1119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install miscellaneous potable water piping specialties as described in Contract Documents.

B. Related Requirements:

1. Section 22 0501: 'Common Plumbing Requirements'.

1.2 REFERENCES

A. Reference Standards:

1. NSF International Standard / American National Standards Institute:

a. NSF/ANSI 61-2012, 'Drinking Water System Components - Health Effects'.
b. NSF/ANSI 372-2011, 'Drinking Water System Components - Lead Content'.

1.3 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

PART 2 - PRODUCTS

2.1 ACCESSORIES

A. Manufacturers:

1. Manufacturer Contact List:

a. Ashcroft, Stratford, CT www.ashcroftinc.com.
b. H O Trerice, Oak Park, MI www.hotco.com.
c. IPS Corporation, Compton, CA www.ipscorp.com.
d. Josam Co, Michigan City, IN www.josam.com.
e. Jay R. Smith Maufacturing Co, Montgomery, AL www.jrsmith.com.
f. Prier Products, Inc., Grandview, MD www.prier.com.
g. Proset Systems Inc., Lawrenceville, GA www.prosetsystems.com.
h. Sioux Chief Manufacturing Co, Peculiar, MO www.siouxchief.com.
i. Sure Seal, Tacoma, WA www.thesureseal.com.
j. Wade (Division of Tyler Pipe), Tyler, TX www.wadedrains.com.
k. Watts Drainage, Spindale, NC www.watts.com or Watts Industries, Burlington, ON, Canada www.wattscda.com.
l. Weiss Instruments, Inc., Holtsville, NY www.weissinstruments.com.
m. Woodford Manufacturing, Colorado Springs, CO www.woodfordmfg.com.
n. Zurn Cast Metals, Erie, PA or Zurn Industries Limited, Mississauga, ON www.zurn.com.

B. Materials:

1. Pressure Reducing Station:

    a. Design Criteria:

        1) Meet NSF International Standards for Lead Free.

    b. Pressure Gauges:

        1) Gauges shall have following features:

            a) Cast aluminum case.
            b) Chrome plated ring.
            c) Impact resistant window.
            d) Phosphor bronze alloy steel bourdon tube.
            e) 1/2 percent scale range accuracy.
            f) 4-1/2 inch diameter dial face.
            g) Range 0 to 100 psig.

        2) Class One Quality Standard: 500X by H O Trerice.

            a) Equal by Ashcroft or Weiss. See Section 01 6200.

    c. Brass Gauge Cocks:

        1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

            a) 1092 by Ashcroft.
            b) 865 by H O Trerice.

2. Hydrants:

    a. Design Criteria:

        1) Provide with integral anti-siphon device.
        2) Ball valve type.
        3) Not required to meet NSF International Standards for Lead Free.

3. Water Hammer Arrestors:

    a. Design Criteria:

        1) Meet NSF International Standards for Lead Free.
        2) Nesting type, air pre-charged bellows with casing.
        3) Bellows constructed of stabilized 18-8 stainless steel.

    b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

        1) Josam: 75003.
        2) Jay R. Smith: 5020.
        3) Sioux Chief: 650 Series.
        4) Wade: 20.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Gauges: Connect to pipe with 1/4 inch connections utilizing gauge cocks.

END OF SECTION

SECTION 22 1313 - FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install soil, waste, and vent piping systems within building and connect with outside utility lines 5 feet out from building where applicable.
2. Perform excavation and backfill required by work of this Section.

B. Related Requirements:

1. Sections Under 07 3000 Heading: Furnishing and installing of roof jacks and pipe flashing at roof.
2. Section 07 8400: 'Firestopping' for quality of firestopping material.
3. Section 22 0501: 'Common Plumbing Requirements'.
4. Section 22 1319: 'Facility Sanitary Sewer Specialties' for furnishing of sewer specialties.
5. Section 31 2316: 'Excavation' for criteria for performance of excavation.
6. Section 31 2323: 'Fill' for criteria for performance of backfill and compaction.
7. Section 33 3313: 'Sanitary Utility Sewerage' for sewage piping from 5 feet out from building to main.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International:

a. ASTM D2321-14, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'.
b. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
c. ASTM D3034–14, 'Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings'.
d. ASTM F656–15, 'Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings'.
e. ASTM F891–10, 'Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core'.

2. International Code Council:

a. ICC IPC-2015, 'International Plumbing Code'.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Manufacturers:

1. Manufacturer Contact List:

a. Clamp-All Corp, Haverhill, MA www.clampall.com.
b. Anaco-Husky, Corona, CA www.anaco-husky.com.
c. Josam Co, Michigan City, IN www.josam.com.
d. Jay R. Smith Manufacturing Co, Montgomery, AL www.jrsmith.com.
e. MG Piping Products Co, Stanton, CA www.mgcoupling.com.
f. Mifab Manufacturing Inc, Chicago, IL www.mifab.com.

g. Wade Div Tyler Pipe, Tyler, TX www.wadedrains.com.
h. Watts Drainage, Spindale, NC www.watts.com or Watts Industries, Burlington, ON, Canada www.wattscda.com.
i. Zurn Cast Metals, Erie, PA or Zurn Industries Limited, Mississauga, ON www.zurn.com.

B. Performance:

1. Design Criteria:

a. Minimum size of waste piping installed under floor slab on grade shall be 2 inches.

C. Materials:

1. Piping And Fittings: PVC Schedule 40 cellular core plastic pipe and pipe fittings meeting requirements of ASTM F891, joined using cement primer meeting requirements of ASTM F656 and pipe cement meeting requirements of ASTM D2564.

a. Furnish wall cleanouts with chrome wall cover and screw.

2. Cleanouts:

a. Furnish wall cleanouts with chrome wall cover and screw.
b. Type Two Acceptable Products:

1) Finish Floors:

a) Josam: 56010.
b) J. R. Smith: 4023.
c) Mifab: C1100C-R-1.
d) Wade: W-6000.
e) Watts: CO-200-R.
f) Zurn: Z-1402.

2) Finished Wall:

a) Josam: 58790.
b) J. R. Smith: 4530.
c) Mifab: C1460RD.
d) Wade: W8560E.
e) Watts: CO-460-RD.
f) Zurn: Z-1446.

3) Exposed Drain Lines:

a) Josam: 58910.
b) J. R. Smith: 4510.
c) Mifab: C1460.
d) Wade: W8560B.
e) Watts: CO-460.
f) Zurn: Z-1440.

4) General Purpose:

a) Josam: 58900.
b) J. R. Smith: 4400.
c) Mifab: C1300-MF
d) Wade: W8550E.

e) Watts: CO-380.
f) Zurn: Z-1440.

5) Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Excavate and backfill as specified in Sections 31 2316 and 31 2323 with following additional requirements:

1. Runs shall be as close as possible to those shown on Drawings.
2. Excavate to required depth and grade to obtain fall required. Grade soil and waste lines within building perimeter 1/4 inch fall in one foot in direction of flow.
3. Bottom of trenches shall be hard. Tamp as required.
4. Remove debris from trench before laying of pipe.
5. Do not cut trenches near footings without consulting Architect.

B. Thermoplastic Pipe And Fittings:

1. General: Piping and joints shall be clean and installed according to Manufacturer's recommendations. Break down contaminated joints, clean seats and gaskets and reinstall.
2. Above Grade: Locate pipe hangers every 4 feet on center maximum and at elbows.
3. Below Grade:

a. Install in accordance with Manufacturer's recommendations and ASTM D2321.
b. Stabilize unstable trench bottoms.
c. Bed pipe true to line and grade with continuous support from firm base.

1) Bedding depth: 4 to 6 inches.
2) Material and compaction to meet ASTM standard noted above.

d. Excavate bell holes into bedding material so pipe is uniformly supported along its entire length. Blocking to grade pipe is forbidden.
e. Trench width at top of pipe:

1) Minimum: 18 inches or diameter of pipe plus 12 inches, whichever is greater.
2) Maximum: Outside diameter of pipe plus 24 inches.

f. Do not use backhoe or power equipment to assemble pipe.
g. Initial backfill shall be 12 inches above top of pipe with material specified in referenced ASTM standard.
h. Minimum cover over top of pipe not under building slab:

1) 36 inches before wheel loading.
2) 48 inches before compaction.

C. Install piping so cleanouts may be installed as follows:

1. At every 135 degrees of accumulative change in direction for horizontal lines.
2. Every 100 feet of horizontal run.
3. Extend piping to accessible surface. Do not install piping so cleanouts must be installed in carpeted floors. In such locations, configure piping so wall type cleanouts may be used.

D. Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have seal trap in connection with complete venting system so gasses pass freely to atmosphere with no pressure or siphon condition on water seal.

E. Vent entire waste system to atmosphere. Join lines together in fewest practicable numbers before projecting above roof. Set back vent lines so they will not pierce roof near edge or valley. Vent line terminations shall be:

1. 6 inches minimum above roof and 12 inches minimum from any vertical surface.
2. Same size as vent pipe.
3. In areas where minimum design temperature is below 0 deg F or where frost or snow closure may be possible:

    a. Vent line terminations shall be same size as vent pipe, except no smaller than 2 inches in diameter.
    b. Vents shall terminate 10 inches minimum above roof or higher if required by local codes.

F. Furnish and install firestopping at penetrations of fire-rated structures as required under Sections 07 8400 and 22 0501.

G. If test Tees are used for testing, plug Tees so wall finish can be installed. Do not leave as exposed cleanouts.

3.2 FIELD QUALITY CONTROL

A. Field Tests:

1. Conduct tests for leaks and defective work. Notify Architect before testing.
2. Thermoplastic Pipe System:

    a. Before backfilling and compacting of trenches, Fill waste and vent system with water to roof level or 10 feet minimum, and show no leaks for two hours. Correct leaks and defective work.
    b. After backfilling and compacting of trenches is complete but before placing floor slab, re-test as specified above. Uncover pipe and correct leaks and defective work. Re-backfill and compact and re-test.

END OF SECTION

SECTION 22 1319 - FACILITY SANITARY SEWER SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under this Section as described in Contract Documents.

B. Related Requirements:

1. Section 22 0501: 'Common Plumbing Requirements'.
2. Section 22 1119: 'Domestic Water Piping Specialties'.
3. Section 22 1313: 'Facility Sanitary Sewers' for installation of miscellaneous sanitary sewer specialties.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Manufacturers:

1. Manufacturer Contact List:

a. Josam Co, Michigan City, IN www.josam.com.
b. Jay R. Smith Manufacturing Co, Montgomery, AL www.jrsmith.com.
c. Mifab Manufacturing Inc, Chicago, IL www.mifab.com.
d. Proset Systems, Lawrenceville, GA www.prosetsystems.com.
e. Sioux Chief Manufacturing Co, Peculiar, MO www.siouxchief.com.
f. Sureseal Manufacturing, Tacoma WA www.thesureseal.com.

1) Contact Information:

a) All Areas except Idaho and Utah: Rick Ensley (253) 564-0624, rick@thesureseal.com.
b) Idaho and Utah Areas: Mark Evans, phone (801) 748-1222, mark@franklinjames.com.

g. Wade Div Tyler Pipe, Tyler, TX www.wadedrains.com.
h. Watts Drainage, Spindale, NC www.watts.com or Watts Industries, Burlington, ON, Canada www.wattscda.com.
i. Zurn Industries, LLC, Erie PA www.zurn.com. or Zurn Industries Ltd, Mississuaga, ON (905) 795-8844.

B. Performance:

1. Design Criteria:

a. All materials NOT required to be low lead compliant.

C. Components:

1. Drains And Drain Accessories:

a. Floor Drain FD-1:

1) Approved types with deep seal trap and chrome plated strainer.
2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a) Josam: 30000-50-Z-5A.
b) J. R. Smith: 2010-A.

c) Mifab: F-1100-C.
d) Sioux Chief: 832.
e) Wade: 1100.
f) Watts: FD-200-A.
g) Zurn: Z-415.

D. Accessories:

a. Floor Drains:

1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a) Trap guard by Proset Systems. Provide model number to match floor drain.
b) Trap seal by Sureseal. Provide model number to match floor drain.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 22 3305 - ELECTRIC DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install electric water heater as specified in Contract Documents.

B. Related Requirements:

1. Section 22 0501: 'Common Plumbing Requirements'.
2. Section 22 1116: 'Domestic Water Piping'.

1.2 REFERENCES

A. Reference Standard:

1. NSF International Standard / American National Standards Institute:

a. NSF/ANSI 61-2017, 'Drinking Water System Components - Health Effects'.
b. NSF/ANSI 372-2016, 'Drinking Water System Components - Lead Content'.

1.3 SUBMITTALS

A. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Operations and Maintenance Data:

1) Maintenance and operational instructions.

b. Warranty Documentation:

1) Final, executed copy of Warranty.

c. Record Documentation:

1) Manufacturers documentation:

a) Manufacturer's literature or cut sheet.

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Meet NSF International Standards for materials or products that come in contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.
2. California only: California Assembly Bill 1953 (AB1953) Compliant for Lead Free.

1.5 WARRANTY

A. Special Warranty:

1. Three-year non-prorated warranty on water heaters of 20 gallon (76 liters) capacity and larger.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Manufacturers:

1. Manufacturer Contact List:

a. American Water Heater Co, Johnson City, TN www.americanwaterheater.com.
b. A. O. Smith Water Products Co, Ashland City, TN www.hotwater.com.
c. Bradford-White Corp, Ambler, PA www.bradfordwhite.com.
d. Lochinvar, Lebanon, TN www.lochinvar.com.
e. Rheem / Ruud Water Heater Div Rheem Manufacturing, Atlanta, GA www.rheem.com.
f. Ruud Manufacturing Co., Atlanta, GA www.ruud.com.
g. State Industries Inc, Ashland City, TN www.stateind.com.

B. Materials:

1. Design Criteria:

a. All (wetted) drinking water products, components, and materials used in drinking water systems must meet NSF International Standards for Lead Free.
b. All water heaters require 'Tempered Water Temperature Control' (mixing valves) as specified in Section 22 1116.

2. 100 Gallon (378.5 Liter) to 120 Gallon (454 Liter):

a. Glass lined storage tank pressure tested and rated for 125 psi (862 kPa) working pressure.
b. Water heaters shall each have ASME rated temperature-pressure relief valve rated at MBH input of heater minimum set to relieve at 120 psi (827 kPa).
c. 3 inches (75 mm) minimum glass fiber or polyurethane foam insulation.
d. Complete with three-stage thermostat with step control, magnesium anode, electric sheath rod type heating elements, and high limit control.
e. Heater shall be pre-wired and entire unit bear UL label.
f. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

1) American: STCE31-119-ASME.
2) AO Smith: DRE-120 ASME.
3) Bradford White: M-II-120A-KW-3SF.
4) Lochenvar: CH(X)kW 100A.
5) Ruud: ES120(A).
6) State Industries: CSB-120 ASME.

3. 19 / 20 Gallon (72 / 76 Liter):

a. Glass lined storage tank pressure tested and rated for 125 psi (862 kPa) working pressure.
b. 110-120 V, single phase, 1500 - 1650 watts maximum heating capacity.
c. Water heaters shall each have ASME rated temperature-pressure relief valve rated at MBH input of heater minimum set to relieve at 120 psi (827 kPa).
d. Complete with thermostat, high limit control, and anode rod.
e. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

1) American: LDCE31-20L.
2) AO Smith: DEL-20.
3) Bradford White: LE120L3-3 or LE120U3-1.

4) Lochenvar: JRC020DS or JTC020DS (both 1650 watts).
5) Rheem: 81VP20S or EGSP20.
6) State Industries: PCE-20.

2.2 ACCESSORIES

A. Anchoring Components:

1. One inch (25 mm) by 18 ga (1.2 mm) galvanized steel straps.
2. No. 10 by 2-1/2 inch (64 mm) screws.

B. Thermal Expansion Absorbers:

1. Bladder type for use with potable water systems.
2. Type One Acceptable Products.

a. Therm-X-Trol ST-12-C by Amtrol Inc, West Warwick, RI www.amtrol.com.
b. Equal as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install temperature-pressure relief valve on hot water heater and pipe discharge to directly above funnel of floor drain.

B. Anchor 20 gallon (76 liter) and larger water heaters to wall using anchoring straps and specified screws.

3.2 ADJUSTING

A. Set discharge water temperature at 140 deg F (60 deg C). Final hot water temperature shall be 110 deg F (43 deg C) after thermostatic mixing valve.

END OF SECTION

SECTION 22 4213 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install plumbing fixtures as described in Contract Documents.

B. Related Requirements:

1. Section 07 9213: 'Elastomeric Joint Sealants' for sealants used between fixtures and other substrates.
2. Section 22 0501: 'Common Plumbing Requirements'.
3. Section 22 1116: 'Domestic Water Piping'.

1.2 REFERENCES

A. Definitions:

1. High-Efficiency Toilet (HET): Toilets with effective flush volume of 1.28 gallons (4.8 liters) or less.
2. Maximum Performance (MaP): Toilet testing that rates toilet efficiency and flush performance by measuring number of grams of solid waste (soybean paste and toilet paper) that a toilet can flush and remove completely from fixture in single flush represented as a scale or score. 1000 grams is highest score possible (www.map-testing.com).

B. Reference Standards:

1. American Society of Mechanical Engineers / CSA Group (Canadian Standards Association):

a. ASME A112.19.2-2018/CSA B45.1-18, 'Ceramic Plumbing Fixtures'.

1.3 SUBMITTALS

A. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Operation and Maintenance Data:

1) Sensor Operated operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Manufacturers:

1. Manufacturer Contact List:

a. American Standard Brands, Piscataway, NJ www.americanstandard-us.com or American Standard Canada, Mississauga, ON www.americanstandard.ca.
b. AMTC - Advanced Modern Technologies Corp, Woodland Hills, CA www.amtcorporation.com.
c. Bemis Manufacturing Co, Sheboygan Falls, WI www.bemismfg.com.
d. Beneke by Sanderson Plumbing Products, Columbus, MS www.sppi.com.
e. Church Seat Co, Sheboygan Falls WI www.churchseats.com.

f. Delany Flush Valves, Charlottesville, VA www.delanyproduct.com.
g. Delta Faucet Co, Indianapolis, IN www.deltafaucet.com or Delta Faucet Canada, London, ON (519) 659-3626.
h. Dearborn Brass, Cleveland, OH www.dearbornbrass.com.
i. Gerber Plumbing Fixtures LLC, Woodridge, IL www.gerberonline.com.
j. Josam Co, Michigan City, IN www.josam.com.
k. Jay R. Smith Mfg. Co, Montgomery, AL www.jrsmith.com.
l. Kohler Co Plumbing Div, Kohler, WI www.us.kohler.com.
m. McGuire Manufacturing Co, Cheshire, CT www.mcguiremfg.com.
n. Mifab Manufacturing Inc, Amherst, NY www.mifab.com.
o. Moen Incorporated, North Olmsted, OH, or Moen Canada, Oakville, ON www.moen.com.
p. Olsonite Corp, Newnan, GA www.olsonite.net or Olsonite Co Ltd, Tilbury, ON (519) 682-1240.
q. Sloan Valve Co, Franklin Park, IL www.sloanvalve.com.
r. South Fork Manufacturing, Coalville, UT (801) 953-3001 www.dirt-grabber.com.
s. Toto U.S.A., Inc., Morrow, GA www.totousa.com
t. Wade Div Tyler Pipe, Tyler, TX www.wadedrains.com.
u. Watts Drainage, Spindale, NC www.wattsdrainage.com or Watts Industries, Burlington, ON, Canada www.wattscda.com.
v. Zurn Industries, LLC, Erie PA www.zurn.com. or Zurn Industries Ltd, Mississuaga, ON (905) 795-8844.

B. Performance:

1. Design Criteria:

a. Meet or exceed ASME A112.19.2/CSA B45.1 for Vitreous China Plumbing Fixtures.
b. Interior exposed pipe, valves, and fixture trim, including trim behind custom casework doors, shall be chrome plated.
c. All materials NOT required to be low lead compliant.
d. Do not use toilets with effective flush volume of less than 1.28 gallons (4.8 liters).

C. Materials:

1. Water Closets:

a. Floor Mounted With Tank:

1) HET (High-Efficiency Toilet) - Standard Fixture:

a) Water usage of 1.28 gallons (4.8 liters) per flush.
b) MaP Score of 1000 grams.
c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

(1) American Standard: Cadet 3 Elongated 215CA.004.
(2) Gerber: Avalanche WS-21-812.
(3) Kohler: Wellworth K-3948.
(4) Toto: 'ECO Drake' CST744E.or CST744EG.

2) HET (High-Efficiency Toilet) - Handicap Accessible Fixture:

a) Water usage of 1.28 gallons (4.8 liters) per flush.
b) 18 inch (450 mm) maximum rim height.
c) MaP Score of 1000 grams.
d) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

(1) American Standard: Cadet Pro Right Height Elongated 215AA.104.
(2) Gerber: Avalanche WS-21-818.
(3) Kohler: Highline K-3949.

(4) Toto: 'ADA Drake' CST744EL.

2. Water Closet Accessories:

a. Seats:

1) Provide split front type with check hinge.
2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a) Standard And Handicap Accessible Fixtures:

(1) American Standard: 5905.100SS.
(2) Bemis: 1655SSC.
(3) Beneke: 527 SS.
(4) Church: 9500SSC.
(5) Kohler: K-4731-C.
(6) Olsonite: 95SSC.
(7) Toto SC534.

b. Supply Pipe And Stop:

1) Provide chrome plated quarter-turn brass ball valve, 12 inch (300 mm) braided stainless steel riser, and chrome-plated steel flange.
2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a) McGuire: BV2166CC.
b) Zurn: Z8804.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install each fixture with separate vent line. Do not circuit vent.

B. Ensure provisions are made for proper support of fixtures and that rough-in piping is accurately set and protected from movement and damage.

1. Seal wall-mounted fixtures around edges to wall with sealant specified in Section 07 9213 'Elastomeric Joint Sealants'.

C. Provide each individual fixture supply with accessible chrome-plated stop valve with hand wheel.

D. Water Closets:

1. Floor Fixtures:

a. Make fixture connections with approved brand of cast iron flange, soldered or caulked securely to waste pipe. Make joints between fixtures and flanges tight with approved fixture setting compound or gaskets. Caulk between fixtures with sealant specified in Section 07 9213. Point edges.

3.2 CLEANING

A. Polish chrome finish at completion of Project.

END OF SECTION

SECTION 22 4216 - COMMERCIAL LAVATORIES AND SINKS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install plumbing fixtures as described in Contract Documents.

B. Related Requirements:

1. Section 07 9213: 'Elastomeric Joint Sealants' for sealants used between fixtures and other substrates.
2. Section 22 0501: 'Common Plumbing Requirements'.
3. Section 22 1116: 'Domestic Water Piping'.

1.2 REFERENCES

A. Reference Standard:

1. American National Standards Institute / International Code Council:

a. ANSI/ICC A117.1-2017, 'Standard for Accessible and Usable Buildings and Facilities'.

2. American Society of Mechanical Engineers / Canadian Standards Association (CSA Group):

a. ASME A112.18.1-2018/CSA B125.1-18, 'Plumbing Supply Fittings'.
b. ASME A112.19.1-2018/CSA B45.2-18, 'Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures'.
c. ASME A112.19.3-2017/CSA B45.4-17, 'Stainless steel plumbing fixtures'.

3. NSF International Standard / American National Standards Institute:

a. NSF/ANSI 61-2017, 'Drinking Water System Components - Health Effects'.
b. NSF/ANSI 372-2016, 'Drinking Water System Components - Lead Content'.

1.3 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

1.4 SUBMITTALS

A. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Warranty Documentation:

1) Final, executed copy of Warranty.

1.5 WARRANTY

A. Manufacturer Warranty:

1. Manufacturer's standard Warranty against material or Manufacturing defects.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Performance:

1. Design Criteria:

a. Interior exposed pipe, valves, and fixture trim, including trim behind custom casework doors, shall be chrome plated.
b. Faucets and other fixture fittings shall conform to requirements of ASME A112.18.1/CSA B125.1.

1) Stainless steel plumbing fixtures:

a) ASME A112.19.3/CSA B45.4.
b) CSA B45.4/ASME A112.19.3.

B. Components:

1. Stainless Steel Lavatories And Fittings:

a. Standard and Handicap Accessible Counter Top Lavatories:

1) Size 19 by 16 inches nominal.
2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a) Elkay: LVR-1916.

b. Lavatory Fittings:

1) Faucet and Grid Strainer For Handicap Accessible Sinks:

a) Design Criteria:

(1) Meet NSF International Standards for Lead Free.

b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

(1) American Standard: Monterrey Two-Handle Centerset Lavatory Faucet with Vandal-Resistant Wrist Blade handles and grid strainer drain 5502.170.
(2) Chicago: 802-317CP with K7715 strainer.
(3) Delta: 2529HDF.
(4) Gerber: CO-44-412.
(5) Kohler: K-7404-5A with K-13885 strainer.
(6) Moen: 8215 with14750 grid strainer.
(7) Speakman: SC 3074.
(8) T & S: B-0890 with B-0899 Grid Strainer.
(9) Zurn: Z-81104 with McGuire 155A grid strainer.

2) Flow Control Fitting:

a) Design Criteria:

(1) Meet NSF International Standards for Lead Free.

b) Accessories:

(1) Provide vandal-proof type in place of aerator. Flow shall be 0.5 gpm.

c) Category Four Approved Product. See Section 01 6200 for definitions of Categories:

(1) Omni L-200 Series by Chronomite Laboratories.

3) Supply pipes with stops:

a) Design Criteria:

(1) Meet NSF International Standards for Lead Free.

b) Accessories:

(1) Provide chrome plated quarter-turn brass ball valve, 12 inches (305 mm) long braided stainless steel riser, and chrome-plated steel flange.

c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

(1) McGuire: BV2165CC.
(2) Zurn: Z8804 LRQ-PC.

4) Trap:

a) Description:

(1) 17 gauge (1.4 mm) tube 'P' trap, chrome plated.

b) Design Criteria:

(1) Not required to meet NSF International Standards for Lead Free.

c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

(1) Dearborn.
(2) Engineered Brass Company (EBC).
(3) Keeney Manufacturing.
(4) McGuire.
(5) Zurn.

5) Safety Covers for Handicap Accessible Lavatories:

a) Description:

(1) Provide protection on water supply pipes and on trap.

b) Design Criteria:

(1) Not required to meet NSF International Standards for Lead Free.

c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

(1) Trapwrap by Brocar Products Inc.
(2) Pro Wrap by McGuire Products.
(3) Lav Guard 2 by TrueBro.

(4) Pro Extreme by Plumberex.

2. Stainless Steel Sinks And Fittings:

a. Design Criteria:

1) Not required to meet NSF International Standards for Lead Free.
2) Self-rimming, 18 gauge (1.2 mm) stainless steel, satin finish.

b. Double Compartment Sinks:

1) Design Criteria:

a) Not required to meet NSF International Standards for Lead Free.

2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

a) Elkay: LR 3319.
b) Just: DL-1933-A-GR.
c) Kindred: LBT 4408P-1.

c. Stainless Steel Sink Fittings:

1) Gooseneck Faucets for Compartment Serving Area Sinks:

a) Design Criteria:

(1) Meet NSF International Standards for Lead Free.

b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

(1) Moen: 8227. (swivel).
(2) Speakman: SC-5724. (swivel).

2) Faucets for Serving Area Sinks:

a) Design Criteria:

(1) Meet NSF International Standards for Lead Free.

b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

(1) Moen: 8227. (swivel).
(2) Speakman: SC-5724. (swivel).

3) Supply pipes with stops:

a) Design Criteria:

(1) Meet NSF International Standards for Lead Free.

b) Accessories:

(1) Provide chrome plated quarter-turn brass ball valve, 12 inches (300 mm) long braided stainless steel riser, and chrome-plated steel flange.

c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

(1) McGuire: BV2165CC.
(2) Zurn: Z8804 LRQ-PC.

4) Flow Control Fitting:

a) Design Criteria:

(1) Meet NSF International Standards for Lead Free.

b) Accessories:

(1) Provide vandal-proof type in place of aerator. Flow shall be 1.5 gpm.

c) Category Four Approved Product. See Section 01 6200 for definitions of Categories:

(1) Omni A-200 Series by Chronomite Laboratories.

5) Waste For Standard Stainless Steel Sinks:

a) Design Criteria:

(1) Not required to meet NSF International Standards for Lead Free.

b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

(1) Elkay: LK-99.
(2) Kindred: 1130.
(3) Kohler: K8801.
(4) McGuire: 151.
(5) Zurn Z-8740-PC.

6) Trap:

a) Description:

(1) 17 gauge (1.4 mm) tube 'P' trap, chrome plated.

b) Design Criteria:

(1) Not required to meet NSF International Standards for Lead Free.

c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

(1) Dearborn.
(2) Engineered Brass Company (EBC).
(3) Keeney Manufacturing.
(4) McGuire: MCT150075NCZN.
(5) Zurn.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install each fixture with separate vent line. Do not circuit vent.

B. Ensure provisions are made for proper support of fixtures and that rough-in piping is accurately set and protected from movement and damage.

C. Seal counter top fixtures to countertop with sealant specified in Section 07 9213.

D. Unless otherwise noted, provide each individual fixture supply with chrome-plated stop valve with hand wheel.

E. Install fixtures with accessible stop or control valve in each hot and cold water branch supply line.

F. Install Safety Covers on all under sink / lavatories with exposed water supply pipes and traps.

G. Install Handicap Accessible Lavatories as per ADA height mounting requirements.

3.2 CLEANING

A. Polish chrome finish at completion of Project.

END OF SECTION

SECTION 22 4223 - COMMERCIAL SHOWERS AND SHOWER VALVES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Individual showers.

B. Shower valves.

C. Related Requirements

1. Division 22 Section "Domestic Water Piping Specialties" for Thermostatic Control Valves.

1.2 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI/ICPA SS-1-2001 - Performance Standard for Solid Surface Materials.
2. ICC/ANSI A117.1 - Accessible And Usable Buildings And Facilities.

B. American Society of Mechanical Engineers (ASME):

1. ASME A112.18.1/CSA B125.1 - Plumbing Supply Fittings.

C. American Society of Sanitary Engineering (ASSE):

1. ASSE 1016-2005 - Performance Requirements for Automatic Compensating Valves for Individual Showers.
2. ASSE 1017-2005 - Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems.

1.3 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For shower faucets to include in maintenance parts manuals.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of plumbing fixture and compatible accessories through one source from a single approved manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide showers and shower valves manufactured by Bradley Corporation

1. Submit requests for substitution in accordance with Instructions to Bidders and Division 01 General Requirements.

2.2 COMMERCIAL SHOWERS, GENERAL

A. Commercial Shower Materials and Fabrication

1. Exposed Parts finish: Type 304 stainless steel or chrome-plated brass.
2. Nominal stainless steel thickness: 0.050 inch (1.3 mm) minimum.
3. Valve Bodies: Solid brass castings.
4. Supply Inlets, Individual Showers: 1/2-inch NPT, 24-inch (610 mm) long flexible stainless steel hoses unless otherwise indicated.

B. Flow Control: 1.5 gpm unless noted otherwise.

2.3 INDIVIDUAL SHOWERS

A. ADA Compliant Individual Coverall Wall Shower

1. Basis-of-Design Product: Bradley Corporation Model No. WS-1WCA-ADA.
2. Standards: ASME A112.18.1/CSA B125.1 and ASSE 1016.
3. Shower Head: Hand-held shower head on 60-inch, 1/2-inch NPT flexible SS hose with inline backflow preventer, quick disconnect, and bracket.
4. Shower Valve:

    a. Single Tempered Supply: Electronic metering valve.

5. Flow Control: 1.5 gpm.
6. Soap Dish: Attached.

B. Individual Coverall Wall Shower

1. Basis-of-Design Product: Bradley Corporation Model No. WS-1WCA.
2. Standards: ASME A112.18.1/CSA B125.1 and ASSE 1016.
3. Showerhead: Fixed direction, adjustable spray.
4. Shower Valve:

    a. Single Tempered Supply: Electronic metering valve.

5. Soap Dish: Attached.

2.4 SHOWER VALVES

A. Accessible Electronic Shower Metering Valves

1. Basis-of-Design Product: Bradley Corporation, Model No. 1C-TT TouchTime Electronic Control Shower Valve.
2. Description: ADA compliant, easy-touch push button solid state electronic control and solenoid shower valve.
3. Valve:

    a. Push-Button Material: Stainless Steel.
    b. Face Plate Material: Chrome plated brass.
    c. Operation: Easy touch push button.
    d. Timing: Factory preset 180 seconds.
    e. Solenoid

        1) Voltage: 24-volt, 50-60-hertz.

    f. Supply Connections: 1/2-inch NPT.

4. Low Voltage Transformer.

        1) Outlet to Showerhead: 3/8-inch IPS.

    b. Timing: Adjustable from 5 to 45 seconds.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine water supply, sanitary piping, and vent piping rough in for coordination with shower installation before beginning installation.

B. Examine architectural installation for compliance with codes a requirement of the manufacturer.

C. Correct unsatisfactory conditions before starting with installation.

3.2 INSTALLATION

A. Assemble and install shower components in accordance with manufacturer's instructions.

B. Install stops on each water supply piping.

1. Install stops in locations where they can be easily reached for operation.

C. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings.

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping.

B. Comply with water piping, soil waste and vent piping requirements specified in Division 22.

3.4 ADJUSTING

A. Operate and adjust showers and controls and adjust water pressure as needed. Replace damaged and malfunctioning showers, fittings, and controls.

3.5 CLEANING AND PROTECTION

A. Repair any damaged finishes after installation is complete.

B. Clean shower equipment and basins with manufacturer's recommended cleaning products.

C. Add protective covering after installation.

END OF SECTION

DIVISION 23 – HEATING, VENTILATING, AND AIR-CONDITIONING:

23 0501	Common HVAC Requirements
23 0529	Hangers And Supports For HVAC Piping And Equipment
23 3001	Common Duct Requirements
23 3401	Exhaust Fans

SECTION 23 0501 - COMMON HVAC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Common requirements and procedures for HVAC systems.
2. Responsibility for proper operation of electrically powered equipment furnished under this Division.
3. Interface with Testing And Balancing Agency.
4. Furnish and install sealants relating to installation of systems installed under this Division.
5. Furnish and install Firestop Penetration Systems for HVAC system penetrations as described in Contract Documents.
6. Furnish and install sound, vibration, and seismic control elements.

B. Products Furnished But Not Installed Under This Section:

1. Sleeves, inserts, and equipment for mechanical systems installed under other Sections.

C. Related Requirements:

1. Sections Under 33 5000 Heading: Fuel Distribution Utilities.

1.2 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's catalog data for each manufactured item.

1) Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
2) Include name, address, and phone number of each supplier.

B. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Warranty Documentation:

1) Include copies of warranties required in individual Sections of Division 23.

b. Record Documentation:

1) Manufacturers documentation:

a) Copies of approved shop drawings.

1.3 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Perform work in accordance with applicable provisions of Gas Ordinances applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.

B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:

1. Company:

a. Company specializing in performing work of this section.

1) Minimum five (5) years experience in HVAC installations.
2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.

b. Upon request, submit documentation.

2. Installer:

a. Licensed for area of Project.
b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
c. Upon request, submit documentation.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Accept valves on site in shipping containers with labeling in place.

B. Storage And Handling Requirements:

1. In addition to requirements specified in Division 01:

a. Stored material shall be readily accessible for inspection by Architect until installed.
b. Store items subject to moisture damage, such as controls, in dry, heated spaces.
c. Provide temporary protective coating on cast iron and steel valves.
d. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

2. Protect bearings during installation. Thoroughly grease steel shafts to prevent corrosion.

1.5 WARRANTY

A. Manufacturer Warranty:

1. Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record 'start-up' date of each piece of equipment on certificate.

B. Special Warranty:

1. Guarantee HVAC systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
2. If HVAC sub-contractor with offices located more than 150 miles from Project site is used, provide service / warranty work agreement for warranty period with local HVAC sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.

B. Pipe And Pipe Fittings:

1. Use domestic made pipe and pipe fittings on Project.
2. Weld-O-Let and Screw-O-Let fittings are acceptable.

C. Sleeves:

1. In Framing: Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 ga galvanized sheet metal two sizes larger than bare pipe or insulation on insulated pipe.
2. In Concrete And Masonry: Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.

D. Valves:

1. Valves of same type shall be of same manufacturer.

PART 3 - EXECUTION

3.1 INSTALLERS

A. Acceptable Installers. See Section 01 4301:

1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.2 EXAMINATION

A. Drawings:

1. HVAC Drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over HVAC Drawings.
3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

B. Verification Of Conditions:

1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which mechanical work is dependent for efficiency and report work that requires correction.
2. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.
3. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

4. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.

3.3 PREPARATION

A. Changes Due To Equipment Selection:

1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings, if requested by Architect, showing proposed installations.
2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
3. Provide any additional motors, valves, controllers, fittings, and other additional equipment required for proper operation of system resulting from selection of equipment.
4. Be responsible for the proper location of roughing-in and connections provided under other Divisions.

3.4 INSTALLATION

A. Interface With Other Work:

1. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and see they are properly installed.
2. Electrical: Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
3. Testing And Balancing:

    a. Put HVAC systems into full operation and continue their operation during each working day of testing and balancing.
    b. Make changes in fan speeds, and dampers or add dampers as required for correct balance as recommended by Testing And Balancing Agency and at no additional cost to Owner.

B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.

C. Locating Equipment:

1. Arrange pipes, ducts, and equipment to permit ready access to valves, cocks, unions, traps, filters, starters, motors, control components, and to clear openings of doors and access panels.
2. Adjust locations of pipes, ducts, switches, panels, and equipment to accommodate work to interferences anticipated and encountered.
3. Install HVAC work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
4. Determine exact route and location of each pipe and duct before fabrication.

    a. Right-Of-Way:

        1) Lines that pitch shall have right-of-way over those that do not pitch.
        2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.

    b. Offsets, Transitions, and Changes in Direction:

        1) Make offsets, transitions, and changes in direction in pipes and ducts as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
        2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.

D. Piping:

1. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus.

E. Sealants:

1. Seal openings through building exterior caused by penetrations of elements of HVAC systems.
2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.

3.5 REPAIR / RESTORATION

A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
2. Surface finishes shall exactly match existing finishes of same materials.

3.6 FIELD QUALITY CONTROL

A. Field Tests:

1. Perform tests on HVAC piping systems. Furnish devices required for testing purposes.

B. Non-Conforming Work:

1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
2. Repeat tests on new material, if requested.

3.7 CLEANING

A. Clean exposed piping, ductwork, and equipment.

3.8 CLOSEOUT ACTIVITIES

A. Instruction Of Owner:

1. Instruct building maintenance personnel and Stake Physical Facilities Representative in operation and maintenance of mechanical systems utilizing Operation And Maintenance Manual when so doing:

3.9 PROTECTION

A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.

END OF SECTION

SECTION 23 0529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Common hanger and support requirements and procedures for HVAC systems.

B. Related Requirements:

1. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.

C. Products Installed But Not Furnished Under This Section:

1. Stencils and band colors of gas piping used in HVAC equipment.

D. Related Requirements:

1. Section 09 9124: 'Interior Painted Metal' for providing field painting of identification of piping used with HVAC equipment.

1.2 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's catalog data for each manufactured item.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Manufacturers:

1. Class Two Quality Standard Approved Manufacturers. See Section 01 6200:

a. Anvil International, Portsmouth, NH www.anvilintl.com.
b. Cooper B-Line, Highland, IL www.cooperbline.com.
c. Erico International, Solon, OH www.erico.com.
d. Hilti Inc, Tulsa, OK www.hilti.com.
e. Minerallac, Hampshire, IL www.minerallac.com.
f. Thomas & Betts, Memphis, TN www.superstrut.com.
g. Unistrut, Wayne, MI www.unistrut.com.

B. Performance:

1. Design Criteria:

a. Support rods for single pipe shall be in accordance with following table:

Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller
1/2 inch	2-1/2 to 3-1/2 inches
5/8 inch	4 to 5 inches
3/4 inch	6 inches
7/8 inch	8 to 12 inches

C. Materials:

1. Hangers, Rods, Channels, Attachments, And Inserts:

a. Galvanized and UL approved for service intended.
b. Support horizontal piping from clevis hangers or on roller assemblies with channel supports, except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.
c. Class Two Quality Standards:

1) Support insulated pipes with clevis hanger equal to Anvil Fig 260 or roller assembly equal to Anvil Fig 171 with an insulation protection shield equal to Anvil Fig 167. Gauge and length of shield shall be in accordance with Anvil design data.
2) Except uninsulated copper pipes, support uninsulated pipes from clevis hanger equal to Anvil Fig 260. Support uninsulated copper pipe from hanger equal to Anvil Fig CT-65 copper plated hangers and otherwise fully suitable for use with copper tubing.

d. Riser Clamps For Vertical Piping:

1) Class Two Quality Standard: Anvil Figure 261.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Piping:

1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.

a. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using support channels and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
b. Supports For Horizontal Piping:

1) Support metal piping at 96 inches mm on center maximum for pipe 1-1/4 inches or larger and 72 inches on center maximum for pipe 1-1/8 inch or less.
2) Support thermoplastic pipe at 48 inches on center maximum.
3) Provide support at each elbow. Install additional support as required.

c. Supports for Vertical Piping:

1) Place riser clamps at each floor or ceiling level.
2) Securely support clamps by structural members, which in turn are supported directly from building structure.
3) Provide clamps as necessary to brace pipe to wall.

d. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.

END OF SECTION

SECTION 23 3001 - COMMON DUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. General procedures and requirements for ductwork.

B. Related Requirements:

1. Section 23 0501: 'Common HVAC Requirements'.

1.2 REFERENCES

A. Reference Standards:

1. Sheet Metal And Air Conditioning Contractors' National Association / American National Standards Institute:

a. SMACNA, 'HVAC Duct Construction Standards - Metal and Flexible' (Third Edition).

1.3 SUBMITTALS

A. Informational Submittals:

1. Manufacturer Instructions:

a. Installation manuals providing detailed instructions on assembly, joint sealing.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Performance:

1. Design Criteria:

a. Standard Ducts: Construction details not specifically called out in Contract Documents shall conform to applicable requirements of SMACNA, 'HVAC Duct Construction Standards - Metal and Flexible'.

B. Materials:

1. Duct Hangers:

a. One inch by 20 ga galvanized steel straps or steel rods as shown on Drawings, and spaced not more than 96 inches apart. Do not use wire hangers.
b. Attaching screws at trusses shall be 2 inch No. 10 round head wood screws. Nails not allowed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. During installation, protect open ends of ducts by covering with plastic sheet tied in place to prevent entrance of debris and dirt.

B. Make necessary allowances and provisions in installation of sheet metal ducts for structural conditions of building. Revisions in layout and configuration may be allowed, with prior written approval of Architect. Maintain required airflows in suggesting revisions.

C. Hangers And Supports:

1. Install pair of hangers as required by spacing indicated in table on Drawings.
2. Install upper ends of hanger securely to floor or roof construction above by method shown on Drawings.
3. Attach strap hangers to ducts with cadmium-plated screws. Use of pop rivets or other means will not be accepted.
4. Secure vertical ducts passing through floors by extending bracing angles to rest firmly on floors without loose blocking or shimming. Support vertical ducts, which do not pass through floors, by using bands bolted to walls, columns, etc. Size, spacing, and method of attachment to vertical ducts shall be same as specified for hanger bands on horizontal ducts.

3.2 CLEANING

A. Clean interior of duct systems before final completion.

END OF SECTION

SECTION 23 3401 - EXHAUST FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install exhaust fans as described in Contract Documents.

B. Related Requirements:

1. Section 23 3001: 'Common Duct Requirements'.
2. Division 26: Control device and electrical connection.

1.2 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Bear AMCA seal and UL label.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Wall Mounted Exhaust Fans:

1. Acoustically insulated housings. Sound level rating of 8.8 sones maximum for 750 CFM and .25" static pressure.
2. Include chatterproof integral back-draft damper with no metal-to-metal contact.
3. True centrifugal wheels, backward curved direct drive.
4. Entire fan, motor, and wheel assembly shall be easily removable without disturbing housing.
5. Suitably ground motors and mount on rubber-in shear vibration isolators.
6. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

    a. Greenheck G 095-D 1550RPM, 1/8HP, 120V, 1PH.
    b. Equal by:

        1) Carnes.
        2) Cook.
        3) ACME

PART 3 - XECUTION

3.1 INSTALLATION

A. Anchor fan units securely to structure.

END OF SECTION

SECTION 23 3713 - GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install ceiling and door grilles connected to ductwork as described in Contract Documents.

B. Related Requirements:

1. Section 23 3001: 'General Duct Requirements'.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer Contact List:

1. Carnes Co, Verona, MI www.carnes.com.
2. J & J Register, Grand Rapids, MI www.jandjreg.com.
3. Krueger Air System Components, Richardson, TX www.krueger-hvac.com.
4. Metal*Aire by Metal Industries Inc, Clearwater, FL www.metalaire.com.
5. Nailor Industries Inc, Houston, TX or Weston, ON www.nailor.com.
6. Price Industries Inc, Suwanee, GA www.price-hvac.com or E H Price Ltd, Winnipeg, MB (204) 669-4220.
7. Titus, Richardson, TX www.titus-hvac.com.
8. Tuttle & Bailey, Richardson, TX www.tuttleandbailey.com.

2.2 MANUFACTURED UNITS

A. Ceiling Exhaust Grilles:

1. Finish: Off-white baked enamel.
2. 1/2 inch spacing.
3. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

    a. Carnes: RSLA.
    b. Krueger: S85H.
    c. Metal*Aire: SRH.
    d. Nailor: 6155H.
    e. Price: 535.
    f. Titus: 355RL or 355 RS.
    g. Tuttle & Bailey: T75D.

B. Door Grilles:

1. Finish: Baked enamel finish. Color as selected by Architect.
2. Material: Heavy gauge, corrosion Resistant Steel.
3. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

    a. Nailor: 61 DG.
    b. Equal by

        1) Price
        2) Titus

PART 3 - EXECUTION

3.1 INSTALLATION

A. Anchor securely into openings. Secure frames to ductwork by using four sheet metal screws, one per side.

END OF SECTION

DIVISION 26 – ELECTRICAL:

26 0501	Common electrical requirements
26 0503	electrical utility services
26 0519	line-voltage electrical power conductors and cables
26 0526	grounding and bonding for electrical systems
26 0533	raceway and boxes for electrical systems
26 0613	electrical equipment mounting height schedule
26 2417	circuit-breaker panelboards
26 2726	wiring devices
26 2816	enclose switches and circuit breakers
26 5100	interior lighting
26 5600	exterior lighting

SECTION 26 0501 - COMMON ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. General electrical system requirements and procedures.
2. Perform excavating and backfilling work required by work of this Division as described in Contract Documents.
3. Make electrical connections to equipment provided under other Sections.

B. Related Requirements:

1. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
2. Section 31 2316: 'Excavation' for criteria for performance of excavating.
3. Section 31 2323: 'Fill' for criteria for performance of backfilling.

1.2 REFERENCES

A. Reference Standards:

1. National Fire Protection Association / American National Standards Institute:

   a. NFPA 70, National Electric Code (NEC).

2. National Electrical Manufacturing Association Standards (NEMA):

   a. NEMA 250, 'Enclosure for Electrical Equipment (1000 Volts Maximum)'.

1.3 SUBMITTALS

A. Action Submittals:

1. Product Data:

   a. Provide following information for each item of equipment:

      1) Catalog Sheets.
      2) Assembly details or dimension drawings.
      3) Installation instructions.
      4) Manufacturer's name and catalog number.
      5) Name of local supplier.

   b. Furnish such information for following equipment:

      1)
      2) Section 26 2417: 'Circuit-Breaker Panelboards'.
      3) Section 26 2726: 'Wiring Devices' for lighting control and dimmer equipment.
      4) Section 26 2816: 'Enclosed Switches And Circuit Breakers'.
      5) Section 26 5100: 'Interior Lighting Fixtures'.
      6) Section 26 5200: 'Emergency Lighting' for battery units.
      7) Section 26 5600: 'Exterior Lighting' for fixtures, poles, and associated control equipment.

   c. Do not purchase equipment before approval of product data.

2. Shop Drawings:

    a. Submit on Panelboards:
    b. Indicate precise equipment to be used, including all options specified. Indicate wording and format of nameplates where applicable. Submit in three-ring binder with hard cover.

B. Informational Submittals:

1. Test And Evaluation Reports:

    a. Report of site tests, before Substantial Completion.

2. Qualification Statement:

    a. Electrical Subcontractor:

        1) Provide Qualification documentation if requested by Architect or Owner.

    b. Installer:

        1) Provide Qualification documentation if requested by Architect or Owner.

C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

    a. Operations and Maintenance Data:

        1) Provide operating and maintenance instructions for each item of equipment submitted under Product Data.

    b. Record Documentation:

        1) Manufacturers documentation:

            a) Manufacturer's literature.
            b) Include copy of approved shop drawings.

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. NEC and local ordinances and regulations shall govern unless more stringent requirements are specified.
2. Material and equipment provided shall meet standards of NEMA or UL and bear their label wherever standards have been established and label service is available.

B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:

1. Electrical Subcontractor:

    a. Company specializing in performing work of this section.

        1) Minimum five (5) years experience in electrical installations.
        2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.

    b. Upon request, submit documentation.

2. Installer:

a. Licensed for area of Project.
b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
c. Upon request, submit documentation.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Performance:

1. Design Criteria:

a. Materials and equipment provided under following Sections shall be by same Manufacturer:

1) Section 26 2417: Panelboards.
2) Section 26 2816: Enclosed Switches and Circuit Breakers.

PART 3 - EXECUTION

3.1 INSTALLERS

A. Acceptable Installers:

1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.2 EXAMINATION

A. Verification Of Conditions:

1. Confirm dimensions, ratings, and specifications of equipment to be installed and coordinate these with site dimensions and with other Sections.

3.3 INSTALLATION

A. General:

1. Locations of electrical equipment shown on Drawings are approximate only. Field verify actual locations for proper installation.
2. Coordinate electrical equipment locations and conduit runs with those providing equipment to be served before installation or rough in.

a. Notify Architect of conflicts before beginning work.
b. Coordinate locations of power and lighting outlets in mechanical rooms and other areas with mechanical equipment, piping, ductwork, cabinets, etc, so they will be readily accessible and functional.

3. Work related to other trades which is required under this Division, such as cutting and patching, trenching, and backfilling, shall be performed according to standards specified in applicable Sections.

B. Install Penetration Firestop System appropriate for penetration at electrical system penetrations through walls, ceilings, and top plates of walls.

3.4 FIELD QUALITY CONTROL

A. Field Tests:

1. Test systems and demonstrate equipment as working and operating properly. Notify Architect before test. Rectify defects at no additional cost to Owner.

END OF SECTION

SECTION 26 0503 - ELECTRICAL UTILITY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install service as described in Contract Documents and as required by National Electrical Code. Existing site if primary metered by RMP at the entrance to the property. All installations shown on drawings are by contractor per NEC. RMP is not involved.
2. Complete cost of service.

B. Related Requirements:

1. Section 03 3053: Transformer pads.
2. Section 26 0501: Common Electrical Requirements.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 26 0519 - LINE-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Quality of conductors used on Project except as excluded below.

B. Related Requirements:

1. Section 26 0501: 'Common Electrical Requirements'.

1.2 REFERENCES

A. Definitions:

1. Line Voltage: Over 70 Volts.

B. Reference Standards:

1. National Fire Protection Association:

a. NFPA (Fire) 70, 'National Electric Code (NEC)' (2014 Edition or most recent edition adopted by AHJ including all applicable amendments and supplements).

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Line Voltage Conductors:

1. Copper with AWG sizes as shown:

a. Minimum size shall be No. 12 except where specified otherwise.
b. Conductor size No. 8 and larger shall be stranded.

2. Insulation:

a. Standard Conductor Size No. 10 And Smaller: 600V type THWN or XHHW (75 deg F (24 deg C)).
b. Standard Conductor Size No. 8 And Larger: 600V Type THW, THWN, or XHHW (75 deg F (24 deg C)).
c. Higher temperature insulation as required by NFPA 70 or local codes.

3. Colors:

a. 240 / 120 V System:

1) Black: Phase A.
2) Red: Phase C.
3) Green: Ground.
4) White: Neutral.

b. Conductors size No. 10 and smaller shall be colored full length. Tagging or other methods for coding of conductors size No. 10 and smaller not allowed.

c. For feeder conductors larger than No. 10 at pull boxes, gutters, and panels, use painted or taped band or color tag color-coded as specified above.

B. Line Voltage Cables:

1. Metal Clad Cable (MC) may be used as restricted below:

a. Copper conductors.
b. Sizes #12 through #8.
c. Use only in indoor dry locations where:

1) Not subject to damage.
2) Not in contact with earth.
3) Not in concrete.

C. Standard Connectors:

1. Conductors No. 8 And Smaller: Steel spring wire connectors.
2. Conductors Larger Than No. 8: Pressure type terminal lugs.
3. Connections Outside Building: Watertight steel spring wire connections with waterproof, non-hardening sealant.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Conductors and cables shall be continuous from outlet to outlet.
2. Do not use direct burial cable.

B. Line Voltage Conductors:

1. Install conductors in raceway where indicated on Contract Drawings. Run conductors of different voltage systems in separate conduits.
2. Route circuits at own discretion, however, circuiting shall be as shown in Panel Schedules. Group circuit homeruns to panels as shown on Contract Drawings.
3. Neutrals:

a. Run separate neutrals for each circuit.

4. Pulling Conductors:

a. Do not pull conductors into conduit until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
b. Do not use heavy mechanical means for pulling conductors.
c. Use only listed wire pulling lubricants.

C. Line Voltage Cables:

1. Route circuits at own discretion, however, circuiting and numbering shall be as shown in Panel Schedules.
2. Support cables using approved staples, cable ties, straps, hangers, or similar fittings, spaced as required.
3. Where installing in framing, do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches (600 mm) of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width. Holes shall be one inch diameter maximum.
4. Conceal cables within ceilings and walls of finished areas. Cables may be exposed in unfinished areas but not run on floors of mechanical equipment spaces or in such a way that they obstruct access to, operation of, or servicing of equipment.

5. Install exposed cables parallel to or at right angles to building structure lines.
6. Keep cables 6 inches (150 mm) minimum from hot water pipes.
7. Do not support cables from mechanical ducts or duct supports without Architect's written approval.
8. Prohibited procedures:

    a. Boring holes for installation of cables in vertical truss members.
    b. Notching of structural members for installation of cables.

END OF SECTION

SECTION 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install grounding for electrical installation as described in Contract Documents except as excluded below.

B. Related Requirements:

1. Section 26 0501: 'Common Electrical Requirements'.

1.2 REFERENCES

A. Reference Standards:

1. Institute of Electrical and. Electronics Engineers (IEEE):

a. IEEE 837-2014, 'Standard for Qualifying Permanent Connections Used in Substation Grounding'.

2. National Fire Protection Association:

a. NFPA (Fire) 70, 'National Electric Code (NEC)' (2014 Edition or most recent edition adopted by AHJ including all applicable amendments and supplements).

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:

1. Participate in pre-installation conference as specified in Section 03 3111.
2. In addition to agenda items specified in Section 01 3100 and 31 3111, review following:

a. Review Architect's inspection of grounding conductor installation before placement of concrete.

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Requirements of Section 27 1501 applies, but is not limited to following:

a. Cable assemblies shall be UL / CE Listed and CSA Certified. Cables shall be a distinctive green or green/yellow in color, and all jackets shall be UL, VW-1 flame rated.
b. Grounding shall conform to all required Commercial Building Grounding and Bonding Requirements for Telecommunications, Electrical Codes, and Manufacturer's grounding requirements.

2. Systems shall be installed per NFPA 780 and NFPA 70.
3. All Bonds shall comply with most current version of IEEE 837 Standard.

B. Qualifications: Requirements of Section 01 4301 applies, but is not limited to following:

1. Installers Qualifications:

a. Grounding and Bonding:

1) Licensed electrical contractor shall perform installation and termination of main bonding conductor to building service entrance ground.
2) Licensed in State that Work is to be performed.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:

1. Type One Acceptable Products:

a. 'Cadweld' by Erico International, Solon, OH www.erico.com.
b. 'ThermOweld' by Continental Industries, Tulsa, NE www.conind.com.
c. Equal as approved by Architect before bidding. See Section 01 6200.

B. Performance:

1. Design Criteria:

a. Size materials as shown on Drawings and in accordance with applicable codes.
b. Bonding System Workmanship:

1) The ground/earthing system shall be designed for high reliability and shall meet following criteria:

a) Local electrical codes shall be adhered to.
b) All grounding/earthing conductors shall be copper.
c) Regulatory Agency Sustainability Approvals requirements are required.

C. Materials:

1. Grounding And Bonding Jumper Conductors: Bare copper or with green insulation.
2. Make grounding conductor connections to ground rods and foundation ground loop using approved bolted clamps listed for such use.
3. Service Grounding Connections And Cable Splices: Make by exothermic process.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Interface With Other Work: Coordinate with Section 03 3111 in installing grounding conductor and placing concrete. Do not allow placement of concrete before Architect's inspection of grounding conductor installation.

B. Grounding conductors and bonding jumper conductors shall be continuous from terminal to terminal without splice. Provide grounding for following.

1. Electrical service, its equipment and enclosures.
2. Conduits and other conductor enclosures.
3. Neutral or identified conductor of interior wiring system.
4. Main panelboard, power and lighting panelboards.
5. Non-current-carrying metal parts of fixed equipment such as motors, starter and controller cabinets, instrument cases, and lighting fixtures.

C. Provide concrete-encased electrode system by embedding 20 feet (6.10 m) minimum of No. 2/0 bare copper conductor in concrete footing that is in direct contact with the earth, 2 inches (50 mm) minimum below concrete surface. Extend No. 2/0 copper conductor to main panel as shown on Drawings.

D. Ground identified common conductor of electrical system at secondary side of main transformer supplying building. Ground identified grounded (neutral) conductor of electrical system on supply side of main service disconnect.

E. Pull grounding conductors in non-metallic raceways, in flexible steel conduit exceeding 72 inches (1 800 mm) in length, and in flexible conduit connecting to mechanical equipment.

F. Provide grounding bushings on all feeder conduit entrances into panelboards and equipment enclosures.

G. Bond conduit grounding bushings to enclosures with minimum #10 AWG conductor.

H. Connect equipment grounds to building system ground.

1. Use same size equipment grounding conductors as Phased conductors up through #10 AWG.
2. Use NEC Table 250-95 for others unless noted otherwise in Drawings.

I. Run separate insulated grounding cable from each equipment cabinet to electrical panel. Do not use intermediate connections or splices. Affix directly to cabinet.

J. On motors, connect ground conductors to conduit with approved grounding bushing and to metal frame with bolted solderless lug.

K. Ground cabinet of transformers to conduit and ground wires, if installed. Bond transformer secondary neutral conductor to cabinet.

3.2 FIELD QUALITY CONTROL

A. Field Inspections:

1. Notify Architect for inspection two (2) days minimum before placing concrete over grounding conductor.
2. Grounding Well integrity shall be tested separately and together with Lightning Protection System integrity.

END OF SECTION

SECTION 26 0533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Quality of material and installation procedures for raceway, boxes, and fittings used on Project but furnished under other Divisions.
2. Furnish and install raceway, conduit, and boxes used on Project not specified to be installed under other Divisions.
3. Furnish and install main electrical service raceway as described in Contract Documents and comply with electrical utility company requirements.

B. Related Requirements:

1.
2. Section 26 0501: 'Common Electrical Requirements' for general electrical requirements'.
3. Section 26 0503: 'Electrical Utility Services' for electrical primary underground service requirements.

1.2 REFERENCES

A. Reference Standards:

1. National Fire Protection Association:

a. NFPA (Fire) 70, 'National Electric Code (NEC)' (2014 Edition or most recent edition adopted by AHJ including all applicable amendments and supplements).

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:

1. Manufacturer Contact List:

a. Cooper B-Line, Highland, IL www.b-line.com.
b. Hubbell Incorporated, Milford, CT www.hubbell-wiring.com or Hubbell Canada Inc, Pickering, ON (905) 839-4332.
c. Square D, Palatine, IL www.squared.com.
d. Thomas & Betts, Memphis, TN www.tnb.com or Thomas & Betts Ltd, Iberville, PQ (450) 347-5318.
e. Walker Systems Inc, Williamstown, WV (800) 240-2601 or Walker Systems Inc / Wiremold Canada Inc, Fergus, ON (519) 843-4332.
f. Wiremold Co, West Hartford, CT www.wiremold.com.

B. Materials:

1. Raceway And Conduit:

a. Sizes:

1) 3/4 inch (19 mm) for exterior use, unless indicated otherwise.
2) 1/2 inch (13 mm) for interior use, unless indicated otherwise.

b. Types: Usage of each type is restricted as specified below by product.

1) Galvanized rigid steel or galvanized intermediate metal conduit (IMC) is allowed for use in all areas. Where in contact with earth or concrete, wrap buried galvanized rigid steel and galvanized IMC conduit and fittings completely with vinyl tape.
2) Galvanized Electrical Metallic Tubing (EMT) and Flexible Steel Conduit:

a) Allowed for use only in indoor dry locations where it is:

(1) Not subject to damage.
(2) Not in contact with earth.
(3) Not in concrete.

b) For metal conduit systems, flexible steel conduit is required for final connections to indoor mechanical equipment.

3) Schedule 40 Polyvinyl Chloride (PVC) Conduit:

a) Allowed for use only underground or below concrete with galvanized rigid steel or IMC elbows and risers.

4) Listed, Liquid-Tight Flexible Metal Conduit:

a) Use in outdoor final connections to mechanical equipment, length not to exceed 36 inches (900 mm).

5) Pre-wired 3/8 Inch (9.5 mm) Flexible Fixture Whips: Allowed only for connection to recessed lighting fixtures, lengths not to exceed 72 inches (1 800 mm).

c. Prohibited Raceway Materials:

1) Aluminum conduit.
2) Armored cable type AC (BX) cable.

2. Raceway And Conduit Fittings:

a. Rigid Steel Conduit And IMC: Threaded and designed for conduit use.
b. EMT:

1) Compression type.
2) Steel set screw housing type.

c. PVC Conduit:

1) PVC type. Use PVC adapters at all boxes.
2) PVC components, (conduit, fittings, cement) shall be from same Manufacturer.

d. Flexible Steel Conduit: Screw-in type.
e. Liquid-tight Flexible Metal Conduit: Sealtite type.
f. Expansion fittings shall be equal to OZ Type AX sized to raceway and including bonding jumper.
g. Prohibited Fitting Materials:

1) Crimp-on, tap-on, indenter type fittings.
2) Cast set-screw fittings for EMT.
3) Spray (aerosol) PVC cement.

3. Outlet Boxes:

a. Galvanized steel of proper size and shape are acceptable for all systems. Where metal boxes are used, provide following:

1) Provide metal supports and other accessories for installation of each box.
2) Equip ceiling and bracket fixture boxes with fixture studs where required.
3) Equip outlets in plastered, paneled, and furred finishes with plaster rings and extensions to bring box flush with finish surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

1. Confirm dimensions, ratings, and specifications of materials to be installed and coordinate these with site dimensions and with other Sections.

3.2 INSTALLATION

A. Interface With Other Work:

1. Coordinate with Divisions 22 and 23 for installation of raceway for control of plumbing and HVAC equipment.
2. Before rough-in, verify locations of boxes with work of other trades to insure that they are properly located for purpose intended.

a. Coordinate location of outlets adjacent to or in millwork with Division 06 before rough-in. Refer conflicts to Architect and locate outlets under his direction.

3. Install pull wires in raceways installed under this Section where conductors or cables are to be installed under other Divisions.

B. Conduit And Raceway:

1. Conceal raceways within ceilings, walls, and floors, except at Contractor's option, conduit may be exposed on walls or ceilings of mechanical equipment areas and above acoustical panel suspension ceiling systems. Install exposed raceway runs parallel to or at right angles to building structure lines.
2. Seal all raceways penetrating fire rated walls, ceilings and barriers. See Section 07 8400.
3. Keep raceway runs 6 inches (150 mm) minimum from hot water pipes.
4. Make no more than four quarter bends, 360 degrees total, in any conduit run between outlet and outlet, fitting and fitting, or outlet and fitting.

a. Make bends and offsets so conduit is not injured and internal diameter of conduit is not effectively reduced.
b. Radius of curve shall be at least minimum indicated by NFPA 70.

5. Cut conduit smooth and square with run and ream to remove rough edges. Cap raceway ends during construction. Clean or replace raceway in which water or foreign matter have accumulated.
6. Bend PVC conduit by hot box bender and, for PVC 2 inches (50 mm) in diameter and larger, expanding plugs. Apply PVC adhesive only by brush.
7. Installation In Framing:

a. Do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches (600 mm) of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width.
b. Holes shall be one inch (25 mm) diameter maximum.

8. Underground Raceway And Conduit:

a. Bury underground raceway installed outside building 24 inches (600 mm) deep minimum.
b. Bury underground conduit in planting areas 24 inches (600 mm) deep minimum. It is permissible to install conduit 6 inch (150 mm) below concrete sidewalks, however, conduit must be buried 24 inches (600 mm) deep at point of exit from planting areas.

9. Conduit And Raceway Support:

a. Securely support raceway with approved straps, clamps, or hangers, spaced as required.
b. Do not support from mechanical ducts or duct supports without Architect's written approval. Securely mount raceway supports, boxes, and cabinets in an approved manner by:

1) Expansion shields in concrete or solid masonry.
2) Toggle bolts on hollow masonry units.
3) Wood screws on wood.
4) Metal screws on metal.

10. Prohibited Procedures:

a. Use of wooden plugs inserted in concrete or masonry units for mounting raceway, supports, boxes, cabinets, or other equipment.
b. Installation of raceway that has been crushed or deformed.
c. Use of torches for bending PVC.
d. Spray applied PVC cement.
e. Boring holes in truss members.
f. Notching of structural members.
g. Supporting raceway from ceiling system support wires.
h. Nail drive straps or tie wire for supporting raceway.

C. Boxes:

1. Boxes shall be accessible and installed with approved cover.
2. Do not locate device boxes that are on opposite sides of framed walls in the same stud space. In other wall construction, do not install boxes back to back.
3. Locate boxes so pipes, ducts, or other items do not obstruct outlets.
4. Install outlets flush with finished surface and level and plumb.
5. Support switch boxes larger than two-gang with side brackets and steel bar hangers in framed walls.
6. At time of substantial completion, install blank plates on uncovered outlet boxes that are for future use.
7. Location:

a. Install boxes at door locations on latch side of door, unless explicitly shown otherwise on Contract Drawings. Verify door swings shown on electrical drawings with architectural drawings, and report discrepancies to Architect before rough-in. Distance of box from jamb shall be 6 inches (150 mm) from door jamb.
b. Properly center boxes located in walls with respect to doors, panels, furring, trim and consistent with architectural details. Where two or more outlets occur, space them uniformly and in straight lines with each other, if possible.

END OF SECTION

SECTION 26 0613 - ELECTRICAL EQUIPMENT MOUNTING HEIGHT SCHEDULE

PART 1 - GENERAL: Not Used

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 INSTALLATION

A. Unless otherwise indicated, mount center of outlets or boxes at following heights above finish floor. Refer special conditions to Architect before rough-in and locate outlet under his direction.

B. Mounting Heights:

1. HVAC:

a.	Indoor Motor Disconnects:	60 inches (1 525 mm).
b.	Outdoor Motor Disconnects:	As indicated on Drawings.
c.	Motor Controls:	60 inches (1 525 mm).

2. Electrical:

a.	Distribution Panels:	72 inches (1 830 mm) to top.
b.	Receptacles:	18 inches (450 mm).
c.	Wall Switches:	42 inches (1 065 mm).

END OF SECTION

SECTION 26 2417 - CIRCUIT-BREAKER PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install circuit-breaker panelboards as described in Contract Documents.

B. Related Requirements:

1. Section 26 0501: 'Common Electrical Requirements'.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Manufacturers:

1. Manufacturer Contact List:

a. Cutler-Hammer Inc, Pittsburgh, PA www.eatonelectric.com.
b. General Electric Industrial Systems, Charlotte, NC www.geindustrial.com.
c. Siemens Energy & Automation, Alphrata, GA www.sea.siemens.com.
d. Square D Co, Palatine, IL www.us.squared.com.

B. Performance:

1. Capacities:

a. Main Panelboards P and S:

1) Minimum integrated equipment short circuit rating of 22,000 amperes for 120 / 208 Volts.
2) Rated for use as service entrance equipment.

b. Lighting And Appliance Panelboards E and W:

1) Minimum integrated equipment short circuit rating of 10,000 amperes for 120 / 208 Volts.

C. Material:

1. Circuit-breaker type.
2. Galvanized steel cabinets
3. Bussing and lugs arranged as required.
4. Multi-pole circuit-breakers shall be common trip.
5. Circuit-breakers shall be molded case thermal magnetic type with inverse time characteristics.
6. Panelboards:

a. Plug-on or bolt-on breakers. Multi-pole breakers shall be common trip.
b. Factory installed or provided circuit number identification for each breaker and space.
c. Cabinets shall be locking type with no exposed latches or screws when door is closed. Key panels alike and provide minimum of three keys.
d. Minimum dimensions of 20 inches (500 mm) wide by 5-3/4 inches (146 mm) deep.
e. Space designation on Drawings indicates bus hardware and panelboard capacity for future acceptance of one 20 Amp, single-pole circuit-breaker.

f. Use equipment from same manufacturer as main panelboard.
g. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

1) Type PRL1a by Cutler-Hammer.
2) Type AL or AQ by General Electric.
3) Type P1 by Siemens.
4) Type NQOD by Square D.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

1. Examine wall framing and verify framing for proper spacing for installation of panelboard(s).

a. Notify Architect of improper spacing in writing.

3.2 INSTALLATION

A. Label panelboards with 1/16 inch (1.6 mm) thick laminated plastic composition material with contrasting color core. Engraved letters shall be 1/4 inch (6 mm) high.

B. Provide typewritten circuit schedules in lighting and distribution panelboards and load centers to identify panelboard and load served by each branch breaker.

C. Arrange conductors neatly within panelboards.

D. Secure to structure in accordance with requirements of Project seismic design category.

3.3 PROTECTION

A. Protect panelboards, load centers, and interior components from paint, gypsum board compound, dirt, dust, and other foreign matter during construction.

END OF SECTION

SECTION 26 2726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install wiring devices complete with plates as described in Contract Documents.

B. Related Requirements:

1. Section 26 0501: 'Common Electrical Requirements'.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Manufacturers:

1. Manufacturer Contact List:

a. Cooper Wiring Devices, Peachtree City, GA www.cooperwiringdevices.com.
b. General Electric Industrial Systems, Charlotte, NC www.geindustrial.com.
c. Hubbell Building Automation, Austin, TX www.hubbell-automation.com.
d. Hubbell Inc, Milford, CT www.hubbell-wiring.com or Hubbell Canada Inc, Pickering, ON (800) 263-4622 or (905) 839-4332.
e. Hunt Control Systems Inc, Fort Collins, CO www.huntdimming.com.
f. Intermatic Inc, Spring Grove, IL www.intermatic.com.
g. IR-TEC America, Inc., Brea, CA www.irtec.com/en-ira/.
h. Leviton Manufacturing Co, Little Neck, NY www.leviton.com or Leviton Manufacturing of Canada Ltd, Pointe-Claire, QB (800) 461-2002 or (514) 954-1840.
i. Legrand, West Hartford, CT www.legrand.us.com or Vaughan, ON www.legrand.ca.com.
j. Lutron Electronics Co Inc, Coopersburg, PA www.lutron.com.
k. Ortronics, New London, CT www.ortronics.com.
l. Paragon Electric Co Inc, Carol Stream, IL www.icca.invensys.com/paragon or Paragon Electric, Mississauga, ON (800) 951-5526 or (905) 890-5956.
m. Pass & Seymour, Syracuse, NY www.passandseymour.com or Pass & Seymour Canada Inc, Concord, ON (905) 738-9195.
n. Philips Lighting Co, Somerset, NJ www.lighting.philips.com/nam or Philips Lighting Canada, Scarborough, ON (416) 292-3000.
o. Red Dot div of Thomas & Betts, Memphis, TN www.tnbcom.
p. Schneider Electric North America, Palatine, IL www.schneider-electric.com (847) 397-2600.
q. Sensorswitch, Wallingford, CT www.sensorswitch.com.
r. Siemon Company, Watertown, CT www.siemon.com.
s. Square D Co, Palatine, IL www.squared.com.
t. Suttle, Hector, MN www.suttleonline.com.
u. Tork Inc, Mount Vernon, NY www.tork.com.
v. Watt Stopper Inc, Santa Clara, CA www.wattstopper.com.

2. Product Options:

a. Faces shall be nylon where available.
b. Devices of single type shall be from same Manufacturer.
c. Devices are listed as white. Use white devices on light colored walls, brown on dark colored walls, and black on black walls.

B. Switches:

1. Standard Style:

a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

1) 20 AMP, single pole for furnace disconnect:

a) Cooper: 2221V.
b) Hubbell: HBL1221-I.
c) Pass & Seymour: 20AC1-I.
d) Leviton: 1221-2I.

C. Receptacles:

1. Standard Style:

a. 15 AMP, specification grade, back and side wired, self grounding, tamper resistant.
b. Verified by UL to meet Fed Spec WC-596F.
c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

1) Cooper: TR5262.
2) Hubbell: BR20.
3) Leviton: TBR20.
4) Pass & Seymour: TR20.

2. Ground Fault Circuit Interrupter (GFCI):

a. 15 AMP, specification grade.
b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

1) Cooper: GF15W.
2) Hubbell: GF5252WA.
3) Leviton: 8599-W.
4) Pass & Seymour: 1594-W.

D. Plates:

1. Standard Cover Plates:

a. Office / Occupied Areas:

1) Nylon or high impact resistant thermoplastic.
2) Color shall match wiring device.

b. All Other: Steel.
c. Ganged switches shall have gang plates.
d. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:

1) Cooper.
2) Hubbell.
3) Leviton.
4) Pass & Seymour.

2. Weatherproof In-Use Receptacle Covers:

a. NEMA 3R rated.

b. Cast aluminum.
c. Compatible with GFCI receptacles.
d. Complete with weather resistant gaskets and stainless steel screws.
e. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

1) Hubbell: WP26MH, horizontal; WP26M, vertical.
2) Intermatic: WP1010HMC, horizontal; WP1010MC, vertical.
3) Red Dot: CKMG, horizontal; CKMGV, vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices flush with walls, straight, and solid to box.

END OF SECTION

SECTION 26 2816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install disconnects as described in Contract Documents, except those provided integral with equipment.

B. Related Requirements:

1. Section 26 0501: Common Electrical Requirements.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Manufacturers:

1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.

a. Disconnects: Same as Manufacturer of Project's main panelboard.
b. Fuses.

1) Cooper Bussmann, Ellisville, IL www.cooperbussmann.com.
2) Edison Fuse, Ellisville, IL (314) 391-3443.
3) Ferraz Shawmut, Newburyport, MA www.ferrazshawmut.com.
4) Littelfuse Inc, Des Plaines, IL www.littelfuse.com.

B. Disconnects:

1. Heavy-duty quick-make, quick-break type, fused unless indicated otherwise.
2. Provide interlock to prevent opening of door when switch is in ON position.
3. Provide means to lock switch in OFF position with padlock.
4. Disconnects for motor circuits shall be horsepower rated.
5. Enclosures:

a. Interior: NEMA / CEMA Type 1.
b. Exterior: NEMA / CEMA Type 3R.

6. Fuses:

a. Fuse fused disconnects with dual-element time delay fuses and equip with rejection type fuse holders.
b. Fuses on Project shall be from single manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Label disconnects to indicate equipment served, such as Condensing Unit CU-1. Use 1/16 inch (1.6 mm) thick laminated plastic composition material with contrasting color core. Engraved letters shall be 1/4 inch (6 mm) high. Attach labels with screws.

END OF SECTION

SECTION 26 5100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install lighting system as described in Contract Documents, complete with lamps.

B. Related Requirements:

1. Section 26 0501: 'Common Electrical Requirements'.

C. Reference Standards:

1. American National Standards Institute (ANSI):

a. ANSI C78.377-2015, 'American National Standard for Electric Lamps: Specification for the Chromaticity of Solid State Lighting Products'.

2. Federal Communications Commission (FCC):

a. Code of Federal Regulations (CFR):

1) FCC 47 CFR Part 18, 'Industrial, Scientific, and Medical Equipment'.

3. Institute of Electrical and. Electronics Engineers (IEEE):

a. IEEE C62.41.1-2002, 'Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits'.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Manufacturers:

1. Manufacturer Contact List:

a. Advance Transformer Co, Rosemont, IL www.advancetransformer.com.
b. Cooper Wiring Devices by Eaton, Peachtree City, GA www.cooperindustries.com.
c. General Electric Lighting, Hendersonville, NC or General Electric Lighting Canada Inc, Mississauga, ON www.gelighting.com/na.
d. Howard Lighting Products, Laurel, MS www.howard-ind.com.
e. Novitas Inc, Peachtree City, GA www.novitas.com.
f. Osram Sylvania, Danvers, MA www.sylvania.com or Osram Sylvania Ltd, Mississauga, ON (905) 673-6171.
g. Philips Lighting Co, Somerset, NJ www.lighting.philips.com/nam or Philips Lighting Canada, Scarborough, ON (416) 292-3000.
h. Universal Lighting Technologies, Nashville, TN www.universalballast.com.
i. Venture Lighting International, Solon, OH www.venturelighting.com.
j. Watt Stopper Inc, Santa Clara, CA www.wattstopper.com.
k. Westinghouse Lighting Corp, Philadelphia, PA www.westinghouselightbulbs.com.

2. Product Options: When several lighting fixtures are specified by name for one use on Drawings, select any one of those specified. Do not mix fixtures from different manufacturers specified for one use.

B. Materials

1. Lighting Fixtures:

a. Type One Acceptable Products:

1) See Fixture Schedule on Drawings for acceptable manufacturers and models.
2) Equals as approved by Architect before bidding. See Section 01 6200.

2. Lamps:

a. LED Lamps and Fixtures:

1) Replacement Lamps shall have minimum efficiency of 70 lm / W per LM 79.
2) Integral LED Lamps shall have minimum efficiency of 90 lm / W per LM 79.
3) Provide minimum rated life of 50,000 per LM 80 and LM 70 standards.
4) Color Temperature: 3000k.
5) Provide full spectrum color index of 65.

C. Factory Assembly:

1. Fixtures shall be fully assembled complete with necessary wiring, sockets, lamps, reflectors, ballasts, auxiliaries, plaster frames, recessing boxes, hangers, supports, lenses, diffusers, and other accessories essential for complete working installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Interface With Other Work:

1. In mechanical equipment rooms, coordinate locations of light fixtures with equipment locations to provide proper room illumination without obstruction. Suspend fixtures that must be mounted below pipes, ducts, etc, with chains or other Architect approved method.

B. Securely mount fixtures. Support fixtures weighing 50 lbs (23 kg) or more from building framing or structural members.

3.2 ADJUSTMENT

A. Repair scratches or nicks on exposed surfaces of fixtures to match original undamaged conditions.

END OF SECTION

SECTION 26 5600 - EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install exterior lighting system as described in Contract Documents.

B. Related Requirements:

1. Section 26 0501: 'Common Electrical Requirements'.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:

1. Manufacturer Contact List:

a. Cutler-Hammer Inc, Milwaukee, WI www.cutler-hammer.eaton.com or Cutler-Hammer/Eaton Yale Ltd, Burlington, ON (905) 333-6442.
b. General Electric Industrial Systems, Charlotte, NC or G E Lighting Canada Inc, Mississauga, ON www.geindustrial.com.
c. Intermatic Inc, Spring Grove, IL www.intermatic.com.
d. Paragon Electric Co Inc, Carol Stream, IL www.icca.invensys.com/paragon or Paragon Electric / Maple Chase, Mississauga, ON (800) 951-5526 or (905) 890-5956.
e. Siemens Energy & Automation, Alphrata, GA www.sea.siemens.com or Siemens Canada, Mississauga, ON (905) 819-8000.
f. Square D Co, Palatine, IL or Square D / Schneider Electric, Toronto, ON www.squared.com.
g. Tork Inc, Mount Vernon, NY www.tork.com.

B. Materials:

1. Exterior Fixtures:

a. Finish shall be high quality polyester powder coating:

1) Finish process shall consist of cleaning, electrostatically applying power coat, and thermal curing.
2) Weather, scratch, UV, and fade resistant.

b. Color shall be Manufacturer's standard white, natural aluminum, or medium bronze as selected by Architect before bidding.
c. Type One Acceptable Products:

1) As indicated on Fixture Schedule. Do not mix fixtures from different manufacturers for one use.
2) Equals as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting Control:

1. Locate photocell(s) outside building under soffit and away from any light source and direct sunlight.

END OF SECTION

DIVISION 31 – EARTHWORK:

33 0501	Common Earthwork Requirements
33 1100	Clearing And Grubbing
31 1123	Aggregate Base
31 2213	Rough Grading
31 2216	Fine Grading
31 2316	Excavation
31 2323	Fill

SECTION 31 0501 - COMMON EARTHWORK REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited to:

1. General procedures and requirements for earthwork.

1.2 REFERENCES

A. Definitions:

1. Aggregate Base: Layer of granular material immediately below concrete and asphalt paving or miscellaneous site concrete (sidewalks, curbs, etc) and below interior concrete slabs on grade.
2. Base: See aggregate base.
3. Building Grading: sloping of grounds immediately adjacent to building. Proper grading causes water to flow away from a structure. Grading can be accomplished either with machinery or by hand.
4. Compacted Fill: Placement of soils on building site placed and compacted per Contract Documents. Used to replace soils removed during excavation or to fill in low spot on building site.
5. Excavation: Removal of soil from project site or cavity formed by cutting, digging or scooping on project site.
6. Fine Grading (FG): Preparation of subgrade preceding placement of surfacing materials (aggregate base, asphalt or concrete paving, and topsoil) for contour of building site required. Fine Grading is conducted to ensure that earth forms and surfaces have been properly shaped and subgrade has been brought to correct elevations. It is performed after rough grading and placement of compacted fill but before placement of aggregate base or topsoil.
7. Finish Grading: Completed surface elevation of landscaping areas for seeding, sodding, and planting on building site.
8. Natural Grade: Undisturbed natural surface of ground.
9. Rough Grading (RG): Grading, leveling, moving, removal and placement of existing or imported soil to its generally required location and elevation. Cut and fill is part of rough grading.
10. Subgrade (definition varies depending upon stage of construction and context of work being performed):

    a. Prepared natural soils on which fill, aggregate base, or topsoil is placed.

    or

    b. Prepared soils immediately beneath paving or topsoil.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:

1. Participate in MANDATORY pre-installation conference for common earthwork sections:

    a. Schedule conference after completion of site clearing but before beginning grading work.
    b. Participate in pre-installation conference held jointly with following sections:

        1) Section 03 3111: 'Cast-In-Place Structural Concrete'.
        2) Section 31 1100: 'Clearing and Grubbing'.
        3) Section 31 1123: 'Aggregate Base'.
        4) Section 31 2213: 'Rough Grading'.
        5) Section 31 2216: 'Fine Grading'.
        6) Section 31 2316: 'Excavation'.
        7) Section 31 2323: 'Fill'.

c. In addition to agenda items specified in Section 01 3100, review following:

1) Review common earthwork schedule.
2) Review protection requirements.
3) Review cleaning requirements.
4) Review safety issues.
5) Review field tests and inspections requirements.

d. In addition to agenda items specified above, review the following. These are items that will occur before pre-installation conference for landscape sections:

1) Review clearing and grubbing requirements.
2) Review additional agenda items as specified in related sections listed above.

B. Sequencing:

1. General Earthwork:

a. Excavation.
b. Rough Grading.
c. Fill.
d. Fine Grading.
e. Aggregate Base or Topsoil Grading.

1.4 QUALITY ASSURANCE

A. Testing And Inspection:

1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.

a. Owner will employ testing agencies to perform testing and inspection as specified in Field Quality Control in Part 3 of this specification:

1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
2) See Section 01 1200: 'Multiple Contract Summary'.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

1. Forty-eight (48) hours minimum before performing any work on site, contact Bluestakes (811) to arrange for utility location services.
2. Perform minor, investigative excavations to verify location of various existing underground facilities at sufficient locations to assure that no conflict with the proposed work exists and sufficient clearance is available to avoid damage to existing facilities.
3. Perform investigative excavating ten (10) days minimum in advance of performing any excavation or underground work.
4. Upon discovery of conflicts or problems with existing facilities, notify Architect by phone or fax within twenty-four (24) hours. Follow telephone or fax notification with letter and diagrams indicating conflict or problem and sufficient measurements and details to evaluate problem.

3.2 PREPARATION

A. Protection:

1. Spillage:

a. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways.
b. Remove spillage and sweep, wash, or otherwise clean project, streets, and highways.

2. Dust Control:

a. Take precautions necessary to prevent dust nuisance, both on-site and adjacent to public and private properties.
b. Correct or repair damage caused by dust.

3. Existing Plants And Features:

a. Do not damage tops, trunks, and roots of existing trees and shrubs on site that are intended to remain.
b. Do not use heavy equipment within branch spread.
c. Interfering branches may be removed only with permission of Architect.
d. Do not damage other plants and features that are to remain.

3.3 REPAIR / RESTORATION

A. Adjust existing covers, boxes, and vaults to grade.

B. Replace broken or damaged covers, boxes, and vaults.

C. Independently confirm size, location, and number of covers, boxes, and vaults that require adjustment.

3.4 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':

a. Quality Control is sole responsibility of Contractor. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform The Work or Contractors own Testing and Inspection services.

2. Testing and inspection of earthwork operations is required.
3. Field Tests and Laboratory Tests:

a. Owner reserves right to require additional testing to re-affirm suitability of completed work including compacted soils that have been exposed to adverse weather conditions.

4. Field Inspections:

a. Notify Architect forty-eight (48) hours before performing excavation or fill work.
b. If weather, scheduling, or any other circumstance has interrupted work, notify Architect twenty-four (24) hours minimum before intended resumption of grading or compacting.

B. Non-Conforming Work:

1. If specified protection precautions are not taken or corrections and repairs not made promptly, Owner may take such steps as may be deemed necessary and deduct costs of such from monies due to Contractor. Such action or lack of action on Owner's part does not relieve Contractor from responsibility for proper protection of The Work.

END OF SECTION

SECTION 31 1100 - CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Perform clearing and grubbing as necessary to prepare site for rough grading and structure excavation as described in Contract Documents.

B. Related Requirements:

1. Section 31 0501: Common Earthwork Requirements:

a. General procedures and requirements for earthwork.
b. Pre-installation conference held jointly with other common earthwork related sections.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:

1. Participate in pre-installation conferences as specified in Section 31 0501.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Tree And Brush Removal:

1. Cut off trees, shrubs, brush, and vegetative growth 12 inches maximum above ground.
2. Do not pull up or rip out roots of trees and shrubs that are to remain. If excavation through roots is required, excavate by hand and cut roots with sharp axe. Make clean, smooth, sloping cuts.
3. Cut roots 6 inches or larger in diameter only with Architect's written permission.

B. Grubbing:

1. Grub out stumps and roots 12 inches minimum below original ground surface, except as follows:

a. Under buildings, remove roots one inch and larger entirely.
b. Entirely remove roots of plants that normally sprout from roots, as identified by Architect.

C. Protect all water sources from sediment entering including the creek and lake.

3.2 CLEANING

A. Remove from site trees, shrubs, uprooted stumps, vegetative layer, and surface debris and dispose of legally.

B. Do not bury cuttings, stumps, roots, and other vegetative matter or burnt waste material on site.

END OF SECTION

SECTION 31 1123 - AGGREGATE BASE

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install the following as described in Contract Documents:

a. Aggregate Base:

1) Pavilion slabs-on-grade concrete.
2) Miscellaneous exterior concrete.

B. Related Requirements:

1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
3. Section 03 3111: 'Cast-In-Place Structural Concrete'.
4. Section 31 0501: 'Common Earthwork Requirements':

a. General procedures and requirements for earthwork.

5. Section 31 2213: 'Rough Grading'.
6. Section 31 2216: 'Fine Grading' for subgrade procedures.
7. Section 31 2323: 'Fill' for compaction procedures and tolerances.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International:

a. ASTM C131/C131M-14, 'Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine'.
b. ASTM D1556/D1556M-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method'.
c. ASTM D1557-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))'.
d. ASTM D1883-16, 'Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils.
e. ASTM D2167-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method'.
f. ASTM D2419-14, 'Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate'.
g. ASTM D4318-10, 'Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils'.
h. ASTM D6938-17, 'Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)'.
i. ASTM E1643-11(2017), 'Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs'.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:

1. Participate in MANADORY pre-installation conference as specified in Section 31 0501.

2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:

    a. Review requirements and frequency of testing and inspections.
    b. Review aggregate base installation requirements.
    c. Review proposed miscellaneous exterior concrete schedule.
    d. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.

        1) Review frequency of testing and inspections.

B. Sequencing:

1. Compaction as described in Section 31 2216 'Fine Grading'.
2. Exterior Footings and Foundations are installed.
3. Aggregate Base:

    a. Install aggregate base at location shown in Contract Drawings.

4. Concrete Slab is installed.

C. Scheduling:

1. Slab-on-grade concrete:

    a. Notify Architect twenty-four (24) hours minimum before installation of concrete to allow inspection of aggregate base.

2. Miscellaneous exterior concrete:

    a. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing concrete for exterior site work concrete (sidewalks, curbs, gutters, etc.), footings, foundation walls, and building slabs to allow inspection of aggregate base.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Materials shall be delivered in original, unopened packages with labels intact.

1.5 FIELD CONDITIONS

A. Ambient Conditions:

1. Do not perform work during unfavorable conditions as specified below:

    a. Aggregate Base:

        1) Presence of free surface water.
        2) Over-saturated sub base materials.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate Base:

1. The sub grade shall be compacted and inspected by a qualified individual not under the contractor's responsibility to ensure proper compaction under all new facilities. Under Slab-On-Grade Concrete (Section 03 3111 'Cast-In-Place Structural Concrete'):

    a. New Aggregate Base:

        1) Gravel: 3/4 inch minimum to one inch maximum well-graded, clean gravel or crushed rock.
        2) Base type gravel or crushed rock, graded by weight as follows (three-quarter to one-inch clean gap-graded gravel):

            a) Road Base type gravel or crushed stone (slag not allowed), graded as follows:

(1) Sieve	Percent of Weight Passing
(a) 1 inch	100
(b) 3/4 inch	90 - 80
(c) 1/2 inch	20 - 40
(d) 3/8 inch	5 - 10
(e) No. 4	0 - 12

2. Under Exterior Concrete (Section 03 3111 'Cast-In-Place Structural Concrete'):

    a. New Aggregate Base:

        1) Road Base to conform to State DOT Specifications.

PART 3 - EXECUTION

3.1 PREPARATION

A. Stockpiles:

1. Provide area for each stockpile of adequate size, reasonably uniform in cross-section, well drained, and cleared of foreign materials.
2. Locate piles so that there is no contamination by foreign material and no intermingling of aggregates from adjacent piles. Do not use steel-tracked equipment on stockpiles.
3. Do not store aggregates from different sources, geological classifications, or of different gradings in stockpiles near each other unless bulkhead is placed between different materials.
4. Do not use washed aggregates sooner than twenty-four (24) hours after washing or until surplus water has drained out and material has uniform moisture content.
5. Do not stockpile higher than 15 feet. Cover or otherwise protect stockpiles for use in HMA to prevent buildup of moisture.

B. Surface Preparation (Miscellaneous Exterior Concrete):

1. Subgrade:

    a. Finish grade to grades required by Contract Documents.
    b. Compact subgrade as specified in Section 31 2323.

3.2 INSTALLATION

A. Aggregate Base:

1. General:

    a. Do not place aggregate base material when subgrade is frozen or unstable.

b. Spread aggregate base material with equipment except in limited or restricted areas where use of hand spreading is allowed.
c. Spread aggregate base material in manner that does not break down material and eliminates segregation, ruts, and ridges.
d. Correct damage to aggregate base caused by construction activities, and maintain corrected aggregate base until subsequent course is placed.
e. Do not allow traffic on aggregate base.
f. Remove all standing storm water.

2. Concrete slab-on-grade aggregate base:

   a. Place 4 inches minimum of aggregate base, level, and compact with vibratory plate compactor.

3. Under miscellaneous exterior concrete aggregate base:

   a. Place 4 inches minimum of aggregate base, level, and compact as specified in Section 31 2323.

END OF SECTION

SECTION 31 2213 - ROUGH GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Perform rough grading work required to prepare site for construction as described in Contract Documents.

B. Related Requirements:

1. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
2. Section 03 3053: Miscellaneous Exterior Cast-In-Place Concrete.
3. Section 31 0501: 'Common Earthwork Requirements' for:

    a. General procedures and requirements for earthwork.

4. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
5. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
6. Section 31 2316: 'Excavation'.
7. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:

1. Participate in MANDATORY pre-installation conference as specified in Section 31 0501:
2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:

    a. Identify benchmark to be used in establishing grades and review Contract Document requirements for grades, fill materials, and topsoil.
    b. Examine site to pre-plan procedures for making cuts, placing fills, and other necessary work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials used for fill shall be as specified for backfill in Section 31 2323 'Fill'.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

1. Verify elevations of rough grading are correct before compacted fill, fine grading, aggregate base or landscape grading are placed.

3.2 PREPARATION

A. Protection Of In-Place Conditions:

1. When existing grade around existing plants to remain is higher than new finish grade, perform regrading by hand.
2. Do not expose or damage shrub or tree roots.

3.3 PERFORMANCE

A. Special Techniques:

1. Compact fills as specified in Section 31 2323 'Fill'.
2. If soft spots, water, or other unusual and unforeseen conditions affecting grading requirements are encountered, stop work and notify Architect.

B. Tolerances:

1. Maximum variation from required grades shall be 1/10 of one foot.

END OF SECTION

SECTION 31 2216 - FINE GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Perform fine grading of subgrade work as described in Contract Documents.

B. Related Requirements:

1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
3. Section 31 0501: 'Common Earthwork Requirements' for:

    a. General procedures and requirements for earthwork.

4. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
5. Section 31 2213: 'Rough Grading' for grading and preparation of natural soil subgrades below fill and aggregate base materials.
6. Section 31 2316: 'Excavation'.
7. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:

1. Participate in MANDATORY pre-installation conference as specified in Section 31 0501 and Section 32 9001.
2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:

    a. Review backfill requirements.
    b. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.

        1) Review requirements and frequency of testing and inspections.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection Of In-Place Conditions: Protect utilities and site elements from damage.

3.2 PERFORMANCE

A. Interface With Other Work: Do not commence work of this Section until grading tolerances specified in Section 31 2213 are met.

B. General:

1. Do not expose or damage existing shrub or tree roots.

C. Tolerances:

1. Site Tolerances:

    a. Subgrade (material immediately below aggregate base):

        1) 0.00 inches high.
        2) Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.

    b. Maximum variation from required grades shall be 1/10 of one foot.

3.3 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Fill / Engineered Fill:

    a. Testing Agency shall provide testing and inspection for fine grading.
    b. Number of tests may vary at discretion of Architect.
    c. Testing Agency is to provide one (1) moisture-maximum density relationship test for each type of fill material.

END OF SECTION

SECTION 31 2316 - EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Perform Project excavating and trenching as described in Contract Documents, except as specified below.
2. Procedure and quality for excavating and trenching performed on Project under other Sections unless specifically specified otherwise.

B. Related Requirements:

1. Section 31 0501: 'Common Earthwork Requirements' for:

    a. General procedures and requirements for earthwork.

2. Section 31 1100: Clearing and Grubbing.
3. Section 31 1123: 'Aggregate Base'.
4. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
5. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
6. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.
7. Performance of excavating inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:

1. Participate in MANDATORY pre-installation conference as specified in Section 31 0501:
2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:

    a. Review protection of existing utilities requirements.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

1. Carefully examine site and available information to determine type soil to be encountered.
2. Discuss problems with Architect before proceeding with work.

3.2 PREPARATION

A. Protection of Existing Utilities:

1. Protect existing utilities identified in Contract Documents during excavation.
2. If existing utility lines not identified in Contract Documents are encountered, contact Engineer before proceeding.

3.3 PERFORMANCE

A. Interface With Other Work:

1. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
2. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.

B. Excavation:

1. Building Footings, Foundations, and Piers:

    a. Bottom of excavations to receive piers shall be undisturbed soil.
    b. Excavation Carried Deeper Than Required:

        1) Under Footings: Fill with concrete specified for footings.
        2) Under Slabs: Use specified compacted engineered fill material.

2. Miscellaneous Cast-In-Place Concrete:

    a. Excavate as necessary for proper placement and forming of concrete site elements. Remove vegetation and deleterious material and remove from site.
    b. Backfill over-excavated areas with compacted base material specified in Section 31 1123.
    c. Remove and replace exposed material that becomes soft or unstable.

3. Utility Trenches:

    a. Unless otherwise indicated, excavation shall be open cut.
    b. Excavate to proper alignment, depth, and grade. Excavate to sufficient width to allow adequate space for proper installation and inspection of utility piping.
    c. If trenches are excavated deeper than required, backfill until trench bottom is proper depth with properly compacted native material.
    d. Pipe 4 Inches In Diameter Or Larger:

        1) Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its length.
        2) Except where rock is encountered, take care not to excavate below depths indicated.

            a) Where rock excavations are required, excavate rock with minimum over-depth of 4 inches below required trench depths.
            b) Backfill over-depths in rock excavation and unauthorized over-depths with loose, granular, moist earth, thoroughly compacted.

        3) Whenever wet or unstable soil incapable of properly supporting pipe, as determined by Architect, occurs in bottom of trench, remove soil to depth required and backfill trench to proper grade with coarse sand, fine gravel, or other suitable material acceptable to Architect.

4. If unusual excavating conditions are encountered, stop work and notify Architect.

3.4 REPAIR / RESTORATION

A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

3.5 CLEANING

A. Debris and material not necessary for Project are property of Contractor and are to be removed before completion of Project. However, if material necessary for Project is hauled away, replace with specified fill / backfill material.

END OF SECTION

SECTION 31 2323 - FILL

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Perform Project backfilling and compacting as described in Contract Documents, except as specified below.
2. Procedure and quality for backfilling and compacting performed on Project under other Sections unless specifically specified otherwise.

B. Related Requirements:

1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
3. Section 31 0501: 'Common Earthwork Requirements' for:

    a. General procedures and requirements for earthwork.

4. Section 31 1100: 'Clearing and Grubbing'.
5. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
6. Section 31 2213: 'Rough Grading' for grading and preparation of natural soil subgrades below fill and aggregate base materials.
7. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
8. Section 31 2316: 'Excavation'.
9. Performance of backfilling and compacting inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International (Following are specifically referenced for fill and aggregate base testing):

    a. ASTM D698-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3))'.
    b. ASTM D1556/D1556M-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method'.
    c. ASTM D1557-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))'.
    d. ASTM D2167-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method'.
    e. ASTM D2487-11, 'Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)'.
    f. ASTM D6938-15, 'Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)'.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:

1. Participate in pre-installation conference.
2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:

a. Review backfill requirements.
b. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.

1) Review requirements and frequency of testing and inspections.

B. Sequencing:

1. Before backfilling, show utility and service lines being covered on record set of Drawings. Do not backfill until utilities involved have been tested and approved by Architect and until instructed by Architect.

C. Scheduling:

1. Notify Testing Agency and Architect seventy-two (72) hours minimum before installation of fill / engineered fill to perform proctor and plasticity index tests on proposed fill or subgrade.
2. Notify Testing Agency and Architect twenty-four (24) hours minimum before installation of fill / engineered fill to allow inspection.
3. Allow inspection and testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after inspections and test results for previously compacted work comply with requirements.

1.4 SUBMITTALS

A. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Record Documentation:

1) Testing and Inspection Reports:

a)Testing Agency Testing and Inspecting Reports of fill / engineered fill.

1.5 QUALITY ASSURANCE

A. Testing and Inspection:

1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
2. Owner may provide Testing and Inspection for fill / engineering fill:

a. Owner will employ testing agencies to perform testing and inspection for fill / engineering fill as specified in Field Quality Control in Part 3 of this specification.

1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
2) See Section 01 1200: 'Multiple Contract Summary'.

1.6 FIELD CONDITIONS

A. Ambient Conditions:

1. Do not perform work during unfavorable conditions as specified below:

a. Aggregate Base:

1) Presence of free surface water.
2) Over-saturated sub base materials.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Site Material:

1. Existing excavated material on site is suitable for use as fill and backfill outside the pavilion and restroom/shower facility footprints.

B. Imported Fill / Backfill:

1. Well graded material conforming to ASTM D2487 free from debris, organic material, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.

a. Under Building Footprint: Use only specified engineered fill.

C. Engineered Fill:

1. Use granular road base specified in Section 31 1123 Aggregate Base.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before placing fill, aggregate base, or finish work, prepare existing subgrade as follows:

1. Do not place fill or aggregate base over frozen subgrade.
2. Under Pavilion and Restroom/ Shower Building Slab:

a. Moisture condition to uniform moisture content of between optimum and four (4) percent over optimum, and mechanically tamp 6 inches deep to ninety-five (95) percent minimum of relative compaction.

3. Landscape Areas:

a. Compact subgrade to eighty-five (85) percent relative compaction.

3.2 PERFORMANCE

A. Interface With Other Work:

1. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
2. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.

B. Fill / Backfill:

1. General:

a. Around Pavilion and restroom/Shower Building: Slope grade away from building as specified in Section 31 2216. Hand backfill when close to building or where damage to building might result.
b. Site Utilities:

1) Use backfill consisting of on-site soil.

c. Do not use puddling or jetting to consolidate fill areas.

2. Compacting:

a. Fill / Backfill And Aggregate Base:

1) All fill material shall be well-graded granular material with maximum size less than 3 inch and with not more than fifteen (15) percent passing No. 200 sieve.
2) Under Pavilion and Restroom/Shower Building Slab Areas:

a) Place in 8 inch maximum layers, moisture condition to plus or minus two (2) percent of optimum moisture content, and mechanically tamp to ninety five (95) percent minimum of maximum laboratory density as established by ASTM D1557.

3) Under Miscellaneous Concrete Site Elements And Outside Face of Foundation Walls:

a) Place in 8 inch maximum layers, dampen but do not soak, and mechanically tamp to ninety five (95) percent minimum of maximum laboratory density as established by ASTM D1557.

4) Utility Trenches:

a) Site:

(1) Place fill in 12 inch layers and moisture condition to plus or minus two (2) percent of optimum moisture content.
(2) Compact fill to ninety (90) percent minimum relative compaction to within 12 inches of finish grade.
(3) Compact fill above 12 inches to eighty-five (85) percent relative compaction.

b) Under Slabs:

(1) Under Slabs: Place fill in 6 inch layers, moisture condition to plus or minus two (2) percent of optimum moisture content, and compact to ninety five (95) percent minimum relative compaction to within 4 inches of finish grade.
(2) Final 4 inches of fill shall be aggregate base as specified in Section 31 1123.

5) Fill Slopes: Compact by rolling or using sheepsfoot roller.
6) Backfill Under Footings: Not Allowed.
7) Landscape Areas:

a) Compact fill to eighty-five (85) percent minimum relative compaction.

8) Loose material from compacted subgrade surface shall be immediately removed before placing compacted fill or aggregate base course.

b. Engineered Fill:

1) Place in 8 inch maximum layers, moisture condition to plus or minus 2 percent of optimum moisture content and mechanically tamp to 95 percent minimum of maximum density as established by ASTM D698 or ASTM D1557.

3.3 REPAIR / RESTORATION

A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

3.4 FIELD QUALITY CONTROL

A. Field Tests and Inspections:

1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':

a. Quality Control is sole responsibility of Contractor:

1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:

a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.

2. Fill / Engineered Fill:

a. Testing Agency shall provide testing and inspection for fill.
b. Number of tests may vary at discretion of Architect.
c. Testing Agency will test compaction of soils according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Tests will be performed at following locations and frequencies:

1) Building Slab Areas: At each compacted fill and backfill layer, at least on test for every 2,500 sq. ft. or less of building slab area but in no case less than three (3) tests.
2) Foundation Wall/Continuous Footing Backfill: At each compacted backfill layer, at least one (1) test for each 40 linear feet or less of wall length, but no fewer than two (2) tests.
3) Trench Backfill: At each 12 inch compacted lift for each 100 linear feet or less of trench length but no fewer than two (2) tests.

d. Required verification and inspection of soils as referenced in 2015 IBC (or latest approved edition) Table 1704.7 'Required Verification And Inspection Of Soils'. Periodic and continuous inspections include:

1) Verify materials below shallow foundations are adequate to achieve design bearing capacity (periodic).
2) Verify excavations are extended to proper depth and have reached proper material (periodic).
3) Perform classification and testing of compacted fill materials (periodic).
4) Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill (continuous).
5) Prior to placement of compacted fill, observe subgrade and verify that site has been prepared properly (periodic).

3.5 CLEANING

A. Debris and material not necessary for Project are property of Contractor and are to be removed before completion of Project. However, if material necessary for Project is hauled away, replace with specified fill / backfill material.

END OF SECTION

DIVISION 33 – UTILITIES:

33 1116	Site Water Utility Distribution Piping
33 3633	Utility Septic Tank Drainage Field
33 3643	Sewage Treatment System

SECTION 33 1116 - SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Perform trenching and backfilling required for work of this Section.
2. Furnish and install piping from water main to inside of building as described in Contract Documents complete with shut-off valve stop and waste valves, and connections.

B. Related Requirements:

1. Section 31 2316: 'Excavation' for criteria for performance of excavation.
2. Section 31 2323: 'Fill' for criteria for performance of backfill and compaction.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International:

a. ASTM B88-14, 'Standard Specification for Seamless Copper Water Tube'.

2. ASTM International (Standard Specifications for Polyethylene (PE) pipe):

a. ASTM D2239-12a, 'Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter'.
b. ASTM D2737-12a, 'Standard Specification for Polyethylene (PE) Plastic Tubing'.
c. ASTM D3035-15, 'Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter'.

3. NSF International Standard / American National Standards Institute:

a. NSF/ANSI 61-2015, 'Drinking Water System Components - Health Effects'.
b. NSF/ANSI 372-2016, 'Drinking Water System Components - Lead Content'.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Thermoplastic Plastic Piping:

1. Manufacturers Contact List:

a. PP-R Aquatherm, Inc., Lindon, UT www.aquathermpipe.com.
b. PP-RCT Prestan North America, Titusville, PA www.pestampipes.com.

2. Materials:

a. Pipe: HDPE DR9 meeting ASTM and NSF requirements.
b. Pipe: PP-R SDR 7.4 Greenpipe faser by Aquatherm.
c. PP-RCT SDR 7.4 Red Stripe fiber core by Prestan.

B. Connection Material: