

CONSTRUCTION SPECIFICATIONS

RISE: UC BERKELEY/UNIVERSITY OF DENVER
U.S. DOE SOLAR DECATHLON 2017 - AS-BUILT PHASE

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NOTE: REFER TO DRAWINGS FOR ANY PRODUCTS/SPECIFICATIONS NOT MENTIONED.

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DIVISION 01 - GENERAL REQUIREMENTS

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SECTION 01 01 01 - PROJECT TITLE PAGE

TITLE: SOLAR DECATHLON AT UC BERKELEY/UNIVERSITY OF DENVER: RISE Home
University of California, Berkeley
University of Denver

Projected Completion Date:
October 2017

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END OF SECTION 01 01 01

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DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

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SECTION 06 09 00 - WOOD AND PLASTIC FASTENINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pre-engineered metal or plastic connectors used to support a wood, plated truss or composite wood, from a concrete, masonry, steel, wood, or composite wood supporting member(s).

1.2 REFERENCES

- A. ASTM A36 – Carbon Structural Steel
- B. ASTM A193 – Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service
- C. ASTM A240 – Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications
- D. ASTM A307 – Carbon Steel Bolts and Studs
- E. ASTM A449 – Hex Cap Screws, Bolts and Studs, Steel, Heat Treated
- F. ASTM A480 – Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
- G. ASTM A493 – Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging
- H. ASTM A500 – Cold-Formed Welded and Seamless Carbon Steel Structural Tubing Rounds and Shapes
- I. ASTM A653 – Steel Sheet, Zinc-Coated or Zinc-Iron Alloy-Coated by Hot-Dip Process
- J. ASTM A706 – Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
- K. ASTM A924 – General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
- L. ASTM A1011 – Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability and Ultra-High Strength
- M. ASTM D7147 – Standard Specification for Testing and Establishing Allowable Loads of Joist Hangers.
- N. ASTM D2395 – Standard Test Methods for Specific Gravity of Wood and Wood-Based Materials
- O. ASTM F1554 – Anchor Bolts, Steel
- P. ASTM F1575 – Standard Test Method for Determining Bending Yield Moment of Nails
- Q. ASTM F1667 – Driven Fasteners: Nails, Spikes, and Staples
- R. ICC-ES AC13 – Acceptance Criteria for Joist Hangers and Similar Devices
- S. ICC-ES AC116 – Acceptance Criteria for Nails and Spikes
- T. ICC-ES AC118 – Acceptance Criteria for Tapping Screw Fasteners
- U. ICC-ES AC120 – Acceptance Criteria for Wood Screws Used in Diaphragms and Shear Walls
- V. ICC-ES AC155 – Acceptance Criteria for Hold-Downs (Tie-Downs) Attached to Wood Members
- W. ICC-ES AC233 – Acceptance Criteria for Alternate Dowel-Type Threaded Fasteners
- X. ICC-ES AC316 – Acceptance Criteria for Shrinkage Compensating Devices
- Y. ICC-ES AC399 Acceptance Criteria for Cast-In-Place Bolts in Concrete Light-Framed Construction
- Z. AISI 2001 – Cold-Formed Steel Specification
- AA. 2015 NDS – National Design Specification

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to job site in manufacturer's or distributor's packaging undamaged, complete with installation instructions.
- B. Protect and handle materials in accordance with manufacturer's recommendations to prevent damage or deterioration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Simpson Strong-Tie Co., Inc.

2.2 MATERIALS

A. Steel:

1. Sheet: ASTM A36, ASTM A653, ASTM A1011
2. Fasteners: ASTM A307, ASTM F1554, ASTM F1667, SAE C1022 (SDS Screws)

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B. Stainless Steel:

1. Sheet: ASTM A240, ASTM A480
2. Fasteners: ASTM A493

C. Finishes:

1. Gray paint
2. Hot-dipped galvanized or electro-plated galvanized: G90, G185 (ZMAX or HDG)
3. Powder-coated paint
4. Electro-galvanized, Zinc dichromate and Double Barrier for SD and SDS screws

2.3 FABRICATION

- A. Shop assembly to occur per the manufacturer's approved production drawings.
- B. Fabrication tolerances per manufacturer.
- C. Fabrication requiring welding shall be performed in accordance with the current AWS standards.
- D. The manufacturer's identification shall be stamped into the metal or wood part and a label may be attached to the part with adhesive.

2.4 TESTING

- A. Allowable loads published in manufacturer's catalog to be determined using the minimum load from static and/or cyclic analysis and one or more of the following test methods:
 1. Static load tests in wood assemblies
 2. Static load tests in steel jigs
 3. Static load tests of products embedded in concrete or masonry
- B. Testing to determine allowable loads shall be performed as per the applicable ICC-ES Acceptance Criteria or ASTM standard.
- C. Allowable loads for hangers are determined by a static load test resulting in not more than a 1/8" deflection of the joist relative to the header, or either the lowest of 3 or average of 6 ultimate load divided by 3, or the fastener allowable load as determined by the NDS, whichever is lowest.
- D. Manufacturer to provide code testing data on all products that have been code tested upon request.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Unless otherwise noted in the manufacturer's catalog, allowable loads are for Douglas Fir under continuously dry conditions. Allowable loads for other species or conditions must be adjusted according to the code. See manufacturer's catalog for additional notes and requirements.
- B. Built up lumber must be fastened together to act as one unit to resist the applied load.
- C. Verify that the dimensions of the supporting member are sufficient to receive the specified fasteners.

3.2 INSTALLATION

- A. Unless otherwise noted in the manufacturer's catalog, bolts, screws and/or nails shall not be combined.
- B. All nails shall be common unless otherwise noted in the manufacturer's catalog or substituted by the engineer of record with a reduction taken.
- C. Unless otherwise noted in the manufacturer's catalog, bending steel in the field may cause fractures at the bend line. Fractured steel will not carry the allowable load and must be replaced. When bending is allowed or required in the catalog, the connector shall be allowed one cycle bend, one time only.
- D. Galvanized connectors should not be placed in contact with treated wood unless the treated wood is adequately verified to be suitable for such contact. Some wood treatments may accelerate metal deterioration. See the manufacturer's catalog for specific recommendations.
- E. A fastener that splits the wood will not carry the allowable load. Evaluate splits to determine if the connection will perform as required. Dry wood will split more easily and should be evaluated as needed. If wood tends to split, consider pre-boring holes with a diameter not exceeding 0.75 of the nail diameter, for screws in wood with a specific gravity of 0.5 or greater use: 5/32" for SDS, 5/64" for SD9 or SD10, and 1/16" for SD8 (2005 NDS 11.1.4 and 11.1.5.3).

CONSTRUCTION SPECIFICATIONS

- F. Wood shrinkage will be taken into consideration when designing and installing connections.
- G. Built-up lumber must be fastened together to act as one unit to resist the applied load.
- H. Top flange hangers may cause unevenness. Possible remedies should be evaluated by a professional and include using a face mount hanger, routing the beam, or cutting the subfloor to accommodate the top flange thickness.
- I. Do not overload by exceeding the manufacturer's catalog allowable load values.
- J. Unless otherwise noted in the manufacturer's catalog, fill all fastener holes with fastener types as specified in the manufacturer's catalog.
- K. All specified fasteners must be installed according to the instructions in the manufacturer's catalog.

END OF SECTION 06 09 00

CONSTRUCTION SPECIFICATIONS

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Provide rough carpentry.

1.2 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Lumber Standards and Grade Stamps: DOC PS 20, American Softwood Lumber Standard and inspection agency grade stamps.

C. Construction Panel Standards: DOC PS 1, U.S. Product Standard for Construction and Industrial Plywood; APA PRP-108.

D. Wood Framing Standards: NFPA House Framing Manual.

1. Exterior Wall Framing: 2 inch by 8-inch nominal studs, 48 inches on center.

2. Exterior Wall Framing: 2 inch by 8-inch nominal studs, 16 inches on center.

3. Interior Wall Framing: 2 inch by 4-inch (38 mm by 89 mm actual) studs, 16 inches (40 cm) on center.

PRESERVATIVE TREATMENT: AWPA C2 for lumber and AWPA C9 for plywood; waterborne pressure treatment. Provide for wood in contact with soil, concrete, masonry, roofing, flashing, dampproofing and waterproofing.

PART 2 PRODUCTS

2.1 MATERIALS

A. Rough Carpentry Applications:

1. Manufacturers, Dimensional Lumber: Precision Building Systems; Manufacturers.

2. Dimension Lumber:

a. Light Framing: Stud, No. 1 Douglas Fir Large.

b. Structural Framing: Laminated Veneer Lumber and Douglas Fir S4S.

c. Species: Douglas Fir.

3. Building Wrap:

a. Material: Air-retarder sheeting made from polyolefins; cross-laminated films, woven strands, or spun-bonded fibers; coated or uncoated; with or without perforations; ASTM E 1677, Type I.

4. Framing Anchors and Fasteners:

a. Material: Non-corrosive, suitable for load and exposure. Drywall screws are not acceptable.

PART 3 EXECUTION

3.1 INSTALLATION

A. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.

B. Plywood: Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial"

C. Provide nailers, blocking and grounds where required. Set work plumb, level and accurately cut.

D. Install materials and systems in accordance with manufacturer's instructions and approved submittals.

Install materials and systems in proper relation with adjacent construction. Coordinate with other work.

E. Comply with manufacturer's requirements for cutting, handling, fastening and working treated materials.

F. Restore damaged components. Protect work from damage.

END OF SECTION 06 10 00

CONSTRUCTION SPECIFICATIONS

SECTION 06 15 33 - WOOD DECK

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: ICC-ES evaluation reports for preservative-treated wood metal framing anchors, and decking fasteners.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Provide dressed lumber, S4S, marked with grade stamp of inspection agency.
- B. Maximum Moisture Content:
 - 1. Boards: 15 percent.
 - 2. Dimension Lumber: 15 percent

2.2 WOOD MATERIALS

- A. Wood Decking:
 - 1. Dimension Lumber Decking: No. 1 grade and the following species:
 - a. Cedar - Large.
 - 2. Board Decking: 2-inch-thick, radius-edged decking of the following species and grades:
 - a. Cedar.
- B. Railings: Provide material hand selected for freedom from characteristics that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.
 - 1. Dimension Lumber Railing Members: Construction or No. 2 grade
 - 3. Railing Boards

2.3 TREATED MATERIALS

- A. Preservative-Treated Boards and Dimension Lumber: AWPA U1; Use Category UC3b.
- B. Preservative-Treated Timber and Poles: AWPA U1; Use Category UC4a, waterborne preservative.
 - 1. Use treatment containing no arsenic or chromium.
- C. After treatment, redry boards and dimension lumber to 19 percent maximum moisture content.
- E. Provide preservative-treated materials for all exterior rough carpentry unless otherwise indicated.
 - 1. Framing members.
 - 2. Posts.
 - 3. Decking.

2.5 MISCELLANEOUS PRODUCTS

- A. Fasteners: Use hot dipped galvanized unless otherwise indicated.
 - 1. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
- B. Metal Framing Anchors: Structural capacity, type, and size indicated, made from hot-dip galvanized steel complying with ASTM A 653/A 653M, G60 (Z180) coating.
 - 1. Simpson StrongTie

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA WCD1 unless otherwise indicated.
- C. Securely attach work to substrates, complying with the following:
 - 1. "Fastening Schedule" in ICC's International Building Code.
 - 2. "Fastener Schedule for Structural Members" and "Alternate Attachments" in ICC's International Residential Code for One- and Two-Family Dwellings.
- D. Secure decking to framing with screws.

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- F. Railing Installation: Countersink fastener heads, fill flush, and sand filler.
1. Fit balusters to railings, glue, and screw in place.
 2. Secure posts to stringers with steel brackets and through bolts.

END OF SECTION 06 15 33

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 00 - FINISH CARPENTRY

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Samples for siding, hardboard paneling, moldings and trim.

PART 2 – PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.
- B. Softwood Plywood: DOC PS 1.
- C. Accoya Lumber

2.2 EXTERIOR FINISH CARPENTRY

- A. Accoya Strips
 - 1. Material: acetylation modified timber.

2.3 INTERIOR FINISH CARPENTRY

- A. Kitchen Cabinets: Fiberboard
- B. Baseboard: wood

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Stainless-steel.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer.
 - 1. Wood glue shall have a VOC content of 30 g/L or less.
 - 2. Use waterproof resorcinol glue for exterior applications
- C. Insect Screening for Soffit Vents: PVC-coated glass-fiber fabric.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Condition interior finish carpentry in installation areas for 24 hours before installing.
- B. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Scribe and cut to fit adjoining work. Refinish and seal cuts.
- C. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
- E. Subparagraph below is based on NFPA 101 requirements.
- F. Install standing and running trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long except where necessary. Stagger joints in adjacent and related trim. Cope at returns and inside corners and miter at outside corners.
- G. Select and arrange paneling for best match of adjacent units. Install with uniform tight joints.

END OF SECTION 06 20 00

CONSTRUCTION SPECIFICATIONS

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 GENERAL

3.2 SUMMARY - Provide interior finish carpentry, and architectural woodwork.

3.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
- C. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

3.4 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Standards: Architectural Woodwork Institute (AWI) 'Architectural Woodwork Standards.'
- C. Wood Products: Comply with the following:
 - 1. Hardboard: AHA A135.4.
 - 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD-Exterior Glue.
 - 3. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
 - 4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
 - 5. Hardwood Plywood and Face Veneers: HPVA HP-1.

PART 4 PRODUCTS

3.1 MATERIALS

- A. Interior Wood Casework:
 - 1. Manufacturers: IKEA, SmartSpaces
 - 2. Species for Transparent Finish: Fiberboard

3.1 INSTALLATION

- A. Provide work to sizes, shapes, and profiles indicated. Install work to comply with quality standards referenced. Back prime work and install plumb, level and straight with tight joints; scribe work to fit.
- B. Quality Standard: Install woodwork to comply with AWI standards for the same grade specified for type of woodwork involved.
- C. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.
- D. Comply with manufacturer's requirements for cutting, handling, fastening and working treated materials.
- E. Repair minor damage, clean and protect.

END OF SECTION 06 40 23

CONSTRUCTION SPECIFICATIONS

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

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SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Batt insulation.
- B. Related Work specified elsewhere includes:
 - 1. Division 07 roofing Sections for insulation installed as part of the roofing system.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Schedule: Indicate where each type of product is to be applied. Provide drawings if necessary to show where insulation is to be installed.

PART 2 - PRODUCTS

2.1 BATT INSULATION

- A. Wool Insulation
 - 1. Manufacturer: Havelock Wool

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Electrical Boxes: Install sheet caulking at each electrical switch and outlet box and at cavity spaces where required to prevent air infiltration through boxes in framed and cavity walls.

END OF SECTION 07 21 00

CONSTRUCTION SPECIFICATIONS

SECTION 07 25 00 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: ICC-ES evaluation reports for water-resistive barrier.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIERS

- A. Building Wrap: ASTM E 1677, Type I air barrier; with water-vapor permeance not less than 23 perms per ASTM E96/E 96M, Desiccant Method (Procedure A); flame-spread and smoke-developed indexes not greater than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

- 1. PROCLIMA SOLITEX MENTO 1000

2.2 ACCESSORIES

- A. Flexible Flashing: Adhesive butyl rubber compound, bonded to plastic film or spunbonded polyolefin, with an overall thickness of 0.030 inch (0.8 mm).

- 1. Butyl Rubber:

- a. DUPONT™ FLEXWRAP NF®
- b. DUPONT™ STRAIGHTFLASH®

- B. Building Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

- C. Rainscreen Battens

- 1. DUPONT™ RAINVENT® BATTEN

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Building Wrap Installation:

- 1. Apply building wrap immediately after sheathing is installed.
- 2. Seal seams, edges, fasteners, and penetrations with building wrap tape.
- 3. Extend into jambs of openings and seal corners with building wrap tape.

- B. Flexible Flashing Installation:

- 1. Prime substrates as recommended by flashing manufacturer.
- 2. Lap seams and junctures with other materials at least 3 inches (75 mm), except that at flashing flanges of other construction, laps need not exceed flange width.
- 3. Lap flashing over water-resistive barrier at bottom and sides of openings.
- 4. Lap water-resistive barrier over flashing at heads of openings.
- 5. After flashing has been applied, roll surfaces with a hard rubber or metal roller.

- C. Rainscreen Batten Installation:

- 1. Place the battens over DuPont™ Tyvek® at 16" on center and align with the wall studs. Secure DuPont™ RainVent™ Battens in place with 1" crown, 1-1/4" long staples at 16" on center or other approved fasteners capable of penetrating the studs by 1/2"

END OF SECTION 07 25 00

CONSTRUCTION SPECIFICATIONS

DIVISION 08 – OPENINGS

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SECTION 08 14 23 - OUT-SWING ENTRY DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. simple hinged doors.

1.2 RELATED SECTIONS

- A. Section 07 25 00 - Weather Barriers: Water-resistant barrier.

1.3 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 502 - Voluntary Specification for Field Testing of Windows and Sliding Doors.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM B 117 - Operating Salt Spray (Fog) Apparatus.
 - 2. ASTM C 1036 - Flat Glass.
 - 3. ASTM C 1048 - Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass.
 - 4. ASTM D 1149 - Rubber Deterioration – Surface Ozone Cracking in a Chamber.
 - 5. ASTM D 2803 - Filiform Corrosion Resistance of Organic Coatings on Metal.
 - 6. ASTM D 3656 - Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns.
 - 7. ASTM D 4060 - Abrasion Resistance of Organic Coatings by the Taber Abraser.
 - 8. ASTM E 283 - Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Difference Across the Specimen.
 - 9. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
 - 10. ASTM E 547 - Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differential.
 - 11. ASTM G 85 - Modified Salt Spray (Fog) Testing.
- C. Screen Manufacturers Association (SMA):
 - 1. SMA 1201 - Specifications for Insect Screens for Windows, Sliding Doors and Swinging Doors.
- D. Window and Door Manufacturers Association (WDMA):
 - 1. ANSI/AAMA/NWWDA 101/I.S.2 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.
 - 2. ANSI/AAMA/NWWDA 101/I.S.2/NAFS-02 - Voluntary Performance Specification for Windows, Skylights and Glass Doors.
 - 3. WDMA I.S.4 - Industry Standard for Water-Repellent Preservative Non-Pressure Treatment for Millwork.

1.4 PERFORMANCE REQUIREMENTS

- A. Door Unit Air Leakage, ASTM E 283, 1.57 psf (25 mph): 0.15 cfm per square foot of frame or less.
- B. Door Unit Water Penetration: No water penetration through door unit when tested in accordance with ASTM E547, under static pressure of 0 psf (0 mph) after 4 cycles of 5 minutes each, with water being applied at a rate of 5 gallons per hour per square foot.

1.5 SUBMITTALS

- A. Comply with Division 1 requirements.
- B. Product Data: Submit manufacturer's product data, including installation instructions.
- C. Warranty: Submit manufacturer's standard warranty.

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1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site undamaged in manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.
- B. Storage: Store materials in an upright position, off ground, under cover, and protected from weather, direct sunlight, and construction activities.
- C. Handling: Protect materials and finish during handling and installation to prevent damage.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Knotty Alder
- B. Alpen

2.2 SIMPLE DOORS

- A. Factory-Primed Wood Door: Architect Series factory-assembled wood doors with outward swing door panels installed in frame.
- B. Weather Strip:
 - 1. Panel-mounted, dual-durometer extruded polymer one-piece design with welded corner.

2.3 GLAZING

- A. Glazing:
 - 1. Float Glass: ASTM C 1036, Quality 1.
 - a. Tempered Glass: ASTM C 1048.
 - 2. Type: Glass, 1025 Series, Fixed High Profile, Fiberglass Frame, R10, Triple Chamber, Low-E, Krypton, Suspended Film

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and approved shop drawings.
- B. Install doors to be weather-tight and freely operating.
- C. Maintain alignment with adjacent work.
- D. Secure assembly to framed openings, plumb and square, without distortion.
- E. Integrate door system installation with exterior water-resistant barrier using flashing/sealant tape. Apply and integrate flashing/sealant tape with water-resistant barrier using watershed principles in accordance with door manufacturer's instructions.
- F. Place interior seal around door perimeter to maintain continuity of building thermal and air barrier using insulating-foam sealant.
- G. Seal door to exterior wall cladding with sealant and related backing materials at perimeter of assembly.
- H. Leave doors closed.

3.3 CLEANING

- A. Clean door frames and glass in accordance with Division 1 requirements.
- B. Do not use harsh cleaning materials or methods that would damage finish.
- C. Remove labels and visible markings.

3.4 PROTECTION

- A. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

CONSTRUCTION SPECIFICATIONS

END OF SECTION 08 14 13

SECTION 08 35 13 - MECHANICAL ROOM DOORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 FOLDING DOORS

- 1. Panel: wood, primed white.
- 2. Track: metal, above door.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install track in one piece.
- B. Install folding doors with floor clearances of 1/4 to 3/4 inch.
- C. Adjust units as necessary to ensure smooth, quiet operation without warping or binding.

END OF SECTION 08 35 13

CONSTRUCTION SPECIFICATIONS

SECTION 08 80 00 - GLAZING

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 – PRODUCTS

2.1 GLASS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

C. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

D. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

E. Windborne-Debris-Impact Resistance: Exterior glazing shall comply with basic protection testing requirements in ASTM E 1996 for Wind Zone 3 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on Project and shall be installed in same manner as glazing indicated for use on Project.

1. Large-Missile Test: For glazing located within 30 feet of grade.

2.2 GLASS PRODUCTS

Glazing Type: Insulated
Unit O/A: 1 3/8",
Glass Type: Outer Lite = Low E 366,
Outer Lite Glass Strength: Tempered
Outer Lite Glass Thickness: 3/16",
Custom Film Type: Double HM88 Flipped
Inner Lite Glass Strength: Tempered
Custom Inner Lite Glass Thickness: 3/16th" i89 (#8),
Gas Fill: Krypton
Type of Seal: Dual Sealed Polyurethane
Spacer Type: Stainless Steel
Breather Tubes Required: Yes

2.4 GLAZING SEALANTS

A. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

B. Low-Emitting Materials: Sealants shall have a VOC content of not more than 250 g/L.

C. Low-Emitting Materials: Sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

CONSTRUCTION SPECIFICATIONS

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are contained in GANA's "Glazing Manual."
- B. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- C. Remove nonpermanent labels, and clean surfaces immediately after installation.

END OF SECTION 08 80 00

CONSTRUCTION SPECIFICATIONS

DIVISION 09 – FINISHES

-

SECTION - 09 29 00 GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 PANEL PRODUCTS

- A. Provide in maximum lengths available to minimize end-to-end butt joints.
- B. Interior Gypsum Board: ASTM C 1396/C 1396M, in thickness indicated, with manufacturer's standard edges. Type X, as required for specific fire-resistance-rated assemblies
- C. Cementitious Backer Units: ANSI A118.9, ASTM C 1288, or ASTM C 1325.

2.3 ACCESSORIES

- A. Aluminum Accessories: Extruded-aluminum reveal strips indicated with Class II, clear anodic finish; AAC12C22A31.
- B. Joint-Treatment Materials: ASTM C 475/C 475M.
 - 1. Joint Tape: Paper unless otherwise recommended by panel manufacturer.
 - 2. Joint Compounds: Drying-type, ready-mixed, all-purpose compounds.
 - 3. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
 - 4. Cementitious Backer Unit Joint-Treatment Materials: Products recommended by cementitious backer unit Manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install gypsum board to comply with ASTM C 840
 - 1. Install reveals level, plumb, true, and straight according to drawings. Attach with fasteners through hidden flange every 12-inches o.c.
 - 2. Isolate gypsum board assemblies from abutting structural work. Provide edge trim.
 - 3. Single-Layer Fastening Methods: Fasten gypsum panels with screws.
- B. Install cementitious backer units to comply with ANSI A108.11.
- C. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.
- D. Finishing Gypsum Board: ASTM C 840.
 - 1. Provide Level 1 finish: Embed tape at joints.
 - 2. At substrates for tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.
 - 3. Unless otherwise indicated, provide Level 4 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

END OF SECTION 09 29 00

CONSTRUCTION SPECIFICATIONS

SECTION - 09 30 13 CERAMIC TILING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.
- B. Obtain tile of each type and color or finish from same production run for each contiguous area.

PART 2 - PRODUCTS

2.1 CERAMIC TILE

- 1. Porcelanosa Tile in accordance with ASTM C485/C499/C502
 - Water absorption: Bla - Porcelain tiles ($E \leq 0.1\%$)
 - Thickness: 13/32 " approx
 - Width 23 1/16 " approx.
 - Length 23 1/16 " approx.
 - Length and width deviation: Below 0.15% $\leq 0.5\%$ *
 - Side straightness deviation: Below 0.15% $\leq 0.5\%$ *
 - Squareness deviation: Below 0.15% $\leq 0.6\%$ *
 - Surface flatness deviation Below 0.15% $\leq 0.5\%$ *

2.2 INSTALLATION MATERIALS

- 1. Notched trowel, rubber mallet, suction cups, cross-spacers
- 2. Proper adhesives according to the Porcelanosa manual

END OF SECTION 09 30 13

CONSTRUCTION SPECIFICATIONS

SECTION 09 64 00 - WOOD FLOORING

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.

PART 2 - PRODUCTS

2.1 Shaw Flooring

- A. Duras Engineered Hardwood: Memorial Hickory Scraped - NOFMA grading rules for species, grade, and cut.

1. Certification: Provide flooring that carries NOFMA grade stamp on each bundle or piece.

2.4 ACCESSORY MATERIALS

- A. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.

1. Low-Emitting Materials: Adhesives shall have a VOC content of 100 g/L or less.
2. Low-Emitting Materials: Adhesives shall comply with Green Seal's GS-36 and with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- B. Fasteners: As recommended by manufacturer, nails or staples

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with flooring manufacturer's written installation instructions
- B. Provide expansion space at walls and other obstructions of flooring not less than $\frac{3}{4}$ inch.
- C. Solid-Wood, Plank Flooring: Blind nail or staple flooring to substrate.
 1. Plank Flooring: For flooring of face width more than 3 inches (75 mm), install countersunk screws at each end of each piece in addition to blind nailing. Cover screw heads with wood plugs glued flush with flooring. Install not less than two countersunk nails at each end of each piece, spaced not more than 16 inches (406 mm) along length of each piece, in addition to blind nailing. Fill holes with matching wood filler.

END OF SECTION 09 64 00

CONSTRUCTION SPECIFICATIONS

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Provide painting and surface preparation.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

1. Include manufacturer's full range of color and finish options if additional selection is Required.

PART 2 - PRODUCTS

2.1 PAINT

A. BEHR PREMIUM PLUS ULTRA Interior Eggshell Enamel

B. MPI Standards: Provide materials that comply with MPI standards indicated and listed in its "MPI Approved Products List."

1. Latex, Interior, (Gloss Level 3): MPI #52.

C. Material Compatibility: Provide materials that are compatible with one another and with substrates.

1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

D. Paints and coatings shall comply with the following limits for VOC content:

1. Flat Paints and Coatings: 50

E. Colors:

1. Walls: white

2. Ceilings: Ultra Pure White

PART 3 - EXECUTION

3.1 PREPARATION

A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, lighting fixtures, and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.

C. Clean and prepare surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

3.2 APPLICATION

A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Paint exposed surfaces, new and existing, unless otherwise indicated.

1. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.

2. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.

3. Paint the back-side of access panels.

4. Color-code mechanical piping in accessible ceiling spaces.

5. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise Indicated.

C. Apply paints according to manufacturer's written instructions.

1. Use brushes only where the use of other applicators is not practical.

2. Use rollers for finish coat on interior walls and ceilings.

CONSTRUCTION SPECIFICATIONS

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

3.3 INTERIOR PAINT APPLICATION SCHEDULE

A. Gypsum:

1. Gloss Level 3 Latex: Two coats: MPI INT 6.3T.

END OF SECTION 09 91 23

CONSTRUCTION SPECIFICATIONS

DIVISION 10 – SPECIALTIES

-

SECTION 10 28 19 - SHOWER DOOR

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Verify dimensions by field measurements before fabrication and indicate on Shop Drawings.

PART 2 - PRODUCTS

2.1 SHOWER DOORS

Aquadica GS 36 in. x 72 in. Frameless Square Shower Enclosure in Stainless Steel with Glass Shelves

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare and install as recommended in manufacturer's written instructions, unless more stringent requirements are contained in GANA's "Glazing Manual."
- B. Set units level, plumb, and true to line, without warp or rack of frames and panels, and anchor securely in place.
- C. Install doors to produce smooth operation and tight fit at contact points.

END OF SECTION 10 28 19

CONSTRUCTION SPECIFICATIONS

DIVISION 11 – EQUIPMENT

-

SECTION 11 31 00 - RESIDENTIAL APPLIANCES

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 – PRODUCTS

2.1 RESIDENTIAL APPLIANCES

A. Regulatory Requirements: Comply with the following:

1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with ICC A117.1.

C. Electric Range: 30-inch wide, drop-in range with 4 burners

1. Manufacturer: General Electric

D. Exhaust Hood: 30-inch, wall-mounted exhaust hood with two-speed fan.

1. Manufacturer: IKEA

2. Color: stainless steel

3. Fan control: Hood-mounted switch, with separate light switch

4. Weatherproof wall cap with backdraft damper and rodent-proof screening

F. Refrigerator/Freezer: Freestanding, automatic defrost, two-door refrigerator with top-mounted freezer, interior cabinet liners.

1. Manufacturer: Beko

2. Color: stainless steel

G. Dishwasher: Built-in, undercounter, automatic dishwasher, sized to replace 24-inch-base cabinet, five wash cycles with hot-air and heat-off drying cycles, polypropylene tub and door liner, nylon-coated sliding dish racks.

1. Manufacturer: Beko

2. Color: Stainless Steel

H. Clothes Washer: Freestanding, front-loading, automatic clothes washer with 4.3-cu. ft. capacity, stainless-steel tub and twelve wash cycles including regular, delicate, and permanent press.

1. Manufacturer: Beko

2. Energy Performance: Qualifies for the EPA/DOE ENERGY STAR product labeling program.

I. Electric Clothes Dryer: Freestanding, front-loading clothes dryer with 7.3-cu. ft. capacity with stainless-steel Interior.

1. Manufacturer: Beko

PART 3 – EXECUTION

3.1 INSTALLATION

A. Built-in Appliances: Securely anchor to supporting cabinetry or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

B. Freestanding Appliances: Place in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

C. Test each item of residential appliances to verify proper operation. Make necessary adjustments.

D. Verify that accessories required have been furnished and installed.

END OF SECTION 11 31 00

CONSTRUCTION SPECIFICATIONS

DIVISION 12 – FURNISHINGS

-

SECTION 12 24 00 - SHADES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Samples.

PART 2 - PRODUCTS

2.1 SHADING FABRIC

A. Manufacturer: IKEA

PART 3 - EXECUTION

3.1 INSTALLATION OF SHADES

END OF SECTION 12 24 00

CONSTRUCTION SPECIFICATIONS

SECTION 12 36 61 - COUNTERTOPS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data

PART 2 - PRODUCTS

2.1 SOLID-SURFACE-MATERIAL COUNTERTOPS

A. Countertops: Porcelanosa Snow White 1100

1. Product Code: S510001184
2. Slab Size: 145" x 30" x 1/2"
3. Snow Series

B. Solid Material

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install countertops according to manufacturer's written directions. Fasten to substrates with adhesive. Align adjacent surfaces. Seal seams and perimeter with mildew-resistant silicone sealant.

1. Seal edges of cutouts in particleboard subtops by saturating with varnish.

B. Install level and plumb to a tolerance of 1/8 inch in 8 feet.

END OF SECTION 12 36 61

CONSTRUCTION SPECIFICATIONS

DIVISION 21 – FIRE SUPPRESSION

SECTION 21 13 13 - WET-PIPE SPRINKLER SYSTEM

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data for valves, sprinklers, specialties, and alarms.
2. Submit sprinkler system drawings identified as "working plans" and calculations according to NFPA 13. Submit required number of sets to authorities having jurisdiction for review, comment, and approval. Include system hydraulic calculations.
3. Submit test reports and certificates as described in NFPA 13.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fire Suppression Systems:

1. Manufacturers, Piping, Valves and Fittings: Sharkbite, Apollo
2. Manufacturers, Fire Suppression Sprinklers: Viking
3. Manufacturers, Alarms, Meters and Gages: Viking, Everbilt
4. Application: Water-based system.
5. Application: Sprinkler system.
6. Sustainable Design: Optimize energy performance.
7. Sustainable Design: Energy efficient equipment and fixtures.
8. Sustainable Design: Commissioning.
9. Type: Fire-suppression sprinkler systems.
 - a. Wet-pipe.
 - b. Sharkbite Model U880W300 Residential concealed pendent sprinkler head.
 1. Viking SIN VK457 (Base Part Number 14694A-X)
 2. Viking Model 135D4MA/W (White cover plate)
10. Components: Sole Sources
 - a. Waterflow alarm.
 1. Viking Model VSRF0100
 - b. Ball valves, check valves, and drain valves.
 1. Apollo Model 4ALF-105-A2F (1" Double check valve assembly)
 2. Sharkbite Model 22463LF (1" Ball valve)
 3. Sharkbite Model 22306-0000LF (1" Ball valve with drain)
 - c. Piping, fittings, and joints.
 1. Sharkbite Model UC260LFA (1" Elbow)
 2. Sharkbite Model UC374LFA (1" Tee)
 3. Sharkbite Model UCF168U (1" PEX x 1/2" FNPT Elbow)
 4. Sharkbite Model UC140LFA (1" Male thread adapter)
11. Components: Suitable for service.
 - a. Pipe hangers and supports.
 - b. Meters and gauges

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATIONS

- A. Install piping free of sags and bends.
- B. Install fittings for changes in direction and branch connections.
- C. Install unions at final connection to each piece of equipment.

CONSTRUCTION SPECIFICATIONS

3.3 SERVICE-ENTRANCE PIPING

- A. Connect sprinkler piping to water-service piping.
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping.

3.4 SPRINKLER PIPING INSTALLATION

- A. Protect piping from earthquake damage as required by NFPA 13.
- B. Install fire-protection service valves supervised-open, located to control sources of water supply except from fire department connections. Where there is more than one control valve, provide permanently marked identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water supply connection. Install backflow preventers in potable-water supply sources.
- D. Install alarm check valves for proper direction of flow, including bypass check valve and retard chamber drain line connection.

3.5 SPRINKLER SCHEDULE

- A. Rooms with Suspended Ceilings: Pendent sprinklers
- B. Wall Mounting: Sidewall sprinklers.
- C. Sprinkler Finishes: White enamel in finished spaces and unfinished spaces. Provide escutcheons in finished and residential spaces.
- D. Install sprinklers in suspended ceilings in center of ceiling panels.

3.6 PIPING SCHEDULE

- A. Use CPVC plastic pipe and fittings and metal-to-plastic transition fittings with solvent-cemented joints.
- B. Install shutoff valve, check valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water service piping.

3.7 TESTING

- A. Flush, test, and inspect sprinkler piping systems according to NFPA 13.

END OF SECTION 21 10 00

CONSTRUCTION SPECIFICATIONS

DIVISION 22 - PLUMBING

-

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
2. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, including operating instructions, list of spare parts and maintenance schedule.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

2.2 PIPE AND FITTINGS

A. PEX Tube and Fittings: ASTM F 877, SDR 9 PEX tubing and ASTM F 1807, metal insert-type fittings with copper or stainless-steel crimp rings.

1. Manifold: ASTM F 877 plastic or corrosion-resistant-metal assembly, with a plastic or corrosion-resistant metal valve for each outlet.

B. Special-Duty Valves:

1. Comply with requirements in Section 220523 "General-Duty Valves for Plumbing Piping" for general-duty metal valves.
2. Comply with requirements in Section 221119 "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.
3. CPVC and Cast Iron and PEX Union Ball Valves: MSS SP-122, with full-port ball, socket detachable end connectors, and pressure rating no less than 125 psig (860 kPa) 73deg F(23 deg C).

C. Transition Fittings: Manufactured piping coupling or specified piping system fitting. Same size as pipes to be joined and pressure rating at least equal to pipes to be joined.

1. Plastic-to-Metal Transition Fittings:

a. Description:

- 1) One end with threaded brass insert and one solvent-cement-socket end.

2. Plastic-to-Metal Transition Unions:

D. Description:

- 1) Brass or stainless-steel threaded end.
- 2) Solvent-cement-joint plastic end.
- 3) Rubber O-ring.
- 4) Union nut.

E. Flexible Connectors: Stainless-steel, corrugated-metal tubing with wire-braid covering. Working-pressure rating a minimum of 100 psig.

2.3 PRESSURE GAGES AND TEST PLUGS

A. Direct-Mounted, Plastic-Case, Dial-Type Pressure Gages:

1. Standard: ASME B40.100.
2. Case: Sealed Solid-front, pressure relief type

B. Test Plug: Corrosion-resistant brass or stainless-steel body with two self-sealing rubber core inserts and

CONSTRUCTION SPECIFICATIONS

gasketed and threaded cap, with extended stem for units to be installed in insulated piping. Minimum pressure and temperature rating 500 psig at 200 deg F (3450 kPa at 93 deg C).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install piping free of sags and bends.
- B. Install fittings for changes in direction and branch connections.
- C. Install unions at final connection to each piece of equipment.
- D. Install domestic water piping with 0.25 percent slope downward toward drain for horizontal piping and plumb for vertical piping.
- E. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- F. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.
 - 1. Install vinyl-coated hangers for PEX piping with the following maximum horizontal spacing and minimum rod Diameters:
 - a. NPS 1 (DN 25) and Smaller: 32 inches (815 mm) with 3/8-inch (10-mm) rod.
 - b. Install hangers for vertical PEX piping every 48 inches (1200 mm).
- G. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump.

3.2 INSPECTING AND CLEANING

- A. Inspect and test piping systems as follows:
 - 1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - 2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or Repaired.

3.3 PIPING SCHEDULE

- A. Aboveground Distribution Piping: PEX piping.

3.4 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
 - 2. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
 - 3. Hot-Water-Piping, Balancing Duty: Calibrated balancing valves.
 - 4. Drain Duty: Hose-end drain valves.
- B. Install gate valves close to main on each branch and riser serving two or more plumbing fixtures or equipment connections and where indicated.
- C. Install gate or ball valves on inlet to each plumbing equipment item, on each supply to each plumbing fixture not having stops on supplies, and elsewhere as indicated.
- D. Install swing check valve on discharge side of each pump and elsewhere as indicated.
- E. Install ball valves in each hot-water circulating loop and discharge side of each pump.

END OF SECTION 22 11 16

CONSTRUCTION SPECIFICATIONS

SECTION 22 11 23 - DOMESTIC WATER PUMPS

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data. For each type of product.

- a. Include certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 DOMESTIC WATER PUMPS

A. Everbilt 1/2 HP Submersible Sump Pump with Tether

- a. Everbilt 18 in. x 22 in. Sump Pump Basin

- B. Description: tethered float switch lets it fit 14 in. or larger basins, discharge flow at 0 ft.: 3800 Gal. per hour

2.3 MOTORS

- A. Comply with NEMA MG 1 unless otherwise indicated.

1. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet (1000 m) above sea Level.

- B. Motor Sizes: 0.5 hp

- C. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 262913 "Enclosed Controllers."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with HI 1.4.

- B. Install pumps with access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.

- C. Support pumps and piping so weight of piping is not supported by pump volute.

- D. Install electrical connections for power, controls, and devices.

- E. Suspend in-line pumps independent from piping. Use continuous-thread hanger rods and vibration isolation hangers. Fabricate brackets or supports as required for pumps.

- F. Connect piping with valves that are at least the same size as piping connecting to pumps.

- G. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.

- H. Install shutoff valve on suction side of pumps.

- I. Install non-slam check valve and throttling valve on discharge side of pumps.

END OF SECTION 22 11 23

CONSTRUCTION SPECIFICATIONS

SECTION 22 12 19 - FACILITY POTABLE WATER STORAGE TANKS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Water tank for supply and storage of domestic water supply systems and fire sprinkler system, completed, including piping and all accessories.

1.2 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit manufacturer's product submittal data and installation instructions.

1.3 COMPLIANCE

A. National Fire Protection Association (NFPA):

1. NFPA 22-08: Water Tanks for Private Fire Protection

2. NFPA 25-08: Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems

B. NSF INTERNATIONAL (NSF):

1. NSF/ANSI 61 (2010) Drinking Water System Components -Health Effects

PART 2 – PRODUCTS

2.1 EXPANSION TANK

A. 1000 Gallon Norwesco Plastic Water Tank.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install tank in accordance with NFPA 22.

B. Set units level, plumb, and true to line, without warp or rack of frames and panels and anchor securely in place.

C. Fasten securely in place, with provisions for thermal and structural movement. Install with concealed fasteners, unless otherwise indicated.

D. Correct deficiencies in or remove and reinstall products that do not comply with requirements.

END OF SECTION 22 12 19

CONSTRUCTION SPECIFICATIONS

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

- A. Minimum Pressure Requirement for Soil, Waste, and Vent: 10-foot head of water (30kPa).
- B. Comply with NSF 14, "Plastic Piping Components and Related Materials," for plastic piping components.

PART 2 – PRODUCTS

2.1 PIPES AND FITTINGS

- A. PVC Plastic, DWV Pipe and Fittings: ASTM D 2665, Schedule 40, plain ends with PVC socket-type, DWV pipe fittings.
 - 1. Adhesive Primer: ASTM F 656.
 - a. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Solvent Cement: ASTM D 2564.
 - a. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Cresline PVC Pipe
 - 1. 2" pipe, ASTM D 1785, Schedule 40.
 - 2. 4" pipe, ASTM D 1785, Schedule 40.
- C. ASTM D 2466, Schedule 40, socket type and npt.

PART 3 – EXECUTION

3.1 PIPING INSTALLATION

- A. Install wall penetration system at each pipe penetration through wall. Make installation watertight.
- B. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- C. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
 - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- D. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- E. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having Jurisdiction.

3.2 PIPE SCHEDULE

- A. Aboveground Applications: Cresline PVC plastic, DWV pipe and fittings with solvent cemented joints.

END OF SECTION 22 13 16

CONSTRUCTION SPECIFICATIONS

SECTION 22 15 53 - FACILITY SEPTIC TANK

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data

PART 2 - PRODUCTS

2.1 SEPTIC TANKS

A. See drawings.

2.2 DISTRIBUTION PIPES AND FITTINGS

A. PVC Sewer Pipe and Fittings: ASTM D 3034, SDR 35, non-perforated, for solvent-cement or elastomeric gasket joints.

B. Solvent Cement: ASTM D 2564.

C. Gaskets: ASTM F 477, elastomeric seal.

PART 3 – EXECUTION

3.1 SEPTIC TANK INSTALLATION

A. Install septic tanks level.

B. Layout PVC piping to proper slope to tank, verify connections are watertight.

END OF SECTION 22 13 53

CONSTRUCTION SPECIFICATIONS

SECTION 22 33 30 - SOLAR WATER HEATING EQUIPMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type and size of domestic-water heater.
2. Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1, Section 7, "Service Water Heating."
 - a. Seismic Qualification Certificates: For commercial domestic-water heaters, accessories, and components, from manufacturer.
3. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Comply with requirements of applicable NSF, AWWA, or FDA and EPA regulatory standards for tasteless and odorless, potable-water-tank linings.
- C. Comply with performance efficiencies prescribed in ASHRAE 90.2, "Energy Efficient Design of New Low-Rise Residential Buildings."

2.2 WATER HEATERS, GENERAL

- A. Insulation: Suitable for operating temperature and required insulating value. Include insulation material that surrounds entire tank except connections and controls.
- B. Anode Rods: Factory installed, magnesium.
- C. Combination Temperature and Pressure Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input and pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into tank.
- D. Drain Valve: Factory installed.

2.3 ELECTRIC WATER HEATERS

- A. Residential, Small-Capacity, Electric, Domestic-Water Heaters:
 1. SunBandit Solar Hybrid Electric Water Heater - 80 gallon tank
- B. Sun Bandit Series 1200-B Inverter

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install temperature and pressure relief valves and extend to closest floor drain.
- B. Install shutoff valves and unions at hot- and cold-water piping connections.
- C. Make piping connections with dielectric fittings where dissimilar piping materials are joined.
- D. Electrically ground units according to authorities having jurisdiction.

END OF SECTION 22 33 00

CONSTRUCTION SPECIFICATIONS

SECTION 22 41 00 - RESIDENTIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide plumbing fixtures and trim.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, including operating instructions, list of spare parts and maintenance schedule.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations.
- B. Standards:
 - 1. Materials, Products, and Installation: ASME B31.9.
 - 2. Plastic Piping Components: NSF 14. C. Compliance: ANSI A117.1 and local regulations. D. Accessibility Requirements: ADAAG and local requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Plumbing Fixtures:
 - 1. Manufacturers: Porcelanosa
 - 2. Application: Return of water from various appliances within the house in question. Secure and safe connection of sections of ABS piping.
 - 3. Sustainable Design: Utility efficient equipment and fixtures.
 - 4. Plumbing Fixtures:
 - a. Water Closets: Suitable for service required.
 - b. Lavatories: Suitable for service required.
 - c. Sinks: Suitable for service required.
 - d. Showers: Enclosure material, receptor material, shower door, fittings.
 - e. Toilet Seats: Compatible with water closet.
 - f. Residential/Light Commercial Faucets: Nonmetal underbody faucets.
 - g. Bath/Shower Pressure Balance Faucets: Single-lever type.
 - h. Bath/Shower Thermostatic Mixing Valve Faucets: Single-lever type.
 - i. Shower Receptors: Acrylic coated fiberglass pan
 - j. Fittings, Except Faucets: Supplies, stops, traps, wastes, and escutcheons.
 - k. Supports: ASME A112.6.1M. I. EXECUTION

3.1 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials in proper relation with adjacent construction and with uniform appearance for exposed work. Coordinate with work of other sections. Comply with applicable regulations and code requirements. Provide proper clearances for servicing.
- B. Support piping properly. Pitch to drain points. Install with pipe expansion loops, mechanical expansion joints, and anchors.
- C. Maintain indicated fire ratings of walls, partitions, ceilings and floors at penetrations. Seal with firestopping to maintain fire rating.
- D. Clearly label and tag all components.
- E. Test and balance all systems for proper operation.
- F. Restore damaged finishes. Clean and protect work from damage.
- G. Instruct Owner's personnel in proper operation of systems.

CONSTRUCTION SPECIFICATIONS

END OF SECTION 22 41 00

DIVISION 23 – HVAC

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SECTION 23 00 00 - HEATING, VENTILATING, AND AIR CONDITIONING

PART 1 - GENERAL

1.1 SUMMARY

A. Provide heating, ventilating, and air conditioning systems.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

B. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, including operating instructions, list of spare parts and maintenance schedule.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Heating, Ventilating, and Air Conditioning:

1. Manufacturer: Parker Sheetmetal

a. Square-to-Round Register Vent Boot

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials in proper relation with adjacent construction and with uniform appearance for exposed work. Coordinate with work of other sections. Comply with applicable regulations and building code requirements.

B. Support piping properly. Pitch to drain points. Install with pipe expansion loops, mechanical expansion joints, and anchors.

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Certified TAB reports.

2. Documentation of work performed per ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

3. Documentation of work performed per ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

B. TAB Firm Qualifications: AABC, NEBB, or TABB certified.

C. TAB Report Forms: Standard TAB contractor's forms approved by Architect.

D. Perform TAB after leakage and pressure tests on air distribution systems have been satisfactorily completed.

C. Install ductwork in accordance with SMACNA recommendations. Seal duct seams with sealer. Provide splitters and balancing dampers. Provide fire dampers and automatic smoke and fire dampers where required. Provide flexible connectors and inlet and discharge connections. Clean before testing and balancing.

D. Clearly label and tag all components.

E. Test and balance all systems for proper operation.

F. Restore damaged finishes. Clean and protect work from damage.

G. Instruct Owner's personnel in proper operation of systems.

H. Zinc-coated steel construction.

I. Use with drop ceilings and wood and metal studs

CONSTRUCTION SPECIFICATIONS

- J. Extend the telescoping arms and nail or screw them in place for quick, easy installation
- K. Foam gasket helps eliminate air leakage with airtight sealing at installation
- L. Pre-drilled pilot holes for quick, easy vent register installation
- M. Dust and debris cover helps keep dust and debris out of your HVAC system
- N. Mud ring helps prevent boot deformation and gaps between the boot and building envelope
- O. Take only one trip up the ladder for ceiling installation, all you have to do is extend the telescoping arms and nail or screw in place

END OF SECTION 23 00 00

CONSTRUCTION SPECIFICATIONS

SECTION 23 00 02 - HVAC DUCTS AND CASINGS

PART 1 – GENERAL

1.1 SUMMARY

A. Provide vapor-compression cycle for refrigerant piping system.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

1.3 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 MATERIALS

A. HVAC Heat Pump

1. Manufacturers: Mitsubishi Mini-Split System.

2. Type: Central HVAC equipment.

a. Packaged outdoor HVAC equipment. PART 3

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to VT4BE-018K installation guide for complete instructions for proper outdoor installation.

B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials in proper relation with adjacent construction and with uniform appearance for exposed work. Coordinate with work of other sections. Comply with applicable regulations and building code requirements.

C. Support piping properly. Pitch to drain points. Install with pipe expansion loops, mechanical expansion joints, and anchors.

D. Install shutoff valves on each piece of equipment on both hot and cold water supply.

E. Install ductwork in accordance with SMACNA recommendations. Seal duct seams with sealer. Provide splitters and balancing dampers. Provide fire dampers and automatic smoke and fire dampers where required. Provide flexible connectors and inlet and discharge connections. Clean before testing and balancing.

F. Clearly label and tag all components.

G. Test and balance all systems for proper operation.

H. Restore damaged finishes. Clean and protect work from damage.

I. Instruct Owner's personnel in proper operation of systems.

END OF SECTION 23 00 02

CONSTRUCTION SPECIFICATIONS

SECTION 23 00 03 - HEAT RECOVERY VENTILATOR

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide heating, ventilating, and air conditioning systems.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, including operating instructions, list of spare parts and maintenance schedule.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Heat Recovery Ventilator
 - 1. Manufacturer: Zehnder ComfoAir 200
 - 2. Application: Provide whole house ventilation
 - 3. Type: Central HVAC equipment.
 - a. Air-to-air energy recovery equipment. PART 3

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Honeywell VNT5150H1000 installation guide for more details.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials in proper relation with adjacent construction and with uniform appearance for exposed work. Coordinate with work of other sections. Comply with applicable regulations and building code requirements.
- C. Support piping properly. Pitch to drain points. Install with pipe expansion loops, mechanical

END OF SECTION 23 00 03

CONSTRUCTION SPECIFICATIONS

DIVISION 26 – ELECTRICAL

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SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70E.

2.2 CONDUCTORS AND CABLES

A. Conductors and Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THW, Type THHN/THWN, or Type XHHW.

B. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for nonmetallic-sheathed cable, Type NM with ground wire.

C. Cable Type NM-B Cable: Comply with UL 719, with Type THHN/THWN conductors complying with UL 83.

D. Cable Type SEU: Comply with UL 854, with Type THHN/THWN conductors complying with UL 83.

E. Cable Type UF-B: Comply with UL 493, with Type THHN/THWN conductors complying with UL 83.

2.3 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 WIRING METHODS

A. Feeders and Branch Circuits: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Service Entrance: Type XHHW-2, single conductors in raceway.

C. Exposed Feeders, Branch Circuits, and Class 1 Control Circuits, Including in Crawlspace: Nonmetallic-sheathed cable, Type NM.

D. Feeders and Branch Circuits Concealed in Ceilings, Walls, Partitions, and Crawlspace: Nonmetallic-sheathed cable, Type NM.

E. Feeders and Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Underground feeder cable, Type UF.

F. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, and strain-relief device at terminations to suit application.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

B. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

C. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire resistance rating of assembly according to Section 078413 "Penetration Firestopping."

D. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

CONSTRUCTION SPECIFICATIONS

- E. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway. Use manufacturer-approved pulling compound or lubricant where necessary.
- F. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- G. Make splices, terminations, and taps that are compatible with conductor material. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors. Install conductor at each outlet, with at least 6 inches (150 mm) of slack.
- H. Identify conductors and cables according to Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections with the assistance of a factory authorized service representative.
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding all critical equipment and services for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters. Cables will be considered defective if they do not pass tests and inspections.
- B. Test and Inspection Reports: Prepare a written report showing procedures used, results complying with requirements, and corrective action taken to achieve compliance.

END OF SECTION 26 05 19

CONSTRUCTION SPECIFICATIONS

SECTION 26 31 00 - PHOTOVOLTAIC PANELS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.
2. Shop Drawings: For photovoltaic (PV) modules.

B. Warranty: Manufacturer agrees to repair or replace components of PV modules that fail in materials or workmanship within specified warranty period of 10 years from date of Substantial Completion.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Comply with the National Electrical Code and applicable local regulations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Nationally Recognized Testing Laboratory Listing: Entire assembly shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for electrical and fire safety, Class C, according to UL 1703.
- B. FM approved for NFPA 70E, Class 1, Division 2, Group C and Group D hazardous locations.

2.2 PHOTOVOLTAIC COLLECTORS

- A. Manufacturer: Panasonic
 1. HIT Panels

2.3 SYSTEM DESCRIPTION

- A. Application: Photovoltaic collectors.
- B. Type: Facility electrical power generating and storing equipment.
 - a. Photovoltaic collectors.
- C. Electrical Standards.
 - a. Code: NFPA 70 National Electrical Code.

2.6 ARRAY CONSTRUCTION

- A. Racking:
 1. Manufacturer: Zilla Racking System

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine roofs, supports, and supporting structures for suitable conditions where PV system will be installed. Do not begin installation until mounting surfaces have been properly prepared.
- B. Install arrays per manufacturer's written instructions.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
 1. Perform tests and inspections with the assistance of a factory-authorized service representative.

END OF SECTION 26 31 00

CONSTRUCTION SPECIFICATIONS

SECTION 26 31 01 - INVERTER

PART 1 - GENERAL

1.1 SUMMARY

A. Convert the direct current from photovoltaic solar panels into a utility frequency alternating current.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

B. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, including operating instructions, list of spare parts and maintenance schedule.

1.3 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. This device complies with Part 15 of the FCC Rules.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Inverter:

1. Manufacturers: Solar Edge

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Comply with applicable regulations and code requirements.

B. Test and balance all systems for proper operation.

C. All electrical installations must be made in accordance with the local and National Electrical Code ANSI/NFPA 70.

D. Before working on the inverter, always disconnect the inverter from all voltage sources.

E. This device may not cause harmful interference.

END OF SECTION 26 31 01

CONSTRUCTION SPECIFICATIONS

SECTION 26 50 00 - LIGHTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data for each luminaire, including lamps.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fixtures, Emergency Lighting Units, Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Exterior luminaires: Comply with UL 1598 and listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
- C. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- D. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

2.3 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

- A. Products
 - 1. Voltage: Suitable for service required.
 - 2. Mounting: Suitable for service required.
 - 3. Lamps: Suitable for service required.
 - 4. Lens: Suitable for service required.
 - 5. External Finish: Suitable for service required.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate ceiling-mounted luminaires with ceiling construction, mechanical work, and security and fire prevention features mounted in ceiling space and on ceiling.
- B. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- C. Comply with NFPA 70 for minimum fixture supports.
- D. Seismic Protection: Luminaire attachments to building walls and ceilings shall comply with seismic criteria in applicable electrical code.
- E. Suspended Lighting Fixture Support: Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
- F. Adjust aimable lighting fixtures to provide required light intensities.

END OF SECTION 26 50 00

CONSTRUCTION SPECIFICATIONS

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

-

SECTION 28 31 00 - FIRE PROTECTION AND ALARM

PART 1 - GENERAL

1.1 DESCRIPTION

A. This specification addresses fire alarm systems installations.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product submittal data and installation instructions, detailed wiring diagrams.

1.3 COMPLIANCE

A. National Fire Protection Association (NFPA):

1. NFPA 70 National Electrical Code
2. NFPA 72 National Fire Alarm Code
3. NFPA 101 Life Safety Code

B. Underwriters Laboratories, Inc. (UL)

PART 2 - PRODUCTS

2.1 SMOKE DETECTORS

A. Combination smoke & carbon monoxide detectors suitable for use.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and test systems according to NFPA 72 and manufacturer's instructions.

END OF SECTION 28 31 00

CONSTRUCTION SPECIFICATIONS

DIVISION 31 – EARTHWORK

-

SECTION 31 66 00 - COMPETITION FOUNDATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Structural Performance: Design, engineer, fabricate, and install foundation system to withstand structural loads required by the U.S. Department of Energy Solar Decathlon Building Code.
- B. Submittals: Product Data

PART 2 - PRODUCTS

2.1 ADJUSTABLE PREFABRICATED STEEL PIERS

- A. Cal Piers
- B. Or approved equivalent.

2.4 FINISHES

- A. Steel Finishes: Cleaned, primed, and painted by manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare ground by cleaning, removing projections, and as otherwise recommended in stand manufacturer's written instructions and DOE Solar Decathlon Building Code foundation provisions.
- B. Set units level, plumb, and true to line, without warp or rack of materials. Adjust products to achieve level foundation within manufacturer's specified minimum and maximum heights. Provide appropriate blocking if necessary.
- C. Fasten stands securely in place, with provisions for thermal and structural movement. Install with concealed fasteners, unless otherwise indicated in drawings. Adjust as needed to integrate stability throughout system.
- D. Separate dissimilar metals and metal products from contact with wood or cementitious materials, by painting each metal surface in area of contact with a bituminous coating or by other permanent separation.
- E. Correct deficiencies in or remove and reinstall products that do not comply with requirements.
- F. Repair, refinish, or replace products damaged during installation, as directed by Architect.
- G. Lubricate hardware and moving parts.
- H. Secure with approved anchoring system.

END OF SECTION 31 66 00