TOYOTA PARK TRANSIT CENTER - PHASE II

The following list of documents comprises Exhibit H- construction Specifications for the project listed above. Where numeric sequence of sections is interrupted, such interruptions are intentional.

The complete Construction Specifications for this project consists of this entire Volume, which must not be separated for any reason. The Architect and Owners disclaim any responsibility for any assumptions made by a contractor or subcontractor who does not receive a complete Volume, including all section listed in the Table of Contents.

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SECTION 07413 METAL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. SECTION INCLUDES

1. Standing-seam metal roof panels, including trim and accessories

2. Metal panels, including fascia, flashing, trim and accessories

3. Gutter and downspouts

4. RELATED SECTIONS

a) Section 05310 - Steel Decking

b) Section 07920 - Joint Sealants

1.2 REFERENCES

A. AISI S-100 – North American Specification for the Design of Cold-Formed Steel Structural Members.

B. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding System by Uniform Static Air Pressure Difference

C. ASTM E1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

D. ASTM B209 - Specification for Aluminum-Alloy Sheet and Plate

E. AISI S-100 – North American Specification for the Design of Cold-Formed Steel Structural Members

F. ASCE-7: American Society of Civil Engineers -Minimum Design Loads for Buildings and Other Structures; version adopted by local Building Code authority having jurisdiction.

G. Factory Mutual 4471 Appendix G - Susceptibility to Leakage Test Procedure for Class 1 Panel Roofs.

H. UL 580 - Tests for Uplift Resistance of Roof Assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Sheet metal roofing system including, but not limited to, metal roof panels, cleats, clips, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, fascia panels, trim, underlayment, and accessories shall comply with requirements indicated without failure due to defective manufacture, fabrication, installation, or other defects in construction. Sheet metal roofing shall remain watertight.

B. Thermal Movements: Provide sheet metal roofing that allows for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient, material surfaces.

C. Solar Reflectance Index: Not less than 29 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meetings:

1. Schedule meeting to discuss metal panel project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements before start of work onsite.

2. Required attendees: Contractor, metal deck & roof installer, and any other subcontractors who have equipment penetrating the metal panel assembly or Work that requires roof access or traffic.

1.5 SUBMITTALS

A. Product Data: Manufacturer literature indicating product specifications, installation instructions, and standard construction details for specified products.

B. Shop Drawings: To be prepared by metal roof system manufacturer. Drawings to distinguish between shop and field-assembled work. Drawings to show panel layout, profiles, components, trim and accessories. Shop Drawings to include the following

1. Submit roof plan and details showing panel layout, profiles, components, accessories, as well as gutters and downspouts as applicable.

2. Submit metal fascia panel shop drawings

3. Submit metal roof flashing, gutter and downspout shop drawings

4. All submittals shall include the following:

a) Indicate layout of metal panels and roof panel sizes, including custom fabricated panels as needed, indicate each trim condition.

b) Include details of each condition of installation, including the locations and types of fasteners, sealants and accessories. Indicate locations, gauges, shapes, and methods of attachment of all panels, accessories and trim.

c) Indicate products/materials required for construction activities of this section not supplied by manufacturer of products of this section.

d) Indicate locations of field applied sealant.

e) Indicate locations of field worked conditions.

5. Panel Attachment:

a) Plan with wind uplift pressure calculations at field, corner and perimeter areas according to version of ASCE-7 referenced by locally-adopted Building Code and the authority having jurisdiction.

b) Plan indication panel clip spacing pattern at field, corner, perimeters and where panels are to be fixed from thermal movement.

c) Panel attachment plan must be stamped by licensed engineer in State in which project is constructed, certifying roof attachment meets local Building Code requirements for wind uplift.

C. Samples:

1. Submit two samples, 12" long, full width panel, showing metal gage, and seam.

2. Two samples each for panel clip, bearing plate and clip fastener.

3. Submit color samples for Architect's selection.

4. Submit sample warranties:

a) Manufacturer Finish Warranty

b) Manufacturer Weathertightness Warranty complying with this Specification

c) Installer Warranty

D. Certificates:

1. Submit panel manufacturer's certification that fasteners, clips, backup plates, closures, roof panels and finishes meet the specification requirements.

2. Submit panel manufacturer's certification that installer meets requirements to install panel system and is qualified to obtain required warranties.

E. Delegated Design Submittals: Submit engineering calculations indicating wind uplift pressure calculations according to local building code and ASTM E1592 for project location with respect to appropriate Importance Factor, Exposure category and Safety Factor. Calculations shall be sealed by a professional engineer licensed to practice structural engineering in the state in which project is located.

1.6 INFORMATIONAL SUBMITTALS

A. Portable Roll-Forming Equipment Certificate: Issued by UL for equipment manufacturer's portable roll-forming equipment capable of producing panels that comply with UL requirements. Show expiration date no earlier than two months after scheduled completion of sheet metal roofing.

1. Submit certificates indicating recertification of equipment whose certification has expired during the construction period.

B. Qualification Data: For qualified Installer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Manual indicating requirements and recommendations, to maintain the roof system, in good working condition.

B. Warranty Documentation: Submit final warranties required in this section.

1.8 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall have a minimum of ten years experience in the manufacturing of metal roof systems similar to those required for this project. Manufacturer must have a current installer training program.

2. Installer Qualifications: Installer ("roofer") to perform the work of

this section, shall have no fewer than 5 years of successful experience with the installation of metal roof systems similar to those required for this project. The installer shall be qualified by the metal panel manufacturer for installation of manufacturer-warranted systems.

B. Pre-installation Conference: Before Starting Roof Decking Construction Conduct conference at Project site.

1. Meet with Pace, Architect, metal panel roofing Installer, and metal deck Installer, and installers whose work interfaces with or affects metal roofing system including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roof decking construction and sheet metal roofing including, but not limited to, items listed for the Pre-installation Conference.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review methods and procedures related to sheet metal roofing installation, including portable roll-forming equipment manufacturer's written instructions.
5. Examine metal deck conditions for compliance with requirements, including flatness and attachment to structural members.
6. Review structural loading limitations of metal deck during and after roofing installation.
7. Review flashings, special roofing details, roof drainage, roof penetrations, and condition of other construction that will affect sheet metal roofing.
8. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
9. Review temporary protection requirements for sheet metal roofing during and after roofing installation.
10. Review roof observation and repair procedures after sheet metal roofing installation.
11. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

C. Field Measurements: Prior to fabrication of panels, take field measurements of structure or substrates to receive panel system. Allow for trimming panel units, where final dimensions cannot be established prior to fabrication.

D. Mock-Ups: Install a 3’0” foot wide, quality control area of metal panel system including both roof and fascia, for review by the Architect. The Architect shall approve the quality of installation for the project, prior to installing additional metal panels.

E. **Roll-Formed Sheet Metal Roofing Fabricator Qualifications: Fabricator authorized by portable roll-forming equipment manufacturer to fabricate and install sheet metal roofing units required for this Project, and who maintains current UL certification of its portable roll-forming equipment.**

F. **UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing roofing panels for sheet metal roofing assemblies that comply with UL 580 for Class 90 wind-uplift resistance. Maintain UL certification of portable roll-forming equipment for duration of sheet metal roofing work.**

G. **Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.**

1.9 DELIVERY, STORAGE AND HANDLING

A. **Delivery and Acceptance Requirements: Deliver panels to jobsite properly packaged to provide protection against transportation damage. Panels too long to ship shall be site formed onto the roof by manufacturer’s factory personnel using manufacturer’s factory roll forming equipment.**

B. **Storage and Handling Requirements:**

1. **Exercise care in unloading, storing and erecting panels to prevent bending, warping, twisting, and surface damage.**

2. **Store all material and accessories above ground on well skidded platforms. Store under waterproof covering. Provide proper ventilation to panels to prevent condensation build-up between each panel.**

3. **Remove from site and replace panels which are damaged, or become water-stained during storage and handling.**

1.10 WARRANTIES

A. **Manufacturer Warranties:**

1. **Panel Material: Furnish manufacturers 25 year warranty covering the panel against rupture, structural failure, or perforation.**

2. **Panel Coating: Furnish manufacturer's 40-year warranty panel coating warranty covering cracking, checking, and peeling, and 30 year warranty covering fade and chalk.**

3. **Metal Weathertightness Warranty:**

   a) Manufacturer’s Single Source Weathertightness Warranty

(1) Warranty term: 20 years commencing on date of substantial completion.

(2) Total manufacturer's liability: NDL No Dollar Limit for material and labor.

(3) Warranty must cover: Wind Speeds up to 75 mph

(a) Manufacturer must supply engineered installation drawings signed and sealed by an engineer registered in the state in which the project is located.

PART 2 - PRODUCTS

2.1 Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to:

1. McElroy Metal.
2. IMETCO.
3. Dimensional Metals, Inc.
4. or equal.

2.1 METAL ROOF SYSTEM

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Product Data

1. Factory-formed panel, width of 24 inches. Panels shall be symmetrical in design and shall be mechanically seamed with a field operated electric seaming machine approved by the manufacturer.

2. Minimum seam height 2-3/8 inches with integral seam. Double lock and snap together type panels are not acceptable

3. Seam cap matching panel finish with two rows of integral factory hot applied sealant. Sealant should not come in contact with clip, and clip should not require sealant to maintain a weathertight condition.

4. Galvalume coated sheet steel, Type AZ-50, Grade 50 as described in ASTM A792; 24 gauge.

5. Finish: Two coat coil applied, baked-on full-strength (70% resin, PVF2) fluorocarbon coating consisting of a nominal 0.25 mil dry film thickness primer, and a nominal dry film thickness of 0.7 - 0.8 mil color coat for a total 0.9 to 1.1 mil total system dry film thickness. Finish to be selected from

manufacturer's standard color selection. The back side of the material should be 0.25 mil primer and 0.25 mil polyester wash coat.

6. **Color: Red- selected by Architect and Pace from manufacturer's full range.**

7. **Panel surface characteristics to be Striated**

8. **Panel system must allow individual panel removal and replacement from any point on the roof without damage to adjacent roof panel(s).**

9. **Panels must be furnished and installed in continuous lengths from ridge to eave with no overlaps. Panels too long to ship will be manufactured on site using manufacturer's employees and equipment.**

10. **Manufacturer weathertightness warranty meeting requirements of this Section.**

11. **Roof panel system must be approved by manufacturer to be installed on slopes as low as 1/2:12.**

2.2 METAL FASCIA SYSTEM

1. **Galvalume coated sheet steel, Type AZ-50, Grade 50 as described in ASTM A792; 24 gauge.**

2. **Finish: Two coat coil applied, baked-on full-strength (70% resin, PVF2) fluorocarbon coating consisting of a nominal 0.25 mil dry film thickness primer, and a nominal dry film thickness of 0.7 - 0.8 mil color coat for a total 0.9 to 1.1 mil total system dry film thickness. Finish to be selected from manufacturer's standard color selection. The back side of the material should be 0.25 mil primer and 0.25 mil polyester wash coat.**

3. **Color: Red- selected by Architect and Pace from manufacturer's full range.**

4. **Panel surface characteristics to be Striated**

2.3 METAL GUTTER AND DOWNSPOUT

1. **Galvalume coated sheet steel, Type AZ-50, Grade 50 as described in ASTM A792; 24 gauge.**

2. **Finish: Two coat coil applied, baked-on full-strength (70% resin, PVF2) fluorocarbon coating consisting of a nominal 0.25 mil dry film thickness primer, and a nominal dry film thickness of 0.7 - 0.8 mil color coat for a total 0.9 to 1.1 mil total system dry film thickness. Finish to be selected from manufacturer's standard color selection. The back side of the material should be 0.25 mil primer and 0.25 mil polyester wash coat.**

3. Color: Red- selected by Architect and Pace from manufacturer's full range.

4. Box Gutter profile with a minimum depth of 6 inches with a continuous length.

5. Rectangular downspout 3 by 4 inches

6. Provide mitered corners, lapped, sealed and riveted. Lap joint and sealant where connecting to continuous gutter.

2.4 PERFORMANCE/DESIGN CRITERIA

A. Thermal Movement: Metal Roofing system, including flashing, shall accommodate unlimited thermal movement without buckling or excess stress on the structure.

B. Panel and trim attachments will be designed to satisfy the requirements of the design (shown in shop drawings).

C. Maximum wind uplift capacity of roof system shall be determined using ASTM E 1592 test results, with an appropriate Factor of Safety in accordance with AISI S-100.

D. Panel system shall be designed in accordance with the local building code and ASCE7 for project location with respect to appropriate Exposure category, Importance Factor and Factor of Safety in accordance with AISI S-100.

E. Tested and listed by Underwriters Laboratories to comply with UL 580 for wind uplift Class 90 rating.

2.5 UNDERLAYMENT MATERIALS

A. Felts: ASTM D 226, Type II No. 30, asphalt-saturated organic felts.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a) Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
    b) Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
    c) Henry Company; Blueskin PE200 HT.
    d) Metal-Fab Manufacturing, LLC; MetShield.
    e) Owens Corning; WeatherLock Metal High-Temperature Underlayment.
    f) or equal.

2.6 ACCESSORIES

A. Panel Clip Screw - screw required in wind uplift rating requirements and design specification for application, with corrosion-resistant coating, in length necessary to penetrate substrate minimum 3/4 inch., as supplied by metal panel manufacturer.

B. Panel Clip:

1. Intermittent Clip: 16 gauge galvanized steel, one-piece, designed to allow panel thermal movement and not contact panel cap, as supplied by panel manufacturer, meeting wind uplift requirements and design criteria of this section.

2. Multi-Span Clip: as provided by panel manufacturer for full assembly warranted systems.

C. Trim and flashing will be of the same gauge and finish.

1. Ridge closures, consisting of metal channel surrounding factory precut closed cell foam, will not be secured through the field of the panel.

2. Trim will be installed specifically as displayed in the manufacturer provided shop drawings. Proposed changes must be approved in writing by the metal panel system manufacturer.

D. Concealed supports, angles, plates, accessories and brackets: gauge and finish as recommended, and furnished by manufacturer.

E. Accessory Screw: Size and screw type as provided by panel manufacturer for each use, with prefinished hex washer head in color to match panels where exposed to view.

F. Rivets: full stainless steel, including mandrel, in size to match application.

G. Field Sealant:

1. Exposed Sealant: Color coordinated urethane or polymer sealant as supplied by panel manufacturer.

2. Non-exposed Sealant: Non-curing, non-skinning, butyl tape or tube sealant as supplied by manufacturer.

H. Sealant Tape: non-drying, 100 percent solids, high grade butyl tape, as supplied by panel manufacturer, in sizes to match application.

I. Pipe Penetration Flashings: 20 year warranted flexible boot type, with stainless steel compression ring. Use silicone type at hot pipes.

PART 3 - EXECUTION

3.1 INSTALLERS

A. Must be certified and qualified by Manufacturer.

3.2 EXAMINATION

A. Verification of Conditions

1. Ensure surfaces are ready for panel application.

2. Inspect and ensure surfaces are free from objectionable warp, wave, and buckle before proceeding with installation of pre-formed metal roofing.

3. Ensure substrate is ready to receive metal roofing. Report items for correction and do not proceed with metal roof panel system installation until resolved.

3.3 PREPARATION

A. Install substrate boards, hat channels, purlins, or furring channels in accordance with manufacturer’s recommendations.

B. Coordinate Work, with installation of other associated Work, to ensure quality application.

C. Coordinate Work with installation of associated metal flashings and building walls.

D. Coordinate Work to minimize foot traffic and construction activity on installed finished surfaces.

E. Coordinate location of pipe penetrations to allow centering of pipe in panel.

3.4 INSTALLATION

A. Comply with and install roofing and flashings in accordance with all details shown on manufacturer’s approved shop drawings and manufacturer's product data, instructions, and installation manuals, within specified erection tolerances.

B. Install field panels in continuous lengths, without endlaps

C. Do not install panels damaged by shipment or handling.

D. Fix panels at location depicted on reviewed shop drawing(s).

E. Fold up pan of panel at ridge, hip and headwalls. Commonly referred to as breadpanning.

F. Allow for required panel clearance at penetrations for thermal movement.

G. Install concealed supports, angles and brackets as furnished by manufacturer to form complete assemblies.

H. Remove panel and flashing protective film prior to extended exposure to sunlight, heat, and other weather elements.

I. Field-apply sealant tape and gun-grade sealant according to reviewed shop drawings and manufacturer's requirements for airtight, watertight installation.

J. Ensure sealant beads and tapes are applied prior to sheet metal installation to achieve a concealed bead. Neatly trim exposed portions of sealant without damaging roof panel or flashing finish.

K. Align pipe penetrations to occur at center of roof panel. Report and have corrected improperly-placed penetrations before proceeding with panel installation. Remove and replace roof panels which have improperly-placed penetration flashings.

L. Install sheet metal flashings according to manufacturer's recommendations, reviewed shop drawings and in accordance with provision of Section 07 62 00.

3.5 CLEANING

A. Clean exposed surfaces of work promptly after completion of installation.

B. Clean mud, dirt, and construction-related debris from panels before panels are scratched or marred.

3.6 PROTECTION

A. Protect Work as required to ensure roofing will be without damage at time of final completion.

B. Do not allow excessive foot traffic over finished surfaces.

C. Do not track mud, dirt, or construction-related debris onto panel surfaces.

D. Replace damaged Work before final completion.

END OF SECTION 07413

SECTION 08451- PLASTIC GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Polycarbonate panel system.

1.2 REFERENCES

A. ASTM E 84 - Surface Burning Characteristics of Building Materials.

B. ASTM D 635 - Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.

C. ASTM D 1929 – Ignition Temperature of Plastics.

D. ASTM D 2843 – Density of Smoke.

1.3 WORK INCLUDED:

A. Design, Engineer, Manufacture and Installation of translucent insulating single panel glazing system. An assembly of extruded celled polycarbonate glazing panels incorporated into a complete aluminum framed system that has been tested and warranted by the manufacturer as a single source system.

B. All anchors, brackets, and hardware attachments necessary to complete the specified structural assembly, weather-ability and water-tightness performance requirements. All flashing up to but not penetrating adjoining work are also required as part of the system and shall be included.

C. Trained and factory authorized labor with supervision to complete the entire panel installation.

1.4 DESIGN REQUIREMENTS

A. Basic Wind Speed: 90 mph.

B. Maximum Allowable Deflection of Structural Members: Live Load of L/360 and a Total Load of L/240

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's product data, including materials,

components, fabrication, finish and installation instructions.

C. Shop Drawings: Submit manufacturer's shop drawings, including plans, elevations, sections, and details, indicating dimensions, tolerances, profiles, anchorage, connections, fasteners, hardware, provisions for expansion and contraction, drainage, flashing, finish, and attachments to supports of glazing, framing, and options.

D. Samples: Submit manufacturer's samples for each panel type, framing system, finish, and color specified.

E. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

F. Manufacturer's Project References: Submit list of completed projects including project name and location, name of architect, and type of panel manufactured.

G. Manufacturer's Warranty: Submit manufacturer's sample standard warranty which includes requirements list in this specification 08451.

H. Testing Reports: Submit manufacturer's test reports. They shall include:
   a. Self-Ignition Temperature per ASTM 1929-3
   b. Smoke Density per ASTM D-2843
   c. Burning Extent per ASTM D-635
   d. Interior Flame Spread per ASTM E-84
   e. Color Difference per ASTM D-2244-85
   f. Weathering ASTM D-4364
   g. Weathering Evaluation before and after 25 minute exposure to 300□F, for Light Transmission and Color Change, per ASTM E-1175, ASTM D-2244
   h. Impact loading per ASTM E 695
   i. Visible light Transmission (VT) per ASTM E972 & ASTM E1084
   j. Water Penetration per AAMA 501.2
   k. Uniform load per (ASTM E-330) cyclic wind load per ASTM 1886 & ASTM E 1996

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
   1. Continuously engaged in polycarbonate panel manufacturing with a minimum of 10 years successful experience.
   2. Able to demonstrate successful performance on comparable projects.
   3. Responsible for all components, including structural design.

B. Installer's Qualifications:
   1. Authorized by manufacturer to install polycarbonate panel products.
   2. Trained by manufacturer's standard training methods and policies.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, and location of installation.

B. Storage:
   1. Store materials in a clean, dry area indoors in accordance with manufacturer's instructions.
   2. Keep temporary protective coverings in place.
   3. Do not expose panels to direct sunlight for extended periods.

1.8 MANUFACTURER'S WARRANTY

A. Warranty Period: Ten years material and labor on weatherization starting on date of substantial completion.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. The basis of design for this system is Pentaglas10 as manufactured by CPI Daylighting, Inc., Phone: (800) 759-6985, Fax (847) 816-0425; www.cpidaylighting.com

B. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to:
   a. CPI Daylighting
   b. Duo-Gard Industries Inc.
   c. Solar Innovations
   d. Extech
   e. CO-EX Corporation
   f. Solutions in Polycarbonate, LLC
   g. or equal.

2.2 SYSTEM

A. Product: Base plate, pressure plate and cap system glazed with polycarbonate structured sheet. System to allow for polycarbonate sheet removal and reinstallation for maintenance without detrimental impact on the system performance. Glass fiber reinforced thermoset resin (fiberglass) faces are not acceptable.

a. Air Infiltration, ASTM E 283-04 2012: Leakage not to exceed 0.05 when tested at 1.57 PSF and not to exceed 0.07 when tested at 6.24 PSF.

b. Water Penetrations, ASTM E 331 and E547– 2009: No water leakage at 7.5 PSF.
c. Air Pressure Difference: ASTM E330-02 2010 No damage at 75 PSF.
d. Impact Testing:
    i. Small Missile, ASTM 1886.
    ii. Windborne Debris, ASTM 1996.

2.3 POLYCARBONATE PANEL

A. Sheet Thicknesses: between 10-20 mm, depending on individual manufacturer's system as designed and warranted by the manufacturer for use indicated within this scope of work.

B. Profile / Appearance: Standing Seam with upstands and battens to the interior (flush look from exterior)

C. Translucent Panel Joint System
    a) Panel shall be extruded in one single formable length. Transverse connections are not acceptable.
    b) The panels should be manufactured with grip-lock tooth up stands that are integral to the unit. The up stands shall be 90 degrees to the panel face (standing seam dry glazed concept). Welding or gluing of up stands or standing seam is not acceptable.
    c) The U battens can be either aluminum or celled polycarbonate and shall have a grip-lock tooth locking mechanism to ensure maximum uplift capability.
    d) System and attachment method to building structure must be tested to meet a wind uplift standard of 90 psf. per ASTM E330
    e) Water Penetration: No water penetration of the panel U joint connection length at test pressure of 6.24 PSF per ASTM E-331
    f) Free movement of the panels shall be allowed to occur without damage to the weather tightness of the completed system.

D. Color: Saturated Red to match Architect's control sample and Opal/White, as specified on drawings.

E. U-Value, ASTM C 1363-2011: 0.28

F. Light Transmission:
    a. NFRC 202-2012 Visible Transmittance at Normal Incidence: 30% (opal).

G. Fire Tests:
    1. Flame Spread, ASTM E 84: Class A.
    2. Smoke Density, ASTM E 84: Class A.
    3. Smoke Developed, ASTM D 635: CC1.
    4. Ignition Temperature, ASTM D1929.
    5. Density of smoke, ASTM D 2843.

H. Sheet widths: 19.7 inches, up to 24 inches

2.4 STRUCTURAL FRAMING SYSTEM

A. Framing System: Base plate, pressure plate and cap system.
   1. Alloy: 6063 T5.

B. Combined Maximum Deflection: The structural framing with polycarbonate glazing installed shall have a deflection not greater than a Live Load of L/360 and a Total Load of L/240

C. Provide aluminum framing as indicated in the Drawings.

D. Glazing system required 6 feet (vertical) without additional support.

E. Air Infiltration, ASTM E 283-1999: Leakage not to exceed 0.05 when tested at 1.57 PSF and not to exceed 0.07 when tested at 6.24 PSF.

F. Water Penetrations, ASTM E 331 – 2000: No water leakage at 30 PSF.

2.5 MATERIALS

A. Glazing Panels:
   1. Panels: Polycarbonate structured sheets.
   2. UV Stabilization: Coextruded into panels, not coated.
   3. Resist Yellowing: Maximum 10 delta for a minimum of 10 years.
   4. Sheet Appearance: Uniform in color.
   5. Expansion and Contraction: Design and install components with provisions for expansion and contraction due to a 120 degree F temperature variation.
   6. Gaskets and Dry Seals: EPDM.

B. Joint Sealant:
   1. Factory-Applied Sealant: Gunnable, nonhardening, elastomeric sealant. ASTM C 920, Type S, Class 12, Grade NS. Fed Spec TT-S-1657, Type 1.n.

C. Field Fasteners:
   1. Comply with manufacturer's instructions for fastener types, quantities, and usage.
   2. Cadmium-plated or better. Prevent oxidation or electrolytic interaction with framing.
   3. Aluminum-to-Aluminum Connections: Self-drilling screws, No. 10 and No. 12, of sufficient length for full-thread engagement, as determined by manufacturer.

2.6 COLOR AND FINISH

A. Panel Color:
   1. Saturated Red and Opal, as specified on drawings to match Architect's control sample

B. Aluminum Finish:
   1. Clear anodized with 5 year warranty for the finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive polycarbonate panels. Notify Architect and/or Pace of conditions that would adversely affect installation or subsequent utilization of polycarbonate panel system. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Ensure supports to receive polycarbonate panels are clean, flat, level, plumb, square, accurately aligned, and correctly located.

3.3 INSTALLATION

A. Install polycarbonate panels in accordance with manufacturer's instructions at locations indicated on the drawings.

B. Install polycarbonate panels level, plumb, square, accurately aligned, correctly located, and without warp.

C. Anchor polycarbonate panels securely in place to supports. Use attachment methods permitting adjustment for construction tolerances, irregularities, alignment, and expansion and contraction.

D. Install polycarbonate panels including flashing, fasteners, hardware, gaskets, joint sealants, and glazing materials required for a complete, weathertight installation.

F. Joint Sealants: Install a one part, low modulus, waterborne acrylic co-polymer joint as specified by manufacturer.

G. Repair minor damages to metal finish or glazing in accordance with manufacturer's instructions and as approved by Architect and/or Pace. Remove and replace damaged components that cannot be successfully repaired as determined by Architect and/or Pace.

3.4 CLEANING

A. Clean polycarbonate panels in accordance with manufacturer's instructions.

B. Remove temporary protective coverings immediately after each panel is installed (exterior).

C. Remove excess joint sealant in accordance with sealant manufacturer's instructions.

D. Do not use harsh cleaning materials or methods that would damage metal finish or glazing.

3.5 PROTECTION

A. Protect installed polycarbonate panels from damage during construction.

B. Remove and replace damaged polycarbonate panel components as determined by Architect and/or Pace.

END OF SECTION 08451

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SECTION 09670 - FLUID APPLIED FLOOR FINISH

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Epoxy Primer

B. Prepigmented Epoxy Resin Binder

C. High Solids UV Stable Urethane Topcoat

1.2 REFERENCES

A. ASTM C 307 - Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.

B. ASTM C 413 - Absorption of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings.

C. ASTM C 579 - Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

D. ASTM D 696 - Coefficient of Linear Thermal Expansion of Plastics.

E. ASTM D-790 – Flexural Strength/Flexural Modulus of Elasticity

F. ASTM D-1644 – Determination of Solids Content

G. ASTM D-1044 – Abrasion Resistance by Tabor Abrasor

H. ASTM D 2240 - Rubber Property - Durometer Hardness.

I. ASTM D 4258 - Surface Cleaning Concrete for Coating.

J. ASTM D 4259 - Abrading Concrete.

K. ASTM C-413 - Water Absorption

L. ICRI Guideline 03732 – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data, including physical properties, environmental site condition requirement for installation, and colors available.

B. Applicator qualifications.

C. Maintenance Instructions: Submit manufacturer's maintenance instructions, including maintenance procedures and materials, procedures for stain removal and surface repair, and recommended schedule for cleaning.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Applicator: Use applicator experienced in application of specified materials for a minimum of five (5) years on projects of similar size and complexity. Provide list of completed projects including project name and location, name of architect, name of material manufacturer, and approximate quantity of materials applied.
   2. Applicator's Personnel: Employ only persons trained for application of specified materials.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, batch or lot number, and date of manufacture. Do not store in direct sunlight or high heat conditions.

B. Storage:
   1. Store materials in accordance with manufacturer's instructions.
   2. Keep containers sealed until ready for use.
   3. Do not subject material to excessive heat or freezing; do not apply material that has been subjected to excessive heat or freezing. Material subjected to excessive heat or freezing shall be separated from inventory and destroyed by mixing all three components. The solid reacted product shall be disposed of in environmentally sound and regulatory compliant manner.
   4. Shelf life: one (1) year after date of manufacture, in unopened containers, under normal conditions.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

D. Condition materials for use to 60º – 85ºF (15º - 30ºC) for 24 hours prior to application, or if more stringent as required by the Manufacturer's written requirements.

1.6 SITE CONDITIONS

A. Do not apply materials if floor or air temperature is below 60ºF (15ºC), or if more stringent as required by the Manufacturer's written requirements.

B. Do not apply materials if relative humidity is above 85 percent or within 5º of dew point at time of application, or if more stringent as required by the Manufacturer's written requirements.

C. Maintain room temperature between 60º – 85ºF (15º - 30ºC) for 48 hours before, during and 48 hours after installation, or until cured, or if more stringent range as required by the Manufacturer's written requirements.

D. At the time of application ensure the minimum substrate temperature is above 60°F (15°C) and the substrate temperature is 5°F (3°C) above the measured dew point at the time of application, or if more stringent as required by the Manufacturer's written requirements

E. Erect suitable barriers and post legible signs at points of entry to prevent traffic and trades from entering the work area during application and cure period of the floor.

F. Condition of concrete slab (moisture content, cure time, finish, etc.) must be compliant with floor

system manufactures written requirements.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Acceptable manufacturer's system include; Sika Corporation Industrial Flooring "Sikafloor Quartzite", Dur-A-Flex "Dur-A-Quartz, or Equal.

2.2 SYSTEM

A. Description: Resinous flooring system is a seamless, aesthetic, broadcast and sealed epoxy floor, composed of multicolored quartz aggregates finished with transparent top coats applied between 56 – 70 mils thick. System to include a coved wall base per manufacturer's standard details.

2.3 MATERIALS

A. Epoxy Primer

1. Minimum 50 % solids, low modulus, low viscosity, penetrating epoxy primer for concrete.
2. Bond Strength ASTM D-4541 >400 psi (2.76 MPa) (100% concrete failure)

B. Epoxy Body Coat

1. Description: 100% solids, epoxy.
2. Hardness ASTM D-2240 >76 (Shore D)
3. Tensile Strength ASTM D-638 >2900 psi
4. Compressive Strength ASTM D-695 >7,250 psi)
5. Flammability ASTM D-635 Film is Self Extinguishing

C. High Traffic System Urethane Topcoat

1. Hardness (Pencil) ASTM D-3363 3H
2. Bond Strength 100% concrete failure
3. Tensile Strength ASTM D 2370 >2882 psi (55.8 MPa)
6. Abrasion Resistance ASTM D-4060 < 20 mg loss (CS-17 wheel, 1000 cycles, 1000 gm load) Taber Abraser

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive material. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected. Do not apply to substrate treatments for moisture, repair, or leveling not of the same Manufacturer.

B. Conduct quantitative moisture testing in accordance with ASTM-F2659-10 utilizing Tramex type impedance moisture meter. Maximum acceptable test result is 4%. If in excess of stated value, provide flooring manufacturer's recommended sealers in number of coats as recommended by manufacturer to meet manufacturer's requirements.

C. Do not apply material to sand-cement setting beds, regardless of condition. Sand-cement beds shall be removed to structural concrete substrate and re-leveled/sloped as necessary to achieve grade and/or adequate drainage.

D. Do not apply to asphaltic or bitumen membranes, soft wood, aluminum, copper or fiberglass reinforced polyester/vinyl ester composites.

E. Application to glazed or vitrified brick and tile, structural wood, or steel shall be approved only with the Manufacturer's written recommendation

3.2 SURFACE PREPARATION

A. Prepare concrete surfaces in accordance with manufacturer's instructions and ASTM D 4258.

B. Remove dirt, oil, grease, wax, laitance, curing compounds, water-soluble concrete hardeners, and other surface contaminants.

C. Remove sealers, finishes, and paints.

D. Remove unsound concrete by scarifying, sand blasting, shot blasting, or high pressure water blasting.

E. Chemical Surface Preparation:

1. Chemical surface preparation (acid etching) is unacceptable and will void Manufacturer's warranty.

F. Mechanical Surface Preparation:

1. Mechanically abrade concrete surface in accordance with manufacturer's instructions.
2. Leave concrete surface with an aggressive texture.
3. Remove concrete dust.
4. Conform to ASTM D-4259.
5. Surface profile shall conform to IRCI Guideline 03732 CSP 3, minimum.

3.3 CONTROL JOINTS, CRACKS

A. Provide repair and treatment of control joints and surface cracks utilizing manufacturer's standard materials and installation details.

3.4 APPLICATION

A. Repair concrete substrate as required using flooring Manufacture's cementious repair/resurfacer in accordance with Manufacturer's instructions.

B. Do not add thinners to materials. No thinners shall be approved or allowed.

C. Provide coverage rates in accordance with published manufacture data sheets.

D. Finish surface to be smooth, with uniform texture, free of surface defects, and without porous areas.

E. Follow Manufacturer's recommendations on terminations and connections to walls, drains, doorways, columns and floor-to-floor transitions.

3.4 CLEANUP

A. Remove masking, draping, and other protection from adjacent surfaces.

B. Remove remaining materials and debris from job site and dispose of them in according with local rules and regulations. Leave area in clean condition free of debris.

3.5 PROTECTION

A. Protect floor resurfacer during curing from traffic and chemical spillage. For minimum periods, based on air temperature of 73ºF/23ºC, as noted or if more stringent per Manufacturer's requirements:

1. Foot Traffic: 12 to 16 hours.
2. Medium Wheeled Load 24 hours.
3. Full Cure: 72 hours

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