SECTION 13120

PRE-ENGINEERED STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

A. Provide pre-engineered, shop-fabricated metal building components and accessories as shown on the Drawings and as specified herein, and erect pre-engineered structures on-site.
   1. The portion of the work covered by this Section shall be executed on a Design-Build basis. The Pre-Engineered Building manufacturer shall be responsible to provide all shop drawings, calculations, and data necessary to obtain building permits from the authorizing agency and to illustrate the design, fabrication, and erection of the Work.
   2. The Drawings provided by the Architect and his Engineers are to illustrate design intent only for the purposes of aesthetics and function. All means and methods pertaining to the Work are the responsibility of the Manufacturer.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary conditions, and Sections in Division 1 of these Specifications.
   2. Section 01410: Testing and Laboratory Services.
   3. Division 3 - Concrete
   4. Section 09900 - Painting

C. Codes: Materials and work shall conform to the governing Building Code. In case of conflict between these specifications, the standard specifications, and the Building Code, the more stringent shall govern.

1.02 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Product data: Within 60 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Sufficient technical data to demonstrate compliance with the specified requirements;
   2. Complete Shop Drawings and structural calculations showing all members, panels, accessories, proposed cuts, connections, holes, and similar data. Drawings and calculations shall be stamped and sealed by a professional engineer licensed to practice in the state of California.
   3. Material samples showing profile, finish, and color of factory-finished panels and accessories.
   4. Manufacturers catalog of factory colors for selection.
   5. Fabricators and Erectors Qualifications and Certifications.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the

specified requirements and the methods needed for proper performance of the work of this Section.

B. In addition to complying with pertinent codes and regulations, comply with:
   1. AISC "Specifications for Structural Steel Buildings";
   2. AISC "Code of Standard Practice";
   3. AISC "Specifications for the Design of Cold Formed Steel Structural Members";
   4. AISI "North American Specification for the Design of Cold-Formed Steel Structural Members".

C. Building shall be produced in a manufacturing facility that is certified by the American Institute of Steel Construction – Category MB.

D. All drawings shall carry the stamp of a California-registered professional engineer.

E. The design-build contractor shall be responsible for designing to meet 2007 CBC requirements and obtaining plan check and building permits for these structures from the authorizing agency.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 01600.

B. Delivery and storage:
   1. Delivery materials to the job site properly marked to identify the location for which they are intended.
   2. Use markings corresponding to markings shown on the approved Shop Drawings.
   3. Store in a manner to maintain identification and prevent damage, off the ground, using pallets or other supports, and to permit easy access for inspection.

1.05 WARRANTY

A. Manufacturer shall warranty installed system for the periods described herein, starting from Date of Substantial Completion against all the conditions indicated below. When notified in writing from the Owner, manufacturer/installer shall, promptly and without inconvenience and cost to Owner, correct said deficiencies.
   1. Materials and Workmanship Warranty: 1 year
   2. Finish Warranty:
      a. Finish coatings shall not peel, blister, chip, crack or check, and shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D659.
      b. Finish coating shall not change color or fade in excess of 5 NBS units as determined by ASTM D2244. Panel finish: 20 years.
   3. Performance Warranty: Furnish written warranty, stating sheet metal roofing system and flashing under this Section will be maintained in watertight condition, and that defects resulting from the following items will be corrected without cost to Owner for a period of 20 years
      a. Defective materials including sealants and fasteners.
      b. Water infiltration.

PART 2 - PRODUCTS

2.01 MAINTENANCE BUILDING

A. General:

1. The building structure shall be a clear-spanning rigid steel frame with tapered or straight columns and roof beams, or similar structural system designed to achieve the design parameters shown on the Drawings. Provide corrugated sectional roof and wall panels. Building dimensions shall be as shown on the Drawings.
2. A single manufacturer shall supply all members, panels, fasteners, braces, clips, seals, and accessories to make a complete and weathertight building as shown on Drawings.
3. Foundations shall be designed by the project engineer and not by the building manufacturer, but the manufacturer shall provide the following for the engineer's use in finalizing the foundation design:
   a. All reactions and loads for the proper design of foundations.
   b. Anchor bolt diameter, layout drawings, and connection details.

B. Structure:

1. Primary frames shall consist of welded-up plate section columns and beams complete with necessary splice plates for bolted field assembly. Endwalls shall be cold-formed channel members or welded-up plate sections.
   a. All plates shall be factory welded into place and have the necessary connection holes shop fabricated.
   b. Columns and roof beams shall be fabricated complete with holes in webs and flanges for the attachment of secondary structural members and bracing except for fieldwork as noted on manufacturer's erection drawings.
2. Secondary structural members shall consist of "Z" shaped purlins and girts of precision roll-formed galvanized steel in gauges required to meet the designed loading conditions.
   a. Purlins and girts shall be provided with factory-punched holes as required for panel connection and connection to primary frame members.
3. Manufacturer shall provide required bracing for structural bays in the form of hot-rolled rod of size indicated on shop drawings, with attachments to columns and beams as necessary.
4. All bolts for field assembly of frame members shall be ASTM A325 high strength bolts.
5. Structural members shall be welded by qualified personnel according to the requirements of the American Welding Society D1.1-2006 – Structural Welding Code – Steel and AWS D1.3-1998 – Structural Welding Code – Sheet Steel.
   a. Certification of welder qualification shall be supplied upon request.
6. All structural steel shall be prime painted with one coat of gray, water reducible, alkyd primer paint as temporary protection against ordinary atmospheric conditions. Subsequent finish painting, if required, shall be performed in the field per the Drawings.

C. Roof Panels:

1. Provide 24 ga. corrugated (ribbed) steel roof panels. The panels shall be roll-formed, with a coverage width no less than 24" and no greater than 36."
2. Roof panels shall have major corrugations on the long sides of the panels and at regular intervals between. Minor corrugations shall be provided between the major corrugations as required to provide additional rigidity and stability to the panels.
3. The major corrugations along the sides of the panel shall be formed to overlap, each panel over the next. The corrugation which is to be overlapped by the next panel shall be formed with a continuous length sealant groove.
4. Where end laps are required, the panel end laps shall be 6"
   a. Panels shall be of maximum length, so as to minimize panel end laps. Panel end laps shall be factory punched or field drilled (top panel with a round hole and bottom panel with a slotted hole) to provide for expansion and contraction and panel alignment.
   b. Where end laps are required, the panels shall be engineered to allow the lap to occur over and be fastened to a secondary structural member.
5. Roof panels shall be factory punched or field drilled at panel ends to match factory punched or field drilled holes in structural members to assure proper alignment. Upper end of panels will have 3/4" long slots to provide for expansion and contraction of the panels.
6. Roof panels shall be 24 ga. galvanized steel factory finished with exterior colors of a full strength, 70% Kynar 500 or Hylar 5000 fluoropolymer coating. Manufacturer shall warrant that coating shall not peel, crack, or chip for 25 years and will not fade more than 5 color difference units per ASTM D2244. Architect shall select color from manufacturer's catalog of standard colors.

D. Wall Panels:
1. Provide 24 ga. corrugated (ribbed) steel wall panels. The panels shall be roll-formed, with a coverage width no less than 24" and no greater than 36"
2. Wall panels shall have major corrugations on the long sides of the panels and at regular intervals between. Minor corrugations shall be provided between the major corrugations as required to provide additional rigidity and stability to the panels.
3. The major corrugations along the sides of the panel shall be formed to overlap, each panel over the next. The corrugation which is to be overlapped by the next panel shall be formed with a continuous length sealant groove.
4. Each wall panel shall be a single piece from top to bottom. No end lapping of wall panels shall be permitted.
5. Wall panels shall be factory punched or field drilled at ends and shall match factory punched or drilled holes in framing members for proper alignment.
6. Wall panels shall be 24 ga. galvanized steel factory finished with exterior colors of a full strength, 70% Kynar 500 or Hylar 5000 fluoropolymer coating. Manufacturer shall warrant that coating shall not peel, crack or chip for 25 years and will not fade more than 5 color difference units per ASTM D2244. Architect shall select color from manufacturer's catalog of standard colors.

2.02 SHADE STRUCTURES

A. General:
1. The shade structures shall be clear-spanning rigid steel frames with tapered or straight columns and roof beams, or similar structural system designed to achieve the design parameters shown on the Drawings. Provide corrugated sectional roof and wall panels. Structure dimensions shall be as shown on the Drawings.

2. A single manufacturer shall supply all members, panels, fasteners, braces, clips, seals, and accessories to make a complete and weathertight shade canopy structure as shown on Drawings.
3. Foundations shall be designed by the project engineer and not by the building manufacturer, but the manufacturer shall provide the following for the engineer's use in finalizing the foundation design:
   a. All reactions and loads for the proper design of foundations.
   b. Anchor bolt diameter, layout drawings, and connection details.

B. Structure:
1. Primary frames shall consist of welded-up plate section columns and beams complete with necessary splice plates for bolted field assembly.
   a. All plates shall be factory welded into place and have the necessary connection holes shop fabricated.
   b. Columns and roof beams shall be fabricated complete with holes in webs and flanges for the attachment of secondary structural members and bracing except for fieldwork as noted on manufacturer's erection drawings.
2. Secondary structural members shall consist of "Z" shaped purlins and girts of precision roll-formed galvanized steel in gauges required to meet the designed loading conditions.
   a. Purlins and girts shall be provided with factory-punched holes as required for panel connection and connection to primary frame members.
3. Manufacturer shall provide required bracing for structural bays in the form of hot-rolled rod of size indicated on shop drawings, with attachments to columns and beams as necessary.
4. All bolts for field assembly of frame members shall be ASTM A325 high strength bolts.
5. Structural members shall be welded by qualified personnel according to the requirements of the American Welding Society D1.1-2006 – Structural Welding Code – Steel and AWS D1.3-1998 – Structural Welding Code – Sheet Steel.
   a. Certification of welder qualification shall be supplied upon request.
6. All structural steel shall be factory prime painted with one coat of gray, water reducible, alkyd primer paint as temporary protection against ordinary atmospheric conditions. Subsequent finish painting shall be performed in the field per specification Section 09900 – Painting.
   a. Color shall be Dunn-Edwards DE5323 "Quiet Splendor"

C. Roof Panels:
1. Provide 24 ga. standing seam roof panels with 2" high interlocking seams along the long sides of the panels and minor corrugations at 4" on center down the length of the flats of the panels to minimize distortion, waviness, or "oil canning."
   a. The roof system shall carry a U.L. wind uplift classification Class 90 as determined according to UL 580 Tests for Uplift Resistance of Roof Assemblies to ensure structural integrity and possible reduction of insurance rates.
   b. The roof system shall be tested according to ASTME 1592 Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air pressure difference.
2. Where end laps are required, the panel end laps shall be 6" and shall be sealed with a field-applied sealant.

a. Panels shall be of maximum length, so as to minimize panel end laps. One panel end shall be "swaged" to ensure nestible, watertight end laps.

b. Where end laps are required, a backing plate shall be used to support the lap, and will occur directly over, but will not be fastened to, structural support members.

3. Roof panel side laps shall be designed to be interlocking seams with a return leg on the lower edge of the female rib. Side lap sealant shall be factory applied.

4. Roof panels shall be attached to the supporting structurals by means of a seamed in clip device with a movable tab. The clip shall occur at the panel seams. The connection between the tab and clip shall be designed and installed to allow movement of the roof panels as a result of thermal expansion and contraction.

5. Roof panels shall be 24 ga. galvanized steel factory finished with exterior colors of a full strength, 70% Kynar 500 or Hylar 5000 fluoropolymer coating. Manufacturer shall warrant that coating shall not peel, crack, or chip for 25 years and will not fade more than 5 color difference units per ASTM D2244. Factory color shall match Dunn-Edwards DE6308 "Black Spruce."

D. Wall Panels:

1. Provide 24 ga. corrugated (ribbed) steel wall panels. The panels shall be roll-formed, with a coverage width no less than 24" and no greater than 36"

2. Wall panels shall have major corrugations on the long sides of the panels and at regular intervals between. Minor corrugations shall be provided between the major corrugations as required to provide additional rigidity and stability to the panels.

3. The major corrugations along the sides of the panel shall be formed to overlap, each panel over the next. The corrugation which is to be overlapped by the next panel shall be formed with a continuous length sealant groove.

4. Each wall panel shall be a single piece from top to bottom. No end lapping of wall panels shall be permitted.

5. Wall panels shall be factory punched or field drilled at ends and shall match factory punched or drilled holes in framing members for proper alignment.

6. Wall panels shall be 24 ga. galvanized steel factory finished with exterior colors of a full strength, 70% Kynar 500 or Hylar 5000 fluoropolymer coating. Manufacturer shall warrant that coating shall not peel, crack or chip for 25 years and will not fade more than 5 color difference units per ASTM D2244. Factory color shall match Dunn-Edwards DE6308 "Black Spruce."

2.03 ACCESSORIES AND MISCELLANEOUS ITEMS

A. Where indicated on the Drawings, the manufacturer shall provide accessories to the building including, but not limited to, rain gutters, downspouts, flashing, wall louvers, door frames, gravity ridge vents, personnel doors, trim, and the like.

1. Accessories visible on the exterior of the building shall be factory finished to match the selected wall and roof panel colors.

2. Accessories visible on the interior of the building shall be primed or painted to match the building's structural elements.

B. Where shown on the drawings, provide high-strength light transmitting/ translucent panels matching the profile of the adjacent roof panels. Install light transmitting panels with metal roof panels so as to create a complete, weatherproof roof surface.

C. Provide fiberglass blanket insulation between girts at roofs and walls of the Maintenance building. Insulation facing shall be laminated on its visible side with

vinyl. Secure insulation to building structure and/or panels so as to prevent separation of insulation from the building surfaces.

D. The manufacturer and/or contractor shall provide all additional miscellaneous hardware and products necessary to achieve a complete and proper installation, including, but not limited to, miscellaneous fasteners, caulking, sealants, closure strips, and the like.

2.04 OTHER MATERIALS

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

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 ERECTION

A. General:
1. The pre-engineered building manufacturer shall be responsible for the means and methods of on-site erection and installation, but in order to facilitate project coordination, manufacturer shall submit erection and construction procedures as a submittal for approval to the Contractor and Architect.
2. Following approval of procedures, the manufacturer or selected contractor shall proceed with erection and installation of pre-engineered structures under the direction of the project Superintendent.

B. Surveys:
1. Establish permanent benchmarks necessary for accurate erection of structural steel.
2. Check elevations of concrete surfaces, and locations of anchor bolts and similar items, before erection proceeds.

C. Temporary shoring and bracing:
1. Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads.
2. Provide temporary guy lines to achieve proper alignment of the structure as erection proceeds.
3. Remove temporary connections and members when permanent members are in place and final connections are made.

D. Anchor bolts:
1. Install anchor bolts and other connectors required for securing structural steel to adjacent work.
2. Provide templates and other devices as needed for presetting bolts and other anchors to accurate locations.

E. Field assembly:

Structural steel shall not be erected until after the 7-day tests on concrete slab/foundations have been approved.

1. Set structural members accurately to the lines and elevations indicated.
2. Align and adjust the members forming part of a complete frame or structure before fastening permanently.
3. Clean the bearing surfaces and other surfaces which will be in permanent contact before assembly.
4. Adjust as required to compensate for discrepancies in elevation and alignment.
5. Level and plumb individual members of the structure within specified AISC tolerances.
6. Establish required leveling and plumbing measurements on the mean operating temperature of the structure, making allowances for the difference between temperature at time of erection and the mean temperature at which the structure will be when completed and in service.
7. Comply with AISC specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to welds.

F. Gas cutting:

1. Do not use gas cutting torches for correcting fabricating errors in structural framing.
2. If gas cutting is permitted by the Engineer for secondary members, finish the gas cut section to a sheared appearance acceptable to the Architect.

END OF SECTION - 13120