

SECTION 13120

PRE-CAST CONCRETE BUILDING

PREFABRICATED

PART I - GENERAL

1.01 SUMMARY

Contractor to furnish pre-cast, post-tensioned concrete building. Building to be field erected on prepared crushed stone foundation in accordance with manufacturer's recommendations. Pre-cast building to be EASI-SET brand Model 2020 as manufactured by Lonestar Prestress Mfg., Inc., Houston, Texas or approved equal. Building to be provided by manufacturer with all necessary openings as specified in conformance with manufacturer's structural requirements.

1.02 CODES, STANDARDS AND REFERENCES

- A. ACI-318-02, "Building Code Requirements for Structural Concrete".
- B. ASCE-7-02, "Minimum Design Loads for Buildings and Other Structures".
- C. 2003 IBC, "2003 International Building Code".
- D. PCI Design Handbook, Precast/Prestressed Concrete Institute.
- E. UL 752, Standard for Safety for Bullet Resisting Equipment, Underwriters Laboratories Inc.
- F. "Manual of Standard Practice", Concrete Reinforcing Institute.
- G. ASTM, American Society for Testing and Materials:
 - 1. C150 - Standard Spec. for Type I and Type II – Low Alkali Portland Cement.
 - 2. C33 - Standard Spec. for Concrete Aggregates.
 - 3. A36 - Standard Spec. for Carbon Structural Steel.
 - 4. A615 - Standard Spec. for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 5. A706 - Standard Spec. for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 6. A416 - Standard Spec. for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
 - 7. A185 - Standard Spec. for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - 8. A307 - Standard Spec. for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - 9. A123 - Standard Spec. for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 10. A153 - Standard Spec. for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

1.03 QUALITY ASSURANCE

- A. Walls to be UL-752 Test Method Level 4 for bullet resistance, certified by an independent structural engineer.
- B. Building fabricator must have a minimum of 10 years experience manufacturing pre-cast concrete buildings.
- C. Building fabricator must be a producer member of the National Precast Concrete Association (NPCA).
- D. No alternate building designs to the pre-engineered EASI-SET building will be allowed unless pre-approved by the owner TEN (10) days prior to the bid date.

1.03 DESIGN REQUIREMENTS

A. Dimensions:

Exterior: 20' x 20' x 10'-5"

Interior: 19'-4" x 19'-4" x 9'-0"

B. Standard Design Loads:

1. Standard Wind Loading - 140 MPH (ASCE 7-02, Category II, Exposure C, Enclosed Building)
2. Standard Roof Live Load - 60 PSF
3. Standard Floor Live Load - 250 PSF
4. Seismic Design category 'D', Seismic use Group I

C. Roof: Roof panel shall slope 6" in 10'-0" direction from peak to edge. The roof shall extend a minimum of 4" beyond the wall panel on each side and have a turndown design which extends 3/4" below the top edge of the wall panels to prevent water migration into the building along top of wall panels. Roof shall also have an integral architectural ribbed edge.

1. Option: If indicated on the contract drawings, building can be made expandable with removable ribbed fascia panel. 20'-0" wall and roof must have lugs to allow post-tensioning of additional modules onto existing structure without removing roof. Roof slabs must be designed to span 20'-0" of free area without internal support for intermediate modules without walls.

D. Keyway Roof Joints: Grout in keyway shall be polymer concrete placed after coating keyway with a methyl methacrylate resin and isocyanate resin.

E. Floor: There shall be a 1/2" deep recess, the width of the wall panels, cast into the floor. The 1/2" recess makes the interior floor surface 1/2" higher than the joint between the wall panel and floor slab preventing intrusion of water.

F. Wall panels shall set on top of floor slab.

1.04 SUBMITTALS

- A. Building engineering calculations that are designed and sealed by a professional engineer, licensed in the state of manufacture, shall be submitted for approval.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete: Steel-reinforced, 6000 PSI minimum 28-day compressive strength.
- B. Reinforcing Steel: ASTM A615, grade 60 or ASTM A185, grade 80 unless otherwise indicated.
- C. Post-tensioning Strand: Roof and floor shall be post-tensioned in field after keyway is filled and has cured to required strength (psi). Post-tensioned cable shall be 41K Polystrand CP50, .50 in., 270 KSI, 7-wire ungreased strand (ASTM A416). There will be a minimum of three post-tensioning cables connecting roof and floors together to provide watertight joint.
 - 1. If post-tensioning is *not* used in the roof panel, the following guidelines must be followed to ensure a watertight roof design.
 - a. The entire pre-cast concrete roof panel surface must be cleaned and primed with a material that prepares the concrete surface for proper adherence to the coating material.
 - b. The entire pre-cast concrete roof panel surface shall be sealed with a .045" EPDM continuous membrane cemented to the concrete with a compound designed for this purpose.
- D. Caulking: All joints between panels shall be caulked on the exterior and interior surface of the joints. Caulking shall be SIKAFLEX-IA elastic sealant or equal. Exterior caulk joint to be 3/8" x 3/8" square so that sides of joint are parallel for correct caulk adhesion. Back of joint to be taped with bond breaking tape to ensure adhesion of caulk to parallel sides of joint and not the back.
- E. Panel Connections: All panels shall be securely fastened together with 3/8" thick steel brackets. Steel is to be of structural quality, hot-rolled carbon complying with ASTM A36 and hot dipped galvanized after fabrication. All fasteners to be 1/2" diameter bolts complying with ASTM A307 for low-carbon steel bolts. Cast-in anchors used for panel connections to be Dayton-Superior #F-63, or equal. All inserts for corner connections must be secured directly to form before casting panels. Floating of connection inserts will not be allowed.

2.02 ACCESSORIES

- A. Door and Frame: Shall comply with Steel Door Institute "Recommended Specifications for Standard Steel Doors and Frames" (SDI-100), and as herein specified. The building shall be equipped with double 3'-0" x 7'-0" x 1-3/4", 18-gauge steel doors, with insulated core and galvanized. Doors shall open as noted on drawings. Frames shall be 16-gauge galvanized steel. Doors and frames shall be painted with one coat of rust inhibitor primer and one finish coat of epoxy paint, medium gray, if no other color is specified.
- B. Door Hardware:
 - 1. Handle: Lindstrum pull-handle stainless steel, 8-1/2" x 2", or passage knob or equal.
 - 2. Lockset: Cal-Royal lever lock or Easi-Set or equal.

3. Deadbolt: Yale or Easi-Set stainless steel keyed outside only or equal.
- B. Door Hardware (con't)
4. Hinges: Hagar stainless steel five knuckle ball bearing with non-removable pins or equal.
 5. Threshold: Hagar or National Guard Products extruded aluminum with neoprene seal or equal.
 6. Overhead Door Holder: Yale surface mounted overhead slide type with safety release or equal.
 7. Drip Cap: Hager or National Guard Products aluminum with stainless steel screws or equal.
 8. Door Closer: Norton 7500 or Yale 4410 with hold open or equal.
 9. Surface Bolts (Upper and Lower): Magnokrom Inc. 400-401 cadmium plated finish or equal, as required for double doors.
 10. Astragal: Galvanized steel, same finish and brand as door, as required for double doors.
 11. Door Stop: Ives 445B26D brushed chrome (inactive leaf only) or equal, as required for double doors.

2.03 FINISHES

- A. Interior of Building: Smooth steel form finish on all interior panel surfaces.
- B. Exterior of Building: Washed San Jacinto river-stone aggregate finish on all exterior wall surfaces. Aggregate must be seeded into top of panel while in form, chemically retarded, and high-pressure water-washed to expose the aggregate to a depth of 1/8". As noted on drawings.
- C. Exterior of Building: (option) Architectural precast concrete brick finish: Finish must be imprinted in top face of panel while in form using an open grid impression tool similar to "EASI-Brick". Finished brick size shall be 2 5/8" x 7 5/8" with vertical steel float or light broom finish. Joints between each brick must be 3/8" wide x 3/8" deep. Back of joint shall be concave to simulate a hand tooled joint. Each brick face shall be coated with an acrylic concrete stain: 1) Cementrate by FOSROC; or 2) Canyon Tone stain by United Coatings. Stain color shall be brick red unless specified otherwise. Stain shall be applied per manufacturer's recommendation. Joints shall be kept substantially free of stain to maintain a gray concrete color, as noted on drawings.

PART 3 - EXECUTION

3.01 SITE PREPARATION REQUIREMENTS (MANUFACTURER'S RECOMMENDATION)

- A. EASI-SET building shall bear fully on firm undisturbed soils with an approved fill or pad. The turf shall be removed and a minimum 6" pad of approved fill material shall be placed. Where unacceptable material occurs, excavate and replace with an approved compacted fill material. The minimum recommended allowable bearing shall be 1,500 pounds per square foot.
- B. No building shall bear directly on rock. Where rock is closer than 2 feet from the bottom of the building floor slab or foundation slab, it shall be undercut to a minimum of 2 feet below the building and replaced with an approved fill material.
- C. Provide positive drainage for the fill, pad, and slab, as required.

3.01 SITE PREPARATION REQUIREMENTS (MANUFACTURER'S RECOMMENDATION) (con't)

- D. Approved fill or pad material shall be stone which conforms to ASTM C33. Allowable sizes are #56, #67, #6, #7, and #8.
- E. All fills, pads, or slabs shall be level to within a 0.042 foot (1/2 inch) differential over the entire building area.
- F. The entire granular fill or pad shall be kept within the confines of the soil or other surrounding objects. Do not allow the fill or pad material to be undermined so that it may wash, erode or otherwise be undermined.
- G. The finished floor slab elevation shall be above the exterior grade. The grade shall have positive slope and drainage away from the building at all points.
- H. Stone base or pad shall be a minimum of 2 feet larger in length and width of building.

3.02 SITE PREPARATION REQUIREMENTS (Poured-in-place slab)

- A. EASI-SET building shall bear fully on an engineered concrete or asphalt slab. The slab shall be designed to support the anticipated load of the EASI-SET building and its contents. The building shall be leveled, shimmed as required, and set in a grout bed sufficient to fill all cavities between the foundation slab and the building floor slab.

3.03 SITE PREPARATION REQUIREMENTS (Cast-in-place floor)

- A. Contractor to pour a concrete floor slab with turndown footing the same length and width of building. The floor slab shall be designed to support the anticipated load of the building walls and its contents.
- B. The floor shall have a 1 1/2" deep recess, the width of the wall plus 3 1/2" wide cast into the floor around the perimeter except at doors. The 1 1/2" recess makes the interior floor surface 1 1/2" higher than the joint between the wall panel and the foundation preventing intrusion of water.
- C. The finished floor slab elevation shall be above the exterior grade. The grade shall have a positive slope and drainage away from the building at all points.
- D. Concrete slab to be steel reinforced and level within 1/8" in both directions.
- E. Footer depth and reinforcement to be in accordance with design drawings.

3.04 ACCESS

- A. Contractor must provide level unobstructed area large enough for crane and tractor/trailer to park adjacent to pad. Crane must be able to place outriggers within 5'-0" of edge of pad and truck and crane must be able to get side-by-side under their own power. No overhead lines may be within 75' radius of center of pad.