

SECTION 13120
PRE-CAST CONCRETE BUILDING

PART I - GENERAL

1.01 SUMMARY

Contractor to furnish pre-cast, post-tensioned concrete *transportable* building. Building to be delivered and placed on prepared crushed stone foundation in accordance with manufacturer's recommendations. Pre-cast building to be EASI-SET brand Model 889 as manufactured by Lonestar Prestress Mfg., Inc., Bellville, 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 (CURRENT ADOPTED)

- A. ACI-318, "Building Code Requirements for Structural Concrete".
- B. ASCE-7, "Minimum Design Loads for Buildings and Other Structures".
- C. 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. A1064 - 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. Building fabricator must have a minimum of 10 years of experience manufacturing pre-cast concrete buildings.
- B. Fabricator must be a producer member of the National Precast Concrete Association (NPCA).

- C. 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: 8'-0" x 8'-0" x 9'-8"

Interior: 6'-11" x 6'-11" x 9'-1 1/2"

B. Standard Design Loads: (DESIGN LOADS MAY BE DIFFERENT BASED ON CURRENT ADOPTED)

1. Standard Wind Loading - $V_{ult} = 120$ MPH ($V_{asd} = 93$ MPH) Risk Category IV, Exposure C, Enclosed Building)
2. Standard Roof Live Load - 60 PSF
3. Standard Floor Live Load - 250 PSF
4. Seismic Design category 'B', Seismic Importance Factor, $I=1.5$

C. Roof: Roof panel shall be post-tensioned and be sloped 1" from front to back. The roof shall extend a minimum of 3" beyond the wall panel on each side and have a turndown design which extends 1/2" 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. Roof surface shall have 14 mil coat of SuperTherm (White) R-19 coating.

D. Floor (if required): 4" thick, steel reinforced and post-tensioned, concrete floor slab. 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.

E. Roof and wall panels must each be produced as single component monolithic panels. No roof, floor, or vertical wall joints will be allowed, except at corners. Wall panels shall set on top of floor slab.

F. Walls to be of an insulated precast concrete sandwich panel type. The walls shall have an extruded polystyrene core sandwiched between interior and exterior concrete wythes. The wall panels shall have a minimum thickness of 6". Minimum wythe thickness shall be 2". The walls shall have a minimum required thermal performance (R-value) per C402.1.3 for mass walls in zones 1 thru 6. Minimum R value for continuous insulation in mass wall shall be R13,3.

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 A1064, grade 80 unless otherwise indicated.

- C. Post-tensioning Strand: 41K Polystrand CP50, .50, 270 KSI, 7-wire strand, greased plastic sheath, (ASTM A416), roof and floor to be each post-tensioned by a single, continuous tendon. Said tendon shall form a substantially rectangular configuration having gently curving corners and a corner where the tendon members are anchored. Tendons shall be greased and enclosed within a sheath.
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. Sealing: All joints between panels shall be sealed on the exterior and interior surface of the joints. Sealant shall be SIKAFLEX-IA elastic sealant or equal. Exterior sealant joint to be 3/8" x 3/8" square so that sides of joint are parallel for correct sealant adhesion. Back of joint to be taped with bond breaking tape to ensure adhesion of sealant 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 (Note to Specifier: Delete this section if doors and hardware are specified in Division 8).

- 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 (1) 3'-0" x 7'-0" x 1-3/4" 18-gauge steel door. Frames shall be 16-gauge steel. Doors and frames shall be painted with epoxy paint.
- B. Door Hardware:
1. Passage: Cal-Royal lever, PDQ or equal.
 2. Lockset: Cal-Royal lever, PDQ or equal.
 3. Deadbolt: PDQ stainless steel keyed outside only or equal.
 4. Panic: Stainless Steel Yale 7100 series / 626F Lever Trim or equal.
 5. Hinges: Hagar stainless steel five knuckle ball bearing with non-removable pins or equal.
 6. Threshold: Hagar, National Guard Products extruded aluminum with neoprene seal or equal.
 7. Weather Strip: Hagar, National Guard Products extruded aluminum with neoprene seal or equal.
 8. Sweep: Hagar, National Guard Products extruded aluminum with neoprene seal or equal.
 9. Drip Cap: Hager, National Guard Products aluminum with stainless steel screws or equal.
 10. Door Closer: Norton 7500H UNI , Yale 4410 with hold open or equal.

11. Overhead Door Holder: Yale surface mounted overhead slide type with safety release or equal.

2.03 FINISHES

- A. Interior of Building: Interior wall and ceiling surfaces to be painted concrete with white epoxy.
- B. Exterior of Building: Washed 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.

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 soil material occurs, a licensed professional engineer should be consulted and provide recommendations.
- 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.
- 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 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.
- C. Concrete slab to be steel reinforced and level within 1/8" in both directions.
- D. Footer depth and reinforcement to be in accordance with design drawings.

- E. Floor slab to have a 1-1/2" deep by 10" wide recess around perimeter except at the doorway.
- F. Corner of slab must be square, not chamfered, to allow for proper sealant joint.

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.