

**SECTION 13 34 00
FABRICATED PRE-ENGINEERED PRECAST CONCRETE STRUCTURES**

**PRECAST CONCRETE BUILDINGS
EASI-SET® & EASI-SPAN® & PRECAST PITCHED ROOF DESIGN
PRE-ASSEMBLED or SITE ASSEMBLED**

SECTION 1 – GENERAL

1.1 WORK INCLUDED

Contractor shall furnish a precast concrete building. Precast buildings to be EASI-SET® or EASI-SPAN® brand as manufactured by a *licensed producer of Easi-Set Buildings*. Building shall be provided by manufacturer with all necessary openings as specified by contractor in conformance with manufacturer's structural requirements.

Easi-Set Pre-Assembled Buildings (when size and site conditions allow) shall be delivered and placed on owner-prepared crushed stone foundation in accordance with manufacturer's recommendations.

Easi-Span Buildings shall either be pre-assembled, delivered and placed on owner-prepared crushed stone foundation in accordance with manufacturer's recommendations **OR** site-assembled by Easi-Set producer's resources.

1.2 REFERENCES

- A. ACI-318-11: Building Code Requirements for Structural Concrete and Commentary
- B. ASCE/SEI 7-10: Minimum Design Loads for Buildings and Other Structures
- C. IBC 2012: International Building Code
- D. National Building Code of Canada, 2020
- E. Ontario Building Code, 2020
- F. PCI Design Handbook, 7th Edition
- G. Concrete Reinforcing Institute, Manual of Standard Practice
- H. UL-752 (Test Method level 5) for bullet resistance certified by a military approved laboratory.

1.3 SYSTEM DESCRIPTION

DESIGN REQUIREMENTS

- A. Building Dimensions: Shall be determined by project engineer in conjunction with precast building manufacturer. Size shall not exceed Easi-Set producer's manufacturing capabilities and/or shipping restrictions for pre-assembled structures and/or panelized components for site assembled structures.

Exterior: Insert project specific size here

Interior: Insert project specific size here

Design case to be selected to correspond to the design criteria indicated in the aforementioned codes for the geographical location of the project or as specified.

CASE 1: Typical

- B. Design Loads:

1. Seismic Design Category 'C', Risk Design Category II
2. Roof Live Load (Snow) – 30 PSF
3. Floor Live Load – 150 PSF
4. Wind Loading* – 115 MPH

*Design loads relate to precast components only, not accessories (i.e. doors, windows, vents, etc.)

- C. **Easi-Set Roof:** Roof slabs shall slope ½" from front to back in shortest direction. The roof shall extend a minimum of 3" beyond the wall panel on each side and have a turndown, integral drip edge cast into the roof slab(s) to prevent water migration into the building along top of wall panels.

- D. **Easi-Span Roof:** Roof panel shall have a minimum of 6" slope from peak to edge. The roof shall extend 4" beyond the wall panel and have a turndown design which extends ½" minimum below the top edge of the wall panels to prevent water migration into the building along top of wall panels. Roof Joint Keyway shall be grouted with a magnesium phosphate material or equal, prepared and placed per the manufacturer's recommendations. Apply a polysulfide, elastomeric joint sealant to the top of the grouted keyway, installed per manufacture's recommendations.

- E. **Precast Pitched Roof Design:** Peak of roof and roof slope shall be determined by precast concrete manufacturer to assure manufacturing, shipping, and installation capabilities. Aluminum roof cap and roof joint seal shall be provided by precast building manufacturer. The surface of the roof slabs shall be textured with simulated formliner finish, simulated steel seam. The roof slabs shall be coated with Sherwin Williams H&C Concrete Stain & Sealer. Color choice of end user.

- F. Precast Floor slabs must have ½” step-down around the entire perimeter to prevent water migration into the building along the bottom of wall panels.
- G. Cast In Place Floor Slabs, Frost Walls & Foundations: Shall be designed by others. Shall not include a step-down design around perimeter.

1.4 SUBMITTALS

- A. Engineering calculations that are designed and sealed by a professional engineer, licensed to practice in the state where the project is located, shall be submitted for approval.
- B. Manufacturers’ product literature shall be provided for any plumbing, electrical, and miscellaneous installed fixtures demonstrating compliance with these specifications.

1.5 QUALITY ASSURANCE

- A. The precast concrete building producer shall be a plant-certified member of either the National Precast Concrete Association (NPCA), The Precast/Prestressed Concrete Institute (PCI), Canadian Specifications Association (CSA) or equal.
- B. The precast concrete building producer shall demonstrate product knowledge and must have a minimum of 5 years experience manufacturing and setting precast concrete.
- C. The manufacturer must be a licensed producer of Easi-Set Buildings. Design Concrete, Inc. (877) 253-4577, designconcrete.ca/modular-precast-buildings
- D. No alternate building designs to the pre-engineered EASI-SET® building will be allowed unless pre-approved by the owner 10 days prior to the bid date.

SECTION 2 – PRODUCTS

2.1 MATERIALS

- A. Concrete: Steel-reinforced, 5000 PSI (40mpa) minimum 28-day compressive strength, air-entrained (ASTM C260).
- B. Reinforcing Steel: ASTM A615, grade 60 unless otherwise specified.
Welded Wire Fabric: ASTM 185 Grade 65
- C. Post-tensioning Strand: 41K Polystrand CP50, ½” 270 KSI Seven-Wire strand, enclosed within a greased plastic sheath (ASTM A416). Roof and floor each shall be post-tensioned by a proprietary, second-generation design using a single, continuous tendon. Said tendon is placed in the concrete slab to form a perimeter loop starting from one corner of the slab to a point where the cable entered the slab. The tendon then turns 90 degrees and follows the cable

member(s) in the periphery to a point midway along the “X” axis of the concrete building panel and then turns 90 degrees along the “Y” axis of the concrete building panel. This bisects the concrete building panel and crosses the opposite parallel portion of the cable member and exits from an adjacent side of the concrete building panel. This creates a cable pattern with no less than 2.5 parallel cables in any direction. To ensure a watertight design, no alternate methods shall be substituted for the post-tensioning.

- D. Sealant: All joints between panels shall be caulked on the exterior and interior surface of the joints. Caulking shall be Silka 1A silicone sealant or equal. Exterior caulk reveal to be 3/8”x 3/4” deep so that sides of the joint are parallel for proper caulk adhesion. Back of the joint to be taped with bond breaking tape to ensure adhesion of caulk to parallel sides of joint and not the back.
- E. Vents: Two screened aluminum vents to be cast in rear wall. Vents shall be SUNVENT INDUSTRIES Model FL-164 or equal.
- F. 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 A325 for carbon steel bolts. Cast-in anchors used for panel connections to be Dayton-Superior F-63 coil inserts, or equal. All inserts for corner connections must be secured directly to form before casting panels.

2.2 ACCESSORIES

- A. **Doors and Frames:** Shall comply with Steel Door Institute “Recommended Specifications for Standard Steel Doors and Frames” (SDI-100) and as herein specified. All door and frame galvanizing shall be in accordance with ASTM A924 and A653, A60 minimum coating thickness.
 - 1. The buildings shall be equipped with single or double (3’-0” x 7’-0” x 1-3/4” thick each door), honeycomb insulated, 18-gauge, metal doors with 16-gauge frames (to meet wall thickness). Doors to have flush top cap. 12-gauge flat astragals shall be applied to the active leaf to protect against the elements or forced opening. Doors and frames shall be factory bonderized and painted with one coat of rust inhibitive primer and one finish coat of DTM (Direct to Metal) paint. Color choice of end user.
 - 2. Doors and frames shall meet SDI standard Level 2, 1¾” heavy duty.
- B. **Door Hardware:**
 - 1. **Pull Handle & Plate:** Shall meet requirements of ANSI A156.2. Shall be thru bolt attached and constructed of a minimum ¾” diameter stainless pull handle sized 7” with a stainless backer plate 4” x 16”, minimum 0.053” on both sides.
 - 2. **Hinges:** Shall comply with ANSI A156.1 and be of the ball bearing, non-removable pin type (3 per door minimum). Hinges shall be 4 ½” x 4” US26D (652) brushed chrome finish. Manufacturer shall provide a lifetime limited warranty.
Approved manufacturers: Taymore 4100 Series, or equal

3. Deadbolt: Commercial Grade Deadbolt conforming to ANSI 156.5 furnished with a 2 ¼" face plate and a 1" projecting deadbolt with hardened steel pins. Dead bolts shall be UL and ADA approved. TLA51 Model. Finish shall be C32D (stainless steel) finish.

Approved manufacturers: Dorex TLA Series, or equal

4. Surface Bolt: 8" Surface bolt UL listed. Finish zinc plated, heavy duty finish. (2 per inactive leaf)

Approved manufacturers: Stanley, or equal

5. Threshold: Bumper Seal type threshold with a maximum 1" rise to prevent water intrusion. Thresholds shall be approved for UL 10B suitable for use with fire doors rated up to three hours. Model W-29.

Approved manufacturers: KN Crowder or equal

6. Drip Cap: Aluminum drip cap with minimum projection of 2 ½" shall be furnished. Model W-3.

Approved Manufacturers: KN Crowder, or equal

7. Door Sweep: Anodized Aluminum with solid Neoprene. Adjustable 2 ¼" high. Model W13-S-2.

Approved manufacturers: KN Crowder, or equal

8. Overhead Door Holder/Closer: (If required) Heavy duty surface mounted hold open device with hold open/stop angle of 85 to 110 degrees. Construction shall be stainless steel. Finish 689 powder coat. Model LCN4111-H-CUSH

Approved manufacturers: LCN, or equal

2.3 FINISHES

- A. Interior of Building: Smooth hand-troweled finish on all interior panel surfaces.
- B. Exterior of Building: Shall be determined by project engineer and/or end user. Available exterior finishes include Simulated Formliner Finishes or Exposed Aggregate:
 - 1. Simulated Formliner Finish (ie: brick, ashlar, barnboard, split face block, smooth block, or smooth) shall be achieved by use of formliners. Easi-Set producer shall provide information on availability of various formliner options.
 - 2. Exposed Aggregate Finish. Washed brown/gray riverstone, chemically retarded, and high pressure washed to expose the aggregate to a depth of 1/8".
 - 3. Simulated Formliner Finishes may be coated with two coats of Sherwin Williams H&C Concrete Stain & Sealer. Color choice of end user.
 - 4. Exposed Aggregate Exterior Finishes shall be sealed with clear, non-yellowing concrete sealer.

SECTION 3 – EXECUTION

3.1 SITE PREPARATION (MANUFACTURER'S RECOMMENDATION)

Work under this section relates to placement of the building by Easi-Set licensed producer on the customer's prepared foundation and site.

- A. EASI-SET® building shall bear fully on a crushed stone base that is at least two feet larger than the length and width of building.
- B. Stone shall be a minimum of 4" thick and down to firm subgrade. The vertical soil capacity under stone shall be compacted to have minimum bearing of 1,500 pounds per square foot. Stone shall be 3/8" or smaller and must be screeded level within 1/4" in both directions. Stone shall be placed within a perimeter form with flat and level top edge for screeding. Forming material shall remain around stone until after the building is set.
- C. The crushed stone base shall be kept within the confines of the soil or perimeter form. Do not allow the base to become unconfined so that it may wash, erode, or otherwise be undermined.

OR

If building is placed on pavement or a concrete slab, substrate below pavement or slab must have a vertical soil capacity of 1,500 pounds per square foot. Ensure bearing surface for building is flat and level. As required, place adequate material (1" thick polystyrene rigid insulation) between the precast floor slab and pavement or cast in place slab to prevent any point loads.

- D. Provide positive drainage for the fill, pad or slab as required.

3.2 SITE ACCESS

Contractor must provide a level, unobstructed area large enough for a crane and a tractor-trailer to park adjacent to the pad. Crane must be able to place outriggers within 5'-0" of edge of pad; 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. Firm roadbed with turns that allow 65' lowbed tractor-trailer must be provided directly to site. No building shall be placed closer than 2'-0" to an existing structure unless specifically permitted.