



# SPECIFICATIONS

## CASCADIAN BUILDING STYLE

### 1.0 SCOPE

This specification covers the construction and placing of precast Cascadian toilet buildings as produced by CXT® Incorporated.

### 2.0 SPECIFICATIONS

ASTM C33	Concrete Aggregates
ASTM C39	Method of Test for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C143	Method of Test for Slump of Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM A185	Standard Specification for Steel Welded Wire Reinforcement, Plain, or Concrete
ASTM C192	Method of Making and Curing Test Specimens in the Laboratory
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C309	Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel bars for Concrete Reinforcement
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
ACI 211.1	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 306	Cold Weather Concreting
ACI 318	Building Code Requirements Structural Concrete and Commentary (includes Errata)
PCI MNL 116	Quality Control for Plants and Production of Precast Prestressed Concrete Products

### 3.0 MANUFACTURER CRITERIA

The manufacturer supplying the requested precast concrete vault facility must meet the following:

- A. Manufacturer must be ISO 9001 certified at the time of bid.
- B. Manufacturing plant must be PCI certified at the time of bid.
- C. Manufacturer must not have defaulted on any contract within the last five (5) years.
- D. Manufacturer must provide stamped, engineered drawings prior to acceptance.
- E. Manufacturer must be pre-approved prior to bidding.

- F. Manufacturer must show four (4) examples of Sweet Smelling Technology designed precast concrete vault toilet facilities produced, installed, and in use as an example of their ability to perform on this contract.
- G. Manufacture shall provide a one-year warranty.
- H. UL 752 Bullet Resistance on 4" thick concrete samples.

**Manufacturer meeting these criteria is:**

CXT Incorporated  
6701 E. Flamingo Avenue, Building 300  
Nampa, ID 83687  
Phone 800-696-5766

#### 4.0 DESIGN CRITERIA

Vault buildings have been designed to individually meet the following criteria. Calculations and engineer's stamped drawings are available, for standard buildings, upon request by the customer and are for their sole and specific use only. The design criteria are to ensure that they not only will withstand the forces of nature listed below but will provide protection from vandalism and other unforeseen hazards. Building will be manufactured using precast concrete including the roof. Building's structural and foundation design will be relevant to the region and properties associated with its final placement. Design will also meet all applicable accessibility and building code requirements. Vault buildings also to meet various structural loads such as below, but not limited to/or restricted by them.

- A. Roof Snow Load
  - 1. Vault buildings are designed to withstand a 350 pounds per square foot snow load.
- B. Floor Load
  - 1. Vault buildings are designed to withstand 400 pounds per square foot floor load.
- C. Wind Load
  - 1. Vault buildings will withstand the effects of 150 miles per hour (3-second gust) wind exposure C.
- D. Earthquake
  - 1. Vault buildings will withstand the effects of a seismic design category E earthquake.
- E. Sweet Smelling Technology (SST)
  - 1. Vault buildings incorporate design aspects of SST as outlined by Briar Cook for the U.S. Forest Service.
  - 2. All wall to floor interior surface seams shall have a minimum 1" radius coving made of high strength grout.
  - 3. The vault shall have a bottom slope of 1" per foot from under the toilet riser out to the outside cleanout area.
  - 4. The vault shall have a 24" diameter (minimum) lightweight manhole cover installed to the rear or side of the building.
    - a. The manhole cover should be raised, with the surrounding concrete sloped away using a minimum slope of 1/2" per foot.
  - 5. The depth of the vault shall be no deeper than 4 1/2' to 5'.

6. A 12" diameter round pipe will be installed to vent the vault and the pipe shall be raised a minimum of 3' above the highest point of the roof.
  - a. Vent pipe shall be straight up from the vault.
7. There shall be only one vent opening in the building and it shall be placed only on one side of the building (the side that the wind blows against).

F. Additional Design Standards

1. Single vault buildings are an all concrete design with a minimum 7/12 roof pitch.
2. Vault buildings shall have a minimum 4" wall, 4½" roof, and 5" floor thickness.
3. Vault buildings have a one-piece floor unit to prevent panels that migrate in different directions during periods of freeze/thaw stress.
4. Vault buildings have a one-piece full length and width vault unit to support the building, screen area, and snow loads evenly.

## 5.0 MATERIALS

A. Concrete – General

1. The concrete mix design is designed to ACI 211.1 to produce concrete of good workability.
2. Concrete will contain a minimum of 675 pounds of cementitious material per yard. Cement is a low alkali type I/II or III conforming to ASTM C-150.
3. Coarse aggregates used in the concrete mix design will conform to ASTM C33 with the designated size of coarse aggregate #67.
4. Maximum water/cement ratio will not exceed .45.
5. Air-entraining admixtures will conform to ASTM C260. Water reducing admixtures will conform to ASTM C494, Type A.
6. If Self Compacting Concrete (SCC) is used, it must conform to ASTM C1611.

B. Concrete – Cold Weather

1. Cold weather concrete placement is in accordance with ACI 306.
2. Concrete will not be placed if ambient temperature is expected to be below 35°F during the curing period unless heat is readily available to maintain the temperature of the concrete at least 50°F.
3. Materials containing frost or lumps of frozen materials will not be used.

C. Concrete – Hot Weather

1. The temperature of the concrete will not exceed 90°F at the time of placement. When the ambient reaches 90°F the concrete is protected with moist covering.

D. Concrete Reinforcement

1. All reinforcing steel will conform to ASTM A615. All welded wire fabric will conform to ASTM A185.
2. All reinforcement is new, free of dirt, oil, paint, grease, loose mill scale and loose or thick rust when placed.
3. Details not shown on drawings or specified are to ACI318.

4. Steel reinforcement is centered in the cross-sectional area of the walls and will have at least 1¼" of cover on the under surface of the floor.
  5. The maximum allowable variation for center-center spacing of reinforcing steel is ½".
  6. Full lengths of reinforcing steel are used when possible. When splices are necessary on long runs, splices are alternated from opposite sides of the components for adjacent steel bars.
    - a. Lap bars under #4 a minimum of 12" bar diameters.
    - b. Lap bars larger than #4 a minimum of 24" bar diameters.
  7. Reinforcing bars are bent cold. No bars partially embedded in concrete are field bent unless approved by the customer.
- E. Caulking, Grout, Adhesive and Sealer
1. Caulking service temperatures from -40°F to +194°F.
  2. Interior and exterior joints are caulked with a paintable polyurethane sealant.
  3. Grout is a non-shrink type and are painted to match the color of surrounding concrete as nearly as possible.
  4. Cement base coating is formulated with a very fine aggregate system and is a built-in bonding agent.
- F. Doors – Steel
1. Doors are flush panel type 1¾" thick, minimum 16-gauge galvanized steel, top painted with DTM ALKYD.
  2. Door frames are knockdown or welded type, single rabbet, minimum 16-gauge prime coated steel top painted with DTM ALKYD, width to suit wall thickness.
  3. Three (3) rubber door silencers are provided on latch side of frame.
- G. Door Hinges
1. Three (3) per door with dull chrome plating 4½" x 4½", adjustable tension, and automatic closing for each door.
- H. Doorstop
1. Dome style stop meeting ANSI 156.16.
- I. Door Sweep
1. Provided at the bottom of door with an adjustable brush.
- J. Double Coat Hook
1. 16-gauge (1.5mm), type 304 stainless steel.
  2. Formed construction with a satin finish and have ¾" x ⅞" nail in anchor.
  3. Upper hook extends at least 2½" from the wall.
  4. Lower hook will extend at least 1¼" from the wall.
- K. Grab Bars
1. 18-gauge, type 304 stainless steel with 1½" clearance.
  2. Able to withstand 300-pound top loading.

- L. Commercial Mortise Lockset
  - 1. ANSI/BHMA certified Grade 1 mortise lockset for exterior door.
  - 2. UL & ULC three-hour fire rating.
  - 3. ANSI A-156 13-2005 certified.
  - 4. ADA barrier free accessibility.
  - 5. Deadbolt function included.
  - 6. Thumb turn privacy function.
- M. Paint
  - 1. All paints and materials will conform to all federal specifications or be similar "top-of-the-line-components."
  - 2. Paints will not contain more than .06% by weight of lead.
  - 3. Type of paints for toilets.
    - a. Inside concrete surfaces.
      - i. Interior floors – chemical resistant urethane. The color is gray.
      - ii. Interior walls and ceilings – modified acrylic, water repellent penetrating stain. The color is white followed by a clear acrylic anti-graffiti sealer.
    - b. Exterior concrete surfaces.
      - i. Exterior slab – clear sealer.
      - ii. Exterior walls and roof – water repellent penetrating stain in the same color as the walls or roof followed by a clear acrylic anti-graffiti sealer.
    - c. Metal surfaces (both inside and out).
      - i. DTM ALKYD.
- N. Riser
  - 1. Meets ADA standards.
  - 2. Molded one-piece HDPE polyethylene.
  - 3. Smooth surface and have high impact resistance at extremely cold temperatures.
- O. Sealers and Curing Compounds
  - 1. Curing compounds, if used, are colorless, complying with ASTM C309, type I or 1-D.
  - 2. Weatherproofing sealer for exterior of building are a clear water repellent penetrating sealer.
- P. Signs
  - 1. Signs to have raised pictograms, letters, and braille to meet ADA.
  - 2. Interior to have "No Trash in Vault" sign.
  - 3. All signs inset a minimum of  $\frac{3}{4}$ " into wall with 45-degree bevel.
  - 4. All signs to be anchored into concrete with  $\frac{1}{4}$ " x  $\frac{3}{4}$ " concrete anchor nails.
- Q. Toilet Paper Dispenser
  - 1. Constructed of  $\frac{1}{4}$ " thick, type 304 stainless steel.
  - 2. Holds three (3) standard rolls of toilet paper.
  - 3. Fastening system able to withstand 300-pound top loading.

- R. Polyethylene Vault Liner
  1. Made of a Roto molded 8460 polyethylene.
  2. Holds up to 1,000 gallons of waste or 15,000 uses per vault.
  3. Minimum thickness .100.
  4. Molded dovetail embeds to attach the liner to concrete walls of the vault.
  5. Welded two (2) C-channels to attach the liner to the bottom of the vault.
- S. Vent Stack
  1. Minimum 12" in diameter and a minimum 3' higher than the roof peak.
- T. Wall Vent
  1. Vent cover is 14-gauge, type 304 stainless steel painted with DTM and anchored into the concrete wall with high strength anti-rust tap con fasteners.
  2. Vent louver frame and louvers are non-vision, .1" extruded, aluminum jet coat finish.
  3. Vent comes with insect screen.
  4. Cover to be recessed a minimum  $\frac{3}{4}$ " on exterior walls with a 45-degree bevel. Interior to be flush mounted. Wall vent will not protrude from the wall.
- U. Windows and Vault Cleanout Cover
  1. Windows and cleanout cover frames are constructed from steel.
  2. Window glazing is  $\frac{3}{16}$ " thick translucent pebble finished mar-resistant Lexan.
  3. Plate for vault cleanout cover is  $\frac{1}{4}$ " thick diamond plate steel.
  4. Lid is hinged and configured so that it can be locked with a padlock. A gasket is provided around the entire perimeter of the lid to provide an airtight seal.
  5. Windows to have  $\frac{3}{4}$ " recess with 45-degree bevel.
  6. Windows frames to have vandal resistant fasteners.
- V. Optional Roof Insulation
  1. Ceiling anchored  $\frac{1}{2}$ " plywood + fiberglass laminate + 2" polyurethane foam. Approximately R-19.

## 6.0 MANUFACTURE

- A. Mixing and Delivery of Concrete
  1. Mixing and delivery of concrete are in accordance with ASTM C94, Section 12.6 through 12.9.
- B. Placing and Consolidating Concrete
  1. Except for SCC, concrete is consolidated by the use of mechanical vibrators. Vibration are sufficient to accomplish compaction but not to the point that segregation occurs.
- C. Finishing Concrete
  1. Interior floor and exterior slabs are floated and troweled.
  2. All exterior building walls and exterior screen walls are any one of the available textures.
  3. All exterior surfaces of the roof panels are cast to simulate any one of the available textures. The underside of the overhang will have a smooth finish.

#### D. Cracks and Patching

1. Cracks in concrete components which are judged to affect the structural integrity of the building are rejected.
2. Small holes, depressions, and air voids are patched with a suitable material. The patch will match the finish and texture of the surrounding surface.
3. Patching will not be allowed on defective areas if the structural integrity of the building is affected.

#### E. Curing and Hardening Concrete

1. Concrete surfaces will not be allowed to dry out from exposure to hot, dry weather during initial curing period.

### 7.0 FINISHING AND FABRICATION

#### A. Structural Joints

1. Wall components are joined together with two (2) welded plate pairs at each joint.
  - a. Each weld plate is 6" long and located one (1) pair in the top quarter and one (1) pair in the bottom quarter of the seam.
  - b. Weld plates are anchored into the concrete panel and welded together with a continuous weld.
  - c. Inside seams are a paintable caulk.
  - d. Outside seams will use a caulk in a coordinating building color or clear.
2. Walls and roof are joined with weld plates, 3" x 6" at each building corner.
3. The joint between the floor slab and walls are joined with a grout mixture on the inside, a matching colored caulk on the outside and two (2) weld plates 6" long per wall.

#### B. Painting/Staining

1. An appropriate curing time is allowed before paint is applied to concrete.
2. Some applications may require acid etching. A 30% solution of hydrochloric acid are used, flushed with water, and allowed to thoroughly air dry.
3. Painting will not be done outside in cold, frosty, or damp weather.
4. Painting will not be done outside in winter unless the temperature is 50°F or higher.
5. Painting will not be done in dusty areas.
6. All surface voids are filled prior to painting.
7. Schedule of finishes.
  - a. Inside concrete surfaces.
    - i. Inside floors – one (1) coat of 1-part water based chemical resistant urethane.
    - ii. Interior walls and ceilings – two (2) coats of a modified acrylic, water repellent penetrating stain, followed by one (1) coat of clear sealer.
  - b. Exterior concrete surfaces.
    - i. Exterior walls – two (2) coats of water repellent penetrating stain in the same color as the walls or roof followed by one (1) coat of clear acrylic anti-graffiti sealer.
  - c. Metal surfaces (both inside and out).
    - i. Two (2) coats of DTM ALKYD.

## 8.0 TESTING

- A. Testing will only be performed by qualified individuals who have been certified ACI Technician Grade 1.
- B. Sampling is in accordance with ASTM C172.
- C. The following tests are performed on concrete used in the manufacture of toilets. All testing is performed in the CXT (PCI certified) laboratories.
  - 1. Air content – checked per ASTM C231 on the first batch of concrete. The air content is in the range of 5.0% +/- 1.5%.
  - 2. Compressive strength of the cylinders – tested to ASTM C39.
    - a. Two (2) are tested at release (minimum strength of 2500 psi).
    - b. One (1) is tested at seven (7) days (minimum strength of 4500 psi).
    - c. Two (2) are tested at 28 days (minimum strength of 5000 psi).
- D. A copy of all test reports are available to the customer as soon as 28-day test results are available.

## 9.0 INSTALLATION

- A. Scope of Work
  - 1. Work specified under this section includes excavation, backfill and placement of precast concrete vault toilet.
- B. Materials
  - 1. Bedding material to be sand or  $\frac{3}{8}$ " minus crushed or screened aggregate.
  - 2. Caulking between vault and toilet floor to be 1" x 1" Butyl tape designed specifically to bond precast concrete to precast concrete.
- C. Location – it is the responsibility of the customer to:
  - 1. Provide exact location by stakes or other approved method.
  - 2. Provide clear and level site free of overhead and/or underground obstructions.
  - 3. Provide access to the site for truck delivery and sufficient area for the crane to install and the equipment to perform the contract requirements.
- D. Access to Site
  - 1. Delivery to site made on normal highway trucks and trailers.
  - 2. If, at the time of delivery, conditions of access are hazardous or unsuitable for truck and equipment due to weather, physical constraints, roadway width or grade, CXT may require an alternate site with better access provided to ensure a safe and quality installation.
- E. Excavation and Elevation
  - 1. Comply with all applicable OSHA standards for excavation.
  - 2. Excavate for the installation of the toilet vault to a depth that will allow the structure site to be free draining after installation is completed. Allow for a 2" leveling course beneath the toilet vault. Stockpile topsoil in a separate pile at sites.
  - 3. Finish floor elevation is 4-6" above natural grade measured at the front (entrance) of the exterior slab unless otherwise approved by the customer. Ideally, the back of the building should be slightly higher to allow water to freely drain out of the toilet rooms. The

customer may specify a finish floor elevation for buildings at some sites. The contractor will install buildings at these sites with the floor elevation within a plus or minus 0.05' of the specified floor elevation.

4. No excavation is to be left open more than seven (7) days unless otherwise approved by the customer.
5. All excavations left open overnight are fenced with wire mesh or plastic mesh fence secured to steel posts all around the excavation.
  - a. The bottom of the fence will generally follow the contour of the ground.
  - b. Maximum spacing of the steel posts is 10'.
  - c. Minimum height of the fence is 36".

#### F. Backfill and Compaction

1. Compact the natural ground at the bottom of the vault excavation with a minimum of three (3) passes with a whacker-type mechanical compactor or equivalent approved by the customer.
2. Install sand or aggregate bedding material for leveling course if needed. Compact leveling course with one (1) pass with a whacker-type mechanical tamper or equivalent approved by the customer. Grade leveling course so there are no high spots in the middle of the vault bottom. Compact with a second pass with a whacker or approved equivalent tamper.
3. Set vault in place and check for level or appropriate scope. Backfill around structure. Use excavated material for backfill except those rocks larger than 6" in maximum dimension shall not be placed within 6" of the exterior vault walls.
4. Fill, adjacent to the building entry, will have excavated material placed in 8" loose lifts and compacted with a minimum of two (2) passes with a whacker-type mechanical compactor or equivalent approved by the customer.

#### G. Finish Grading

1. Spread excess excavated material from the vault around structure. Intended final grade is flush with the top of the front slab. Allow for placement of topsoil to reach that grade. Grade backfill away from structure at maximum slope of 5% unless otherwise approved by the customer.
2. Spread stockpiled topsoil as final layer after rough grading is completed. Areas disturbed by excavation, backfilling and stockpiling of excavated materials are hand raked to remove exposed rocks over 1" in maximum dimension.
3. Oversized rocks removed from the surface shall be disposed of in a designated area within 200' of the site.

#### H. Exhaust Pipe Installation

1. After exhaust pipe is installed, seal around pipe at top of roof with polyurethane caulk. Seal around pipe at top of slab are accomplished by using polyurethane caulk.

## **10.0 WARRANTY—PRECAST DIVISION**

CXT provides a one (1) year warranty on all concrete components. The warranty is valid only when concrete is used within the specified loadings. Furthermore, said warranty includes only the related material necessary for the construction and fabrication of said concrete components. All other non-concrete components will carry a one (1) year warranty. CXT warrants that all goods sold pursuant hereto will, when delivered, conform to specifications set forth above. Goods shall be deemed accepted and meeting specifications unless notice identifying the nature of any non-conformity is provided to CXT in writing within the specified warranty. CXT, at its option, will repair or replace the goods or issue credit for the customer provided CXT is first given the opportunity to inspect such goods. It is specifically understood that CXT's obligation hereunder is for credit, repair, or replacement only, F.O.B. CXT's manufacturing plants, and does not include shipping, handling, installation or other incidental or consequential costs unless otherwise agreed to in writing by CXT.

This warranty shall not apply to:

1. Any goods which have been repaired or altered without CXT's express written consent, in such a way as in the reasonable judgment of CXT, to adversely affect the stability or reliability thereof;
2. To any goods which have been subject to misuse, negligence, acts of God or accidents; or
3. To any goods which have not been installed to manufacturer's specifications and guidelines, improperly maintained, or used outside of the specifications for which such goods were designed.

## **11.0 DISCLAIMER OF OTHER WARRANTIES**

The warranty set forth above is in lieu of all other warranties, express or implied. All other warranties are hereby disclaimed. CXT makes no other warranty, express or implied, including, without limitation, no warranty of merchantability of fitness for a particular purpose or use.

## **12.0 LIMITATION OF REMEDIES**

In the event of any breach of any obligation hereunder, breach of any warranty regarding the goods or any negligent act or omission or any party, the parties shall otherwise have all rights and remedies available at law; however, IN NO EVENT SHALL CXT BE SUBJECT TO OR LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.