



# SPECIFICATIONS

## DENALI BUILDING STYLE

### 1.0 SCOPE

This specification covers the construction and placing of the Denali flush precast concrete flush toilet building 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 Bar for Concrete Reinforcement
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcine 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 flush 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 precast concrete flush facilities produced, installed and in use as an example of their ability to perform this contract.
- G. Manufacturer (CXT) shall provide 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.
- 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**

The flush building has 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 the flush building not only will withstand the forces of nature listed below, but to provide protection from vandalism and other unforeseen hazards. 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. Buildings will also meet various structural loads such as below, but not limited to/or restricted by them.

- A. Roof Snow Load
  - 1. The flush building is designed to withstand a 250 PSF snow load.
- B. Floor Load
  - 1. The flush building is designed to withstand 400 PSF floor load.
- C. Wind Load
  - 1. The flush building will withstand the effects of 150 miles per hour (3-second gust) wind exposure C.
- D. Earthquake
  - 1. The flush building will withstand the effects of a seismic group 1 design category E earthquake.
- E. Additional Design Standards
  - 1. The flush building is designed to meet the accessibility requirements put forth by federal, state, and local statutes.
  - 2. The flush building is an all concrete design with a minimum 7/12 roof pitch. The flush building shall have a minimum 4" wall, 4½" roof, and 5" floor thickness.
  - 3. All wall to floor interior surface seams shall have a minimum 1" radius coving made of high strength grout.
  - + Recycled Material
  - + LED Lighting

## 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 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.
7. Lap bars under #4 a minimum of 12" bar diameters.
8. Lap bars larger than #4 a minimum of 24" bar diameters.
9. Reinforcing bars are bent cold. No bars partially embedded in concrete are field bent unless approved by the customer.

### C. 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.

### D. Paint

1. All paints and materials will conform to all federal specifications or be similar "top-of-the-line-components."

2. Type of paints for toilets.
  - a. Inside concrete surfaces.
    - i. Interior floors will be a chemical resistant urethane. The color will be gray.
    - ii. Interior walls and ceilings will be a modified acrylic, water repellent penetrating stain. The color will be white followed by a clear acrylic anti-graffiti sealer.
  - b. Metal surfaces both inside and out.
    - i. DTM ALKYD.
  - c. Exterior concrete surfaces.
    - i. Exterior slab will be clear sealer.
    - ii. Exterior walls and roof will be a water repellent penetrating stain in the same color as the walls or roof followed by a clear acrylic anti-graffiti sealer.
- E. Grab Bars
  1. Grab bars will be 18-gauge, type 304 stainless steel with 1½" clearance. Grab bars will each be able to withstand 300-pound top loading.
- F. Toilet Paper Dispenser
  1. Dispenser will be constructed of ¼" thick, type 304 stainless steel. Dispenser will be capable of holding three (3) standard rolls of toilet paper. Toilet paper holder fastening system will be able to withstand 300-pound top loading.
- G. Steel Doors
  1. Doors will be flush panel type 1¾" thick, minimum 16-gauge galvanized steel, top painted with DTM ALKYD.
  2. Door frames will be knockdown or welded type, single rabbet, minimum 16-gauge prime coated steel top painted with DTM ALKYD, width to suit wall thickness. Three (3) rubber door silencers will be provided on latch side of frame.
- H. Door Hinges
  1. Door hinges will be three (3) per door with dull chrome plating 4½" x 4½", adjustable tension, and automatic closing for each door.
- I. 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.
- J. Doorstop
  1. Doorstop will be a dome style stop meeting ANSI 156.16.
- K. Double Coat Hook
  1. Coat hook will be 304 stainless steel 16-gauge (1.5mm), formed construction with a satin finish and have ¾" x 7/8" nail in anchor. Upper hook will extend at least 2½" from the wall. Lower hook will extend at least 1¼" from the wall.
- L. Door Sweep
  1. Door sweep will be provided at the bottom of door and will be an adjustable brush type.

M. Wall Vent

1. Wall vent will be crank operated allowing the unit to be opened or closed. Crank will be removable. Vent cover will be 14-gauge 304 stainless steel and anchored into the concrete wall with high strength anti-rust tap con fasteners. Vent to come with insect screen. 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.

N. Signs

1. Signs to have raised pictograms, letters, and braille to meet ADA.

O. Windows

1. Window frames will be constructed from steel.
2. Window glazing will be  $\frac{3}{16}$ " thick translucent pebble finished mar-resistant Lexan.
3. Windows to have  $\frac{3}{4}$ " recess with 45-degree bevel.
4. Window frames to have vandal resistant fasteners.
5. Gable window to be 4 x 4 x  $\frac{1}{4}$  tube steel.

P. Mirrors

1. Mirror to be 18" x 36" frameless 430 18-gauge stainless steel with #8 bright polish.

Q. Plumbing

1. All fixtures to meet ANSI A112.19.2.
2. Plumbing will be concealed in the service area.
3. *Flush valve* – Concealed closet flush-o-meter constructed of rough brass. Furnish valve with integral vacuum breaker and wall mounted push button. Valve will be of a water saver type with a flow of 1.6 gallons per flush.
4. *Hammer arrester* – Installed on water line.
5. *Hose bib* – Available in the chase area.
6. *Lavatory* – Vitreous china with back splashguard, front overflow opening, equipped with brass trap and drainpipe without stopper. Sink will be 20" wide x 18" front to back x  $5\frac{3}{4}$ " deep with ADA trap cover. Optional stainless steel fixtures available.
7. Main shut-off valve and drain.
8. *Toilet* – Constructed of vitreous china, wall hung, with siphon jet action. Toilet will have a back spud for a concealed flush valve connection and will be mounted with the top of the seat 18" above the finished floor. Seat will be heavy duty solid plastic with an open front. Optional stainless steel fixtures available.
9. Trap primer distribution unit.
10. *Waste and vent material* – ABS or PVC plastic and will be plumbed to meet Uniform Building Codes.
11. *Water material* – Copper tubing Type L, hard drawn. A gate valve will be provided at the inlet end of the water line. All water lines will be of a size to provide proper flushing action based on a nominal water pressure of 40 psi.
12. *Water valve* – Self-closing water set with indexed push button.

13. *Water heater* – High efficiency commercial grade water heater(s) provided per code.

R. Electrical

1. All components are UL listed.
2. *Breaker panel* – 100 amps, mounted to meet electrical code.
3. *Interior lighting* – Vandal resistant fixtures with built-in occupancy sensor, energy efficient LED lights, and lifetime warranty.
4. *Exterior lighting* – Vandal resistant fixtures with built-in photoelectric switch, energy efficient LED lights.
5. *Exhaust fans* – All wet location motion activated with speed control in chase area to control CFM.
6. *Wiring* – Conduit, surface mounted in the service area and concealed in the user compartments. All wire will be copper.
7. Optional warm air, ADA compliant, vandal resistant hand dryers available.

## 6.0 MANUFACTURE

A. Finishing Concrete

1. All exterior building walls and exterior screen walls will be any one of the available textures.
2. All exterior surfaces of the roof panels will be cast to simulate any one of the available textures. The underside of the overhang will have a smooth finish.

B. Cracks and Patching

1. Cracks in concrete components which are judged to affect the structural integrity of the building will be rejected.
2. Small holes, depressions, and air voids will be 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.

## 7.0 FINISHING AND FABRICATION

A. Structural Joints

1. Wall components will be joined together with two (2) welded plate pairs at each joint. Each weld plate will be 6" long and located one (1) pair in the top quarter and one (1) pair in the bottom quarter of the seam. Weld plates will be anchored into the concrete panel and welded together with a continuous weld.
2. The inside seams will be a paintable caulk. The outside seams will use a caulk in a coordinating building color or clear.
3. Walls and roof will be joined with weld plates, 3" x 6" at each building corner.
4. The joint between the floor slab and walls will be 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 will be allowed before paint is applied to concrete.

2. Schedule of finishes.
  - a. Inside concrete surfaces.
    - i. Inside floors will be one (1) coat of one (1) part water based chemical resistant urethane.
    - ii. Interior walls and ceilings will be two (2) coats of a modified acrylic, water repellent penetrating stain, followed by one (1) coat of clear sealer.
  - b. Metal surfaces both inside and out.
    - i. Two (2) coats of DTM ALKYD.
  - c. Exterior concrete surfaces.
    - i. Exterior walls will be 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.

## 8.0 TESTING

The following tests will be performed on concrete used in the manufacture of toilets. All testing will be performed in the CXT (PCI certified) laboratories. Testing will only be performed by qualified individuals who have been certified ACI Technician Grade 1. Sampling will be in accordance with ASTM C172.

- A. The air content of the concrete will be checked per ASTM C231 on the first batch of concrete. The air content will be in the range of 5.0% +/- 2.0%.
- B. The compressive strength of the cylinders will be tested to ASTM C39. We will make one (1) cylinder for release, one (1) for seven (7) days and one (1) for 28 days. The release must be a minimum strength of 2500 psi, the 7-day must be a minimum of 4500 psi and the 28-day must be a minimum of 5000 psi.
- C. A copy of all test reports will be 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 relates to the placement of the unit by CXT on customer prepared foundations. *See Installation Specifications or by others.*
- B. Location
  1. It is the responsibility of the customer to:
    - a. Provide exact location by stakes or other approved method.
    - b. Provide clear and level site free of overhead and/or underground obstructions. *See Installation Questionnaire for details.*
    - c. Provide access to the site for truck delivery and sufficient area for the crane to install and the equipment to perform the contract requirements. *See Installation Questionnaire for details.*
    - d. Water, electrical, and sewage site connections to be placed per CXT drawings. Must be placed to easily connect to the building. *See Installation Questionnaire for details.*
- C. Compacting
  1. The bottom of the area must be compacted after it has been dug out. After the base has been placed, it must be compacted as well. The bearing of the soil and base should be a minimum of 1,500 pounds per square foot.

#### D. Base

1. After compacting the bottom of the area, a minimum of 6" thick and consist of ¾" minus crushed rock (i.e. road base material) compacted to 95% of optimal density in accordance with ASTM D1557. Finished surface of sub-base shall be flat and level, with a maximum deviation of -½", +0" from a true horizontal plane.
2. The base should be placed for support, leveling and drainage purposes, and also to limit frost action. The base must be confined so as to prevent washout, erosion, or any other undermining.

#### E. Access to Site

1. Delivery to site made on normal highway trucks and trailers. 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. In any such case, additional costs for cranes, trucking, etc. will be charged to the account of the customer. *See Installation Questionnaire for details.*

### 10.0 WARRANTY—PRECAST DIVISION

CXT provides 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:

- A. 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;
- B. To any goods which have been subject to misuse, negligence, acts of God or accidents; or
- C. 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.