

**SPECIFICATIONS  
FOR DENALI STYLE  
FLUSH TOILET BUILDINGS**

**1.0**    **SCOPE**

This specification covers the construction and placing of the Denali 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 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 C979	Standard Specification for Pigments for Integrally Colored Concrete
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 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 examples of precast concrete flush facilities produced, installed and in use as an example of their ability to perform this contract.
- G.** Manufacture shall provide a 20 year warranty.

Manufacturers meeting these criteria are:

CXT, Incorporated  
Spokane Industrial Park  
3808 North Sullivan Road, Building 7  
Spokane, WA 99216  
Phone: 800-696-5766

### **4.0 DESIGN CRITERIA**

The Denali 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 Denali not only will withstand the forces of nature listed below but to provide protection from vandalism and other unforeseen hazards.

#### **A. Snow Load**

- 1. The Denali will withstand a snow load of 250 pound per square foot snow load.

#### **B. Floor Load**

- 1. The Denali is designed to withstand 400 pounds per square foot floor load

**C. Wind Load**

1. The Denali will withstand the effects of 150 mile per hour (3-second gust) wind exposure C

**D. Earthquake**

1. The Denali will withstand the effects of a seismic group 1 design category E earthquake.

**E. Additional Design Standards**

1. The Denali is designed to meet the requirements of the sixty-inch turning radius inside toilet room specified by the American with Disabilities Act Requirements and Uniform Federal Accessibility Standards as of the date of these specifications.
2. The Denali is an all concrete design with a minimum 7/12 roof pitch.
3. The Denali shall have a minimum 4 inch wall, 4 ½ inch roof, and 5 inch floor thickness.
4. All wall to floor interior surface seams shall have a minimum 1” radius coving made of high strength grout.

**5.0 MATERIALS**

**A. Concrete - General**

The concrete mix design will be designed to ACI 211.1 to produce concrete of good workability.

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

**B. Colored Concrete**

1. Color additives will conform to ASTM C979. A 12”x12”x1” color sample will be available for customer approval.
2. The following will contain colored concrete:
  - a. Toilet building roof panels
  - b. Building walls
  - c. Screen panels

3. The same brand and type of color additive will be used throughout the manufacturing process.
4. All ingredients will be weighed and the mixing operation will be adequate to ensure uniform dispersion of the color.

#### **C. Cold Weather Concrete**

1. Cold weather concrete placement will be in accordance with ACI 306.
2. Concrete will not be placed if ambient temperature is expected to be below 35 degrees F. during the curing period unless heat is readily available to maintain the surface temperature of the concrete at least 45 degrees F.
3. Materials containing frost or lumps of frozen materials will not be used.

#### **D. Hot Weather Concrete**

The temperature of the concrete will not exceed 95 degrees F. at the time of placement. When the ambient reaches 90 degrees F. the concrete will be protected with moist covering.

#### **E. Concrete Reinforcement**

1. All reinforcing steel will conform to ASTM A615. All welded wire fabric will conform to ASTM A185.
2. All reinforcement will be new, free of dirt, oil, paint, grease, loose mill scale and loose or thick rust when placed.
3. Details not shown of drawings or specified will be to ACI318.
4. Steel reinforcement will be centered in the cross-sectional area of the walls and will have at least 1 1/4" of cover on the under surface of the floor.
5. The maximum allowable variation for center-center spacing of reinforcing steel will be 1/2".
6. Full lengths of reinforcing steel will be used when possible. When splices are necessary on long runs, splices will be alternated from opposite sides of the components for adjacent steel bars. Lap bars #4 or smaller a minimum of 12". Lap bars larger than #4 a minimum of 24 bar diameters.
7. Reinforcing bars will be bent cold. No bars partially embedded in concrete will be field bent unless approved by the customer.

#### **F. Sealers and Curing Compounds**

1. Curing compounds, if used, will be colorless, complying with ASTM C309, type I or 1-D.
2. Weatherproofing sealer for exterior of building will be a clear water repellent penetrating sealer.

#### **G. Caulking, Grout, Adhesive and Sealer**

1. Caulking service temperatures from -40 to +194 degrees Fahrenheit.
2. Interior and exterior joints will be caulked with a paintable polyurethane sealant.
3. Grout will be a non-shrink type and will be 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.

#### **H. Paint**

1. All paints and materials will conform to all Federal specifications or be similar “top-of-the-line-components”. Paints will not contain more than .06 percent by weight of lead.
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

#### **I. Grab bars**

Grab bars will be 18 gauge, type 304 stainless steel with 1-1/2” clearance. Grab bars will each be able to withstand 300 pound top loading.

**J. Toilet Paper Dispenser**

Dispenser will be constructed of 1/4" 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.

**K. Steel Doors**

1. Doors will be flush panel type 1-3/4" 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.

**L. Door Hinges**

Door hinges will be 3 per door with dull chrome plating 4-1/2"x4-1/2", adjustable tension, automatic-closing for each door.

**M. Lockset**

1. Lockset will meet ANSI A156.2 Series 4000, Grade 1 cylindrical lockset for exterior door.
2. Lever handle both inside and out
3. Either handle operates latch unless outside handle is locked by inside push-button.
4. Push-button will automatically release when inside lever handle is turned or door is closed.
5. Emergency slot on exterior so door can be unlocked from the outside with a coin, screwdriver and etc.
6. Inside lever always active.
7. U.S. 26D finish.

**N. Dead Bolt**

Deadbolt will be a Lori Lock standard model with a double cylinder, 2 3/4" backset, and US26D finish. The cylinder will be a standard 1 1/8" Schlage Mortise cylinder with compression ring and 626 finish.

**O. Door Stop**

Doorstop will be a dome style stop meeting ANSI 156.16.

**P. Double Coat Hook**

Coat hook will be 304 stainless steel 16 gauge (1.5mm), formed construction with a satin finish and have 3/16" x 7/8" nail in anchor. Upper hook will extend at least 2-1/2" inches from the wall. Lower hook will extend at least 1-1/4" from the wall.

**Q. Door Sweep**

Door sweep will be provided at the bottom of door and will be an adjustable brush type.

**R. Wall Vent**

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 painted with DTM 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 3/4" on exterior walls with a 45 degree bevel. Interior to be flush mounted. Wall vent will not protrude from the wall.

**S. Signs**

1. Signs to have raised pictograms, letters and Braille to meet ADA.
2. All signs inset a minimum of 3/4" into wall with 45 degree bevel.
3. All signs to be anchored into concrete with 1/4" x 3/4" concrete anchor nails.

**T. Windows**

1. Window frames will be constructed from steel.
2. Window glazing will be 3/16" thick translucent pebble finished mar-resistant Lexan.
3. Windows to have 3/4" recess with 45 degree bevel.
4. Window frames to have vandal resistant fasteners.

**U. Plumbing**

1. All fixtures to meet ANSI A112.19.2
2. Waste and vent material will be ABS or PVC plastic and will be plumbed to meet Uniform Building Codes.
3. Water material will be 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.

4. All plumbing will be concealed in the service area.
5. Toilet will be 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 inches above the finished floor. Seat will be heavy duty solid plastic with an open front. Optional stainless steel fixtures available.
6. Flush valve will be 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.
7. Lavatory will be vitreous china with back splashguard, front overflow opening, equipped with brass trap and drainpipe without stopper. Sink will be 20 inches wide x 18 inches front to back x 5 ¾ inches deep with ADA trap cover. Optional stainless steel fixtures available.
8. Water valve will be self-closing water set with indexed push button.
9. Hose bib available in the chase area.
10. A main shut-off valve and drain will be provided with plumbing.
11. Hammer arrester to be installed on water line.
12. Trap primer distribution unit shall be installed.
13. Optional Instant-Flow tankless electric water heater. Temperature rise of 75 degrees at .5gpm with a temperature preset of 104 degrees.

## **V. Electrical**

1. All components UL listed
2. All electrical wiring will be in conduit, surface mounted in the service area and concealed in the user compartments. All wire will be copper.
3. A 100-amp NEMA 3R breaker panel will be provided and must be mounted on the exterior of the building to meet electrical code.
4. The chase area will have, cast in both common walls, lexan windows to allow light into each toilet room with Two (2) 4-foot 3 bulb wall mounted low temperature ballast light fixture.
5. 2 exterior 35-watt High Pressure Sodium lights, polycarbonate vandal resistant.
6. The optional hand dryer is an air compression type with remote motor unit. Push button switch located in cast nozzle housing with flexible hose connecting blower motor, housing and nozzle. Power input 120VAC, 7A (non-heated air).
7. One GFI outlet located next to the sink.
8. Two restroom area exhaust fans HVI certified, with 270 CFM speed controlled (control in chase area)
9. Lighting on the exterior of building will be photocell activated;

interior will be motion activated; override switch in chase/utility room.

## **6.0 MANUFACTURE**

### **A. Mixing and Delivery of Concrete**

Mixing and delivery of concrete will be in accordance with ASTM C94, section 10.6 through 10.9 with the following additions:

1. Aggregate and water will be adjusted to compensate for differences in the saturated surface-dry condition.

### **B. Placing and Consolidating Concrete**

Concrete will be consolidated by the use of mechanical vibrators. Vibration will be sufficient to accomplish compaction but not to the point that segregation occurs.

### **C. Finishing Concrete**

1. Interior floor and exterior slabs will be floated and troweled.
2. All exterior building walls and exterior screen walls will be any one of the available textures.
3. 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.

### **D. 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.

### **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 will be joined together with two welded plate pairs at each joint. Each weld plate will be 6" long and located one pair in the top quarter and one pair in the bottom quarter of the seam. Weld plates will be anchored into the concrete panel and welded together with a continuous weld. The inside seams will be a paintable caulk. The outside seams will use a caulk in a coordinating building color or clear.
2. Walls and roof will be joined with weld plates, 3"x6" at each building corner.
3. 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 weld plates 6" long per wall.

### B. **Painting/Staining**

1. An appropriate curing time will be allowed before paint is applied to concrete.
2. Some applications may require acid etching. A 30% solution of hydrochloric acid will be 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 degrees F. or higher.
5. Painting will not be done in dusty areas.
6. Schedule of finishes
  - a. Inside concrete surfaces
    - I Inside floors will be 1 coat of 1-part water based chemical resistant urethane.
    - II Interior walls and ceilings will be 2 coats of a modified acrylic, water repellent penetrating stain, followed by 1 coat of clear sealer.
  - b. Metal surfaces both inside and out
    - I 2 coats of DTM ALKYD
  - c. Exterior concrete surfaces
    - I Exterior walls will be 2 coats of water repellent penetrating stain in the same color as the walls or roof followed by 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.

1. 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%.
2. The compressive strength of the cylinders will be tested to ASTM C39. We will make one (1) cylinder for release, one (1) for 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.
3. 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**

Work specified under this Section relates to the placement of the unit by CXT on customer prepared foundations.

### **B. Location**

It's 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.
4. Water, electrical, and sewage site connections to be placed per CXT drawings. Must be placed to easily connect to the building.

### **C. Compacting**

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**

After compacting the bottom of the area, a minimum of 6” of a compacted, ¾” minus material base of gravel (i.e. road base) should be placed for support, leveling and drainage purposes. The base also limits frost action. The base must be confined so as to prevent washout, erosion or any other undermining.

**E. Access to Site**

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, and etc. will be charged to the account of the customer.

**10.0 WARRANTY—PRECAST DIVISION**

CXT provides a warranty against defects in material or workmanship for a period of twenty (20) years 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.