



GENERAL SPECIFICATIONS FOR CABLE TRENCH

1. TECHNICAL SCOPE

- 1-A.** These specifications cover any precast Fibercrete® (G.F.R.C.) and/or concrete cable trench system manufactured by Concast Incorporated in Zumbrota, Minnesota. The manufacturer must have experience in design and fabrication of these products and also the facilities for fabricating them with the quality specified herein and without delay to the agreed upon schedule.
- 1-B.** The trench system shall be designed and constructed to provide a serviceable life of 35 years and warranted for 5 years when installed outdoors in full sunlight and without any protection from the weather at any location in the continental United States or Canada.
- 1-C.** The Supplier shall design, construct, perform dimensional and quality control tests, and prepare the trench for truck shipment. Shipping and delivery responsibilities shall be defined in the project specific purchase documents. The Supplier shall provide all necessary documentation as stated in this specification.

2. DIMENSIONS AND DESIGN

- 2-A.** Drawings shall be made available for engineering approval and field installation. Final drawings will include individual details, the layout, a complete BOM (Bill of Materials), and installation guidelines. Electronic individual component drawings in PDF format are available upon request. Standard part drawings shall be available online.
- 2-B.** The tolerances of the dimensions of each trench component shall not exceed $\pm 1/8"$. These tolerances apply to the components when ready for shipping, when set on a flat and level surface with no loads applied to it.
- 2-C.** Fiber and steel reinforced concrete components shall be non-flammable.
- 2-D.** The precast components are designed to conform to requirements stated in ASTM C857-07 "Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures, ASTM C858-07 "Specifications for Underground Precast Concrete Utility Structures".
- 2-E.** Provisions, such as cast-in threaded inserts, must be offered for lifting traffic rated trench channels. Mounting holes must be adequately reinforced to avoid damaging the channel, and to provide an ultimate strength of at least 5 times the part weight when the unit is lifted in accordance with the manufacturer's instructions.

3. PERFORMANCE AND MATERIALS

- 3-A.** Cement shall conform to the requirement of ASTM C150 - Type I, II or ASTM C595 - Type IL.
- 3-B.** Course and fine aggregates shall conform to ASTM C33 "Specification for Concrete Aggregates".
- 3-C.** Preparation of concrete shall conform to ASTM C94 "Specification for Ready-Mix Concrete" & ACI 304 "Guide for Mixing, Transporting and Placing Concrete".
- 3-D. LAY-UP GFRC - FIBERCRETE®**
 - 3-D.1** Composed of cement mortar reinforced by alkali resistant glass fiber, and deformed high tensile welded wire. It is fabricated via the Concast spray lay-up method which incorporates a minimum of 4 percent volume A.R. glass fibers.
 - 3-D.2** Conforms to AIA Masterspec Section 03491 for Glass Fiber Reinforced Concrete and quality control procedures per PCI# MNL-130-91.



3-E. PREMIX GFRC - FIBERCRETE®

- 3-E.1 Composed of cement mortar reinforced by alkali resistant glass fiber, and a deformed prefabricated high tensile welded steel wire. It is fabricated via casting into steel forms.
- 3-E.2 A.R. Glass is required to prevent glass deterioration if in contact with any poured cement or grout foundation.
- 3-E.3 Shall obtain a minimum compressive strength of 6000 PSI at 28 days of age.

3-F. MICRO-CONCRETE

- 3-F.1 Precast concrete trench components shall be cast into steel forms using Type I/II Portland Cement.
- 3-F.2 Concrete shall contain 6% entrained air (plus or minus 1%)
- 3-F.3 Shall obtain a minimum compressive strength of 7500 PSI at 28 days of age.

3-G. REINFORCEMENT

- 3-G.1 Steel reinforcing bars shall conform to ASTM A615/A615M-16 "Standard Specification for Deformed and Plain Carbon-Steel Bars for Reinforcement".
- 3-G.2 Steel reinforcing wires shall conform to ASTM A496 "Specification for Steel Wire, Deformed for Concrete Reinforcement".
- 3-G.3 Steel reinforcing weld wire cages shall conform to ASTM A497 "Specification for Steel Welded Wire Fabric, Deformed for Concrete Reinforcement".

3-H. With equipment installed; the trench system shall be capable of withstanding temperature variations of -40° Fahrenheit to 149° Fahrenheit without cracking, splitting, or otherwise deforming. Material shall have been tested and conform to ASTM C666/C666M-03. Relative dynamic modulus - less than 5% change. Mass change - less than 0.25%.

3-I. Fire Resistance: Per ASTM E-84 surface burning test must provide Class A level with a flame spread index of 0 and smoke developed index is also 0.

3-J. Chloride Ion Penetrability per AASHTO T 277-15 and ASTM C1202-12 shall be moderate.

3-K. When required, site-specific, PE stamped, seismic calculations shall be provided.

3-L. Concrete properties will vary depending upon the particular formulation of the concrete mix design. Customized properties can be achieved by using nonstandard ingredients, by changing or adding reinforcements, and by tailoring the overall mix design.

3-M. METAL COMPONENT

3-M.1 All galvanized steel covers, hardware, and embedments shall meet the following requirements:

- Steel Deck Plating - ASTM A786
- Steel Sheet - A1011 HSLAS Gr 50
- Steel Angles & Flats - ASTM A-36
- Galvanized Covers - ASTM 123
- Galvanized Hardware - ASTM 153

3-M.2 All stainless steel hardware and embedments shall meet the following requirements:

- Stainless Steel Angles & Flats Type 304 - ASTM A276
- Stainless Steel Sheet Type 304 - ASTM A-240



3-M.3 All aluminum covers, hardware, and embedments shall meet the following requirements:

- Aluminum Flats 6061-T6511 - ASTM B22
- Aluminum Sheet Smooth 5052-H32 - ASTM B209
- Aluminum Deck Plating 3003 - ASTM B209 or 6061 - ASTM B632
- Aluminum Angles 6061-T6 - ASTM B308
- Aluminum Channels 6061-T6 - ASTM B308

3-N. POLYMER CONCRETE

3-N.1 All polymer concrete covers shall meet the following requirements:

- | | | |
|--------------------------------------|---------------|---|
| • Compressive Strength | ASTM C-39 | Min: 16,000 psi |
| • Modulus of Rupture | ASTM C-293 | Avg: 1670 psi |
| • Modulus of Elasticity (Tension) | ASTM D-790 | Min: 1.15x10 ⁶ psi |
| • Direct Tensile Strength | ASTM D-638 | Min: 2070 psi |
| • Splitting Tensile Strength | ASTM C-494 | Avg: 1670 psi |
| • Tensile Elongation | ASTM 638 | 1.48% |
| • Shear Strength | ASTM D-732.02 | Min: 11,000 psi |
| • Flexural Strength | ASTM D-790 | Avg: 3,750 psi |
| • UV Radiation | ASTM G-154 | No effect to slight fading |
| • Water Absorption | ASTM D-570 | Max: .047% |
| • Fire resistance | ASTM D-635 | Will not sustain burning. Self-extinguishing surface. Flammability value less than 25 (E-162) |
| • Smoke Density | ASTM E662-03 | Less than .5 minutes and less than 15 at 4 minutes |
| • Freeze/thaw resistance 1000 cycles | ASTM D1037 | No effect |
| • Salt Spray | ASTM B-117 | No effect |
| • Impact Resistance 160 in-lbs. | ASTM -2794 | No Cracking. 1/4" diameter indentation |
| • Sodium Chloride 5% | ASTM D-543 | No effect |
| • Sulfuric Acid 0.1N | ASTM D-543 | No effect to slight discoloration |
| • Ammonium Hydroxide 28% | ASTM D-543 | No effect |
| • Potassium Hydroxide 20% | ASTM D-543 | No effect |
| • Calcium Chloride 5% | ASTM D-543 | No effect |
| • Sodium Hydroxide 0.1N | ASTM D-543 | No effect |
| • Ethyl Alcohol 100% | ASTM D-543 | No effect |
| • Acetic Acid 5% | ASTM D-543 | No effect |
| • Nitric Acid 30% | ASTM D-543 | Slight Discoloration |
| • Hydrochloric 0.2N | ASTM D-543 | Slight Discoloration |

4. ALL CONCAST TRENCH SYSTEMS

- 4-A.** Trench systems shall consist of precast reinforced concrete channel sections with removable cover sections and end plates assembled to form a completely enclosed trench.
- 4-B.** Trench channels shall have an inside depth of 8, 12, 16, 24 or 36 inches which excludes the cover and floor thickness.
- 4-C.** Trench channels have an interior minimum width of 6, 12, 18, 20, 24, 30, 40, or 50 inches. All channels shall be available with open or solid bottom configurations.
- 4-D.** The channel design is such that it is self-supporting and can be set above grade level if required.



- 4-E.** All channels to be of one-piece design and shall be furnished in standard 4 or 8 foot lengths. Special lengths under 8' long must be made available when needed in a trench run layout. Channel sections must be designed to interlock via male/ female end joints.
- 4-F.** A universal channel shall be provided for ells, tees, crosses, and reducers. Special angled channels are used for turns in the trench run, for elevation changes, or transitions from pedestrian rated to traffic rated channel.

5. PEDESTRIAN RATED TRENCH SYSTEMS

- 5-A.** Trench systems are designed to support at least 200 PSF live load. Not intended for vehicle traffic.
- 5-B.** Standard lightweight channels are to be constructed with spray up Fibercrete®.
- 5-C.** Covers must be made available in aluminum, Fibercrete®, galvanized steel, ventilated galvanized steel, polymer & fiberglass; they are sized to permit manual removal by a single person using the Concast, Inc. lifting tool to engage the lifting slots in the cover.

6. TRAFFIC RATED TRENCH SYSTEMS

- 6-A.** All Light Traffic channels shall meet AASHTO H-10 light equipment requirement of supporting 16,000 lb./axle load.
- 6-B.** All Light Traffic channels shall have the following H-10 rated cover options: lightweight Fibercrete®, precast steel reinforced concrete, or fabricated hot-dipped galvanized steel with or without ventilation grates.
- 6-B.** All Heavy Traffic channels shall meet AASHTO H-40 heavy equipment requirement of supporting 64,000 lb./axle load.
- 6-B.** All Heavy Traffic system's final traffic rating is controlled by the traffic rating of the cover.
- 6-C.** All HTSG40 steel covers, standard HTSG steel covers & standard HT concrete covers shall meet AASHTO H-40 heavy equipment requirement of supporting 64,000 lb./axle load.
- 6-C.** All angled HTSG steel covers, angled HT concrete covers, HT3 concrete, polymer & fiberglass covers shall meet AASHTO H-20 heavy equipment requirement of supporting 32,000 lb./axle load.
- 6-E.** Provisions, such as cast-in threaded inserts, must be offered for lifting traffic rated trench channels. Mounting holes must be adequately reinforced to avoid damaging the channel, and to provide an ultimate strength of at least 5 times the part weight when the unit is lifted in accordance with the manufacturer's instructions.
- 6-F.** All steel reinforcement is held inside the concrete mold using rebar chairs. These chairs ensure a proper concrete coverage of 3/4 inch minimum over all areas of steel reinforcement.



7. INSTALLATION REQUIREMENTS

- 7-A.** When the bottom of the excavation is soft, or where in the opinion of the soils engineer unsatisfactory foundation conditions exist, the contractor shall over excavate to a depth to ensure a proper foundation as directed by the soils engineer. The excavation can then be brought back up to the prescribed grade with a thoroughly compacted granular material.
- 7-B.** All trench excavations shall be backfilled to restore pre-existing conditions or to the final grade as specified by the owner.
- 7-C.** All backfill material shall be a granular material as required by the soils engineer. Trench shall be designed to have no limitations of backfill height.
- 7-D.** Installation guidelines shall be made available online.



P.O. Box 69
1010 North Star Drive
Zumbrota, MN 55992-0069

Revised 12/13/2021



Fibercrete[®] Trench System