INTENT: To structurally restore and provide corrosion protection of exposed concrete benches, inverts and bottoms where inert liners have been installed for wall protection.

1.0 GENERAL

1.1 The specification shall govern all work, materials and tools required to construct and/or provide a monolithic cementitious mixture to restore structural integrity and provide corrosion protection to benches, bottoms and inverts of manhole and other structures where fiberglass or other inert liners have been installed in a municipal sanitary system as a result of a hand applying fiber reinforced cementitious mixture.

1.2 Described are procedures for cleaning, substrate preparation and application. The applicator shall furnish all labor, equipment, and materials for applying a corrosive resistant cementitious mix. All aspects of the installation shall be in accordance with the manufacturer’s recommendation and per the following specifications which includes:

A. The removal of any loose and unsound substrate material.
B. Cleaning of the area with high-pressure washer.
C. The elimination of active infiltration prior to liner application.
D. The hand troweled application of an acid resistant cementitious material.

2.0 MATERIALS

2.1 INFILTRATION CONTROL MATERIAL (Strong-Seal® Strong-Plug®):

Strong-Seal® Strong-Plug®, a rapid setting cementitious product specifically formulated for leak control, shall be used to stop minor water infiltration and shall be mixed and applied according to manufacturer's recommendations and shall have the following minimum requirements:
### Strong-Seal® Strong-Plug® Minimum Requirements

<table>
<thead>
<tr>
<th></th>
<th>ASTM C109</th>
<th></th>
<th>ASTM C267</th>
<th>No weight loss after 15 cycles @ 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive Strength</td>
<td>&gt;400 psi, 1hr.</td>
<td></td>
<td>&gt;1000 psi, 24 hrs.</td>
<td></td>
</tr>
<tr>
<td>Sulfate Resistance</td>
<td></td>
<td></td>
<td>ASTM C267</td>
<td></td>
</tr>
<tr>
<td>Freeze/Thaw</td>
<td>ASTM C666 &quot;Method A&quot;</td>
<td>100 cycles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pull Out Strength</td>
<td></td>
<td></td>
<td></td>
<td>14,000 lbs.</td>
</tr>
<tr>
<td>Set Time</td>
<td></td>
<td></td>
<td></td>
<td>&lt;1.0 minute</td>
</tr>
</tbody>
</table>

#### 2.2 STRONG-SEAL® BENCH MIX COATING MATERIAL:

2.2.1 Strong-Seal® Bench Mix shall be used to construct/line the bench/bottoms and invert surfaces with an acid resistant cementitious product and shall have the following minimum requirements at 28 days:

<table>
<thead>
<tr>
<th></th>
<th>ASTM C109</th>
<th>28 days</th>
<th>&gt;9000 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive Strength</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>ASTM C496</td>
<td>28 days</td>
<td>&gt;800 psi</td>
</tr>
<tr>
<td>Flexural Strength</td>
<td>ASTM C293</td>
<td>28 days</td>
<td>&gt;1200 psi</td>
</tr>
<tr>
<td>Shrinkage @90% R.H.</td>
<td>ASTM C490</td>
<td>28 days</td>
<td>0%</td>
</tr>
<tr>
<td>Bond</td>
<td>ASTM C882</td>
<td>28 days</td>
<td>&gt;2000 psi</td>
</tr>
<tr>
<td>Density, When Applied</td>
<td>-</td>
<td>N/A</td>
<td>130 pcf ± 5lbs</td>
</tr>
<tr>
<td>Freeze/Thaw</td>
<td>ASTM C666</td>
<td>N/A</td>
<td>100 cycles</td>
</tr>
</tbody>
</table>

2.2.2 Strong-Seal® Bench Mix shall be made with pure fused aluminate aggregates and calcium aluminate cement and shall include alkaline-resistant fiberglass fibers. It shall be used according to manufacturer's recommendations for use where structural integrity needs to be restored and corrosion protection is needed for benches, bottoms and inverted manholes and other structures with fiberglass or other inert liners.

#### 2.3 WATER

Water used to mix product shall be clean and potable. Questionable water shall be tested by a laboratory in accordance with ASTM C-94 procedure. Potable water need not be tested.

#### 2.4 OTHER MATERIALS

No other material shall be used with the product described without the prior approval or recommendation from Strong-Seal® Systems.
3.0 APPLICATION

3.1 PREPARATION

3.1.1 All foreign material shall be removed from the bench and invert using a high-pressure spray (minimum 3000 psi). Loose and protruding brick, mortar and concrete shall be removed using a mason's hammer, chisel and/or scraper. The liner wall shall also be clean a minimum of one foot above bench/bottom.

3.1.2 Active leaks shall be stopped using quick setting, specially formulated mix (2.1) according to manufacturer's recommendations. When severe infiltration exists, cementitious pressure grouting or chemical grouting may be required to stop infiltration. Contact manufacturer for grouting specifications.

3.2 MIXING

3.2.1 Add potable water to a clean container or 5 gallon pail using 0.9 – 1.2 gallons per 65 pound pail of material. Add at least 90% of the water to the container or pail then introduce the entire pail of mix. Mix with electric or pneumatic powered drill with mixing shaft and add remaining water to achieve the consistency needed and mix for one minute or until all lumps have dissolved.

4.0 COATING EXISTING BENCH AND INVERT

4.1 The surface shall be clean and free of all foreign material and shall be damp without noticeable free water droplets or running water, but totally saturated just prior to application. A concrete bonding agent maybe brush applied to the liner where Bench Mix and wall liner intersect. Follow manufacturer’s recommendations for applying curing compound.

4.2 After blocking flow through manhole, Strong-Seal® Bench Mix shall be hand applied to the invert and bench and up onto the liner wall a minimum of 2 inches. The surface is to be troweled to assure that material penetrates voids and sets the bond to the substrate. A brush finish is then applied to the troweled finish.

5.0 CURING

5.1 Caution should be taken to minimize exposure of applied product to sunlight and air movement. If application of additional coats is to be longer than 15 minutes, the structure shall be covered. At no time should the finished product be exposed to sunlight or air movement for longer than 15 minutes before covering or closing access.
5.2 The final application shall have a minimum of 2 hours cure time before being subject to active flow or surcharge.

6.0 WEATHER

No application shall be made to frozen surfaces or if freezing is expected to occur within the substrate within 24 hours after application. Precautions shall be taken to keep the mix temperature at time of application below 90 degrees F. Water temperature shall not exceed 80 degrees F. Chill with ice if necessary.

7.0 PRODUCT TESTING

Four 2 inch cubes may be cast each day or from every package of product used and shall be properly packaged, labeled and returned to the manufacturer for testing in accordance with the owner's or manufacturer's directions for compression strength per ASTM C 109 procedure.

8.0 FINAL ACCEPTANCE TESTING

8.1 At the discretion of the owner or his assignee, the reconstructed structure shall be tested as follows:

8.1.1 Visually verify the absence of leaks.

8.1.2 Perform an exfiltration test.

8.1.2.1 For manholes 0 to 6 foot deep, if water loss is 1 inch plus 1/8 inch for each additional foot of depth, or less in five minutes, manhole reconstruction is acceptable.

8.1.2.2 For manholes over 6 feet deep, if water loss is 1 inch plus 1/8 inch for each additional foot of depth or less in 5 minutes, manhole is acceptable.

8.1.3 Vacuum testing following ASTM C1244-93 procedure is acceptable. Vacuum testing shall not be conducted earlier than 7 days after application.

9.0 LIMITED WARRANTY

The Strong Company, Inc. warrants that this product was produced in conformity with its standard specifications or formulations within recognized tolerances, free of adulteration or contamination, and that the product will perform in accordance with representations in Strong-Seal® Systems literature and Technical Data Sheets when properly applied in strict conformance with the printed instructions on container and prescribed in technical data instructions and when applied to a properly prepared surface.
The sole remedy of the purchaser shall be replacement of the product or refund of the purchase price of the product if any defect in material and variance in the product beyond recognized tolerances in the specifications are found to exist.

No other remedy including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss shall be available to the purchaser.

**DISCLAIMER**

THE WARRANTY DESCRIBED IN THE ABOVE PARGRAPHS SHALL BE IN LIEU OF ANY OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.