SECTION 02740 - CONCRETE WALL SURFACE REPAIR

City of San Diego, CWP Guidelines

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NTS: This Guide Specification addresses the use of the Linabond Simulform System to repair existing flat surfaces in pump stations, and channels which have seriously deteriorated concrete to the degree that structural integrity is compromised. There is no known equal at this time.

The Simulform System is a protective lining of semi-rigid PVC sheeting behind which a flowable structural polymer is poured. The PVC sheeting provides resistance to corrosive attack, and after curing, the polymer restores structural strength to the wall.

Structure the bid for a unit price per square foot of repaired surface, listing a reasonably accurate quantity estimate for bid evaluation purposes.

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PART 1 -- GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing repairs to existing concrete wall surfaces at locations indicated on the Drawings. Repairs shall employ semi-rigid PVC sheeting and pourable structural polymer.

B. The WORK of this Section requires that materials and installation procedures be the Simulform System from Linabond, Inc. No substitutions will be considered.

1.2 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.3 REGULATORY REQUIREMENTS

A. The WORK of this Section shall comply with the current versions of the following:

1. Construction Safety Orders, Division of Industrial Safety, State of California.

2. California Department of Transportation Traffic Manual

1.4 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

ASTM D 746	Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

ASTM D 792	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM C 805	Test Method for Rebound Number of Hardened Concrete
ASTM D 882	Standard Test Methods for Tensile Properties of Thin Plastic Sheeting
ASTM D 1004	Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting
ASTM D 2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D 4258	Practice for Surface Cleaning Concrete for Coating
ASTM D 4259	Practice for Abrading Concrete
ASTM D 4262	Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces

1.5 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300 in addition to the shop drawings required by SSPWC Subsection 500-1.1.2.

1. Manufacturer's affidavit attesting to the previous successful use of the system for repair of concrete exposed to sanitary sewage and the corrosive vapors therefrom.

2. Written certification from the manufacturer that the [CONTRACTOR] [proposed Subcontractor] is licensed by Linabond, Inc. to install the Simulform System.

3. Copy of Linabond, Inc. certification for each individual who will apply the System.

4. Manufacturer's application instructions, including details of joints, terminations, supports, Material Safety Data Sheets, maximum storage life and storage condition requirements, mixing and proportioning requirements, environmental requirements for worker safety such as ventilation, humidity, and temperature, and curing time requirements.

5. Drawings and design calculations demonstrating adequacy of the proposed temporary working platforms. For the purpose of calculations, assume a wastewater velocity of 6 ft per second and the pipe is flowing full.

6. Describe the means and time required to remove a platform system in an emergency.

1.6 INSTALLER QUALIFICATIONS

A. The CONTRACTOR or subcontractor performing the WORK of this section shall be licensed by the repair system manufacturer. Each individual installing the repair material shall be certified by the manufacturer.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Repair shall be made with semi-rigid PVC sheeting and pourable structural polymer applied to prepared surfaces of existing concrete. Repairs shall be leakproof under a minimum external hydrostatic pressure equal to the lateral pressure of saturated soils outside the wall.

B. Application of the repair system shall be performed under the supervision of a technical representative of the manufacturer who shall be present at the site during repair operations.

2.2 MATERIALS

A. **Structural Polymer:** Structural Polymer shall be a pourable plural-component, closed-cell polyurethane type, resistant to weathering, aging, 10 percent solutions of sulfuric acid, and intermittent wetting by raw sewage.

B. **PVC Sheet Liner:** Polyvinyl chloride lining material shall be a 1/8-inch thick homogenous thermoplastic sheet furnished by the manufacturer.

1. Instead of the properties in Table 210-2.2(A), the PVC sheet shall have the following properties:

Property	Standard	Requirement
Specific gravity	ASTM D 792	1.33
Tensile Strength	ASTM D 882	7,400 psi
Elongation	ASTM D 882	150 percent
Color		White

C. **Surface Activator:** Surface activator shall provide cross linking with the PVC sheet liner and the polyurethane. Surface activator shall be as required by the manufacturer.

D. **Seam Material:** Seam material shall match the chemical and adhesive properties of the structural polymer while permitting flat, smooth laps between adjacent PVC sheets and injection bonding of semi-rigid sheets into the support channels. Seam material shall be as required by the manufacturer.

E. **Chemical Resistance:** The PVC sheet liner, sealant material, and surface activator shall act as a cured seam through molecular bonding and shall conform to the chemical resistance test requirements of SSPWC subsection 210-2.3.3 for chemical solutions at listed concentrations. SSPWC subsection 210-2.3.4 shall not apply: the criteria above shall apply.

F. **Hydraulic Plug:** Quick-setting material recommended by the manufacturer for sealing active leaks. Material shall be compatible with structural polymer.

PART 3 -- EXECUTION

3.1 PRODUCT, DELIVERY, STORAGE, AND HANDLING

A. Materials shall be shipped in original manufacturer's containers and such additional packaging as needed to protect the material from damage during transport. Containers shall be plainly labeled to show manufacturer's name, product name, batch number, date of manufacture, quantity of contents, and storage requirements.

B. Stored materials shall be protected from excessive heat, cold, and weathering. PVC sheeting pretreated with activator prior to delivery to the job site shall be protected from debris contamination and be maintained at 70 degrees F minimum.

3.2 WORKING CONDITIONS

A. The CONTRACTOR is hereby notified that the pump station [and channel] is a permit required confined space.

B. Wastewater will continue to flow to the structure during wall repair, and the CONTRACTOR shall be prepared to perform liner repair during prevailing flow conditions or to divert the sewage as indicated below. Repair operations shall not be performed if weather conditions are such that anticipated wastewater flows can exceed diversion pumping capacity or depths that prevent proper and safe work within the structure.

C. The CONTRACTOR shall employ means and methods which prevent blockage and minimize surcharge of wastewater in upstream manholes and tributary pipelines.

3.3 DIVERSION PUMPING

A. Install and operate diversion pumping equipment to maintain sewage flow and to prevent backup or overflow upstream.

B. Design all piping, joints, and accessories to withstand twice the maximum system pressure or 50 psi, whichever is greater. A spare pump and piping shall be at the site, ready for use in case of a breakdown.

C. In the event of accidental spill or overflow, immediately stop the overflow and take action to clean up spillage and disinfect the spill area to the satisfaction of the CONSTRUCTION MANAGER.

3.4 WORKING PLATFORMS

A. The CONTRACTOR shall provide temporary working platforms designed to withstand the hydraulic forces created by sewage flow. Platforms shall be sized and located to collect falling debris larger than 1/2-inch from [cleaning and] hydroblasting operations.

B. Platforms may be anchored to the wall, but all holes and penetrations of the existing PVC liner shall be repaired according to this section.

3.5 CLEANING AND SURFACE PREPARATION

A. Cleaning and Debris Removal

1. Prior to blasting the concrete surfaces and installing the new system, the CONTRACTOR shall clean the wall surfaces by removing all accumulated debris and disposing of it in compliance with all Federal, State and local regulations. Debris includes sludge, dirt, grease, and other solid or semi solid materials.

2. The CONTRACTOR shall employ suitable equipment to collect all debris dislodged during cleaning operations. At a minimum, debris shall be removed prior to the end of each day and shall be disposed of daily at an approved off-site location. Hauling containers shall be watertight.

3. Active leaks, if present, shall be sealed by application of hydraulic plug material.

B. **Surface Preparation:** The CONTRACTOR may choose any of the surface preparation methods below that will produce a clean, contamination-free, sound, roughened surface acceptable to the manufacturer's representative. Exposed reinforcing steel shall be cleaned to white metal blast condition (SSPC-SP5) and coated immediately with 40 mils of **Sikatop 110 Armatec by Sika Corporation**.

1. Wet Abrasive Blast: Water and blast material at 80 psi or greater at the nozzle. Abrasive shall be free of arsenic and free silica. Residue shall be removed by washing with water and brushing if necessary.

2. Hydroblast: Water pressurized to at least 6000 psi.

3. Dry Sandblasting: Air and blast material at 80 psi or greater at the nozzle. Abrasive shall be free of arsenic and free silica. Residue shall be removed by brushing, vacuuming, or oil-free compressed air.

3.6 SURFACE TESTING

A. The pH of the abraded surface shall be tested according to ASTM D 4262. The acceptable pH range for the prepared surface shall be greater than 7 and less than 11 unless the manufacturer representative accepts otherwise. Surface with pH less than 7.0 shall be reblasted and retested until the pH is in the acceptable range. All testing shall be performed by the CONTRACTOR in the presence of the manufacturer's representative and the CONSTRUCTION MANAGER.

B. The manufacturer's representative shall inspect the prepared surfaces and observe the surface testing above and approve surface conditions before repairs begin.

3.7 REPAIR

A. Prior to application of the PVC sheeting and structural polymer, the surface of the prepared concrete shall be dry. Surface dry is defined as a surface where there is no visible water beading, dripping, or running. The CONTRACTOR shall be responsible for methods and equipment to achieve a dry surface condition. If compressed air equipment is utilized, it shall be equipped with an oil filter.

B. Anchor and seal the channels for the bottom course of sheeting. Insert sealing material into the channels. Install channels in a pattern which will minimize the number of seams.

C. Cut if necessary the semi-rigid PVC sheets to the dimensions necessary to slide into the channels.

D. Apply surface activator to the sheets under environmental conditions acceptable to the manufacturer. Keep the activated surfaces free from dust and contamination during installation.

E. Slide the sheets into the channels, making sure that the seams are sealed.

F. Pour the structural polymer between the PVC sheets and the concrete surface, using equipment and procedures acceptable to the manufacturer.

G. Repeat the steps of channel installation, sheet cutting, activation, and installation, and pouring, moving up the wall to the top.

3.8 FIELD TESTING

A. The liner will be inspected by the CONSTRUCTION MANAGER for proper adhesion, air pockets, edges or seam defects, rips, tears, and punctures. Defects shall be removed, replaced, and retested.

B. The newly applied PVC liner shall be spark tested and any lining failing to meet the spark test shall be properly repaired and retested. The spark testing shall be done with a Tinker and Rasor Holiday Detector set at 20,000 volts.

C. Areas failing the spark test shall be repaired by injecting seam material through the defect and 4 inches around the defect on the PVC surface and applying new activated sheet trimmed to be 4 inches larger than the defect.

[3.9 TELEVISION INSPECTION

A. Wall surfaces shall be inspected by closed circuit television (CCTV) to document the condition of PVC liner in accordance with Section 02735.]

** END OF SECTION **