

**SECTION 02540****STORM DRAIN REHABILITATION****02540.01 GENERAL****A. Description**

Storm drain rehabilitation shall include, but not necessarily be limited to, pipe joint sealing, inlet and manhole rehabilitation, pipe and fitting replacement, and inlet and manhole replacement in accordance with the Contract Documents.

**B. Related Work Included Elsewhere**

1. Protection of environment; Section O1500.
2. Trench excavation, backfill, and compaction; Section 02250.
3. Storm drainage pipe and culvert installation; Section 02520.
4. Storm drainage structure installation; Section 02530.

**C. Quality Assurance**

1. Materials
  - a. The Engineer will inspect all materials before and/or after installation to ensure compliance with the Contract Documents.
  - b. Special grouts, sealers, and coating systems shall be delivered to the site in the manufacturer's sealed, labeled, and dated containers. Storing and handling materials shall be in strict accordance with the manufacturer's instructions. Failure to properly store and handle material will result in rejection of material for use. Materials beyond the expiration date indicating the manufacturer's recommended shelf life will not be permitted to be used.
2. Field Testing
  - a. General
    - 1) After the item in question has been rehabilitated or replaced, it will be inspected by the Engineer for compliance with these Specifications.
    - 2) If the item in question fails the inspection, the Contractor shall, at his own expense repair or replace any defective component and have the Engineer reinspect the item until all requirements are met.

**D. Submittals**

## 1. Shop Drawings

- a. Shop drawings shall be submitted as specified in the "General Provisions" for all materials listed in Section 02540.02. The Contractor shall submit product information and detailed manufacturer's recommendations and instruction on the storage, handling, mixing (where appropriate), and installation of all materials intended to be used for rehabilitation.
- b. For those materials which rely on chemical reactions and/or heat (energy) sources to obtain a "cure" of the materials, detailed instructions shall be submitted indicating "pot life" after mixing; curing time; temperature limitations during transportation, application, and installation; and special handling requirements.

## 2. Certificates of Compliance

Certificates of compliance shall be submitted as specified in the "General Provisions" for materials listed in Section 02540.02 when indicated in the paragraph where the materials are specified.

**02540.02 MATERIALS****A. Materials Furnished by the County**

The County will not furnish any materials for storm drain rehabilitation.

**B. Detailed Material Requirements**

1. Portland cement concrete for pipe encasement shall be Mix No. 1 as specified in Section 03310.
2. Quick-setting, non-shrink grout shall be as specified in Section 03600.
3. Storm drain structure rehabilitation
  - a. Frame, cover, grate, ladder, and step materials shall be as specified in Section 05500.02. Covers shall be labeled in accordance with the Standard Details.
  - b. Brick for structures and inverts shall be sewer brick as specified in Section 04200.02.
  - c. Structural wall rehabilitation compounds shall be Drycon as supplied by I.P.A. Systems, Inc., Brush-Bond as supplied by Preco Manufacturing, or equal.

4. Pipe and culvert replacement

Pipe and culverts shall be as specified in Section 02520.02.

5. Storm drain structure replacement

- a. Cast-in-place concrete shall be as specified in Section 03300, Mix Number as indicated on the Standard Details or the Plans.
- b. Precast concrete shall be as specified in Section 03400.
- c. Brick shall be sewer brick as specified in Section 04200.02.
- d. Frame, cover, grate, ladder, and step materials shall be as specified in Section 05500.02. Covers shall be labeled in accordance with the Standard Details.
- e. Waterproofing for storm drain structure exterior shall be as specified in Section 07130.02.

**02540.03 EXECUTION****A. Pipe Joint Sealing**

1. General

- a. The intent of pipe joint sealing is to seal damaged or defective joints to prevent the surrounding soil from washing into the storm drain causing surface subsidence.
- b. Pipe joint sealing may be accomplished from either inside or outside the pipe as specified in the Contract Documents.

2. Inside Joint Repair

- a. The inside of joints to be sealed shall be carefully cleaned, and where determined by the Engineer, notched to provide a suitable anchorage for the repair patch.
- b. Once the joint has been prepared, it shall be sealed by firmly packing with a quick-setting, non-shrink grout.

3. Outside Joint Repair

- a. The area over the joint shall be excavated in accordance with Section 02250.03.

- b. The damaged joint shall be carefully cleaned and packed with a stiff mortar mix.

## **B. Storm Drain Structure Rehabilitation**

### 1. General

- a. The intent of storm drain structure rehabilitation work is to provide materials and equipment appropriate for each structure scheduled for rehabilitation.
- b. Storm drain structure rehabilitation includes the following:
  - 1) Replacement or resetting of manhole frames and/or covers.
  - 2) Replacement or resetting of inlet frames and/or grates.
  - 3) Replacement of steps or ladders.
  - 4) Repair of inverts and benches.
  - 5) Structural rehabilitation of walls, inverts and benches with coatings.

### 2. Structure Identification

Structures requiring rehabilitation work will be indicated in the Contract Documents which will identify and locate structures to be rehabilitated and the type of rehabilitation required for each structure.

### 3. Structural Rehabilitation of Walls

Rehabilitation shall be accomplished by applying high-strength compounds to the walls as follows:

- a. Surface preparation shall consist of cleaning all foreign materials and matter from the interior of the structure. Cleaning may be accomplished by waterblasting, sandblasting, or applying a 10% solution of muriatic acid or hydrochloric acid over all surfaces. If an acid solution is used, it shall be washed off and the wall allowed to dry before any coating application. Mixing, application, and removal of acid shall be done in strict accordance with the manufacturer's recommendations.
- b. After surface preparation and before application of coating materials, infiltration shall either be stopped by sealing in accordance with Section 02565 .03, Article F, or channeled to the drain through "bleed" pipes installed at the bottom of the structure.
- c. Application of the coating materials shall be by spray gun, Guniting gun, roller, brush, or hand trowel at the option of the Contractor in accordance with the

material manufacturer's recommendations. The material shall be applied to all surfaces from the base to the manhole ring.

- d. After proper curing of surface coating materials, the "bleed" pipes shall be removed and the structure sealed in accordance with Section 02565.03, Article F.

#### 4. Frame, Cover, and Grate Resetting or Replacement

Storm drain structure frames, covers and grates shall be removed and reset or replaced as follows:

- a. Excavation for Frames, Covers, and Grates in Pavement
  - 1) The removal of manhole or inlet frames or grates shall be accomplished by making a rectangular cut in the pavement of sufficient size and depth to fully expose the frame or grate.
- b. Excavation for Frames, Covers, and Grates in Unpaved Areas
  - 1) Only sufficient excavation of materials from around the manhole or inlet shall be done to expose the frame or grate.
  - 2) Excavated material shall be used for backfill and shall be compacted to prevent settlement and to restore the setting. Backfill shall not cover the manhole or inlet.
  - 3) Private property which is disturbed for access to the manhole shall be restored by the Contractor to its original condition.
- c. Replacement frames, covers, and grates shall be installed where indicated on the Plans or as directed by the Engineer, and as specified in Section 02530.03.
- d. Installation of new or resetting of existing frames, covers, and grates shall be accomplished as follows and as shown on the Standard Details:
  - 1) Existing frames, covers, and/or grates designated on the Plans or by the Engineer as defective or unacceptable shall become the property of the Contractor and removed from the site of the work.
  - 2) The Contractor shall install a new frame and cover or frame and grate as indicated or directed, or reinstall the existing frame and cover or frame and grate.
  - 3) The frame shall be carefully set flush with the existing surface or to new elevations shown on the Plans or as directed by the Engineer.

- a ) Where a manhole is located in a paved area, the frame and cover shall be carefully set flush with the paved surface to conform to both longitudinal and transverse slopes.
  - b ) Where manholes are located in sump areas, and/or where indicated on the Plans, the manhole frames shall be fitted with grating-type covers.
- 4) The frames shall be set in a full bed of mortar and encased in concrete in accordance with the requirements of Section 02680.03.
  - 5) Where manhole frames are to be raised, the grade adjustment shall be accomplished by adding a sufficient number of precast concrete grade rings set in a full bed of mortar to obtain the desired elevation.
  - 6) The Contractor, at no additional cost to the County, shall replace any portion of concrete or brick and mortar ring of the existing manhole or inlet, which is damaged when the existing frame is removed or replaced or a new frame is installed.
5. Step or Ladder Replacement
- a. Existing steps or ladders shall be removed or cut off flush with the inside of the wall. Any damage to the wall as a result of this activity shall be repaired by the Contractor at no additional cost to the County.
  - b. Location of holes for new steps shall be in accordance with the Plans or Standard Details and carefully measured and marked on the wall.
  - c. Holes shall be drilled to the diameter and depth, and the steps installed as recommended by the step manufacturer.
  - d. Ladders shall be installed with materials furnished by and in accordance with the manufacturer's recommendations at the locations indicated on the Plans or Standard Details.
6. Invert and Bench Repair
- a. Sections to be repaired shall be carefully cleaned as described in Paragraph 3 of this Article, and all loose brick and mortar removed to sound material.
  - b. After the section to be repaired has been acceptably cleaned, new brick and quick-setting non-shrink grout shall be used to rebuild the invert and bench as shown on the Plans, indicated on the Standard Details, and/or as directed by the Engineer.

**C. Pipe and Fitting Replacement**

## 1. General

When a portion of the pipeline in question has collapsed, cannot be cleaned by the methods previously described, or is structurally damaged where it cannot be lined, those sections of the pipeline shall be uncovered, removed, and replaced with new pipe as directed by the Engineer.

## 2. Installation Procedures

- a. The area over the pipe shall be excavated in accordance with Section 02250.03 to fully expose the damaged section.
- b. The damaged pipe shall be cut and removed to limits indicated or directed and a new section or sections installed in its place. Particular care shall be given to insure the slope and invert of the new pipe matches the existing line.
- c. The new pipe shall be connected to the existing pipe with a full circle clamp or other acceptable means.
- d. The line shall be secured in place and backfilled in accordance with Section 02250.03.
- e. Structurally damaged fittings shall be removed from the drain system and replaced with new fittings.

**D. Storm Drain Structure Replacement**

## 1. General

When an existing storm drain structure cannot be repaired by one of the previously described methods, or is structurally damaged or deficient, it shall be removed and replaced by a new structure.

## 2. Installation procedures shall be as follows for removal of the existing structure and installation of the new structure:

- a. The area around the existing structure shall be carefully excavated in a manner to prevent disturbing or damaging the existing pipes in accordance with Section 02250.03.
- b. The existing structure shall be removed to the crown of the existing pipe, or as directed by the Engineer. Any irregularities in the remaining wall shall be repaired and the base leveled with quick-setting non-shrink, grout.

- c. After the base has been repaired to the satisfaction of the Engineer, a layer of quick-setting non-shrink, grout shall be placed on the base and the new riser section set in place, or new walls constructed.
- d. After the grout has set, the remaining sections and frame and cover or grate shall be installed in accordance with Section 02530.03 and the Standard Details.

#### **02540.04 METHOD OF MEASUREMENT**

##### **A. Pipe Joint Sealing**

Measurement for pipe joint sealing will be made of the actual number of joints sealed.

##### **B. Storm Drain Structure Rehabilitation**

1. Measurement for the structural rehabilitation of storm drain structures will be made of the actual length in vertical feet of wall rehabilitated.
2. Measurement for frame and cover, or grate resetting or replacement will be made of the actual number of frames and covers, or grates reset or replaced.
3. Measurement for step or ladder replacement will be made of the actual number of steps or ladders replaced.
4. Measurement for invert and bench repair will be made of the actual number of inverts and/or benches repaired.

##### **C. Pipe and Fitting Replacement**

1. Measurement for pipe replacement will be made horizontally in linear feet along the centerline of the pipe replaced.
2. Measurement for fitting replacement will be made of the actual number of fittings replaced.

##### **D. Storm Drain Structure Replacement**

Measurement for storm drain structure replacement will be made of the actual length in vertical feet of structure replaced. Measurement will be made from the lowest point in the invert to the highest external point on top of the frame.

##### **E. Excavation, Backfill and Compaction**

Measurement will be made for the volume of excavation actually performed for storm drainage system rehabilitation in accordance with Section 02220.04. No separate measurement will be made for backfill and compaction.



**02540.05 BASIS OF PAYMENT****A. General**

1. Payment will be made at the unit and/or lump sum prices bid. The prices bid shall include furnishing of all labor, tools, equipment, materials, and all other incidental items of work necessary to complete the work as shown, specified, and in strict accordance with the Contract Documents, and accepted by the Engineer.
2. Payment will be made for contingent items when ordered by the Engineer. Payment will be as specified in Sections 02951, 02952, 02953, 02954, 02955, 02956, and 02957.

**B. Pipe Joint Sealing**

Payment for pipe joint sealing will be made per joint sealed. The price bid shall include removing and disposing of residual sealing material from the pipeline.

**C. Storm Drain Structure Rehabilitation**

1. Payment for the structural rehabilitation of storm drain structures will be made per vertical foot of wall rehabilitated.
2. Payment for resetting or replacing frames and covers, or grates will be made per frame, cover, or grate replaced or reset. The price bid shall include removing and disposing of existing frames and covers, or grates where appropriate and setting the frames and covers, or grates to the proper grade and cross slope.
3. Payment for replacing steps and ladders will be made per step and ladder replaced. The price bid shall include removing and disposing of the existing steps and ladder.
4. Payment for invert and bench repair will be made per invert and/or bench repaired. The price bid shall include removing and disposing of all loose brick and mortar.

**D. Pipe and Fitting Replacement**

1. Payment for pipe replacement will be made per linear foot of the size and type of pipe replaced. The price bid shall include removing and disposing of all damaged pipe.
2. Payment for fitting replacement will be made per type and size of fitting replaced. The price bid shall include removing and disposing of all damaged fittings.

**E. Storm Drain Structure Replacement**

Payment for storm drain structure replacement will be made per vertical foot of structure replaced. The price bid shall include removing and disposing of the existing structure and resetting the existing frame and cover, or grate on the new structure to proper grade and cross slope.

**F. Excavation, Backfill and Compaction**

1. Payment for excavation, refill or backfill, and compaction will be made for the number of cubic yards of Class 3 excavation satisfactorily completed in conjunction with storm drainage system rehabilitation work items.
2. The price bid for Class 3 excavation shall include the following:
  - a. Removal of existing pavement, sidewalk, curb and combination curb and gutter as specified in Section O2160.
  - b. Excavation support as specified in Section 02400.
  - c. Dewatering as specified in Section 02512.
  - d. Maintenance of traffic as specified in Section 01410 through 01470.
  - e. Clearing and grubbing as specified in Section 02110.
  - f. Sediment control as specified in Section 01500.
  - g. Tree removal and protection as specified in Section 02120.
  - h. Adjusting and replacing fences, shrubs, hedges, etc. as specified in Section 02130.
  - i. Protecting and adjusting existing utilities and underground structures as specified in Section O2140.
  - j. Removal of existing pavement, sidewalk, curb and combination curb and gutter as specified in Section 02160.
  - k. Surface restoration as specified in Sections 02811 through 02850.
  - l. Excavation support as specified in Section 02400.
  - m. Dewatering as specified in Section 02512.
  - n. Patching paving as specified in Section 02680.