SANITARY SEWER MANHOLE STRUCTURAL REHABILITATION

A Manhole Rehabilitation, Concrete Liner, Complete

1. The purpose of this specification is to provide for full structural restoration of existing brick and block manholes. The restoration is accomplished by pouring a new monolithic concrete liner within the existing structure. By design, the new liner will have a minimum thickness of 3 inches in the barrel of the manhole and 5 inches in the chimney of the manhole.

2. Preparation of the Structure.

   Cleaning. High pressure water shall be used to clean the manhole prior to installing the concrete liner. Remove all loose debris, grease and loose material form the structure's surface.

   Step Removal. All existing steps shall be removed to within 1 inch of the existing wall.

3. Removal of Existing Chimney Material. The structure must be prepared to allow:

   A minimum liner thickness of 3 inches in the barrel and 5 inches in the chimney.

   A minimum entrance opening of 26 inches at the top of the manhole.

   Remove the existing casting, remove the existing chimney to a depth where the inside diameter of the manhole equals 36 inches. After the existing chimney is removed, a 36 inch inside diameter form is to be used as an outside pouring form. This form can be a typical pour tube (Sono-tube) which remains in place following construction. A removable form is also acceptable. In no instances will the liner be allowed to be poured in the excavation without the use of a form to provide a break between the unexcavated earth and the newly constructed liner.

4. Removed material will not be allowed to enter the pipeline. All dislodged material will be removed from the structure and disposed of by the Contractor. The owner will provide a dumpsite for the Contractor to dispose of debris.

5. All castings not being reused shall be salvaged and delivered to a site provide by the owner.

B. Installation of New Concrete Liner.

The new concrete liner shall be installed without disruption of flow at the bench level of the manhole. Whenever possible, flows entering the structure above the bench level shall be handled by means of a flow through line plug and piping plumbed through the forming system passing flow into the outlet invert.

C. Concrete Forms Requirement.

Specially designed forms are required to provide a rounded surface of the new concrete liner. Flat panels will not be accepted. The forming system shall be designed to fit the configuration of concentric structures and eccentric structures where applicable. The system shall be designed to allow the new concrete liner to be a minimum of 3 inches thick. The system shall have straight sections in various diameters and rise heights and reducing sections to connect the various diameter straight sections. Block out inserts shall be used to provide full diameter opening to all piping entering and leaving the structure.

In instance where the pour depth is less than 15 vertical feet, the entire liner shall be installed in one pour without joints. If the pour depth exceeds 15 feet, the new liner shall be poured in stages. A water stop shall be installed to insure a watertight seam is obtained between subsequent pours.

Concrete shall be thoroughly consolidated so that it comes into close contact with the forms and fills all existing pockets, seams and cracks. Consolidation shall not be continued so as to cause segregation or to the extent that localized areas of grout are formed. The operations of pouring and consolidating shall be so conducted that the resultant concrete, upon removal of the forms, is smooth and dense, free from any honeycomb or pockets of segregated aggregate.

D. Liner Material.

Concrete materials shall be selected and proportioned in such a manner as to produce concrete which will be extremely strong, dense and resistant to weathering and abrasion. A collated, fibrillated polypropylene (Fibermesh or equal) admixture shall be added according to the admixture manufacturer's recommendations. Concrete shall have a minimum 28 day cure strength of 4,500 psi.

E. Bench and Invert Repair or Replacement.

All manholes to be reconstructed will require bench and/or invert repair or replacement. The engineer will determine the extent of work needed at each manhole and notify the contractor prior to commencing the work.

F. Preparation.

Whenever possible, bypass plugs will be installed in all the inlets and plumbed into the outlet, allowing flow to pass through the structure without interference of bench and invert repairs. All loose and/or deteriorated material shall be removed. Material will be removed to allow a minimum of 2 inches of new concrete to be placed around the circumference of the invert and over the existing bench at a point half the depth of the outlet invert and tapered up to the wall.

G. Forming New Inverts.

A forming system shall be used to provide a smooth, straight, and uniform flow line from the invert of the inlet pipe(s) to the invert of the outlet pipe. Where laterals are present, the system shall provide for a sanitary sweep into the main flow line.

H. Installation.

New concrete shall be placed to a minimum 2 inch thickness, over solid existing concrete base properly prepared as specified for manhole walls. Where solid concrete does not remain after preparation, new concrete shall be poured to a minimum 4 inch thickness. The new bench shall be tapered up to the manhole wall at a slope of 2 inches per foot.

I. Materials.
composition. Concrete shall conform to the following ASTM standards: C-33; C-94; C-150; C-260; and C-494.

Strength Requirement: Concrete shall be selected and proportioned in such a manner as to produce concrete which will be extremely strong, dense, and resistant to weathering and abrasion. Concrete shall have a 28 day cure strength of 4500 psi. A water reducing agent shall be used in the concrete mix.

J. Casting, Frames, Covers and Grade Rings.

Provide and install one 2 inch (36" O..D. by 26" I.D.) reinforced concrete grade ring. The material specification of these rings shall comply with Standard Specifications for Sewer and Water Construction in Wisconsin. The ring shall be set in a fresh bed of mortar, extending the full width of and continuously around the ring. The mortar shall be Type "M" mortar, meeting the property specification of ASTM C-270. Provide and install new castings for all rehabilitated manholes. Provide and install new chimney seals for each reconstructed manhole. Castings shall be East Jordan Iron Works Type_____ or Neenah Foundry Type_____ with self-sealing gasketed cover. Chimney seals shall be the Infishield 36x12 external seal as manufactured by Sealing Systems, Inc. All costs related to the installation of new castings, grade rings and chimney seals shall be included in the "Manhole Rehabilitation, Concrete Liner, Complete."

K. Surface Restoration.

The contractor shall be responsible for restoring the street pavement, including saw-cutting and removing existing pavement, supplying and placing ¾" base material, and supplying and placing a concrete pavement surface at a minimum thickness of 9 inches. Particular attention shall be made toward orienting the "diamond" cut points to be centered and parallel with existing street or intersection. Control joints shall be saw-cut or troweled to a uniform depth of 1/8". Backfill surface excavation with granular material and compact the excavation after the concrete liner has sufficiently cured. Place new concrete at a minimum thickness of 9 inches. Concrete shall have a 28 day cure strength of 6500 psi. All costs related to surface restoration shall be included in the "Manhole Rehabilitation, Concrete Liner, Complete."

L. Payment.

All costs related to manhole rehabilitation, including cleaning, step removal, interior preparation, removal of chimney sections, salvaging existing castings, flow management, disposal of waste materials, lining, bench and invert repair or replacement, new castings, adjustment rings, internal/external chimney seals and pavement restoration shall be in the unit price bid for " Manhole Rehabilitation, Concrete Liner Complete".

END OF SECTION