

# CITY OF JANESVILLE



## PUBLIC WORKS BID SCHEDULE "B" – 2012

### CONTRACT 2012-6, MANHOLE REHABILITATION/RECONSTRUCTION

#### DETAIL SPECIFICATIONS

##### 1.0 MANHOLE REHABILITATION/RECONSTRUCTION – SCOPE OF WORK

The Contractor shall furnish all labor, equipment, supervision, and materials as specified to install a uniform, structural concrete lining wall to thirty-one (31) existing sanitary sewer and seven (7) existing water valve manholes. The manhole locations are found in Attachment A and associated map pages. This lining shall restore the structural integrity of the manholes and provide protection against corrosion.

The Contractor shall also furnish all labor, equipment, supervision, and materials as specified to complete the manhole chimney and/or bench and invert work, of varied depths, to forty (40) existing sanitary sewer, water valve, and storm sewer manholes. The manhole locations are found in Attachment B and associated map pages.

The Contractor shall comply with applicable specifications listed in Special Provision No. 1 and these Detail Specifications. The Contractor shall note to supply necessary resources to remove existing debris from **all** manhole bottom areas prior to commencing work.

All manhole rim elevations shall be set to existing street grades or grades established by the Engineer. Existing street grades may change at some locations, particularly on Eisenhower Street, North Palm Street, Peterson Avenue, Sherman Avenue, and South Fremont Street. The Contractor shall verify grades on **ALL** streets with the Engineer prior to commencing work.

All work shall be performed in strict accordance with City, State, and OSHA standards for confined space entry procedures, and other safety regulations.

Contractor shall submit a progress schedule and any shop drawings (as required in these Detail Specifications) at the time of preconstruction meeting.

##### 2.0 FULL DEPTH MANHOLE RECONSTRUCTION



## 2.1 Testing Requirements and Submittals

The Engineer shall collect two concrete test cylinders per 6 manholes reconstructed (6 sets total). The sample locations will be selected at random by the Engineer. The testing shall be done by an independent laboratory selected by Contractor and approved by the Engineer prior to testing. The testing lab shall submit the following test data directly to the Engineer:

- A. Date Tested and Location
- B. Compressive Strength - 7 and 28 Day
- C. Compressive Strength - Load at Failure

## 2.2 Preparation of Existing Structure

- A. Cleaning - Contractor shall properly clean existing structure by means of wire brushing or pressure washing to facilitate the removal of:
  - 1. Loose brick/mortar material, dirt, and grease build-up.
  - 2. Loose structural material caused by surface deterioration.
- B. Pavement Removal - Prior to reconstruction work, the Contractor shall be remove existing pavement according to a 4' x 4' square area saw cut centrally around the manhole casting. Pavement removal must be done by saw cutting straight, neat, uniform edges through entire pavement depth. The existing pavement material may consist of asphalt, concrete, or asphalt over concrete. Existing pavement materials are listed for each manhole in Attachments A and B.
- C. Step Removal - Contractor shall properly remove all existing manhole steps to within one (1) inch of existing wall. Step material shall be properly disposed of by the Contractor.
- D. Removal of Existing Wall Material - The Contractor shall prepare the structure to allow:
  - 1. A nominal concrete liner thickness of 3" or greater. 2" thickness may be allowed in some wall areas as approved by the Engineer.
  - 2. A minimum surface entrance opening of 26" after liner is in place. (A smaller entrance may be permitted in special circumstances, upon prior approval of the Engineer.). The chimney section shall be removed to a depth where the interior diameter of the existing



structure is approximately 36". The Engineer must approve any revisions to this requirement.

3. The existing loose structural material shall be removed by mechanical means (if applicable) to provide the above described conditions. The material removal shall be accomplished concurrently with removal of the existing manhole casting and cover. The Contractor shall prevent any removed material from entering the sewer system.
  4. All debris material (including pavement material and old castings/covers) shall be the property of the Contractor for proper disposal at the City's landfills, private disposal site, or salvaged for scrap/recycled.
- E. Infiltration - In all areas of ongoing infiltration, Contractor must grout affected area prior to forming new wall. The grouting method shall be according to National Association of Sewer Service Companies (NASSCO) specifications. In areas where infiltration is occurring at manhole base, a water stop barrier, approved by the Engineer, must be installed along the base of the new manhole wall prior to setting forms.
- F. Existing Utilities Inside Manholes - The Contractor shall note (by inspection) any manholes in the Contract that may have existing utility lines traversing through them. Prior to starting work on these manholes, the Contractor shall contact the respective owner of each utility to determine their status (active or abandoned).

If utility is abandoned, the Contractor shall proceed with removing the utility section from the manhole interior, cutting off the ends (even with interior wall), and plugging the ends at the utility owner's direction. **Abandoning the utility as is shall not be acceptable.**

If the utility is active, the Contractor shall make arrangements with the utility owner to have the utility offset outside the manhole at the utility owner's direction. **The Contractor will not be allowed to form around the utility, even if the new liner fully encapsulates the pipe.**

*All existing water and sewer pipe/lateral connections to the manhole shall be opened through the new interior wall unless specifically requested, **in writing**, by the Engineer to plug. The Engineer shall provide a signature form to document this request.*

2.3 Materials (Full Depth and Chimney Reconstruction)

- A. Concrete – Concrete for both manhole walls, bench replacement/repair, and pavement restoration (on existing concrete streets) shall comply with City Specifications Division I-A, General Specifications (Section 1) for High Early Strength Grade A concrete. Slump range shall be 4" - 6". Contractor shall allow Engineer to test slump upon request.

Concrete ingredients shall be selected and proportioned to produce concrete which will be strong, dense, and resistant to weathering and abrasion. A collated, fibrillated polypropylene fiber (Fibermesh or equal) admixture shall be added according to fiber admixture manufacturer's recommendations to increase flexural strength. The Engineer must approve any other admixture to the concrete. The intent of any admixture is to improve placement, while not decreasing strength or long-term structural integrity. Written documentation must be provided by admixture manufacturer to document this intent.

- B. External Chimney Seals - All sanitary manholes shall include an external chimney seal and/or seal extensions shall be manufactured by Cretex Specialty Products (X-85), Adaptor Inc., or approved equal. The external chimney seals and/or seal extensions (required on all sanitary manholes) shall be manufactured by Cretex Specialty Products (X-85), Adaptor Inc., or approved equal. The seal and/or seal extension shall be extruded or molded from a high grade rubber conforming to the applicable material requirements of ASTM C-923 and shall be a minimum 60 mil thickness. A corrugated shape or other vertical spacing allowance shall provide 2 inches of movement without stretching the material. The bands and any fasteners used to compress the rubber against the manhole shall be manufactured from stainless steel with a minimum thickness of 16 gauge which meets the applicable material requirements of ASTM C-923, Type 304. Two (2) bands shall be supplied with each sleeve. One (1) additional band shall be supplied with each extension, if necessary. The external chimney seal shall extend from the base flange of the manhole frame casting down the top of the precast manhole cone. Extensions are part of the seal design and shall be used when necessary to achieve full coverage. The external chimney seals and/or seal extensions shall be supplied in the quantity noted in the Bid Proposal.

The seal shall consist of a minimum 60 mil neoprene sleeve, neoprene seal gasket, four 1/2" x minimum 1-1/2" neoprene spacers, and two 1/2" or "C" shaped stainless steel tightening bands with clamps. The seal



shall have a 6"-10" standard width. Adaptor, Inc. also manufactures an external seal known as the "I.A.S." ring. This model is not acceptable.

- C. Slurry Backfill and Asphalt – The slurry backfill and asphalt materials used in the street restoration work detailed in Section 2.4 (D) shall be of the mix designs specified in attached details: Policy 96.95 of WDOT State Highway Maintenance Manual (as modified) and Asphalt Pavement Restoration Material Detail respectively (copy attached). The temporary cold mix asphalt shall be a standard mix design as supplied through Rock Road Companies (608/752-8944) or approved equal.
- D. Adjusting Rings - The reinforced pre-cast concrete grade adjusting rings shall comply with the material specification of Section 8.39.11 of the Standard Specifications for Sewer and Water Construction in Wisconsin (copy attached), and 3" to 6" in thickness. Concrete rings shall not be used on full depth manhole reconstruction, which requires one or two 2" rings, and may be used, as applicable, on chimney reconstruction.

Rings that are less than 3" thickness shall consist of plastic based EPP (Expanded Polypropylene) material as manufactured by Cretex, Inc. (Pro-Ring) or approved equal. Plastic rings shall comply with ASTM Specification D-4976 (latest edition) and have a traffic rating compliant to AASHTO HS-20.

All rings shall have an inside diameter of 24-26 inches and a minimum bearing width of 4 inches. A 3/8" (wide) bitumastic rope seal to be placed between all concrete adjusting rings, and shall be a flexible, butyl rubber gasket or rope with the physical requirements for Type "B" gaskets in AASHTO Designation M-198 (or approved equal). The Contractor shall use a sealant between the plastic rings as recommended by the manufacturer.

The non-shrink mortar grout used as specified in Detail Specifications shall be Ipatop-Penngrout manufactured by IPA Systems, Inc. ([www.ipasystems.com](http://www.ipasystems.com)) or equal. The material shall contain a balanced blend of washed and graded silica sand, finely ground Portland cement, and applicable special additive(s).

## 2.4 Installation

- A. Forms - Specially designed forms are required to provide a smooth, rounded surface of the new concrete liner. Flat panels will not be



accepted. The form system shall be designed to fit the configuration of any concentric structure. The system shall be designed to allow the new concrete liner to be as close to a 3" thickness as possible. The liner thickness cannot be less than 2" at any point in the manhole. The system shall have straight vertical sections in various increments and reducing sections to connect the various diameter straight sections. The system shall be designed to go through the manhole top section (after removal of existing pavement, casting, and partial chimney) and assembled inside the existing structure. The assembled forms shall be bolted together to prevent shifting and shall have sufficient stiffness and strength to prevent collapse or bowing. Block-outs shall be used to provide a full opening to all pipes into the manhole, unless otherwise approved, in writing, by the Engineer. The Engineer must approve the forming of each manhole prior to concrete placement.

The entire structure depth shall be installed for one pour, without seams, to insure structural integrity and a water-tight seal. If the pour depth exceeds 15 V.F., the new concrete liner can be poured in two stages. A water stop shall be properly installed to insure a water-tight seam is obtained between subsequent pours.

The top of the forms shall be set at an elevation, as approved by the Engineer, to allow for the installation of two 2" adjusting rings (one ring only for existing concrete pavement) and a 9" casting/cover as specified in Sections 2.3 (D) and 4.1.

- B. Concrete Placement - The new concrete shall be thoroughly consolidated so it comes into close contact with the forms and fills existing pockets, seams, and cracks in the existing structure. Consolidation shall not cause segregation of aggregate or localized areas of mortar. The placement and consolidating of material shall be performed so the resultant concrete is smooth, dense and free from all honeycomb or pockets of segregated aggregate. Maximum drop height shall be 15 feet. Defective work shall be repaired or replaced by the Contractor, at Engineer's direction. The top of the manhole wall shall be uniformly level.
- C. Setting of Adjusting Rings and Castings - The Contractor shall supply and install two 2" EPP material grade adjusting rings for existing asphalt (including asphalt over concrete) pavements and one 2" ring for existing concrete pavement. A butyl rope or other sealant (as approved by the ring manufacturer) shall be centrally placed between the rings. Prior to setting adjusting rings and casting/cover, a 3/8" (wide) bitumastic rope



seal, as specified in Section 2.3, shall be centrally placed between the top of manhole wall and bottom ring.

In addition to the rope seals, a uniform bed of non-shrink grout, also specified in Section 2.3, may be placed, as needed, between the top of the manhole structure and bottom ring to establish proper level of the casting to match existing or proposed street surface as directed by the Engineer. If conditions allow, a  $\frac{3}{4}$ " – 1  $\frac{1}{2}$ " sloped or flat plastic grade ring shall be used, in lieu of grout, between the top ring and the casting/cover on manholes to best match existing/proposed street grade/cross slope. All castings shall be centered over the opening of the corbel and adjusting rings. The top adjusting ring upon which the casting is set shall be level from side to side unless a pitch is required to match existing pavement in street areas. All castings shall be set on approved butyl rope (or other sealant approved by EPP material manufacturer). The Engineer must approve use of non-shrink grout as required to match existing street grade/cross slope. Grout, if needed, shall be spread over the entire bearing surface of the top adjusting ring prior to setting of the frame.

- D. External Chimney Seals - The Contractor shall install external chimney seals according to the manufacturer's specifications, Cretex, Adaptor Inc., or equal units, on **all** sanitary manholes in Attachment A and B. The Contractor shall ensure the outer surface of the corbel, adjusting rings, and casting is free of loose or cracked materials prior to placement of the seal. There shall be no offset greater than 2-1/2" between any adjusting ring, corbel, or casting. If there is an offset greater than 2-1/2", necessary adjusting rings and casting shall be removed and reset as described in the above paragraph. Each external seal shall be properly set in place and secured to the structure with two (2) stainless steel (16 gauge) tightening bands for each seal, with one (1) additional tightening band for each seal extension, if extension is required. The standard dimensions for the specified manufacturers are as follows:

Cretex:           6" Width  
Adaptor Inc.:   8" Width

The width of the seal and extensions, if necessary, shall be 2 to 4 inches greater than the overall height of adjusting rings or height of structure to be sealed. All steel tightening bands shall be secured so there is an even pressure distribution around the entire circumference of the area being tightened.



- E. Street Restoration – After installation of manhole casting and chimney seal, the Contractor shall restore excavated street by supplying and placing slurry backfill material described in Section 2.3. This material shall be placed to within 4" (5" on arterial streets) of the street surface and allowed to set (minimum 12 hours). The Contractor shall then supply and place 4" of hot-mix asphalt on residential streets and 5" on arterial streets (as designated in Section 22 of the Special Provisions), in 2" (or 2 ½") layers, or concrete according to existing pavement thickness (8" minimum). On asphalt patches, the layers shall be compacted by mechanical vibratory plate compactor (applicable for asphalt compaction) to meet the density requirements of Asphaltic Pavement Restoration Material Detail (copy attached). If density testing, by the Engineer, determines that requirements are not being met, the Contractor shall employ other compaction measures to achieve compliance. The patch shall not be lower, or be less than a uniform 1/4" higher than the adjacent pavement, and match the sloped profile, in all directions, of the adjacent pavement. The Contractor shall note that all manhole work on streets with completion dates prior to the availability of hot-mix asphalt shall require the supply and placement of 4" of cold-mix asphalt material. The asphalt material(s) shall be placed in two (2) 2" (2 ½") thick layers. The Engineer shall approve the grade of the street patch, to be set, generally, to match existing street grade, the City's standard 2% cross slope (as measured from the existing flag of the gutter). The cold-mix is to be a permanent surface patch for asphalt streets, and hot-mix replacement shall not be required. Cold-mix will not be allowed for work on arterial street listed in Section 19 of the Special Provisions.

The concrete pavement patch material, to be placed on Linn Street and Locust Street only, shall be placed in accordance with City Standard Specifications, Section 1.7.1 of Division 1-A – General Specifications at locations where existing pavement is concrete. Manhole work on South River Street (planned for reconstruction in 2013) shall require an 5" thick asphalt patch, which will be paid at unit price for asphalt over concrete patch.

The repaired manholes shall be protected from direct traffic loading for a minimum of 24 hours.

## 2.5 Bench and Invert Replacement (Full Depth and Chimney Reconstruction)

**All** of the sanitary manholes to be reconstructed, and several of the sanitary manholes having chimney reconstruction (as designated on Attachment B), will require bench and/or invert rehabilitation or replacement. The Engineer will



determine the extent of work needed at each manhole and notify the Contractor prior to commencing work on each manhole. This work shall comply with the following specifications:

- A. Preparation: Whenever possible, bypass plugs shall be installed in the intake pipe(s) and plumbed into the outlet, allowing flow to pass through the structure without interference with bench and invert repairs. Short term flow interruption through the manhole will be allowed as approved by the Engineer.
- B. All loose or deteriorated material must be removed. Material shall 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 from the spring line of the outlet invert and tapered up to the manhole wall. The Contractor will remove existing debris from all manhole bottom areas prior to commencing work.
- C. Forming: A forming system shall be used to provide a smooth, straight, and uniform flow line from the invert of the inlet pipe(s) to invert of the outlet pipe. Where laterals are involved, the system shall provide for a sanitary sweep into the main flow line in a smooth, straight line from the invert of the inlet lateral to the main flow line. All inactive laterals or main line stubs shall be plugged with same material used for the bench repair. The Engineer must authorize all pipes to be plugged.
- D. Installation: New concrete, as specified in Section 2.5 (E) shall be placed to a minimum 2 inch thickness, over solid existing concrete or brick base properly prepared as specified for manhole walls. Where solid foundation does not remain after preparation, new concrete shall be poured to a minimum 4 inch thickness. Concrete shall be placed forming a new flow line shaped to match the bottom half of the outlet pipe. The new bench shall be tapered up to the manhole wall at a slope of 2" per foot and troweled to form a smooth, uniform surface.

Once installed, the new concrete shall be allowed to cure a minimum of 24 hours before flow can pass directly over the new concrete unless otherwise approved by the Engineer.

- F. Materials: The concrete shall comply with City of Janesville Standard Specifications (Section 1) for Grade A concrete. Non-shrink grout, as specified in Section 2.3 (D), may be approved by the Engineer, if conformance with A through D is made.



### 3.0 MANHOLE CHIMNEY RECONSTRUCTION

#### 3.1 Materials

The Contractor shall comply with applicable parts of Section 2.3 (A through D) for specified materials to be used in the chimney reconstruction work.

#### 3.2 Installation

##### A. Preparation of Existing Structure

The Contractor shall comply with applicable parts of Section 2.2 (B through D) for removal of existing pavement and chimney materials in preparation for reconstruction.

##### B. Installing Concrete Forms/Adjusting Rings/External Seals

The depths of reconstruction listed in Attachment B do not include the existing 9" casting/cover.

For a depth range between 1" to 18", the Contractor shall use the minimum number of new (2" to 6") adjusting rings to complete the work, with a maximum of 3 rings being allowed. The Contractor shall comply with installing adjusting rings, as specified under Section 2.4 (C), for reconstructed chimney depths between 1" and 18", and rings shall be set at an elevation to allow for the installation of a 9" casting/cover. Any plastic (EPP) rings used shall be placed at the top, just below casting/cover

For a depth greater than 18", the Contractor shall use the same forming system as specified in Section 2.0 for chimney (reconstruction) depths over 18". Reinforced precast concrete barrel and/or eccentric cone section(s) may be used if compatible with existing structure and must be approved by the Engineer. The forming system shall be designed to fit the configuration of any varying concentric structure, and allow the new concrete liner to be a minimum 3" thickness (4½" thickness for precast sections). The top of the forms shall be set at an elevation to allow for the installation of one or two 2" plastic (EPP) adjusting rings, as specified under Section 2.4 (A & C) and a 9" casting. The Engineer must approve the forming of each manhole chimney prior to concrete placement.

The setting or resetting of new or existing castings shall be according to Section 4.0.

The Engineer must approve the actual depths to be reconstructed as the depths listed in Attachment B are estimated. Any additional chimney removal needed by the Contractor to install the forms (or precast sections, if approved) shall be at Contractors expense.

The Contractor shall install external chimney seals, according to the manufacturer's specifications, on all sanitary manholes in Attachment B according to Section 2.4 (C).

D. Surface Restoration

The Contractor shall restore street in accordance with all applicable items under Section 2.4 (E).

4.0 MANHOLE CASTINGS/COVERS

4.1 Materials

**The Contractor shall supply new castings and covers as required for replacement.** New manhole covers, to fit Neenah R-1710-NR casting shall have the City of Janesville logo according Neenah component numbers:

- N1090-1091 (Wastewater Utility – **with T-gasketed seal**)
- N1090-1092 (Water Utility)
- N1090-1093 (Storm Water Utility)

Use of temporary, non-conforming castings and/or covers will not be allowed. The Contractor is expected to supply new castings and covers, as indicated on Attachments A and B, prior to commencement of work.

4.2 Installation

The installation procedures of castings/covers on all manholes in Attachments A and B are as follows:

- Reset Existing Casting/Cover
- Install New Casting/Cover

The Contractor shall supply and install all new or reinstall existing castings/covers as specified in Attachments A and B after completion of

reconstruction or chimney work. The Contractor shall reset the existing casting/cover on manholes where a new casting & cover is NOT indicated on Attachments A and B. The Contractor shall remove any cast iron cover adjustment rings prior to resetting existing castings. The Contractor shall supply and install new casting and cover where noted and specified. The old castings/covers (including any cover adjustment rings) that are removed become property of the Contractor for proper disposal or salvage.

Temporary castings/covers, nor borrowing of City stock **will not** be allowed where new castings/covers are indicated. Contractor shall note to order City, custom made covers with sufficient lead time for delivery in time for start of work and for throughout contract work schedule.

#### 4.0 SCHEDULE/TIME CONSTRAINTS/WORK COORDINATION

All of the manhole rehabilitation work will occur on streets scheduled for bituminous resurfacing or reconstruction later this year, with exception to South River Street (scheduled in 2013). It shall be the Contractor's responsibility to coordinate their schedule with the City Engineering Division to insure there are no conflicts with other work. **The manhole repairs must be completed prior to the respective street resurfacing, according to special interim completion dates (Item 2 of the Special Provisions), and no later than June 30<sup>th</sup>, 2012.**

#### 5.0 PAYMENT DESCRIPTION

##### 5.1 Full Depth Manhole Reconstruction

Payment shall be per each manhole bid item as listed under Part A of the Bid Proposal. Payment includes furnishing all labor, equipment, mobilizations, supervision, materials, and other miscellaneous items to supply and install a uniform structural concrete lining wall, as specified under Section 2.0. The cost for concrete testing shall be incidental to total bid price for the manhole work. Any costs associated with grouting areas of infiltration (Section 2.2 E) or removing existing utilities (Section 2.2 F) shall be incidental to the manhole unit price.

##### 5.2 Manhole Chimney Reconstruction

Payment shall be a per depth bid item (as established in 1"-18", or 19"-35" increments) of sanitary sewer, water valve, and storm sewer manhole chimney reconstruction. Payment includes furnishing all labor, equipment, mobilizations, supervision, materials (including precast sections, if approved), and other miscellaneous items to reconstruct manhole chimney, as specified

under Section 3.0. Payment will be per measured depth (as included in the two established depth range pay items) of deteriorated chimney reconstructed as approved by the Engineer. The costs to supply and install all adjustment grade rings, bitumastic seal material and non-shrink mortar grout, where required, shall be incidental to chimney depth unit price.

5.3 Manhole Adjusting Grade Ring

Payment shall be a per each bid item for grade ring supplied and installed, under full depth manhole reconstruction. The costs to supply and install bitumastic rope seal material and non-shrink mortar grout, where required, shall be incidental to grade ring unit price. Payment includes furnishing all labor, equipment, mobilizations, supervision, materials, and other miscellaneous items to supply and install each 2" plastic (EDPM) adjusting ring, including rope seal/approved sealant and mortar grout, as specified under Section 2.4 (C).

5.4 External Chimney Seal

Payment for each seal provided will be paid at the unit price bid for standard width, 6"-10", or extensions of the same 6"-10" width range under Parts A and B of the Bid Proposal. The Contractor will be paid per each for the standard width of seal installed. Extensions shall also be paid per each width installed under the same unit price bid item. Payment includes furnishing all labor, equipment, mobilizations, supervision, materials, and other miscellaneous items to supply and install a chimney seal or extension, as specified under Section 2.4 (D).

5.5 Bench and Invert Repair

Payment for this work, under each Bid Part A and B, will be per unit price bid item of each manhole bench and/or invert rehabilitated or replaced (as directed by Engineer) according to Section 2.5. Payment includes furnishing all labor, equipment, mobilizations, supervision, materials, and other miscellaneous items to include removal of all existing debris (including concrete, bricks, sludge, sewage, etc.) that inhibits the proper repair and replacement of the bench and/or invert, and any sewage flow control necessary to complete the work required.

5.6 Street Restoration (Including Cold Mix Asphalt Restoration)

Payment for hot-mix asphalt restoration shall be a per each bid item for existing pavement material encountered (Section 2.2 (B)). The cost of

pavement cutting, removal, and restoration, including final site clean-up, shall be included in this bid item. The cost to reset existing casting/cover on manholes indicated as not receiving a new casting/cover (per Attachment A or B) shall be incidental to this bid item.

Payment for cold mix pavement patching, as detailed under Section 2.4 (E), shall be per each bid item. This bid item price includes supplying and placing cold-mix asphalt as specified.

Payment includes furnishing all labor, equipment, mobilizations, supervision, materials, and other miscellaneous items to complete the restoration work as specified.

#### 5.7 Manhole Casting and Cover

Payment shall be per each bid item, under Bid Parts A and B, for supplying/installing new casting/cover. Payment includes furnishing all labor, equipment, mobilizations, supervision, materials, and other miscellaneous items to complete the work as specified.

#### 5.8 Traffic Control

Payment for all traffic control, including traffic plan submittals, mobilization, supplying and installing advance warning, barricades, lane signing, street closures, flagging, etc., shall be paid as a lump sum item, under Bid Parts A and B, applied to arterial street project locations as specified

The cost of all required work zone traffic control on residential streets and for any special business access arrangements shall be incidental to the traffic control work.

#### 5.9 Clean Up and Final Acceptance

Payment for work site clean up (to original conditions) according to GC-6.20 of the City Standard Specifications shall be incidental to the contract. Waste materials shall be disposed of at the City Clean Fill Site or Sanitary Landfill as appropriate on Black Bridge Road, or other private disposal facility, and disposal costs shall be incidental as well.

A work sheet for each manhole in the contract will be provided by the Engineer. The sheet must be completed and signed by the Contractor (Project Foreman) to assure payment for completed work.

Final acceptance and payment shall be issued upon review and approval of all repair work and upon completion and submittal of all applicable final Contract documentation. The contract warranty period shall begin at the time that a letter of substantial completion is issued.