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1. GENERAL

The Contractor shall have experience with Manhole (MH) Restoration. The Contractor shall be responsible for delegation and coordinating the work and supply of all materials that shall produce a complete and operating job. The Contractor shall be familiar with the codes, bylaws, specifications and other regulations governing their work. The Contractor physically inspects and examine all the manholes by their own expenses and initiatives prior to bid the tender.

2. PROJECT CONTACT

Inquiries regarding all aspects of the project shall be directed to:

Rabindra Bhowmik, C.E.T.
Engineering Technologist

Phone: (306) 694-4525

Email: rbhowmik@moosejaw.ca

Throughout the specification the Engineer will refer to either Colin or Rabindra

3. HOURS OF WORK

The Contractor shall limit the work under this contract to the hours between 7:00 a.m. and 10:00 p.m. on non-statutory weekdays and between the hours 9:00 a.m. and 10:00 p.m. on Sundays and Statutory holidays. The hours of work may only be extended with written approval from the Manager of Engineering.

4. DESCRIPTION OF THE WORK

The contractor shall restore operating manholes using High Sulphate Resistant Hydrallic Cement (HS). All cracks, joints shall be cleaned to remove loose concrete, infiltration roots, soil or any other loose deleterious material which may hamper bonding of the mortar to the structure. Any brick bevelled top sections are to be replaced by precast concrete. MH bases that are poor condition shall be replaced with concrete. Minimum compressive strength of mortar/concrete is 30Mpa.

The intent of this contract is to restore eleven (11) sanitary sewer Manholes around the City. Project locations are ranked in order of severity. This tender will be awarded according to funds available. Any increase or decrease in quantities from those stated below will be established at the time of initial award. The work shall be completed in a

timely manner according to a schedule agreed upon by the contractor and the City of Moose Jaw and as described in “Notice to Bidders”.

The location and details of the project related to restoration of existing manholes are listed below:

Locations:

- i. 11th Ave NE & Ominica St East; Sanitary; Intersection
North Invert – 200mm VCT – Depth 2.55m
East Invert – 200mm VCT – Depth 5.01m
South Invert – 300mm VCT – Depth 6.90m
West Invert – 200mm VCT – Depth 2.64m
- ii. 11th Ave NE & Stadacona St East; Sanitary; Intersection
North Invert – 200mm VCT – Depth 2.64m
South Invert – 200mm VCT – Depth 2.91m
West Invert – 200mm VCT – Depth 2.91m
- iii. 9th Ave NE & Stadacona St East; Sanitary; Intersection
East Invert – 200mm VCT – Depth 3.51m
South Invert – 250mm VCT – Depth 5.32m
West Invert – 200mm PVC – Depth 5.30m
- iv. 3rd Ave NE & Ominica St East; Sanitary; Intersection
North Invert – 200mm VCT – Depth 6.44m
East Invert – 200mm VCT – Depth 6.45m
South Invert – 200mm VCT – Depth 6.44m
- v. 3rd Ave NE & Fairford St East; Sanitary; Intersection
North Invert – 200mm VCT – Depth 5.68m
East Invert – 200mm VCT – Depth 5.68m
South Invert – 200mm VCT – Depth 5.68m
- vi. Home St West & 7th Ave SW, north of Back Entrance to Pork Plant; Sanitary; Intermediate
North Invert – 450mm VCT – 9.24m
Southwest Invert – 450mm VCT – 9.24m
- vii. 1609 Marshal Crescent Sanitary; Intermediate
North Invert – 200mm VCT – Depth 2.86m
South Invert – 200mm VCT – Depth 2.86m
- viii. 0 Block High St East & Intersection of Street & Alley behind Walter Scott/TD Bank; Sanitary; Intermediate
North Invert – 250mm VCT – Depth 4.25m
East Invert – 200mm VCT – Depth 4.22m
South Invert – 250mm VCT – Depth 4.28m

- ix. Algoma & Laurier St; Sanitary; Intersection
East Invert – 375mm VCT – Depth 2.90m
South Invert – 200mm VCT – Depth 2.52m
West Invert – 375mm VCT – Depth 2.90m
- x. Home St West & 7th Ave SW, back entrance to Pork Plant; Sanitary; Intermediate
Northeast Invert – 450mm VCT – Depth 7.25m
West Invert – 450mm VCT – Depth 7.16m
- xi. Home St West & 7th Ave SW, back entrance to pork plant (East);
Sanitary; Intermediate
East Invert – 200mm VCT – Depth 3.69m

* Please see maps of locations in (Appendix - A).

The work shall be considered complete when approved by the City of Moose Jaw and all requirements are met.

5. COMMUNICATION

The contractor will designate a Project Manager/Supervisor, whom, with the City Engineer or his designate, will form the primary link between the contractor and the City. All instructions, guidance, data and reports will flow between these two persons. The Project Manager will communicate with the City Engineer or his designate to discuss progress, clarify instructions and to solve problems as required. It is the responsibility of the Contractor to ensure that a list of contact numbers of all supervisory staff is provided prior to start the work. The Contractor shall keep the Fire Department, Police Department, Transit System and Ambulance Service posted on road and/or hydrant closures.

6. SITE INSPECTION

Bidders are recommended to examine each manhole and its condition prior to submitting a bid. All bidders must comply with the current requirements of the Occupational Health and Safety Act and regulations prior to access of the manholes for site inspections and/or any work under the terms of this contract.

7. CONSTRUCTION SCHEDULES AND COMPLETION

At least 2 days prior to commencement of the work, the Contractor is responsible for preparing and submitting the manhole restoration schedule. If, in the opinion of the

Engineer, any Schedule is inadequate as a control tool or if it does not show the work being fully completed by the Contract Completion date, the Engineer may reject it until one is acceptable. The Contractor shall execute the work in such a manner as to **complete it on or before August 31, 2017**. The successful bidder shall supply all equipment, labour and materials to ensure that the completion dates are met.

8. DOCUMENTS REQUIRED

Maintain at least one copy at the job site at all times:

- Locations map
- Copy of approved schedule
- Specifications

Final Report Submission with:

- Two sets of Final Report including Pre and Post pictures of all manholes

9. PRIVATE / ADJACENT LANDS

The Contractor shall not enter on or occupy any private lands without the owners written consent. Any alterations or damage to private lands shall be restored to original condition or better at the expense of the Contractor. The project limits will be marked out or discussed by the Engineer's representative prior to work beginning. Any damages/stoppage in work caused by working outside the project limits will be solely at the cost of the contractor.

10. CONSTRUCTION USE OF SITE

The Contractor shall have full use of the site, provided that the Contractor permits access to the City for purposes of inspections, reviews, tests, and carrying out related work. The contractor shall return the site in a clean state, free of all materials and construction debris. Protect all trees, plants, fences and other items from damage during restoration.

11. STAGING / STORAGE

The City will allow the contractor staging of equipment and material stock piling near the City Yards (1000 block High St. W).

12. SAFETY PROGRAM

The Contractor shall provide safe working conditions for all their respective employees. The program shall fully respond to the requirements of applicable laws, ordinances, rules,

regulations, orders, and general construction practices for safety. Proof of COR Certification in the construction industry must be supplied prior to award of tender. The Contractor shall comply with the Occupational Health and Safety Act, R.S.A, Chapter 0-2, as amended and regulations here under (the “Act”).

Confined spaces are dangerous places. Many people are injured or killed each year by entering confined spaces when it is not safe to do so or they die making attempts to rescue someone in a confined space when it is not safe to do so. Anyone entering a MH must provide a current confined space entry-training certificate.

13. PUBLIC PROTECTION & WARNING

- i. The contractor shall, as far as practicable, carry out the work causing the least possible obstruction to streets, lanes, or thoroughfares leading to, crossing, adjacent to or alongside of the Work, and shall provide temporary access to locations as directed by the City’s Eng. Dept. The contractor shall not break up or otherwise obstruct any street, lane or thoroughfare without the written approval from City’s Eng. Dept. or it’s designate. The contractor shall provide and maintain all necessary notices, detour signs, barriers, warning lights or other means of protection for the safety of the public from the commencement to the completion of its work.
- ii. The contractor shall not deposit any material on any street, sidewalk, boulevard or private property without the permission of the City’s Eng. Dept. or it’s designate. Any material placed on these locations by the contractor must be removed as quickly as possible and the boulevard, sidewalk, or other property thoroughly cleaned and restored to its original condition at the contractor’s expense.
- iii. The contractor shall carefully observe any directions given by the Fire Chief with respect to easy access to hydrants that might be in any way be affected by the carrying out of the works. The contractor shall keep the Fire Department, Police Department, Transit System and Ambulance Service posted on all of his activities which may hinder their access to any street or lane.

14. DAMAGE TO PUBLIC OR PRIVATE PROPERTY

The contractor must be careful to not damage any adjacent property, public or private, or any infrastructure, and any damage must be restored to its original state by the contractor

at their own expense and to the satisfaction of the Engineer and party concerned. It is recommended that the contractor discuss items at risk with the City prior to construction as well as mitigation strategies.

15. MATERIALS

The City shall supply new cast iron manhole frames and covers for locations as designated by the Engineer. The Contractor accompanied by an Engineering Department employee, shall take possession of these at the City Stores and then deliver them to the site of the work. The contractor should inform the City at least two days prior to the date required.

The Contractor shall supply all other materials, except asphalt, required to complete the specified work.

16. TESTING

Mortar

The Engineer shall at all times have access to the work whenever it is in preparation or progress and the Contractor shall provide facilities for such access and inspection.

The Contractor shall, when requested, provide samples of the concrete or mortar being used for the purpose of quality assurance testing. Samples of concrete to be taken will consist of sets of three cylinders taken directly from the truck discharge.

Costs associated to regular testing required are the City's responsibility. Tester will collect the samples any suitable time of the schedule dates.

Samples of cement mortar to be taken will consist of plywood test panels measuring 18" x 18" x 3" to which the Contractor shall apply mortar in the same manner as to the work under this contract.

Concrete and cement mortar samples will be taken randomly. Each test panel and set of concrete cylinders will be accepted as a representation of all of the cement mortar and concrete used on the day of the sample. Test reports from testing company, 3 sets of cylinder test for 7 & 28 days, panels tests for 7 & 28 days.

17. INSPECTION, CLEANING AND PREPERATION

- i. Prior to entering confined spaces, such as manholes, and performing inspection or cleaning the contractor shall undertake, in accordance with provincial Occupational Health and Safety (OH&S) regulations, an evaluation of the atmosphere to determine the presence of toxic or flammable vapours or lack of oxygen.
- ii. The contractor shall thoroughly clean all interior surfaces of the manholes to be reconstructed in such a manner as to remove all products of corrosion, chemicals or other deposits, loose and deteriorated remains of old concrete, mortar, brick, rungs, tar, oil, grease, dirt, sewage and debris and all accumulations of water.
- iii. All large cracks and joints shall be cleaned to remove loose existing mortar, soil or any other loose deleterious material which may hinder bonding of the shotcrete to the structure. Root infiltrations shall be cut at the base of the intrusions (wall or base) and removed from the manhole.
- iv. The manholes shall be maintained in clean condition throughout the rehabilitation process. All visible infiltration shall be stopped using a suitable, rapid setting cementations or waterproofing material prior to placing any concrete and/or mortar.
- v. The City will provide a dumpsite for all debris removed from the sewers during the cleaning operations.

18. TRAFFIC CONTROL

The Contractor shall be responsible for the control of vehicular and pedestrian traffic in the vicinity of the work. Parking may be prohibited and traffic lanes diverted by the Contractor to provide adequate working room in the vicinity of the manholes. Upon request and approval by the Engineer, minor streets may be closed to vehicular traffic for short periods of time. A minimum of one lane traffic in each direction shall be maintained at all times on arterial/collector roadways.

19. SEWAGE FLOW

All sewers within the scope of this contract are subject to continuous variable flows. The contractor shall effectively have measures in place to ensure the grey water does not contact the concrete until it has properly cured. Flow has to be managed in such a manner

as to prevent any flow from coming into contact with the work until the concrete and/or mortar contained in the work has cured sufficiently. The contractor shall ensure that bypassing the flow to the sewer does not result in the flooding of any private or public property. The contractor may temporarily, with permission, divert sanitary sewer flows to an alternate sanitary sewer manhole. The Contractor must prevent material from entry sewer pipes during cleaning and dry work.

20. MORTER

All mortar shall conform to the latest edition of ACI Standard 506-66 and 506.2-77 and to specifications as further outlined in these documents. All cement mortar shall be reinforced with 19mm (3/4") long fibrillated polypropylene fibres engineered for use in concrete and added to the cement mortar at the rate of one kilogram per cubic metre in accordance with the manufacturers' recommendations. The reinforced cement mortar shall be applied as a wet mix shotcrete in one or more successive coats, ensuring that rebound is always properly removed. All cement shall be **High Sulphate Resistant Hydraulic Cement (HS)**, in accordance with CSA Standard A-5.

Sand shall conform to ASTM Specifications C33 with 100% passing the 9.5mm (3/8") standard sieve.

The minimum 28 days compressive strength of the mix shall be 30 Mpa. The maximum water/cement ratio shall be 0.50. The final mix design, including the use of any admixtures, shall be approved by the Engineer. All admixtures, with the exception of calcium chloride, which will not be authorized for use, must conform to ACI specification A23.1M.

21. CONCRETE

All cement used in the manufacture of the concrete shall be **HS**, the concrete shall have a minimum compressive strength of 30Mpa and the slump shall not exceed 75mm. A mix design shall be submitted to the Engineer for approval before any material is supplied to the job site.

22. MANHOLE STRUCTURE

i. Frames and Covers

The Contractor shall inspect all frame and covers for excessively worn, cracked or otherwise hazardous conditions and advise the Engineer accordingly. Frame and covers will be supplied by the City. Where replacement of the frame and cover is required, the Contractor will be required to obtain new frames and covers at the City stores accompanied by an Engineering Department employee and install these as part of the work.

Where replacement of the frame and cover is not required, the Contractor will be required to ensure that the existing frame and cover is protected from damage throughout the course of the construction and is in that same condition prior to leaving the site of the work.

ii. Bevelled Tops

Any locations that contain brick bevelled tops, the Contractor shall replace the bevelled top section with precast concrete. The Contractor shall supply and install all of the materials required including, but not limited to, concentric bevelled top sections, concrete grade rings, fill and granular road base material, in quantities required to restore the original manhole depth. The use of concrete grade rings shall be limited to that of final grade adjustment.

The Contractor will not be required to reinstate the asphalt pavement removed. However, they must keep removal to a minimum.

23. MANHOLE BASES

Manhole bases, which have deteriorated to a condition where replacement is necessary, shall be sloped toward the trough at a slope of no less than 6% from the horizontal. Slopes shall be trowelled smooth. The base shall have a minimum thickness of 100mm. The concrete shall contain Hydraulic Sulphide Resistance Cement (HS) and have a minimum compressive strength of 30Mpa.

In those manholes in which the concrete base is deteriorated but intact, the existing concrete base shall be prepared such that all loose, deteriorated concrete is removed

exposing sound, clean concrete. The new material placed over top of the existing concrete base may be concrete or shotcrete. It shall be 6% or higher sloped towards the trough and slopes shall be trowelled smooth. The concrete/shotcrete shall be dowelled to base with 150mm lengths of 15mm rebar at 300mm centre.

The trough shall be continuously supported along its length with concrete or shotcrete. All “troughs” and inlet and outlet piping shall be PVC SDR 35 gravity sewer pipe manufactured in accordance with the provisions of the current edition of ASTM Specification D3034. Troughs, inlet pipes, and outlet pipes shall be cut square and butted together. New PVC troughs shall be bolted to the concrete base with a minimum of 4-9mm x 75mm stainless steel carriage bolts. Bolts shall be located such as to lease impede the flow of sewerage through the trough.

24. CRACK AND JOINT FILLING

All large cracks and joints shall be cleaned to remove loose existing mortar, solid or any other loose deleterious material which hinder bonding of the concrete to the existing material. Cracks and other gaps may be filled with mortar at time of repair. Cleaning and filling of cracks and joints cost shall be included during pricing.

25. PLACEMENT

i. Shotcrete

Surface preparation, shotcrete mix designs and the application of all shotcrete shall conform to the current editions of ACI Standards ACI 506-66 and 506.2-77 and further details as outlined in these specifications.

The Contractor must be capable of maintaining a constant, uniform quality of shotcrete mix. The lining may be applied in one or more successive coats to produce a thickness of 50 - 70mm. Rebound is to be properly removed and surfaces trowelled smooth. The finished lining shall be plumb and not exhibit any irregularities in excess of 20mm when measured with a 3 metre straight edge or template.

ii. Rungs

New rungs shall be installed in each manhole requiring such. Rungs shall be MSU NO. 350 3/4” (20mm) diameter aluminium step rungs embedded on one side of the manhole,

450mm on centre. Rungs must be uniformly spaced with centers that are not less than 250 millimetres and not more than 350 millimetres apart. A clearance of at least 150 millimetres must be maintained between the rung and wall surface. The bottom rung in manholes must be a minimum of 300 Millimetres from the base of the manhole. All rungs must be cleaned and free from debris/concrete after complete the repair job.

iii. **Curing and Protection**

The mortar shall be maintained at a temperature between 5⁰C and 30⁰C for seven days after placing and finishing. Free water shall not be permitted to be in contact with the mortar or restored MH until it has set sufficiently to prevent damage.

26. MEASUREMENT AND PAYMENT

Upon Acceptance of the restoration work and testing results, the contractor shall.

- i. Receive payment for this work on a number basis per manhole in accordance with the unit prices contained in the BID.
- ii. The unit BID price shall include all bypass, cleaning, pre - and post-construction pictures, labour, equipment, material, installation, safety, dust/erosion control, site restoration and all other work specified or not which is reasonably required.
- iii. Contractor may claim monthly payment for the work completed upon submission of invoice as per notice to bidders.
- iv. The maintenance period shall be for the period of two years from the date of the CCC as per notice to bidders.

27. FORCE ACCOUNTS OR EXTRAS

Any Force Account work shall be authorized prior to beginning work. Any force account items must be approved by the Engineer. The Force Account sheets will be signed by the Engineer and contractor the day of the work. The Force Account sheet shall indicate the equipment used, name of each worker, starting and finishing time with all unit costs.

Force Accounts with dollar extensions are to be submitted by the Contractor within two (2) weeks of the extra work being completed. Payment will be made on the following progress estimate. Force Accounts submitted without preapproval will not be accepted for

payment. The City's inspector will also state in his daily reports if there were any extras that day.

28. MOBILIZATION AND DEMOBILIZATION

Included in mobilization are such items as bonding, insurance, permits, moving, personnel, materials and equipment to the site, and all preparation for performing the work. Included in demobilization are preparation and submission of operation and maintenance manual. Removal of all personnel, materials, and equipment; and clean-up of the site and work. The Contractor shall demobilize his equipment and construction facilities in an orderly and expeditious manner. Mobilization and demobilization costs will be included in the unit rate for manhole restoration and no separate payment will be issued for this item.

29. POWERED MOBILE EQUIPMENT (PME) TRAINING REQUIREMENTS

Occupational Health and Safety Legislation requires that only trained and competent operators are required or permitted to operate PME. Training must meet the specific requirements under Table 14.1, and be provided by a competent person(s) and that a written record of all training delivered to workers is kept readily available. Contractors will be required to produce written documentation prior to commencing work that they, and/or their operators, have been trained and are competent within the meaning of Section 154 of the Occupational Health & Safety Regulations.

30. CONSTRUCTION COMPLETION AND FINAL INSPECTION

Upon written request by the Contractor, the City will inspect all aspects of the final product within two weeks and provide a list of all deficiencies within one week of inspection.

31. CLEAN UP

The contractor shall clean up the site as the work progresses. It is contractor's responsibility and there will be no measurement and payment for clean up as this is considered incidental to the contract.

32. PROGRESS PAYMENTS

The Contractor is required to submit progress payments in a format similar to the Tender Form, detailing quantities and cost by location of work. The Contractor shall provide

supporting documentation to the Engineer covering the Progress Payment reporting period.

33. APPENDIX “A”

Location Maps

34. APPENDIX “B”

2017 Manhole Works

END OF SPECIFICATIONS