ORTH DRAIN

SPECIFICATIONS

TOWNSHIP OF NORWICH

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Our Reference No. 218092

May 2025

DRAWING NO.	TITLE	
1.	WATERSHED PLAN, GENERAL NOTES AND DETAILS	
2.	DRAIN PLAN & PROFILE	Sta. 0+594.5 to Sta. 0+682 & Spring Street
3.	DRAIN PLAN & PROFILE	Sta. 0+390 to 0+594.5
4.	DOWNSTREAM PROFILE	Sta. 0+000 to Sta. 0+390
5.	ELGIN STREET ROAD IMPROVEMENTS	

INDEX

101. SCOPE OF WORK

The Contractor shall perform all items of work covered and stipulated in the Specifications, Tender and Contracts, together with any authorized alterations, special provisions, extra work and supplemental agreements, all in accordance with the lines, grades, cross sections and dimensions shown on the Contract Drawings. The Contractor shall furnish all materials, implements, machinery, equipment, tools, supplies, transportation and labour necessary to the prosecution and completion of the work.

On the completion of construction, the Contractor shall leave the entire work in a clean and orderly condition to the satisfaction of the Contract Administrator.

102. TEMPORARY BUILDINGS

Temporary construction buildings may be erected by the Contractor at the site of the work, but the location of all temporary buildings used for construction purposes must be submitted to the Contract Administrator for approval prior to the commencement of the work. In the event that there is inadequate space for the contractor's office space, storage yard, etc. the Contractor shall obtain same at his own cost and payment will be on the basis that such costs are included in the Lump Sum for other Requirements in the Form of Tender.

Adequate fire extinguishers must be provided at the site of any temporary building to be used in case of fire and all temporary buildings shall comply in all respects with the requirements of any local, national or provincial legislation pertaining thereto.

The Contractor shall pay for all permits and fees in connection with the erection, movement or placing of any temporary building used by him.

103. PROGRESS SCHEDULE AND SCHEDULING OF WORK (N/A)

Within two weeks after receipt by him of his instructions to commence work, the Contractor shall prepare and submit to the Contract Administrator four (4) copies of a Construction Progress Schedule, showing clearly the proposed rate of progress of construction in weekly stages. When approved by the Contract Administrator, the sequence of work shall be strictly adhered to by the Contractor.

104. MATERIALS TO BE SUPPLIED BY THE CONTRACTOR

The Contractor shall supply all materials necessary for the completion of the work. The Contractor shall assume complete responsibility for ordering, deliveries, checking, rejecting, breakage, theft, unloading and storage for all materials, in a manner satisfactory to the Contract Administrator.

105. TRAFFIC

Refer to Special Provisions.

106. NOISE ABATEMENT

The Contractor shall at all times, attempt to keep the noise level caused by his operations to a minimum. The Contractor will not be permitted to carry out any work where excessive noise is created at any time except with the approval of the Contract Administrator, and the Contractor will not be able to carry out any work at night or Sundays, or Holidays without the consent of the Contract Administrator.

The Contractor shall take all reasonable precautions to minimize the noise from his construction operations by providing effective mufflers, or other devices for his equipment and silencers on his compressors, so that the noise level is kept to a tolerable minimum.

107. CONSTRUCTION EQUIPMENT

If, in the opinion of the Contract Administrator, the contractor is not using suitable equipment for the work, he may direct the Contractor to suspend operations forthwith and such suspension shall remain in effect until the Contractor has provided satisfactory equipment.

If the Contractor does not have sufficient equipment on the job in the opinion of the Contract Administrator to carry out the work satisfactorily, the Contract Administrator may direct that the Contractor supply additional equipment immediately or the Contract Administrator may suspend the work forthwith. Any suspension of the work by the Contract Administrator on account of improper equipment or lack of equipment to carry out the work satisfactorily, shall not entitle the Contractor to an extension of Time for Completion and he shall remain liable for any liquidating damages caused by his failure to complete the Contract within the time specified.

108. QUALITY OF WORK

The work shall be executed in the best and most workmanlike manner by qualified, careful and efficient mechanics. Unless otherwise specified, all materials to be incorporated in the work shall be new, unused and of recent manufacture.

109. APPROVALS AND TESTING

Samples, drawings and other data shall be submitted for approval of the Contract Administrator as required by the various sections of these specifications. Only materials that have been approved in writing shall be used in the work. No compensation or allowance resulting from delays due to testing will be allowed the Contractor. The cost of carrying out all testing shall be borne by the contractor unless specified otherwise in these specifications.

All material testing shall be done by an inspection laboratory designated by the Contract Administrator. The supply, handling, checking and shipping of test specimens and the replacing of rejected materials shall be done by the Contractor at his expense. Satisfactory proof of compliance with the specifications shall be submitted as directed by the Contract Administrator in one or more of the following ways:

109. APPROVALS AND TESTING (cont'd)

(a) Manufacturer's Certificate of Compliance
In case of standard labelled stock products of Standard manufacture which have a record of a period of not less than two years, the Contract Administrator may accept a notarized statement from the manufacturer certifying that the product conforms to the applicable specifications.

(b) Mill Certificates
For materials where such practice is the usual standard, the Contract Administrator may accept the manufacturer's certified mill and laboratory certificate.

(c) Testing Laboratory Certificates
The Contract Administrator may accept a certificate from a commercial testing laboratory satisfactory to him certifying that the product has been tested within a period acceptable to the Contract Administrator and that it conforms to the Specifications.

(d) Report of Actual Laboratory Test
The Contract Administrator may require that the Contractor make actual tests of any product and submit a report of the specified test. Such tests shall be made by a commercial testing laboratory designated by the Contract Administrator.

(e) Construction Control Tests
The Contract Administrator will carry out construction control tests to verify the quality of construction. The cost of such initial tests will be borne by the Owner. subsequent tests on account of failure of the initial tests to meet the specified requirements will be borne by the Contractor.

110. LINES AND GRADES

The Contract Administrator will provide the Contractor, in writing, with benchmarks and points of reference to be used by him in setting out the work. The Owner will be responsible only for the correctness of the information so supplied.

The Contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions and alignment of all parts of the works and for the provision of all necessary instruments and labour in connection therewith. If at any time during the progress of the works any error shall appear or arise in the position, levels, dimensions, or alignment of any parts of the works, the Contractor shall at his own expense rectify such error to the satisfaction of the Contract Administrator, unless such error is based on incorrect data supplied in writing by the Contract Administrator. The checking of the setting out of any lines or levels by the Contract Administrator shall not in any way release the Contractor of his responsibility for the correctness thereof, and the Contractor shall carefully protect and preserve all benchmark stakes and other items used in setting out the works.

111. CLEANING OF PIPES

During the progress of the work, and until the entire completion and acceptance thereof, all pipes shall be kept clean throughout. Following the completion of construction, the pipes shall be thoroughly cleaned. The pipes shall be cleaned of all material, debris, either by flushing or by other approved methods, to the satisfaction of the Contract Administrator.

The cost of all pipe cleaning operations shall be included in the Contract Price.

112. DEFECTS TO BE MADE GOOD

If, in the final inspection of the work, any broken or crushed pipes or specials or any defects are found in connections or in any equipment and appurtenances, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship, without extra compensation for labour and materials required.

113. CONDITION OF STREETS, SIDEWALKS AND BRIDGES

The Contractor shall include in his Total Contract Price the cost of removing all materials, earth or debris which falls out of his vehicles; his sub-contractor's vehicles; and his supplier's vehicles on to streets, sidewalks and bridges used as a route between sources of material and the site and dumping of materials and the site. The Contractor shall employ workmen sufficient in number or shall use some other means necessary to keep such streets, sidewalks and bridges in a clean condition free from material, earth or debris.

Should the Contractor be negligent in his duties in maintaining the proper cleanliness in the opinion of the Contract Administrator, the Owner will take the necessary steps to perform such cleaning and shall charge the Contractor all costs therefor.

The Contractor shall familiarize himself with any and all load limits in force and also on those portions of the works to be constructed outside the limits of the works and should such load limits exist, he shall comply with the requirements.

114. MAINTENANCE WORK

Prior to the commencement of the one year's maintenance period the Contractor shall provide the Contract Administrator and the Owner with a letter supplying a telephone number and address to which the Contract Administrator or the Owner may refer in the event that deficiencies in the work occur and maintenance is required.

If the Contractor's headquarters is not local or close to the site of the works, he shall make arrangements satisfactory to the Contract Administrator to have a local Contractor available to carry out this type of work, and this information should be forwarded to the Contract Administrator and the Owner.

115. SUPPLY OF WORKING DRAWINGS

The Contractor shall supply working drawings or shop drawings showing the dimensions and layout of all and every part of the equipment and structures which have not been supplied in the contract Documents. The Contract Administrator may reject any drawing which does not conform with the Drawings and Specifications and instruct the Contractor to revise and resubmit same.

Any discrepancies or errors in these Drawings shall be the entire responsibility of the Contractor and any works necessitated by such errors or omissions or discrepancies shall be paid for by the Contractor. Such drawings shall be supplied when called for by the Contract Administrator or prior to the commencement of manufacture of any item included in this Contract.

In the event of such Drawings not being supplied to the Contract Administrator in adequate time, the Contract Administrator shall have the right to order such Drawings to be prepared at the source of manufacture and the cost of any such preparation shall be paid for by the Contractor. The contractor is to ensure that access to equipment for maintenance and repair purposes shall be easily obtainable in the space provided.

Working drawings for any falsework, shoring, forms or other incidental details of construction, shall be prepared and stamped by a Contract Administrator experienced in structural design of falsework and registered in the Province of Ontario. The Contract Administrator whose stamp appears on the working drawings of such falsework or formwork shall inspect and approve, in writing, that all work has been carried out in accordance with the Drawings and to his own satisfaction.

The Contractor shall allow in his Tender for the provision of not less than six (6) copies of all drawings for approval and eight (8) copies of all working or shop drawings and one clear transparency after the final approval.

Only working drawings which are to scale and incorporate all the scaled dimensions and arrangements of details will be accepted as working drawings.

116. PROTECTION AND RELOCATION OF STRUCTURES AND UTILITIES

All structures and utilities known to the Owner to be in existence above and below ground are shown on the Drawings. The Contractor shall examine the location of the work and shall make such enquiries necessary to determine the existence and location of structures and utilities which may be encountered in the line of work. The Owner will assume no responsibility for structures and utilities inaccurately shown on, or omitted from, the Drawings.

The Contractor shall, at his own expense, and in a manner approved by the Contract Administrator, sustain in their places and protect from injury and damage any and all poles, posts, water or gasmains, public or private sewers or drains, conduit, cables, service pipes, ducts, culverts, sidewalks, curbs and gutters, and all other services, structures or property in the vicinity of the work, whether above or below ground, or which appear in the excavation. The Contractor shall assume all costs and expenses for damage which may be occasioned by injury to any structure or utility, and for any temporary relocation, replacement or adjustment required to facilitate the proper

116. PROTECTION AND RELOCATION OF STRUCTURES AND UTILITIES (cont'd)

execution of the work. If damage to any structure, utility or service occurs by reason of the Contractor's operations, even though special precautions have been employed, the Contractor shall be entirely responsible for such damage, whether such operations and the work resulting therefrom have received the approval of the Contract Administrator, or not, and all such damage shall be satisfactorily rectified at the Contractor's expense.

It shall be the Contractor's responsibility to inform the utility companies, or owners, involved, of his intention to work in the vicinity of their services. The Contractor shall request that an inspector be on the site at the time to protect the interests of the company or owner involved. Should any costs arise from this inspection, they shall be borne by the Contractor.

Before commencing any excavations, the Contractor shall have the location of all utility lines, conduits, pipes, cables, etc. located by a representative of the appropriate utility company, or municipality. Should the exact location of the utilities not be known, then it will be the Contractor's responsibility to search for and uncover them. Excavation will be commenced only after sufficient precautions have been taken to protect all utilities.

The cost of exploratory excavation shall be borne by the Contractor, and no claim shall be made for any necessary excavation, sheeting, shoring, bracing, equipment, labour, standby time, traffic control, detours, barricades, etc. The Contractor shall provide the Contract Administrator with all the necessary assistance to enable the Contract Administrator to make the necessary measurements and take the necessary levels. In addition, the Contractor shall take note that the Contract Administrator may vary the grade of the watermain to suit conditions which are encountered, or he may require additional work to be carried out in order to solve any problem which may occur. Extra work, if required, will be carried out and will be paid for in accordance with the Provisions of the Contract for extra work.

117. MAINTAINING FLOW OF SEWERS, DRAINS AND DITCHES

The Contractor shall, at his expense, permanently and temporarily provide for and maintain the flow, where required, of all sewers, drains, ditches, house or inlet connections, and all watercourses that may be encountered during the progress of the work, and shall maintain the site of the work free from surface and ground water so that construction can proceed "in the dry". He shall not allow the contents of any sewer, drain, ditch or house inlet connection to flow into the trench to be constructed under this contract, unless he has written permission from the Contract Administrator and shall at his own cost and expense, immediately remove from the proximity of the work all offensive matter, using such precautions in so doing, as may be directed by the Contract Administrator.

Drainage ditches shall be kept open at all times for surface drainage. Damming or impounding of water in ditches or other waterways will not be permitted, except where the Contract Administrator considers it necessary. The Contractor shall not direct any flow of water across or over pavements, except through approved pipes or property constructed troughs, and he shall, when required by the Contract Administrator, provide pipes or troughs of such sizes and lengths as may be required, and place the same as may be directed, at his own cost and expense.

118. RELOCATION OF THE WORK

The Contract Administrator may relocate the work at any time to suit the interest of the Owner. The relocation of such work shall not invalidate the Contract and the Contractor shall be required to carry out all of the terms and conditions of the Contract despite such relocation. However, the Contractor will be entitled to payment for any extra work caused on account of such relocation in accordance with the unit prices quoted in the Form of Tender or as calculated by such other means as provided in the Contract. Relocation of any work will only

be carried out with the written instructions of the Contract Administrator and the Contractor may not relocate any work for his own purpose except with such written approval of the Contract Administrator.

Should the relocation of any work result in a lesser amount of work required to be done, the cost of such reduction will be deducted from the Contractor's final contract price in accordance with the Unit Prices shown on the Schedule or such other sum as agreed between the Contract Administrator and the Contractor.

119. GENERAL RESTORATION AND SITE CLEANUP

Following the completion of the work, the Contractor shall clean up the site, remove all materials and restore the site to at least its original condition, to the satisfaction of the Contract Administrator. The cost of general restoration and site clean up shall be deemed to have been included in the Total Contract Price unless specifically paid for under an item in the Schedule of Items and Prices in the Form of Tender. Since there are several types of restoration work involved on the project, the various types of restoration work shall be as specified herein unless otherwise specified on the Contract Drawings.

(i) Tar and Chip Roads (N/A)
In these areas a 150mm compacted layer of Granular 'A' compacted to 100% Standard Proctor Density shall be placed over a 300mm compacted layer of Granular 'B' compacted to 100% Standard Proctor Density. The finished grade of the Granular 'A' shall conform with the original granular grade of the road. The surface shall then be restored by placing prime and double surface treatment with tar and chips (MTO 303) to conform with the existing grade of the road.

(ii) Hot-Mixed Paved Roads
In these areas a 150mm compacted layer of Granular 'A' compacted to 100% Standard Proctor Density shall be placed over a 300mm compacted layer of Granular 'B' compacted to 100% Standard Proctor Density. The finished grade of the Granular 'A' shall be such to allow two courses of Hot-Mix Asphalt (MTO 310) (50mm HL8 and 40mm HL3 or to such greater thickness as may be required to match the existing). The top of the asphaltic concrete surface shall conform to the original road grade.

Before the restoration work is carried out, the Contractor shall carefully cut any broken or irregular pavement edges, to a neat, straight vertical face. These edges shall be rotomilled 40mm depth for 450mm width the full length of the saw cut. The Contractor shall tack coat with SS-1 Emulsion, the top of the HL8

119. GENERAL RESTORATION AND SITE CLEANUP (cont'd)

along concrete curbs, manhole covers and all milled existing asphalt edges, prior to the installation of the top coat of asphalt.

(iii) Gravel Roads (N/A)
In these areas a 150mm compacted layer of Granular 'A' compacted to 100% Standard Proctor Density shall be placed over a 300mm compacted layer of Granular 'B' compacted to 100% Standard Proctor Density. The finished grade of the Granular 'A' shall conform with the original grade of the road.

(iv) Concrete Roads (N/A)
In these areas a 150mm compacted layer of Granular 'A' compacted to 100% Standard Proctor Density shall be placed over a 300mm compacted layer of Granular 'B' compacted to 100% Standard Proctor Density. The finished grade of the Granular 'A' shall be such to allow the placement of concrete of thickness equal to the existing.

Before restoration work begins, broken or irregular pavement edges will be cut back to a straight and vertical face. The edges shall be treated as an expansion joint by placing 15mm Flexcell or other approved material between the new pour and the prepared edge.

(v) Paved Drives
Specific areas, other than public roadways, that are paved, the Contractor shall place a 100mm layer of Granular 'A' compacted to 100% Standard Proctor Density over a 150mm layer of Granular 'B' compacted to 100% Standard Proctor Density. A 50mm minimum course of Hot-Mix Asphalt (HL3) or a minimum thickness of 127mm of concrete shall be placed over the Granular 'A'. The finished grade and material shall be made to match existing grades. Before restoration work begins, broken or irregular pavement edges will be cut back to a straight and vertical face. The asphalt edges shall be treated as in (ii) above. The concrete edges shall be treated as an expansion joint by placing 15mm Flexcell or other approved material between the new pour and the prepared edge.

(vi) Gravel Drives
In these areas the Contractor will place a 100mm layer of Granular 'A' compacted to 100% Standard Proctor Density over a 200mm layer of Granular 'B' compacted to 100% Standard Proctor Density. The finished grade of the Granular 'A' shall conform with the original grade of the drive.

All existing gravel driveways located on the same side of the road as the proposed sidewalk shall be restored as an asphalt laneway between the proposed curb and sidewalk.

All existing gravel driveways located on the opposite side of the road as the proposed sidewalk shall be restored as an asphalt laneway between the proposed curb and road allowance.

119. GENERAL RESTORATION AND SITE CLEANUP (cont'd)

(vii) Concrete Sidewalks

In these areas the Contractor will place a 150mm layer of Granular 'A' compacted to 100% Standard Proctor Density on the prepared sub-grade for the full width of proposed sidewalk.

The finished grade of the Granular 'A' shall be such to allow the placement of 125mm of concrete. The grade and width of the sidewalk shall match the original. Before restoration work begins, broken or irregular concrete edges will be cut back to a straight and vertical face.

(viii) Curbs, Gutters, etc.

Where the Contractor's operations damage any of the existing curbs, gutters, catchbasins, sewers, and other roadside appurtenances, these shall be replaced and/or restored to at least the original condition prior to construction or as described below.

The current OPSS Form 353 - "Specifications for Concrete Curb and Gutter Systems" shall apply. Expansion joints shall be provided in conformity with the original or as directed by the Contract Administrator.

Damaged sewer pipes shall be replaced by pipes of the same materials, class and size as were the original pipes. Replaced portions of pipe shall be properly bedded and backfilled to the satisfaction of the Contract Administrator.

(ix) Roadside Ditches

Where the Contractor's excavations appear within the limits of an existing roadside ditch, the Contractor will, after backfilling, regrade the ditch to its original grade. Should there be any culverts along the line of the trench, these should be removed prior to excavation, and then replaced at their original inverts upon restoration. Generally the contractor will be required to seed and mulch the slopes of the re-graded ditches. However, in case where the slopes are steeper than 12 to 1, he will be required to sod them.

(x) Boulevards and Private Lawns (N/A) (See Special Provisions)

Where the Contractor's operations have damaged these areas he will be required to re-grade, place 100mm of topsoil (from salvaged stockpile and/or imported topsoil) and nursery sod to the complete satisfaction of the Contract Administrator and/or property owner affected. The Contractor shall make his own judgement as to whether his forces will strip, salvage and stockpile existing topsoil for reuse or import the required topsoil.

All installed sod shall be watered when/as required by the Contractor to maintain it for a period of thirty (30) days. If the sod is accepted by the Engineer after these thirty (30) days, the responsibility for maintaining the sod will be passed on to the property owner. All installed sod must be rolled and cut in to blend in to match existing grass and back of curb elevations.

120. DUST CONTROL

The Contractor shall be responsible for the control of all dust nuisance resulting from his operations and if in the opinion of the Contract Administrator, control is necessary, may order the supply of water or calcium chloride at the unit price in the Contract.

121. FREEZING WEATHER

During freezing weather, all work shall be adequately protected with straw, tarpaulins or wet steam, or any combination of these methods, as considered necessary by the Contract Administrator. The cost of all such special precautions during freezing weather shall be the Contractor's expense. No payment will be made for frost-ripping regardless of the depth.

122. CONTRACTOR'S STANDING WITH WORKERS' COMPENSATION BOARD

Prior to construction, and prior to the Final Payment Certificate submission, the Contractor shall supply the Contract Administrator with a letter from the Workers' Compensation Board stating that his firm is in good standing with the Workers' Compensation Board. This letter shall be in the form of a declaration as provided by the Workers' Compensation Board.

123. FIRST AID EQUIPMENT

The Contractor shall provide and maintain on the site, in a clean orderly condition, completely equipped first aid facilities which shall be readily accessible at all times to all his employees and the Contract Administrator and his staff. The Contractor shall designate certain employees who are appropriately instructed to be in charge of first aid. At least one such employee shall always be available on the site while work is being carried on. A telephone call list for summoning aid, such as doctors, ambulances, pulmotors and rescue squads from outside sources shall be conspicuously posted.

124. IRON BAR MONUMENTS

The Contractor shall take every precaution not to disturb any iron bars or witness post. The Contractor shall provide an Ontario Land surveyor at no expense to the Owner to replace all iron bars and witness posts that have been disturbed by the Contractor's operations. This includes all survey bars, etc. shown or not shown on the Contract Drawings.

125. COMPLAINTS AND CLAIMS FROM THE PUBLIC

The Contractor shall assign an employee to investigate all complaints from the public resulting from his work during the course of the project and to immediately rectify any situation from which the public has just cause for complaint. This employee shall keep a diary listing all complaints, the time and date that they were received, and the action taken by the Contractor to rectify the situation. One copy of this diary will be submitted to the Contract Administrator every week. The employee designated by the Contractor to investigate these complaints will be on-site on a full-time basis and will co-operate fully with the Contract Administrator's staff.

125. COMPLAINTS AND CLAIMS FROM THE PUBLIC (cont'd)

The Contractor shall immediately investigate all claims from the public regarding damage to private property. The Contractor shall also notify the Contract Administrator and the property owner in writing if their claim is submitted to the Contractor's Insurance Agent by the Contractor for investigation.

126. MAINTENANCE OF EXISTING POTABLE WATER SUPPLY (N/A)

Subject to the conditions set out below, the Contractor shall provide a temporary supply of potable water to users in the area affected by the Contractor's dewatering operations during the time period where such users have their normal supply of potable water interrupted by the Contractor's dewatering operations.

i) The area affected by the Contractor's dewatering operations for the purposes of this clause is defined as that area within a radius of 300 meters of the Contractor's dewatering operations.

ii) The Contractor shall notify users of surface water or ground water in the area defined in (i) above of his intention to commence dewatering operations and of the address at which users can apply for a temporary water supply if the users' normal source of water supply is interrupted.

iii) The time period during which the Contractor is required to provide a temporary supply of potable water shall be that time from when the Contractor starts his dewatering operation to that time one week after he completes his dewatering operation.

iv) A temporary supply of potable water is herein defined as either of the following:

a) Delivery daily in hygienic containers to individual users an amount of potable water not less than 100 litres per person per day. This method of supply shall be limited to a maximum period of 5 days.

b) Delivery, via a system of pipes which have been adequately disinfected, of a pressurized potable water supply to individual users at a minimum pressure of 275 x 10-3 MPa (40 psi).

c) Delivery of a potable water supply to individual users by means of maintaining, deepening or renewing existing supply facilities. This method of supply shall be agreed by the individual user in writing.

v) Payment to the Contractor or others for an alternative supply of potable water as described herein will not be made. The cost of this alternative water supply is deemed to be included under the items for watermain construction in the Schedule of Items and Prices.

127. PERMIT TO TAKE WATER

The Contractor is required to conform with Section 37 of the Ontario Water Resources Act whereby a person taking more than 45.46m³ (10,000 gallons) of water in a day from any ground or surface source of water supply, or a combination thereof, shall obtain a permit from the Ministry of the Environment.

Applications on Form MOE 07-095-74 shall be made to the Director of the Ministry of the Environment region in which the taking of water occurs.

128. SITE OFFICE (N/A)

The Contractor shall provide on the side a weathertight office (200ft2 min. floor space) for the contractor's use and that of the Engineer's inspector, the cost of which shall be included in Form of Tender. As a minimum, the office shall be provided with internal lighting, a table (1.2m x 2.4m minimum), eight (8) chairs, lockable 2-drawer filing cabinet, and air conditioning/heating. Adequate road access, parking facilities, and temporary sanitary facilities shall be provided adjacent to the office.

129. ROAD CROSSINGS

.1 Scope: These specifications apply to all road crossings - Municipal, County, Regional, or Highway Roads. Where the word "Authority" is used, it shall be deemed to apply to the appropriate owning authority. These specifications in no way limit the Authority's Specifications and Regulations governing the construction of drains on their Road Allowance.

.2 Road Closure Request and Construction Notification: The Contractor shall submit written notification of construction and request for road closure (if applicable) to the Road Authority/Public Works Manager and the Drainage Engineer or Superintendent for review and approval a minimum of five (5) working days (exclusive of holidays) prior to proceeding with any work on road allowance. It shall be the Road Authority's responsibility to notify all the applicable emergency services, schools, etc. of the road closure or construction taking place.

.3 Traffic Control: Where the Contractor is permitted to close the road to through traffic, the Contractor shall provide for and adequately sign the detour route to the satisfaction of the Road Authority. Otherwise, the Contractor shall keep the road open to traffic at all times. The Contractor shall provide, for the supply, erection and maintenance, suitable warning signs and/or flagmen in accordance with the Ontario Traffic Manual, Book 7, Temporary Conditions, the Manual of Uniform Traffic Control Devices and to the satisfaction of the Road Authority to notify the motorists of work on the road ahead.

.4 Site Meeting/Inspection: A site meeting shall be held with the affected parties to review in detail the crossing and/or its related works. The Authority's Inspector and/or the Drainage Engineer will inspect the work while in progress to ensure that the work is done in strict accordance with the specifications.

.5 Weather: No construction shall take place during inclement weather or periods of poor visibility.

129. ROAD CROSSINGS (cont'd)

.6 Equipment: No construction material and/or equipment is to be left within 3 meters of the edge of pavement overnight or during periods of inclement weather.

130. FENCES

No earth shall be placed against fences and all fences removed by the Contractor are to be replaced by him in as good condition as found. In general, the Contractor will not be allowed to cut existing fences but shall disconnect existing fences at the nearest anchor post or other such fixed joint and shall carefully roll it back out of the way. Where the distance to the closest anchor post or fixed joint exceeds 50 meters, the Contractor will be allowed to cut and splice in accordance with accepted methods and to the satisfaction of the owner and the Engineer or Superintendent. Where existing fences are deteriorated to the extent that existing materials are not salvageable for replacement, the Contractor shall notify the Engineer or the Superintendent prior to dismantling.

Fences damaged beyond salvaging by the Contractor's negligence shall be replaced with new materials, similar to those existing, at the Contractor's expense. The replacement of the fences shall be done to the satisfaction of the owner and the Engineer or Superintendent. The site examination should indicate to the Contractor such work, if any, and an allowance should be made in the tendered price.

The Contractor shall not leave any fence open when he is not at work in the immediate vicinity.

131. SURPLUS GRAVEL

If, as a result of any work, gravel or crushed stone is required and not all the gravel or crushed stone is used in the construction of the works, the Contractor shall haul away such surplus gravel or stone unless otherwise approved.

132. QUARRY STONE RIP-RAP

Quarry stone rip-rap shall be specified on the drawings and shall conform to the following:

.1 Quarry Stone: shall range in size from 150mm to 300mm evenly distributed and shall be placed to a 300mm thickness on a geotextile at a 1.5: 1 slope unless otherwise noted. Geotextile to be Terrafix 360R or approved equal.

INDEX

201. GENERAL

The work to be done shall consist generally of the supply of all materials, labour and equipment necessary to complete the installation of storm sewers and appurtenances of the sizes, to the lines and at the elevations shown on the Contract Drawings, as specified herein or as directed by the Engineer.

202. CONSTRUCTION SPECIFICATIONS

a) General

The construction of storm sewers and appurtenances shall be in accordance with the applicable section of the local Design and Construction Standards if available and the following Construction Specifications from the Ontario Provincial Standard Specifications:

OPSS 405 Pipe Subdrains
OPSS 407 Construction of Manholes, Catchbasins, Ditch Inlets and Valve Chamber
OPSS 408 Adjusting or Rebuilding Manholes, Catchbasins, Ditch Inlets and Valve Chambers
OPSS 410 Pipe Sewer Construction by Open Cut Method
OPSS 501 Compacting
OPSS 503 Site Preparation
OPSS 504 Preservation, Protection and Reconstruction of Existing Facilities
OPSS 507 Restoration
OPSS 514 Trenching, Backfilling and Compacting
OPSS 516 Excavating, Backfilling and Compacting for Manholes, Catchbasins, Ditch Inlets and Valve Chambers
OPSS 517 Dewatering
OPSS 538 Shoring and Bracing
and all referenced Specifications.

b) Material

The storm sewer shall be as specified on the Contract Drawings or as listed in the Form of Tender. All pipe, couplings and fittings shall be watertight and free from defects. The following material specifications shall apply:

i) Concrete Pipe

All non-reinforced concrete sewer pipes shall conform to A.S.T.M. Specification C14 and CSA A257.1.

All reinforced concrete sewer pipe shall conform to A.S.T.M. C76 and CSA A257.2.

Rubber type gaskets are to be used and shall conform to the requirements of A.S.T.M. 1C-443.

202. CONSTRUCTION SPECIFICATIONS (cont'd)

ii) PVC Pipe

All PVC storm sewer shall conform to A.S.T.M. D3034 and CSA B182.2. The pipe is to have a maximum Dimensional Ratio (DR) of 35. Minimum pipe stiffness shall not be less than 320 kPa at 5% deflection when tested in accordance with A.S.T.M. D2412. The pipe shall have locked-in gasket and Integral Bell Joint features.

iii) Ribbed Polyvinyl Chloride

The use of Ribbed Polyvinyl Chloride (PVC) pipe is approved for use on storm sewers only for sizes of 200mm to 600mm inclusive.

iv) HDPE Pipe

The use of high-density polyethylene (HDPE) annular profile pipe (CSA 182.6) with integral bell and spigot is approved for use on storm sewers only for sizes of 200mm to 600mm inclusive.

v) Appurtenances

Manholes may be either poured-in-place concrete or precast concrete conforming to the applicable Ontario Provincial Standards and the local Design and Construction Standards. Safety landings will be required in manholes deeper than 5.0 meters measured from the top of frame to the lowest invert. Manhole frame and cover shall be in accordance with OPSD-401.01 Type 'A'. Manholes shall be benched in accordance with OPSD 701.021 unless otherwise noted.

Catchbasins shall be standard 600mmx600mm precast catchbasins conforming to OPSD-705.010. Curb inlet catchbasins shall be 840mmx600mm precast standard catchbasins as per the detail on Drawing No. 217160-3. Twin inlet catchbasins shall be standard precast catchbasins conforming to OPSD-705.020. Catchbasin manholes shall be cast-in-place conforming to OPSD-700.03 or standard 1200mm diameter precast manhole. Frame and grates shall be standard cast iron conforming to OPSD-400.02 and 400.09. All catchbasins to include 900mm sump below outgoing sewer invert elevation.

Catchbasin leads shall have a minimum diameter of 200mm and a minimum grade of 1.0%. Material for catchbasin leads shall match those proposed for the storm sewers.

Pipe subdrain shall be perforated corrugated polyethylene tubing with knit filter sock conforming to the requirements of OPSS 1840/1860 and CGSB 41-GP-29M and installed in accordance with OPSD-216.021. Bedding and backfill material shall be coarse sand or approved granular material conforming to the requirements of OPSS 405. Pipe subdrains to be installed in 2 directions at all CB/CICB/TICB's for 3 meter length.

202. CONSTRUCTION SPECIFICATIONS (cont'd)

c) Bedding and Backfill

Bedding and cover material for both rigid pipe (concrete) and flexible pipe (PVC, polyethylene, steel, ductile iron) shall be Granular "A". Backfill material for both rigid and flexible pipe within the excavated trench shall be Granular "B".

Bedding and cover material shall be compacted to 98% standard proctor maximum dry density (SPMDD).

In general, trench backfill for storm sewers and catchbasin leads located within existing or future roadways shall be imported Granular "B" to the underside of the proposed road subbase granular material. The use of approved on-site or other materials for trench backfill outside the limits of existing or future roadways and catchbasin leads will be permitted.

The backfill materials shall be compacted in the trench in maximum 150mm thick layers. The material shall have sufficient moisture to achieve maximum density specified. If needed, the Contractor shall supply at his expense, all water needed for the proper compaction of materials.

The compaction tests when required by the Contract Administrator shall be carried out by an approved Soil Testing Company selected and paid by the Owner. The Contractor shall note that upon his request to have the backfill material tested and the densities obtained are below the specified, then the Contractor shall carry out further compaction under the Contract Administrator's supervision. The Contract Administrator may order the Contractor to remove all or part of the material in the trench and same to be placed back and compacted to the satisfaction of the Contract Administrator, all at the Contractor's expense. Density tests taken following the remedial work on trench backfill shall be charged to the Contractor.

Surplus shall be disposed of at the Contractor's expense.

203. CLOSED CIRCUIT TELEVISION INSPECTION

See O.P.S.S. 409 with the following exceptions/amendments.

All pipes and maintenance holes shall be cleaned and flushed prior to closed circuit television inspections.

The Contractor will provide the Owner with two (2) copies each of the video (on CD) and report. Catchbasin leads shall be videoed as well as all main line storm sewers.

Measurement for payment will be in meters.

204. DEFLECTION TESTING

Ring deflection testing shall be performed on all proposed storm sewers, in accordance with O.P.S.S. 410.07.15.05.

205. MEASUREMENT AND PAYMENT

Measurement for storm sewers and appurtenances will be in accordance with the applicable Ontario Provincial Standard specification for the work involved and the appropriate units specified in the Form of Tender.

Payment for the storm sewer and CB/DICB/CICB lead installation shall include the supply and installation of all required bedding and trench backfill materials up to the underside of the proposed road sub base material and the removal and disposal off site of existing native materials within the trench limits. The costs to perform the ring deflection testing, noted in Item 304 shall be included in the storm sewer installation item.

Payment will be made in accordance with the appropriate tendered lump sum appearing in the Form of Tender and such payment shall be compensation in full for the supply of all labour, materials and equipment to complete the work as specified herein and on the Contract Drawings including connection to existing storm manholes and the supply and installation of frames and grates.

INDEX

301. GRANULAR BACKFILL

The payment for this item will be included in the installation of storm sewers.

302. BOULEVARDS/BACKFILLED DITCHES

Sub-Section of General Restoration and Site Clean-up of Section 1 General Work shall apply except as modified herein.

The Contractor shall import and level 100mm topsoil over the backfilled areas disturbed by construction with the exception of driveways, sidewalks, gravelled and paved boulevards. The topsoiled areas shall be hydro seeded in accordance with the general notes.

303. DISPOSAL OF ASPHALT AND SURPLUS EXCAVATED MATERIAL

All existing concrete and asphalt materials, if any, shall be disposed of by the contractor at an approved disposal site in accordance with Ministry of Environment requirements.

All surplus clean native and granular fill material is to be disposed of by the contractor. In general, all work shall conform to OPSS 206.

No additional payment shall be made to the contractor for work done described herein, the cost of which shall be deemed to have been included in the unit prices of the appropriate items in the Form of Tender.

No material will be allowed to be placed within any fill regulated zones as identified by the local Conservation Authority mapping.

The Contractor shall be responsible for finding a location suitable to the Contract Administrator for disposal of all excess materials and shall provide the Contract Administrator with the written permission of the owner of the property concerned.

304. RESTORATION OF LAWNS AND ROAD DITCHES

.1 General: Areas disturbed during construction or noted on the drawings to be restored with seeding or sodding shall conform to this specification, and the Contractor shall allow for all costs in his lump sum bid for the following works.

.2 Topsoil: Prior to excavation, the working area shall be stripped of existing topsoil. The topsoil stockpile shall be located so as to prevent contamination with material excavated from the trench. Upon completion of backfilling operations, topsoil shall be spread over the working area to a depth equal to that which previously existed but not less than the following:

Seeding and sodding	-	minimum depth of 100mm
Gardens	-	minimum depth of 300mm

304. RESTORATION OF LAWNS AND ROAD DITCHES (cont'd)

In all cases where a shortfall of topsoil occurs, whether due to lack of sufficient original depth or rejection of stockpiled material due to Contractor's operations, imported screened topsoil from acceptable sources shall be imported to provide the specified depths. Topsoil shall be uniformly spread, graded and cultivated prior to seeding or sodding. All clods or lumps shall be pulverized and any roots or foreign matter shall be raked up and removed as directed.

.3 Seeding: Seed to be supplied by the contractor shall be Ahigh quality grass seed@ harvested during the previous year, and shall be supplied to the project in the suppliers original bags on which a tag setting out the following information is affixed:

Year or Harvest	-	recommended rate of application
Type of Mixture	-	fertilizer requirements

Placement of seed shall be by means of an approved mechanical spreader. All areas on which seed is to be placed shall be loose at the time of placing seed, to a depth of 25mm. Seed and fertilizer shall be spread in accordance with the suppliers recommendations unless otherwise directed by the Engineer. Thereafter it will be the responsibility of the property owner to maintain the area in a manner so as to promote growth.

.4 Settlement: The contractor shall be responsible during the one-year guarantee period for the necessary repair of restored areas due to trench settlement. Areas where settlement does not exceed 50mm may be repaired by top dressing with fine topsoil. In areas where settlement exceeds 50mm, the contractor will be required to backfill the area with topsoil and restore with seeding and/or sodding as originally specified.

305. TRAFFIC CONTROL

The roadway will remain open to through traffic, "local traffic only" during all phases of construction.

The contractor will be fully responsible to provide complete traffic control and signage to be in accordance with the requirement of the Ontario Traffic Control Manual, Book 7, Temporary Conditions and the Municipality of North Middlesex.

The contractor is also responsible for notifying the necessary Municipal Officials, the local Ontario Provincial Police detachment, the local Fire Department, the Middlesex County Board of Education, the Separate School Board and the local Ambulance Service a minimum of 24 hours prior to the closing of any road or portion thereof.

306. COLLECT RESIDENTIAL SOLID WASTE

Under this item the Contractor shall supply all labour and equipment necessary to collect residential solid waste and deliver it to the nearest landfill. This will only be required when solid waste collectors refuse pick up due to restricted construction site conditions.

307. TREE REMOVALS

Due to the proximity of existing trees, several trees, hedges and shrubs must be fully removed (including stumps) as part of this work and disposed off site, as noted on the drawings.

308. ASPHALT CEMENT PAYMENT ADJUSTMENT

The Contract Administrator shall make an Asphalt Cement Payment Adjustment to reflect OHMPA formula which states:

The payment adjustment per tonne will apply to the quantity of asphalt cement in the hot mix accepted into the work during the month for which it is established. The payment adjustment for the month will be calculated by the following:

.1 When AC Prices are Rising by more than a $15.00/tonne difference: the payment adjustment to be paid to the Contractor is the result of subtracting the latest published price index when the tender closed from the price index in effect when paving took place, minus the $15.00 float, multiplied by the number of tonnes of PGAC incorporated in the mix as determined by the job mix formula. PST on the adjustment will be included. If the answer is negative, no adjustment is made.

.2 When AC Prices are Falling by more than $15.00/tonne difference: the payment adjustment made in favour of the Owner is the result of subtracting the price index in effect when paving took place, plus $15.00 float from the latest published price index when the tender closed, multiplied by the number of tonnes PGAC incorporated in the mix as determined by the job mix formula. PST on the adjustment will be included.

The quantity of new asphalt cement includes all grades of asphalt cement supplied by the Contractor with and without polymer modifiers. For each month in which a payment adjustment has been established, the quantity of the escalation/de-escalation will be calculated using the hot mix quantity accepted into the work and its corresponding asphalt cement content as required by the job mix formula.

A mark up on the Payment Adjustment will not apply to the asphalt Cement Payment Adjustment.

Payment adjustment may result in additional compensation to the Contractor or a rebate to the Owner.

The Township of Warwick will not compensate the general contractor for any mark-ups above the calculated A/C adjustment.

309. CLEARING AND GRUBBING

Prior to commencement of drain construction, clear and grub all trees, scrub, fallen timber and debris necessary to perform the work.

309. CLEARING AND GRUBBING (cont'd)

All trees or limbs 150mm (6") or larger, that it is necessary to remove, shall be considered as logs and shall be cut and trimmed, and left in the working width separate from the brush, for use or disposal by the owner. Trees or limbs less than 150mm in diameter, tree tops, grubbed stumps and roots shall be disposed of off-site by the Contractor.

310. DISPOSAL OF SURPLUS EXCAVATED MATERIAL

All existing concrete and asphalt materials, if any, shall be disposed of by the contractor at an approved disposal site in accordance with Ministry of Environment.

All surplus clean native and granular fill material is to be disposed of by the contractor. In general, all work shall conform to OPSS 206.

No additional payment shall be made to the contractor for work done described herein, the cost of which shall be deemed to have been included in the unit prices of the appropriate items in the Form of Tender.

No material will be allowed to be placed within any fill regulated zones as identified by the local Conservation Authority mapping.

The Contractor shall be responsible for finding a location suitable to the Contract Administrator for disposal of all excess materials and shall provide the Contract Administrator with the written permission of the owner of the property concerned.

311. UTILITY RELOCATION

If the Contractor's earth excavation and granular road base work exposes the existing underground utility, the Contractor shall carefully expose, salvage and re-install the utility cables at a location 0.75 meters below proposed surface grades. Granular 'B' bedding will be required to install the relocated utility, with a minimum 150mm (6") below and above the utility. The costs to carefully expose, salvage and re-install the utility at the proposed location shall be negotiated as an extra to the contract.

312. TEMPORARY GAS PIPES SUPPORT

Under this tender item the contractor shall supply all labour and equipment necessary to provide adequate protection and support of existing gas pipe.

All work shall conform to the requirements of the applicable Gas Company.

313. TEMPORARY WATER PIPES SUPPORT

Under this tender item the contractor shall supply all labour and equipment necessary to provide adequate protection and support of existing water pipe.

All work shall conform to the requirements of the Township.

314. ENVIRONMENTAL PROTECTION

The Contractor shall include with the construction schedule required an environmental protection scheme detailing environmental protection measures proposed by the Contractor. This scheme should include but not be limited to spills response, contact numbers, location of storage of on-site materials, i.e. diesel fuel tanks and containment measurements, spoil management, equipment refuelling and maintenance areas, etc.

315. SAWCUTTING ASPHALT PAVEMENT

This work consists of the sawcutting of existing asphalt pavements to allow removal of asphalt for construction of the new watermain, sanitary sewer and storm sewer. Sawcutting shall be by approved methods and shall provide a straight clean edge.

Payment for sawcutting shall be at the unit price tendered for the appropriate item in the Form of Tender and shall be compensation in full to complete the sawcutting as shown on the Contract Drawings or as directed by the Contract Administrator.

316. CONCRETE CURB AND GUTTER

This work consists of the supply of all labour, materials and equipment necessary to properly construct the concrete curb and gutter in accordance with Ontario Provincial Standard Specification 353 - Concrete Curb and Gutter Systems. The curb and gutter shall be barrier type OPSD 600.04, as noted on the drawings. Curb shall be dropped as per OPSD detail at driveway locations, parking lot entrances and where otherwise noted on plans.

Measurement of curb and gutter will be in lineal meters along the gutter line for all curb and gutter installed.

Payment for curb and gutter will be made at the unit price appearing in the Form of Tender and shall be compensation in full for all efforts required to properly construct the curb and gutter. The Granular 'A' base under the curb and gutter will be paid under the tender item for the supply and placing of Granular 'A'.

317. CONCRETE SIDEWALK

This work consists of the supply of all labour, materials and equipment necessary to properly construct concrete sidewalk in accordance with OPSS 351 - Construction Specifications for Concrete Sidewalk. The concrete sidewalk shall be constructed as designated by the Contract Administrator. The concrete sidewalk shall be constructed to the liens and at the grades indicated on the Contract Drawings or as designated by the Contract Administrator.

Concrete sidewalk shall be standard concrete sidewalk 125mm thick in accordance with OPSD - 310-010. Sidewalk ramps (OPSD - 310.03) shall be provided where shown on the Contract Drawings or as directed by the Contract Administrator. Sidewalk to be constructed on 150mm Granular 'A'.

317. CONCRETE SIDEWALK (cont'd)

Measurement for concrete in sidewalk will be by square meters. Payment at the unit prices appearing in the Form of Tender for the appropriate items shall be compensation in full for all labour, equipment and material required to complete the work as specified.

318. ADJUST EXISTING MANHOLES, CATCHBASINS, VALVE CHAMBERS

Under this item and for the contract price, the Contractor shall adjust the elevation of the existing manholes or catchbasins to fit the new construction as shown on the Contract Drawings and/or as directed by the Contract Administrator and shall include removal of frame and cover/grate, removal of adjustment bricks/rings, supply and installation of new adjustment units, replacement of frame and cover/grate and parging of the adjustment units. The top of manhole cover shall be set to base asphalt elevation and the top of catchbasin grate shall be set to final elevation.

Section 408.09 of OPSS 408 is amended in that the adjustment to each frame and grate or frame and cover shall be considered a single unit.

319. TACTILE PLATES

Under this item, the Contractor shall provide all labour, materials and equipment necessary to install cast iron detectable tactile plates to meet the needs of ACCESSIBILITY FOR ONTARIANS WITH DISABILITIES ACT (AODA). The Tactile Plates must have:

Raised tactile profiles,
High tonal contrast with adjacent surface,
Located at the bottom portion of the ramp,
Set back between 150mm and 200mm from the curb edge,
Minimum of 600mm in depth.

Approved manufacturers are East Jordan Iron Works Inc., Iron Ped LLC, Neenah Foundry Co. and Bibby-Ste-Croix.

INDEX

401. **GENERAL**

The work to be done under this Section shall consist of supplying all materials, labour, equipment and transportation necessary to complete the watermain installation, including various fittings and appurtenances, of the sizes, to the lines, and at the depths shown on the Contract Drawings, as specified herein or as designated by the Contract Administrator.

402. **MATERIALS**

402.1 DUCTILE IRON PIPE

The use of ductile iron pipe is not acceptable to the Owner.

402.2 ASBESTOS CEMENT PIPE

The use of Asbestos Cement Pipe is not acceptable to the Owner.

402.3 POLYVINYL CHLORIDE (PVC) PIPE

The Polyvinyl Chloride (PVC) plastic pipe shall be constructed of rigid polyvinyl chloride compound and shall conform to the current AWWA C-900 or CSA B-137.3 specifications. Polyvinyl chloride plastic pipe shall be Class 150 (SDR 18) as indicated in the Form of Tender.

Where directional drilling is proposed, watermain pipe material shall be PVC pipe and shall be in conformance with AWWA Standard C900-16 for PVC Pressure Pipe and Fittings 100mm through 1500mm for Water Distribution and Transmission.

Tracer wire shall be 12-gauge TWU solid copper and shall be installed along all PVC watermains at 12 o'clock position strapped to the pipe at 6 meter intervals. The tracer wire shall be brought to the surface at all fire hydrants (and water valves) looped twice around the hydrant barrel 100mm below finished grade and fastened by means of a washer to a breakaway flange bolt.

Pipes shall be supplied in standard lengths of not less than 6 meters nor more than 11.6 meters except that short lengths and special adaptors shall be provided as required for completing connections or where ground conditions are such that shorter lengths are necessary. Pipes shall be jointed by means of a "Tyton" type rubber ring bell joint which shall be an integral and homogeneous part of the pipe barrel. Rubber rings shall conform to ASTM Specifications D1869. The supplier of the PVC pipe must be approved by the Contract Administrator before the material can be ordered by the Contractor. The class and type of pipe shall be stencilled on each length of pipe.

402.4 FITTINGS

(i) PVC Pipe

Fittings shall be cast iron with mechanical joint or push-on ends adapted for use in making connection with PVC pipe and in accordance with AWWA C110 and C111. All fittings shall be cement lined in accordance with AWWA C104. All metallic fittings including rods and nuts, as defined by OPSS 702.03 shall be protected by sacrificial zinc anodes. The anode is to be placed in the location as shown in OPSD 1109.011.

402. **MATERIALS** (cont'd)

402.4 FITTINGS (cont'd)

All main stops and curb stops shall be protected with a minimum 5.4kg zinc anode. All other metallic fittings shall be protected with a minimum 11.0kg zinc anode. Protection with "denso" paste, profiling mastic and LT tape will not be required for this contract.

402.5 WATERMAIN VALVES

All watermain valves shall be gate valves or butterfly valves.

Gate valves shall be iron body, bronze-mounted, non-rising stem with mechanical joints. Gates may be double disc parallel seal or solid wedge. Valves shall be manufactured in accordance with AWWA Standard C500 or other approved specification. Minimum design working water pressure shall be 1.21 MPa (175 psi). "O" rings shall be used for valve stem stuffing box packing. Clow F6112 Push-on gate valves are acceptable.

Valves to open to the LEFT i.e., counter-clockwise and stems fitted with 50mm square operating nut with arrow showing opening direction. An extension rod shall be installed on every valve and shall be 150 to 300mm below the final grade. The chamber shall be plumb and centred on the extension rod.

All water valves including fittings, rods, and nuts, shall be protected by protective zinc anodes.

402.6 VALVE CHAMBERS

A cast iron valve chamber or valve box shall be supplied and installed on every watermain valve and hydrant shut-off valve. Box shall have a minimum internal diameter of 125mm and be adjustable for total length. Box to have attachable base of sufficient size to prevent box bearing on the valve. Cover to be marked WATER. Valve boxes may be the No. 5 Slide Type Valve Box or the No. 5 Screw Type W\No. 6 base as manufactured by EMCO or approved equal.

402.7 FIRE HYDRANTS

Fire hydrants shall be manufactured in accordance with AWWA Standard C502. Hydrants shall be post type with compression valve control designed for a working pressure of 1.03 MPa (150 psi) and to close with water pressure. Hydrants shall be suitable for a minimum 1830mm trench and shall be supplied with two Standard 64mm hose nozzles and a 100mm storz pumper nozzle with caps. Nozzle threads shall be Ontario Provincial Standards threads. Barrel to have ground line flange and designed so that all internal parts can be removed through the top of hydrant. Hydrant barrel to drain automatically when hydrant is closed. Base connection shall be 150mm. Hydrant must open LEFT i.e., counter-clockwise.

Hydrants shall be shop painted YELLOW all over. All field painting shall be carried out in accordance with the AWWA Standards for fire-hydrant designations as indicated in the Hydrant Paint Code.

402. **MATERIALS** (cont'd)

402.7 FIRE HYDRANTS (cont'd)

All scratched or dirty hydrants disturbed during construction shall be re-painted yellow epoxy. Hydrants to be Canada Valve "Century", Clow McAvity Brigadier M67B, or approved equal. Hydrants to be installed with mechanical joint restraint and 10.9 kg zinc anode.

402.8 SERVICE PIPE

Polyethylene Plastic - of not less than 25mm nominal size in conformance with ASTM C1248 or CSA B137.1 with a working pressure of 1.10 MPa (160 psi).

Bedding for proposed HDPE water service pipe to be Granular 'A' with a maximum particle size of 20mm. All proposed HDPE water service pipe shall be installed with 12-gauge AWG solid copperhead reinforced tracer wire, to be included in the water service item in the Form of Tender.

All long (across roadway) water services must be installed by horizontal directional drilling methods. All short water services may be installed by either open-cut or horizontal directional drilling methods. All proposed HDPE water services shall include stainless steel inserts.

402.9 SERVICE MAIN STOP

Main stop for plastic tube shall be round way bronze stop with inlet AWWA thread. Outlet plastic tube compression. 25mm shall have stainless steel insert. Main stop to be similar to EMCO 25mm - 22973, 38mm - 22975 and 50mm - 22976 or approved equal.

Main stop shall open LEFT i.e., counter-clockwise.

402.10 SERVICE CURB STOP

Curb stop for 25mm plastic tube with stainless steel insert and shall be similar to EMCO "Century" ball valve type (17010) or approved equal.

Curb stop for 38mm and 50mm plastic tube shall be similar to EMCO "Century" ball valve type (38mm - 17030, 50mm - 17040) or approved equal.

Curb stop shall open LEFT i.e., counter-clockwise.

402.11 SERVICE CURB BOX

All curb stops shall have adjustable service boxes with rods of sufficient length to suit bury of valve. Base shall be cast iron. Cover shall be cast iron with 19mm pentagon brass plug. Service boxes for valves up to 25mm shall be similar to Mueller A726 or approved equal. Services boxes for 38mm and 50mm valves shall be similar to Mueller A728 or approved equal.

402. **MATERIALS** (cont'd)

402.11 SERVICE CURB BOX (cont'd)

Curb boxes to include a 5.4 kg zinc anode in accordance with OPSS 702. Ground clamps to be Thomas and Betts #3888 or Duratron ground clamp, or approved equivalent.

12-gauge TWU solid copper tracer wire shall be raised along the outside of the curb box to within 100mm of ground surface.

402.12 SERVICE SADDLE CLAMPS

Service clamps shall be used where specified. Clamps shall be double strap broad band stainless steel body. Thick boss to have full length thread to suit AWWA thread of corporation stop. Threads and nut of strap to be cadmium plated. Neoprene gasket cemented in place to seal boss to pipe.

Service clamps shall be used on:
- All Class 150 plastic pipe shall have a plastic pipe service saddle.

402.13 HANDLING OF MATERIALS

Pipe, fittings, valves, hydrants, and all accessories shall be loaded and unloaded by lifting with a hoist or skidding, so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe previously unloaded.

403. **TRENCH EXCAVATION**

403.1 UNCLASSIFIED EXCAVATION

All excavation shall be unclassified and shall consist of and include all necessary excavation, clearing and grubbing, removal of pavements, structures and obstructions and the satisfactory disposal of all material and covers all classes of excavation. Excavated material shall not be stockpiled along any roadway surface or shoulder and shall be cast away from any travelled surface.

403.2 LENGTH OF OPEN TRENCH

No greater length of trench in any location shall be left open, in advance of the completed structure placed therein, than shall be authorized or directed. The Contract Administrator shall be empowered, at any time to require the refilling of open trenches over completed pipe lines, if in their judgement, such action is necessary, and the Contractor shall thereby have no claim for extra compensation, even though to accomplish said refilling he/she is compelled temporarily to stop excavation of other work at any place.

403. **TRENCH EXCAVATION** (cont'd)

403.2 LENGTH OF OPEN TRENCH (cont'd)

If work is stopped on any trench, for any reason except by order of the Contract Administrator, and the excavation is left open for an unreasonable length of time in advance of construction, the Contractor shall, if so directed, refill such trench at their own cost, and shall not again open said trench until he/she is ready to complete the structure therein.

The excavation of all trenches shall be fully completed at least seven (7) meters in advance of pipe laying, unless otherwise authorized.

403.3 WIDTH AND DEPTH OF TRENCHES

All trench and boring pit excavation shall be carried out in conformance with the requirements of the Occupational Health and Safety Act.

Trenches shall be excavated to the necessary width and depth as may be shown on the drawings, or as directed. The bottom of the trench shall be solid undisturbed ground. Any part of the bottom of the trench sub-excavated below the specified sub-grade shall be backfilled with approved material, thoroughly compacted.

Where the bottom of the trench at sub-grade is in unstable or unsuitable material, excavation shall be carried to such depth as ordered by the Contract Administrator. The trench bottom shall be restored to sub-grade with approved granular stabilizing material. All excavation in excess of 150mm below sub-grade will be paid for as sub-excavation, where ordered.

The trench shall be drained or pumped to avoid the making of joints under water and to prevent water from entering the pipe. Tendered prices shall include the cost of dewatering of the trench wherever required and by whatever method.

Sheeting and shoring of the trench, as required, shall be included in the tendered unit prices under the appropriate items in the Form of Tender for watermain and water service construction.

Depth - In general, all watermain pipe shall have not less than 1700mm and not greater than 2200mm of cover when final grade is established unless otherwise shown on the Contract Drawings. The correct depth of main and service pipe shall be maintained regardless of ground and other site conditions.

Caution shall be exercised in this respect where mains, services and hydrant laterals cross drainage ditches or other low areas.

The trench shall be excavated to the depth required so as to provide a uniform and continuous bearing and support for the pipe on solid and undisturbed ground at every point between bell holes, except that it will be permissible to disturb and otherwise damage the finished surface over a maximum length of 450mm near the middle of each length of pipe by a withdrawal of pipe slings or other lifting tackle.

403. **TRENCH EXCAVATION** (cont'd)

403.3 WIDTH AND DEPTH OF TRENCHES (cont'd)

Width - The width of the trench shall be sufficient to permit the pipe to be laid and jointed properly and to permit trench backfill to be placed and compacted as specified. Trenches shall be of such extra width, when required, as will permit the convenient placing of timber supports, sheeting and bracing and handling of materials.

404. **INSTALLATION OF PIPE AND APPURTENANCES**

404.1 GENERAL

Proper implements, tools and facilities satisfactory to the Contract Administrator shall be provided and used by the Contractor for the efficient laying of the pipe and the setting of the required fittings. All materials shall be lowered into the trench by suitable means. Under no circumstances shall these materials be dropped or dumped into the trench.

The inside of the bell and the outside of the spigot shall be wire brushed and wiped clean and free from oil and grease before the pipe is laid. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line.

Where it is required that the new watermain shall cross under existing utilities, the Contract Administrator may order the installation of concrete support beams and columns for the utilities as per the Contract Drawings.

Watermain pipe shall not be laid on blocks. The pipe shall be placed on a prepared granular bedding and shall bear uniformly and continuously along its full length, except for that portion of the bell hole. Bell holes shall be made at all pipe joints.

404.2 PIPE DEFLECTION

Wherever it is necessary to deflect the pipe from a straight line either in the vertical or horizontal plane, the amount of deflection shall not exceed that recommended by the manufacturer. If in the opinion of the Contract Administrator, the deflection is excessive, the Contractor will realign watermain to provide the necessary deflection.

404.3 CUTTING PIPE

The field cutting of pipe for the insertion of valves, fittings or closure pieces shall be done in a neat and workmanlike manner, using the proper tools.

404.4 PIPE JOINT

Mechanical joint and/or "Tyton" joint shall be used. The use of poured joint bell and spigot pipe will not be permitted.

404. **INSTALLATION OF PIPE AND APPURTENANCES** (cont'd)

404.4 PIPE JOINT (cont'd)

Only those methods approved by the manufacturer shall be used in the jointing of mechanical or Tyton joint pipe. Substitution of accessories will not be permitted. This shall apply to nuts, bolts, follower rings and rubber rings. Lubricants used shall be vegetable soaps, approved by the Contract Administrator.

404.5 SHUT-DOWN PRECAUTIONS

At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the Contract Administrator. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry. Every precaution shall be taken to prevent foreign material from entering the pipe.

404.6 SETTING VALVES AND FITTINGS

Valves, fittings and other accessories shall be fitted and jointed to the pipe in the manner heretofore specified for the cleaning, laying and jointing of pipe.

Valves shall be located on the street property lines extended, unless shown otherwise on the approved plans. A cast iron valve chamber shall be provided for every valve. An extension rod shall be installed on every valve key, including hydrant valve keys, and shall be 150 to 300mm below the final proposed grade. The chamber shall be plumb and centred on the extension rod. The top of the valve chamber shall be set flush with the finished grade of the road.

404.7 HYDRANT INSTALLATION

Hydrants shall be set at a grade whereby the final grading of the street or area shall conform to the ground line cast into the hydrant barrel. A hydrant installation will not be accepted where any portion of the hose nozzle cap is less than 300mm from the finished grade.

Hydrants will be set as shown or as directed by the Contract Administrator, and in a manner so as to provide complete accessibility and so that the possibility of damage by vehicles and injury to pedestrians are minimized.

All hydrants shall stand plumb and shall have their nozzles parallel with the road and be set so that their fracture heads are level with the existing grade.

Hydrants will be firmly blocked by means of mechanical joint restraint.

In order to provide barrel drainage, the hydrant shall be set into a pocket of crushed gravel or crushed stone. This pocket shall measure not less than 1,000mm by 1,000mm by 500mm. The crushed stone or gravel shall extend to at least 150mm above the waste opening in the hydrant. The cost of the porous material around the hydrant and the bracing shall be included in the Contractor's price for setting the hydrants.

404. **INSTALLATION OF PIPE AND APPURTENANCES** (cont'd)

404.7 HYDRANT INSTALLATION (cont'd)

Hydrants shall, if necessitated by a change in ground level, be extended upwards by the addition of an extension to the barrel of the hydrant. Each hydrant shall be connected to the main with a 150mm lateral, controlled by an independent gate valve. PVC pipe is required from valve to hydrant.

404.8 ANCHORAGE FOR PLUGS, CAPS, TEES, BENDS AND OTHER FITTINGS

All fittings shall be anchored to prevent movement by providing mechanical joint restraints. Clow F6100 mechanical joint restraint is acceptable.

404.9 ELECTRICAL CONDUCTIVITY

It shall be the responsibility of the Contractor to use such materials and methods in making joints as to ensure continuity of electrical conductivity in any IRON watermain piping. Such materials and methods shall be in accordance with the manufacturer's specifications and shall meet with the approval of the Contract Administrator.

405. **PIPE BEDDING**

PVC watermain pipe shall be placed on a Granular 'A' bedding with a particle size not greater than 20mm, as detailed on Drawing No. 16.

Bedding shall extend to a minimum depth of 150mm below the pipe barrel and shall be brought up around the pipe to a minimum depth of 300mm above the top of pipe and shall be compacted to 98% modified Proctor Density. The width of bedding shall be the width of the trench.

406. **TRENCH BACKFILL**

The Contractor shall carefully study and familiarize himself/herself with the locations of the proposed watermains as indicated on the Contract Drawings so as to establish the backfill requirements to be used as specified.

In general, trench backfill for watermains located within existing or future roadways shall be Granular "B". The use of approved on-site or other materials for trench backfill outside the limits of existing or future roadways will be permitted. Backfill material shall be compacted to 98% standard proctor dry density.

Above the upper limit of the backfill the travelled portion of the roadway structure for each type shall be restored in accordance with the requirements as set out in Sub-Section 129 - "General Restoration and Site Clean Up" of the General Provisions.

All equipment used in backfilling of the trenches shall be approved by the Contract Administrator. No work shall be allowed until the Contractor has satisfied the Contract Administrator that equipment on the site is in good working order and suitable to carry out the specific function.

406. **TRENCH BACKFILL** (cont'd)

The backfill materials shall be compacted in the trench in maximum 150mm thick layers. The material shall have sufficient moisture to achieve maximum density specified. If needed, the Contractor shall supply at their expense, all water needed for the proper compaction of materials.

The compaction tests when required by the Contract Administrator shall be carried out by an approved Soil Testing Company selected and paid by the Owner. The Contractor shall note that upon their request to have the backfill material tested and the densities obtained are below the specified, then the Contractor shall carry out further compaction under the Contract Administrator's supervision. The Contract Administrator may order the Contractor to remove all or part of the material in the trench and same to be placed back and compacted to the satisfaction of the Contract Administrator, all at the Contractor's expense. Density tests taken following the remedial work on trench backfill shall be charged to the Contractor.

Surplus material shall be disposed of at the Contractor's expense.

In general, selected native materials if approved shall be free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks or stones, or any other material which in the opinion of the Contract Administrator is unsuitable. However, from one foot above the top of the pipe, material containing stones up to 100mm in their greatest dimension may be used, unless specified otherwise.

Stones or boulders larger than 75mm in any dimension shall have at least a 300mm clearance from all mains, valves and fittings.

No frozen material shall be used as backfill in the trench.

No excavated material shall be cast or deposited on the travelled portion or shoulders of roads or streets even as a temporary measure. Where circumstances do not permit the casting of excavated material clear of roads and shoulder the excavated material shall be loaded onto trucks or other approved equipment and transported for use as trench backfill or transported to an approved disposal site.

The Contractor shall be responsible for finding a location suitable to the Contract Administrator for the stockpiling of excavated selected native material for later incorporation into the work and shall provide the Contract Administrator with the written permission of the owner of the property concerned.

The Contractor shall load, haul, dump and level the excess material and shall return the stockpiled material to the site at the direction and to the satisfaction of the Contract Administrator. Payment for this work shall be included in the Unit Price quoted in the Form of Tender for supplying and installing the pipe, complete with restoration.

The Contractor shall provide for all the labour necessary to continuously maintain the condition of the trench in a satisfactory manner and to provide for all necessary grading, levelling, water dust control, etc.

406. **TRENCH BACKFILL** (cont'd)

The Contractor shall quickly fill the trench wherever any settlement occurs and if it is impossible to make speedy repairs to any area requiring treatment, the Contractor shall immediately place all necessary lights, barricades or watchmen as may be required to provide for the safety of the traffic and pedestrians alike until the necessary restoration or repair has been made.

The Contractor shall not be paid for any materials, plant, labour or equipment required to carry out the backfilling operations to meet with the requirements of this sub-section and he shall provide for all such times in their Total Tender Price for the work.

The Contractor shall not backfill around any concrete structure or any concrete thrust block for a period of at least 24 hours after the concrete has been placed and he/she shall then take special care to backfill very carefully around such structure or thrust block so as not to disturb the fresh concrete or to cause any damage to same.

The granular backfill material supplied shall conform to the current O.P.S.S. material specifications and the specifications within this document.

Payment for watermain and water service installation shall include the supply and installation of all required bedding and trench backfill materials up to the underside of the proposed road sub-base material, and the removal and disposal off site of existing native materials within the trench limits.

407. **PRESSURE TEST AND ALLOWABLE LEAKAGE**

Hydrostatic testing shall be conducted under the supervision of the Owner's representative and the Project Engineer's representative upon completion of the watermain installation including services and backfilling.

Hydrostatic testing of new watermain and appurtenances (fire hydrants and laterals, etc.) including water services to the curb box shall be performed on new watermain infrastructure.

All caps and/or plugs used for testing process to be supplied by the Contractor at their expense.

Hydrostatic pressure test and hydrostatic leakage test may be conducted either simultaneously or separately.

Duration of test shall be two (2) hours or longer if so directed by Owner or Project Engineer, if tests are performed simultaneously.

If two tests are performed separately, conduct hydrostatic pressure test before hydrostatic leakage test. Duration of pressure test shall be one (1) hour or longer if so directed. Duration of leakage test shall be two (2) hours or longer if so directed.

The Contractor shall assume all responsibility when testing against existing or new line valves. The Contractor is to provide all bulkheads, taps, fittings and pipe thrust restraint necessary to undertake pre-qualification or final testing at their expense.

407. **PRESSURE TEST AND ALLOWABLE LEAKAGE** (cont'd)

Testing for polyethylene pipe shall be performed in accordance with the manufactured specifications and AWWA M55.

The Contractor is to provide all means of obtaining water for performing the pressure and leakage tests.

Fill test section slowly with water making sure that all air is removed from pipeline. Allow a period of 24 hours before starting test. Subject test section to continuous test pressure specified for one hour or as directed.

Test pressure shall be 1035 kpa. (150 psi).

Examine all parts of test section while under pressure. If test pressure is maintained with no pressure drop for specified test duration, test result is satisfactory.

If test result is not satisfactory, repair all deficient parts of section and retest until a satisfactory result is attained.

The leakage is the amount of water added to the test section to maintain the specified test pressure for the test duration. The measured leakage shall be compared with the allowable leakage as calculated for the test section. The allowable leakage is 0.082L per mm of pipe diameter per km of pipe per the test period.

If the measured leakage exceeds the allowable leakage, all leaks shall be located and repaired and the test section shall be retested until a satisfactory result is obtained.

408. **DISINFECTION OF WATERMAINS**

When the Contractor has completed the installation of the watermain and has carried out satisfactorily the specified pressure and leakage test thereon, he/she shall thoroughly flush the whole system so as to remove completely from the system all unwanted matter.

When the required flushing has been completed satisfactorily, the Contractor shall proceed with disinfection of the system as specified below.

Before being placed in service, all new mains and water services shall be chlorinated. Unless otherwise specified, the Contractor shall be responsible for disinfecting the watermains. The procedure for carrying out the disinfection shall conform to the A.W.W.A. Specification C601-54. The Municipality shall be notified 4 days prior to disinfection.

Chlorination shall be accomplished by the application of a recommended chlorine compound approved by the Contract Administrator. A minimum residual of 25 p.p.m. shall remain in the water after 24 hours standing in the pipe and samples of the water taken after the main has been flushed and refilled. The chlorination and residual tests will be carried out by the Contractor to the approval of the Ministry of the Environment. In the event that samples are not approved by the Ministry of the Environment, the Contractor shall repeat the disinfection procedure until such time as samples meet with approval. After the system has been recharged and tested it shall not be put into use until clearance is given by the Municipality.

409. **INSTALLATION OF WATER SERVICES**

409.1 GENERAL

All services shall be installed in accordance with the preceding specifications governing watermain construction.

The Contractor shall furnish all materials and lay all services as shown on the Contract Drawings and as specified herein.

Prior to the start of service installation a qualified representative of the pipe manufacturer shall demonstrate to the Contractor and the Contract Administrator, the proper tools and method of tapping the pipe. The Contractor shall follow this recommended procedure.

409.2 LOCATION OF SERVICE

The Contract Administrator will not allow the service installation to proceed until stakes are set to indicate boundaries of the lot and the exact location of the existing service.

Where water is to be taken into a building lot from a watermain located upon or under an adjacent thoroughfare, the stub service shall be installed in a straight line from and measured at right angles to the watermain. The curb stop shall be located 300mm from the street line on the Municipal side of the line.

On "cul-de-sac" or similar type streets, where it may not be feasible to lay a water service at right angles to the main, the service shall be laid in such a manner that the curb stop and main cock are in a straight line.

The property owner may, with the written permission of the Contract Administrator, install the stub service at any point on the lot frontage, provided that the finished service shall be at right angles to the main, in a straight line from the main to the street line.

409.3 INSTALLATION OF SERVICES

Main cocks shall not be space closer than 450mm and shall be tapped at the 2:00 o'clock or 10:00 o'clock position only, and left fully open by the Contractor. Service pipe shall be at a depth of not less than 1700mm and not more than 2000mm below the final grade.

Service connections passing under roadside ditches shall have a minimum of 1700mm cover at all times and shall be installed at a depth of not less than 1850mm at the property line.

A "Goose Neck" shall be formed into the service pipe, "laid over" into a horizontal position. Service pipe shall be continued to the curb stop, which shall be located 300mm from the street line, and on the street side of the property line. The curb stop shall be securely positioned on a standard bottom board and left fully closed. No other method of positioning the curb stop will be accepted. The curb box shall sit squarely over the curb stop and the bottom board. The top section of the box shall be adjusted to grade.

410. **MEASUREMENT AND PAYMENT**

410.1 MEASUREMENT

Measurements for payment for watermain will be made horizontally along the centerline of the trench through all fittings and valves except between vertical bends where measurement will be made along the centre of the pipe including all fittings. Water services will be measured along the centerline of the pipe and through fittings.

No separate measurements will be made for watermain pipe fittings.

Measurements for payments of service fittings will be for each of the type and size used as specified herein. Service box for curb stop will not be measured.

Gate valves will be measured for each of the size supplied, complete with valve box.

Hydrants will be measured for each supplied, complete. Hydrant laterals will be measured between the main and hydrant shut-off valve. No measurement will be made for the lateral between the shut-off valve and hydrant. Hydrant shut-off valves and 300mm vertical extension shall be included in the "supply and install hydrant" item.

410.2 PAYMENT

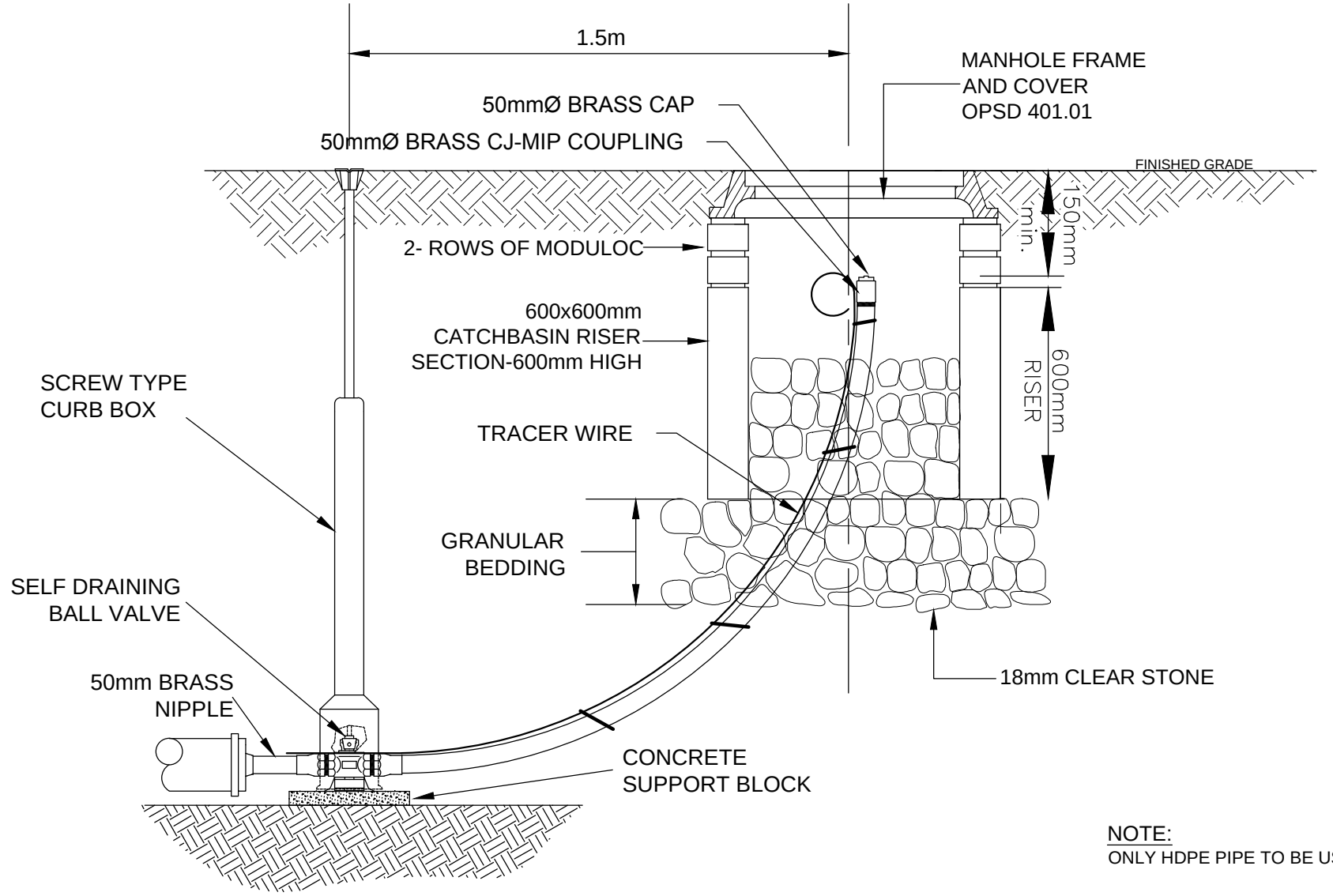
Payment will be made in accordance with the following methods:

(a) Watermains - The unit price tendered per linear meter appearing in the Form of Tender and shall be compensation in full for the supply of all labour, materials and equipment to satisfactorily complete the work in all respects as specified herein and as shown on the Contract Drawings. Pipe fittings (including concrete backing), will not be paid for separately but shall be deemed to have been included in the payment for watermains.

(b) Gate Valves - The unit price tendered per valve supplied and installed, complete with extension valve box to the satisfaction of the Contract Administrator.

(c) Fire Hydrants - The unit price tendered per fire hydrant supplied and installed, complete, including all excavation and backfill, stone or gravel fill, the section of ductile iron lateral pipe between the shut-off valve and hydrant, and mechanical joint restraints as specified herein. Payment for hydrant pipe lateral between the main and shut-off valve shall be included in the "supply and install fire hydrants" item. Hydrant 300mm vertical extension, shut-off valve and box shall be included in the "supply and install fire hydrants" item.

(d) Service Connection - The unit price tendered per linear meter of service pipe laid to include for the supply of all labour, materials and equipment to satisfactorily complete the work in every respect as specified herein and as shown on the Contract Drawings. Payment for main cock and curb stop including service shut-off box will be made in accordance with the tendered unit prices for these items appearing in the Form of Tender for the sizes specified and shall be deemed to be compensation in full for the supply of all labour, materials and equipment.



NOTE:
ONLY HDPE PIPE TO BE USED.

OXFORD COUNTY

50mm BLOW OFF-MANHOLE COVER

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