The Corporation of the Town of Tecumseh
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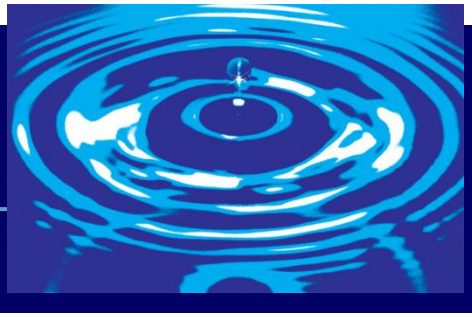

Water Distribution System
Standards & Material Specifications

Public Works & Environmental Services
Water & Wastewater Services Division
Dated: December 03, 2013

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DRINKING WATER QUALITY MANAGEMENT SYSTEM POLICY

The Corporation of the Town of Tecumseh is committed to supplying a safe, consistent, drinking water supply while maintaining strict adherence to all applicable legislative and regulatory requirements. The Corporation of the Town of Tecumseh will strive to achieve these goals through the implementation of a management system and staff competency to our customers.

The municipal owners, management and the employees of The Corporation of the Town of Tecumseh who are directly involved in the supply of drinking water, share in the responsibilities of implementing, maintaining, and contributing to the continual improvement of the Drinking Water Quality Management System (DWQMS).

Important Notes

Tracer Wire

- Splices shall be accomplished using "Dryconn waterproof connectors" manufactured by King Innovation or similar product approved by the Town of Tecumseh representative.

Water Valves

Gate valves shall be ductile iron, epoxy lined gate valves, minimum 8 mil thickness resilient seat, bronze, non-rising stem with 316 stainless steel bolts. Valves shall be black top opening counter clockwise in North end or red top opening clockwise in South end. AWWA - C509 and C550. North and South areas described in figure 3.10 on page 41.

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Flushing, Testing and Disinfecting Watermains

- The Contractor shall supply all necessary materials for the chlorination and the de-chlorination including all hoses, chlorine (NSF/ANSI 60 Liquid Chlorine – 12%), and sodium thiosulfate ($Na_2S_2O_3$) and all other materials used to carry out this work; amounts and types shall be as per the direction of the Town. For DE chlorination of super chlorinated water all hoses shall be free of leaks. 25kd bag(s) of sodium thiosulphate is to be used for DE chlorination of super chlorinated water.

Corrosion Protection

- Anti-corrosion wrap shall consist of Denso paste or Denso priming Solution (for cold temperature application), Denso Profiling Mastic or Denso Blankets, and Denso LT Tape

1.0 STANDARDS

The Town of Tecumseh Water Distribution System Standards and Material Specifications shall apply and govern except as amended or extended herein.

1.1 Excavation

The work shall be to furnish all labour, materials and equipment for the installation of watermains, hydrants, valves and accessories. When excavating trenches they must be excavated to the required dimensions; sheet, brace and support the adjoining ground or structures, where necessary; handle all drainage or groundwater; lay the pipe, castings fittings and accessories; install valves and hydrants; backfill and compact the trenches and pits. Restoration, if required, of all areas on private property disturbed by the Contractor shall be considered part of this item.

All mechanical connections shall be rodded to valves, bends, tees and hydrants and shall include sacrificial nuts, one for each bolt. All thrust rodding shall be 19mm diameter (3/4 inch) hot dipped galvanized steel threaded rods. All t-bolts shall be forged steel.

During installation, any open ended pipe shall be capped with a mechanical joint (M.J.) cap, gland, and gasket, nut and bolts assembly at the end of the working day.

All required curb and sidewalk repair due to watermain works shall be incidental to this item.

The Contractor will be responsible for minimizing damage to existing trees and shall retain the services of a qualified tree trimming Contractor, approved by the Town of Tecumseh for trimming existing trees in advance as required, to accommodate his equipment.

1.2 Corrosion Protection

All mechanical parts that are not PVC must be corrosion protected with Denso Paste; it is applied prior to the tape application (Denso Petrolatum Tapes or Denso Bituminous Tapes). Denso Profiling Mastic will be used to provide a smooth profile on irregular shaped fittings such as flanged and mechanical joints and valves.
Fire hydrants and hydrant extensions shall also have this corrosion protection on any buried mechanical joint or flange. The corrosion protection should extend a minimum of 150mm above and below each mechanical joint or flange and installed as per manufacturer's specifications.

All fasteners shall have sacrificial bolt caps.

1.3 Pipe Material

Polyvinyl chloride (PVC) pressure pipe shall conform to A.W.W.A. Standard C-900-89, Class 150 (DR 18), and Ductile Iron. PVC watermain shall be installed in accordance with the manufacturer's instructions including sand bedding and cover to 300mm above the crown of the pipe and 100mm below the pipe. Concrete pipe or High Density Polyethylene (HDPE) may be permitted at the Town's discretion.

Fittings shall be Ductile Iron; cement or epoxy lined, Class 250 or PVC Class 150, DR18, conforming to AWWA C-907 and CSA B137.2.

All brass fittings are to be lead free.*

All pipes shall be delivered to the site capped, with brass fittings as per the above. Material that is not delivered to the site capped, or contains lead fittings, shall be rejected and shall not be permitted to be used.

All watermain must remain capped until installation. All watermain must be visually inspected inside and out for quality control of material. The interior of the pipe must clean and free any debris before installation. The exterior and interior cannot have any structural damage to the pipe. If any damage is identified during the inspection that section of pipe should not be used.

1.4 Excavated Material

The Contractor shall deposit material excavated from the trenches and all material required for the work in such manner as to cause the least possible interference with other work on the site including vehicular traffic. All excavated material shall be kept piled and trimmed.

Excavation shall include removal of hard pan, frost, boulders, rock, concrete, quicksand, ice or any obstacles found in the trench.

Excess excavated material removed from the trench shall be hauled away by the Contractor.

1.5 Preparation of Trench

The trench shall be excavated to the alignment and depth shown on the drawings. The trench shall not be opened for a length greater than 30m, unless permitted by the Engineer.

If the bottom of any trench is excavated below the limits shown on the drawings or prescribed by the Engineer, it shall be refilled at the Contractor's expense with material acceptable to the Engineer, in such a manner as the Town of Tecumseh Representative or designate may direct.

The width of the trench shall meet the requirements of the *Occupational Health & Safety Act* and be sufficient to permit the pipe to be laid and joined properly, and the backfill to be placed and compacted.

The Contractor shall furnish, put in place and maintain such sheeting and bracing as may be required to support the sides and roof of the excavation and to prevent any movement which can in any way:

- Injure personnel, pipe or appurtenances;
- Diminish the necessary width of the excavation;
- Otherwise injure or delay the work or endanger adjacent structures.

If the Town of Tecumseh Representative or designate is of the opinion that at any point inadequate support has been provided, they may order additional supports put in at the expense of the Contractor. Compliance with such order shall not release the Contractor from his responsibility for the adequacy of such supports.
If voids are formed outside the sheeting they shall be immediately filled and rammed with suitable material. If necessary, additional sheeting shall be driven outside the existing sheeting to prevent settlement of the adjacent ground.

Where sheeting and bracing is to be removed, it shall be done so that adjacent facilities and properties are not damaged. All voids left or caused by the withdrawal of sheeting shall be immediately refilled with suitable material and compacted.

Where timber or steel is used in sheeting, bracing or coffer damming has been left in place for the convenience or to serve the interests of the Contractor, the Contractor shall receive no additional payment.

1.6 Removal and Replacement of Unsuitable Material

If unsuitable material such as silt, clay, muskeg or rock is encountered in any part of the trench bottom and is considered unsatisfactory by the Town of Tecumseh Representative or designate for the support of the pipe, the Contractor shall make such further excavation as may be required and shall backfill the extra excavation with suitable compacted material.

Disturbance to sub-grade resulting from the Contractor's failure to completely dewater the trench shall be the Contractor's responsibility.

If unstable soils are encountered in the trench bottom, the Contractor may be required to install Filter Fabric between the trench and the bedding. The fabric shall have an Equivalent Opening Size equal to Standard Sieve No. 70 (0.2mm or .008 inches).

1.7 Dewatering

The Contractor shall dewater the trench so as to permit the proper laying of the pipe on a firm foundation. Drainage through watermains or mortar jointed pipes shall not be permitted. The Contractor shall remove water at his own expense and shall have sufficient pumping equipment available for immediate use.

The water discharged from trenches shall be disposed of so that it will not damage the works or any private property. It shall be conveyed to natural drainage channels or to sewers. If trench water is to be conveyed to a sewer, the Contractor may be required to remove all sand and mud by means of settling basins and no compensation shall be allowed therefore.

In general, all water encountered in trenches shall be pumped out and at no time shall the watermain pipe be used as a drain for such water. Pipe shall not be laid in water.

No extra payment will be allowed for dewatering regardless of the method used.

1.8 Disposal of Excavated Material

No extra compensation shall be paid to the Contractor for the disposal of surplus excavated material, including rock

1.9 Installation and Setting Out

DURING TRENCHING OPERATIONS THE CONTRACTOR IS TO INSTALL BLUE NON-DETECTABLE WATER LINE MARKING TAPE 300MM ABOVE THE WATERMAIN AND WATER SERVICES.

Watermains shall be laid to the lines shown on the drawings with 1.5m minimum cover to finished grade. Top-of-pipe elevations have been shown on the Contract Drawings where watermains cross a sewer or other obstruction, either existing or proposed. Deflection of the watermain to achieve these elevations will require mechanical joints in all cases unless otherwise noted on the Contract Drawings.

The Contractor shall comply with the requirements of the *Occupational Health & Safety Act* and other applicable acts, regulations and ordinances. The Contractor shall slope the trench side to conform to the *Act*.

Barricades, guards, lights and other safety precautions shall be provided by the Contractor.

The Contractor shall take such precautions as are necessary to prevent foreign material from entering the pipe and if the Engineer is not satisfied that this requirement is being met, he may require that, before lowering the pipe into the trench, a heavy, tightly-woven canvas bag be placed over each end of the pipe and shall only be removed immediately prior to connection of adjacent pipes.

The outside of the pipe spigot and the inside of the bell shall be wiped clean and dry and free from oil and grease before the pipe is laid. The Town of Tecumseh Representative or designate must inspect each pipe before it is laid.

As each length of pipe is placed in the trench, the spigot end shall be centered in the bell and the pipe forced home using a bar and block and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tamped under it except at the bells. Precautions shall be taken to prevent dirt from entering the joint space.

Pipe shall be laid with bell ends facing the direction of laying.

All pipe, fittings and valves shall be carefully lowered into the trench piece by piece in such a manner as to prevent damage to watermain materials and protective coatings and linings. Under no circumstances shall watermain materials be dropped and dumped into the trench.

If damage occurs to any pipe, fittings, valves or watermain accessories in handling, the damaged items shall be removed. Prior to the laying of the pipe a minimum of 100mm with Granular B (sand) bedding is required. After laying the pipe, the trench shall be filled with Granular “B” (sand) to a minimum of 300mm above the top of the pipe.

At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug approved by the Town of Tecumseh Representative or designate. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe and/or cement lining of ductile iron pipe and so as to leave a smooth end at right angles to the axis of the pipe.

When crossing over or under sanitary and storm sewers, a full pipe must be used so that joints are have a minimum 0.6m separation away from the sewers.

Pipe shall not deviate from line or grade by more than 75mm (3").

The trench bottom should be smooth and free from large stones, dirt clods and frozen material. Excavation for bells (bell holes) should be provided so that pipe is uniformly supported along its length.

1.10 Separation Distance from Contaminated Sources (Sewers/Sewage Works)

As per the *"Watermain Design Criteria for Future Alterations Authorized Under a Drinking Water Works Permit: Ministry of the Environment Safe Drinking Water Branch June 2012 PIBS 7064e"*

*"**Section 15** (Separation Distances from Contamination Sources) has been updated to ensure consistency with the "Design Guidelines for Sewage Works, 2008" (PIBS 6879). Specifically, workable alternatives for meeting construction requirements have been included for situations where adequate separation for vertical crossings between a watermain and sewer cannot be achieved."*

15.0 Separation Distances from Contamination Sources

15.1 *Sewers/sewage works and watermains located parallel to each other shall be constructed in separate trenches, maintaining a clear horizontal separation distance of at least 2.5 m measured from closest pipe edge to closest pipe edge.*

15.1.1 Under unusual conditions, where a significant portion of the construction will be in rock, or where it is anticipated that severe dewatering problems will occur or where congestion with other utilities will prevent a clear horizontal separation of 2.5 metres, a watermain may be laid closer to a sewer, provided that the elevation of the crown of the sewer is at least 0.5 metres below the invert of the watermain. Such separation shall be of in-situ material or compacted backfill.

15.1.2 Where this vertical separation cannot be obtained, the sewer shall be constructed of materials and with joints that are equivalent to watermain standards of construction and shall be pressure tested, in accordance with Division 701 of the OPSS (Ontario Provincial Standards Specification, published by Ontario Ministry of Transportation) at a pressure of 350 kPa, with no leakage.

15.1.3 In rock trenches, facilities should be provided to permit drainage of the trench to minimize the effects of impounding of surface water and/or leakage from sewers in the trench.

15.2 *Under practicable conditions, watermains shall cross above sewers with sufficient vertical separation to allow for proper bedding and structural support of the watermain and sewer.*

15.3 *When it is not possible for the watermain to cross above the sewer, the watermain passing under a sewer shall be protected by:*

15.3.1 Providing a vertical separation of at least 0.5 metres between the invert of the sewer and the crown of the watermain; sewer and the crown of the watermain;

15.3.2 Providing adequate structural support for the sewers to prevent excessive deflection of joints and settling; and

15.3.3 Ensuring that the length of water pipe shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the sewer.

15.4 *Alternatively, when adequate vertical separation cannot be achieved with crossings of watermain and sewer, either the watermain or the sewer line should be encased in a watertight carrier pipe which extends 3 m (10 ft) on both sides of the crossing, measured perpendicular to the watermain.*

15.5 *No watermain shall pass through or come in contact with any part of a sewer access/maintenance hole, septic tank, tile field, subsoil treatment system or other source of contamination.*

1.11 Tracer Wire

All PVC pipe shall include tracer wire "12 AWG conductor, solid white, TWU Flameseal wire".

Splices shall be accomplished using "Dryconn waterproof connectors" manufactured by King Innovation or similar product approved by the Town of Tecumseh representative.

Tracer Wire Installation

- Tracer wire shall be laid immediately alongside and at the bottom of the new watermain pipe.
- Tracing wire must run outside the valve box and inserted through the hole provided at the top of the valve box. A minimum of a 6 inch lead (tail pipes) must be provided at the end of the valve box/curb box for tracing purposes. Tracing wire to be fasten to the curb box with **"tape only".**
- Care must be taken not to damage the plastic coating. No bare copper wire shall be exposed.
- The Contractor shall provide protection of the tracer wire at all splices. Contractor shall use jell filled caps when joining tracer wire. "Dryconn waterproof connectors" manufactured by King Innovation or similar product approved by the Town of Tecumseh representative.
- ***After completion of the project, the Town of Tecumseh will perform a trace test on the entire installation, and deficiencies will be noted and must be repaired by the Contractor at their cost.***

1.12 Joint Deflection

Wherever it is necessary to deflect the pipe from the straight line either in the vertical or horizontal plane, pipe lengths should be assembled in a straight line and then curbed in the trench. All curvature shall result from the bending of pipe lengths. Deflection at the joint shall not be greater than 2 degrees. Following table list limits of offset per typical length of pipe of 6.1m (20 feet).

Pipe Size	Offset per Length of Pipe
100mm (4")	**609mm (24")**
150mm (6")	**432mm (17")**
200mm (8")	**304mm (12")**
250mm (10")	**280mm (11")**
300mm (12")	**228mm (9")**

The Town of Tecumseh Representative or designate will inspect the job and if necessary will order the use of specials fittings required to provide the necessary deflection.

1.13 Backfilling

Backfilling operations are to follow immediately behind watermain installation. **Foundry/Black mold sand will not be permitted as trench backfill.**

Backfill material shall be excavated material except that no topsoil, boulders, garbage or organic materials shall be placed in the trench. The material shall be compacted in 300mm lifts with proper mechanical equipment to achieve at least 95% of Standard Proctor Density after compaction.

Backfill after laying pipes: refill clean sand and soil directly into the channel. For soil and stone base, fill 100mm of sand at bottom of the pipe and 300mm at top of pipe after laying pipe, covering with soil then, assuring that there is no hard stone or other hard objects within 300mm to the top of the pipe, Pump out water in channel before backfilling.

Where the excavation is made through permanent pavements, curbs, driveways or sidewalks or where such structures are undercut by the excavation, the entire backfill to the sub grade of the structures shall be made with Granular “B” material unless otherwise specified. Walks and driveways consisting of broken stone, gravel, slag or cinders shall not be considered as being of a permanent construction.

Excavations shall be kept free of water while backfilling is in progress. If necessary, in the opinion of the Town of Tecumseh Representative, sheeting and shoring shall be withdrawn progressively as the backfill is brought up rather than being completely removed prior to backfilling.

Backfill must be carefully placed and not pushed directly onto the pipe. Clear sand backfill material shall be placed around the pipe

Backfill shall be bladed down the end of the trench so that the backfill material rolls into the trench. The trench shall be filled evenly to prevent displacement of the pipe.
The open end of the pipe shall be suitably protected to prevent foreign material from entering the pipe.

1.14 Watermain Lowering (Conflicting infrastructure)

Watermain lowering shall be carried out wherever proposed watermains conflict in grade with existing or proposed sewers or other utilities. Watermains shall be lowered to provide a minimum of 600mm, **or less at the discretion of the Town of Tecumseh Representative or designate,** clear distance between the outside face of the watermain and the outside face of the sewer or utility.

1.15 Notification of Consumers

Residents or commercial and industrial establishments that will be without water service for any period of time during the progress of the work are to receive at least 24 hours' notice from the Town. Town Employee will use a notice template provided by the Town of Tecumseh Representative.

1.16 Blow-Offs

When a full size blow-off is required, the Contractor shall restrain all fittings, install and remove M.J. cap with a 2 inch outlet as directed by the Town of Tecumseh Representative or designate. The blow-off must be installed no less than 1.0m above grade.

Contractor to note that all blow-offs are to be restrained to the last fitting.

Measurement

Measurement shall be one lump sum basis per blow-off.

1.17 Connect to Existing Watermains

The work shall be to furnish all labour and equipment to connect to existing watermains, saw-cutting of existing mains and abandoning of existing mains (including capping). The Contractor shall also excavate the trenches to the required dimensions; sheet, brace and support the adjoining ground or structures where necessary; and handle all drainage or groundwater**. The**

contractor shall provide a minimum of two (2) working water pumps at all times for the purpose of removing water from the excavation site.

All work related to isolating of existing mains, shutdown of existing water valves will be performed by the Tecumseh Water Services Department. The Contractor shall notify and coordinate this work with Tecumseh Water Services Department as part of this item.

When a watermain tie-in is required, a maximum of one (1) length of watermain pipe will be allowed (at a time) to be disinfected for the purpose of putting the watermain back into service, the same day. This work will be at the discretion of the **Town of Tecumseh Water Operator "ONLY".**

All work completed under this provision, shall be witnessed by the Tecumseh Water Service Department. A minimum of 24 hours' notice shall be given to the Owner for scheduling purposes. Town forces are to approve contractors tapping equipment and methods.

The Contractor shall note that the supply and installation of all cap and blow-offs required and as detailed on the Contract Drawings shall be incidental to this item.

In order to properly swab and flush watermains, the Contractor shall install full size blow-offs at the end of new watermains, as indicated on the Contract Drawings and directed by the Town of Tecumseh Representative or designate. Subsequent to flushing and swabbing, the Contractor shall remove full size blow-offs and install permanent 50mm diametre blow-offs.

Contractor to note that all blow-offs are to be restrained to the last fitting.

Measurement

Consultant will measure location and depth of all watermains, valves, hydrants, fittings, water services and curb boxes. Consultant will provide the Town Water Services and Engineering Services Divisions with an electronic/paper copy of all measurements.

Payment

Payment shall be made at the Unit Price bid in the Form of Tender and shall be compensated in full for all labour, equipment and materials required to connect to the existing watermain including coordination with Tecumseh Water Services Department; excavation, disposal of excess material removed, excess sand bedding and cover material, excess granular backfill, compaction and supporting existing utilities during construction.

1.18 Fire Hydrants and Valves

All hydrants shall be dry barrel hydrants (plugged only) AWWA C-502. Ductile Iron portion coated with bitumen. 316 Stainless Steel nuts and bolts on bolt assembly with "Storz" fittings. Approved suppliers are Canada Valve (Century Model), McAvity (Model M67) and Bibby (Sentinel Model Type 4). Hydrants shall be shop-painted with 2 coats of enamel.

Hydrant bases shall be 150mm mechanical joint. Each hydrant shall have a shut-off valve. Each hydrant shall be equipped with a 1.2m fiberglass marker attached to the hose connection (rural area hydrant).

Setting of Hydrants

All hydrants shall stand plumb and shall have their hose nozzles parallel with, or at right angles to the curb (road) with the pumper nozzle facing the road.

Each hydrant shall be controlled by an auxiliary independent 6 inch (150mm) gate valve. Turn direction is shown and described in figure 3.10 on page 41.

All hydrants to be level and installed with break-away flange at proper grade level or no more than 3 inches (75mm) above grade or below grade. All hydrant extensions shall be installed by Town forces.

The bowl of each hydrant shall be well braced against unexcavated earth at the end of the trench with a solid concrete backing, as shown on the detail drawing.

In order to prevent confusion of availability of water for firefighting purposes, immediately after installation, all hydrants shall be covered with a coloured plastic bag as per Town of Tecumseh Representative or designate, secured to prevent the bag to be blown away from the hydrant by wind. This cover shall be removed only after the watermain has been completely installed, tested and approved for use by the Town of Tecumseh.

All hydrants and valves shall be painted with two coats of paint approved by the Tecumseh Water Services Department.

Galvanized steel anchor rods can be used to anchor the valve to the tee and anchor the hydrant to the valve to permit the removal of the hydrant without "shutting down" the main. Hydrants shall be seated and blocked using precast concrete blocks.

Payment

Payment shall be made at the Unit Price bid in the Form of Tender and shall be compensated in full for all labour, equipment and materials required to supply and install the fire hydrants including tees, leads, fittings, valves, joint restraining devices and flushing and complete surface restoration.

1.19 Water Valves and Valve Boxes

Gate valves shall be ductile iron, epoxy lined gate valves, minimum 8 mil thickness resilient seat, bronze, non-rising stem with 316 stainless steel bolts, black or red top opening is specified and described in figure 3.10 on page 41 (AWWA - C509 and C550). Valve boxes shall be cast iron, screw type Bibby VB3000 or equivalent.

- iron body bronze mounted;
- inside screw type with non-rising spindle;
- suitable for 1.38 MPA, (200 psi) cold water working pressure;
- direction of opening to be counterclockwise (black top), as per Town of Tecumseh;(red top could be specified in special circumstances)
- 50mm square nut (unless noted otherwise); mechanical joint ends or push on style valve (must be restrained to manufacturer's specifications;
- valve top attached to the main body by 4 bolts;
- lock style gasket/gland on all MJ fittings.

Tapping sleeves shall be Ford Fast Series or Mueller 304L Series, Class 150, all stainless steel, with 304 stainless steel bolts, nuts and washers. Nuts to be fluorocarbon or Teflon coated.

Scope of Work

Each valve shall have a valve box unless installed in a chamber. Valve boxes shall be a 3 piece screw type to suit size of valve, as supplied by Canada Valve or equivalent. Bases shall be set on clear stone only above valve and shall not rest on the valve.

Setting of Valves and Fittings

Valves shall be supported and blocked and installed truly plumb and vertical in locations indicated or as directed by Town of Tecumseh Representative or designate. Valve extension is to be installed to bring operating nut to 1.5m below grade.

The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve, with the box cover flush with the surface of the finished pavement or such other level as may be directed.

All dead ends on new mains shall be closed with cast iron plugs or caps; such dead ends shall be equipped with suitable blow-off facilities.

Payment

Payment shall be made at the Unit Price bid in the Form of Tender and shall be compensated in full for all labour, equipment and materials required to supply and install valves including valve boxes, blocking, backfill, final grade adjustment and corrosion resisting nuts as per Contract Drawings.

1.20 Private Water Service Connections

Materials

Water service lines, 50mm in diameter and less, shall be PE Series 160 to A.S.T.M. B.88.

Main stops or corporation stops shall be compression fitting type Cambridge Brass Series 301 A4A4 - ball valve, or equivalent approved by the Town of Tecumseh.

No Lead Only.

Curb stops shall be compression fitting, non-draining, Cambridge Brass Series 202 H4H4 - ball valve, non-draining, or equivalent approved by the Town of Tecumseh.

Curb boxes shall be #7 Mueller A-726 with A-800 lid, or equivalent approved by the Town of Tecumseh, adjustable, and complete with stainless steel extension rods from curb stop to top of box.

Stainless steel saddles shall be #403 Teck Series and double bolted with band or equivalent approved by the Town of Tecumseh. Meter pit crocks shall be 450mm (18 in.) diameter precast concrete with Ford Wabash cover or approved equal where found in paved surface or 450mm (18in.) diameter Ultra Rib pipe with Ford Wabash cover where found in boulevard.

Tracer wire shall be “12 AWG conductor, solid white, TWU Flameseal wire”.

Scope of Work

Replace all services by extending a new service line by tapping new watermain using stainless steel service saddle, extending the service line to a new curb stop and curb box located at the property line on the short or long side. This work shall include connection to the existing water service using fittings as required.

Existing services shall be abandoned by closing the existing main stop. ***Abandonment of existing mainstop must be verified by the Town of Tecumseh Representative or designate.***

The Contractor may install water services by directional drill, or open cutting.

Restoration, if required, of all areas on private property disturbed by the Contractor shall be considered part of this item.

Specifics

Private Service connections to the watermain are not to be made until after the watermain has been tested, chlorinated and accepted for service.

Standard waterworks equipment shall be used for the tapping of watermain pipe and the insertion of corporation stops. Watermains shall be tapped wet. The tapping machine must be in good condition. It is important that the boring bar does not wobble and that the drill-tap tool is clean and sharp. All services shall be installed using a service saddle and ***under the direct supervision of a Town of Tecumseh Licensed Water Operator.***

Care must be exercised during insertion of the corporation stops to prevent crossing threads and over tightening. Corporation stops are to be located on the watermain at an angle of about 90 degrees. The main stop must be supported with a solid cement block if greater than 25mm. When multiple corporation stops are required for one service, they must be staggered and spaced at least 300mm apart and at least 300mm from the end of the pipe.

Service pipe connection to the corporation stop will be either bent to form a proper "gooseneck" when using copper piping or a standard "gooseneck" shall be used but in a horizontal plane when using PVC piping.

Service pipe shall be laid in an evenly graded trench to provide a minimum of 1.5m cover below future or existing road grades, whichever is lower. Care must be exercised to prevent deformed sections in the pipe caused by excessive bending. All deformed sections shall be removed and replaced at the Contractor's expense.

Sand bedding material shall be used to 300mm above the water service connection and 100mm below the water service connection. Curb stops shall be located as shown in the drawings. The top of the box and boxes are to be set plumb. The top of the box should be set at grade elevation. After all material has been installed, but before backfilling has started, the Contractor shall check to make sure that the curb stops is closed and the corporation stop is open.

If there are any potential conflicts with existing features at the property line/locations of curb stops and meter pits, the Contractor shall coordinate the exact location of curb stops and meter pits with the Town Representative or designate, and alignment/location shall be determined in the field.

Shut-off boxes are to be set on property line or as directed by the Town of Tecumseh Representative or designate. The operating key is to fit over the curb stops and is to be in operating condition. Shut-off boxes are to be set plumb with tops slightly above ground level for easy identification.

Payment

Payment shall be made at the Unit Price bid in the Form of Tender and shall be compensated in full for all labour, equipment and materials required to supply and install the private water services, at locations to be determined by the Town Representative or designate, connection to the watermain and existing live services, excavation, backfill, compaction, fittings, flushing, boring, saddles, curb and main stops, curb boxes, abandonment of old service as per Contract Drawings and complete restoration of private property disturbed by the Contractor.

1.21 Flushing, Testing and Disinfecting Watermains

General

These Special Provisions shall apply and govern except as amended or extended herein.

Specifics

The Town Representative shall be notified at least 24 hours in advance of the proposed date on which disinfection operations are to commence. Prior to testing the Town of Tecumseh Water Operator will inspect all water valves and hydrants. During this inspection, each and every valve will be checked using the proper valve operating key. Each valve must be (fully opened or closed) as required.

In order to properly swab and flush watermains, the Contractor shall install full size blow-offs at the end of new watermains, as indicated on the Contract Drawings and directed by the Town of Tecumseh Representative or designate. Subsequent to flushing and swabbing, the Contractor shall remove full size blow-offs and install permanent 50mm diameter blow-offs.

During winter months when watermain testing is required, the contractor shall ensure all water components (that may be exposed to freezing temperatures) are protected and insulted to prevent freezing and damage. Any components damaged due to freezing, will be replaced at the contractors cost.

The discharge of chlorinated water shall be in accordance with "Environmental Construction Guidelines for Municipal Road, Sewage and Water Projects" by Municipal Engineers Association.

Monitoring for free residual chlorine is a requirement during de-chlorination efforts. The concentration of chlorine in the discharge water will determine if de-chlorination techniques are required, and the dosing rate of the de-chlorinating agent.

Watermains shall be flushed in a sequence and in accordance with the procedure set out by the Town. The Town Representative or designate may permit or require the flushing to be carried out in stages as sections of the system are completed. No unsuitable matter shall be allowed to enter the sections which have been flushed.

Flushing, disinfection and pressure testing of watermains shall be in strict accordance with the following Town of Tecumseh procedures:

1. The Town of Tecumseh Water Services Division will perform all testing required to commission the watermain.

2. At no time shall any person other than a Town of Tecumseh Water Operator, operate any valve on the Town of Tecumseh water distribution system.

3. At no time shall any person other than a Town of Tecumseh Water Operator, operate or use any fire hydrant on the Town of Tecumseh water distribution system.

4. The Contractor shall provide a sketch to the Water Services Division before testing is to begin.

5. All water samples shall be taken and delivered to an accredited laboratory by the Town of Tecumseh Water Operator.

6. All regulatory requirements are to be followed when commissioning newly installed watermains, and in addition the following procedures shall be followed and supervised by a Town of Tecumseh Water Operator:

    a. Newly installed watermains shall be **swabbed and flushed using two swabs**, or less at the discretion of the Town Representative until water runs clear;

    b. Watermains greater than 300mm are to be butterfly valves, and swabbing will be removed.

    c. Any new sections of watermain are then to be chlorinated and chlorine is to remain in the new section for 24 hours;

    d. The new section is then to be entirely re-flushed and a sample(s) are to be taken (as per Town direction);

    e. After 24 hours the new section is to be flushed again and a second sample is to be taken;

    f. Both the above samples have to pass all necessary requirements before pressure testing can occur. There must be 2 consecutive passed samples before pressure testing.

    g. Subject to completion of successful sampling, pressure testing can occur. The new section will be tested to a minimum of 150 pounds per square inch for a minimum period of 1 (one) hour, or at the Town's discretion;

    h. After successful completion of (f) above, the Town of Tecumseh will allow connection to the water distribution system.

    i. Contractors shall install services on new watermain section(s) after commissioning the new section(s).

    j. The Town of Tecumseh reserves the right to amend any or all of the above procedures at any time should it be deemed necessary in order to ensure the safety of the potable water system.

The Contractor shall supply all necessary materials for the chlorination and the de-chlorination including all hoses, chlorine (NSF/ANSI 60 Liquid Chlorine – 12%), and sodium thiosulfate ($Na_2S_2O_3$) and all other materials used to carry out this work; amounts and types shall be as per the direction of the Town. All hoses shall be free of leaks.

Other Considerations

Oxygen Depletion:

De-chlorinating agents containing sulphite, such as sodium sulfite and sodium bisulfite, exert an oxygen demand on the water it is being applied to. If excess chemical is used and it enters a creek or lake, an environmental impact can result because of a reduction in the oxygen content of the water. Care must be taken to ensure that oxygen levels are not significantly altered with the addition of such chemicals. The best way to ensure that oxygen is not depleted is to use sodium thiosulphate as the dechlorinating agent rather than sodium sulphiteor sodium bisulfite.

Payment

Payment shall be made at the Lump Sum Price bid in the Form of Tender and shall be compensated in full for all labour, equipment and materials required for flushing, testing, chlorinating and commissioning of the watermain, including any and all related charges, supplying hoses, chlorine and de-chlorination agent, the supplying and installing and removing of a temporary blow-off, and installation of an end cap at the completion of the testing.

All labour, material and service costs associated with retesting, water samples or pressure, due to failure as set out above, will be charged to the Contractor.

1.22 Expose Existing Watermain *(PROVISIONAL)*

Scope of Work

Provide labour, materials, products, equipment and services to complete an investigation as to the location of the existing watermain in the location shown on the Contract Drawings.

The Contractor shall expose the existing watermain at locations where the alignment of the proposed watermain may conflict with an existing utility. This investigation will determine whether the watermain will have to be lowered or deflected above and insulated, or if no action is required. The Contractor shall provide the Town Representative or designate assistance in determining the elevation of the existing watermain.

Measurement

Measurement shall be in lineal meters along the surface, in a horizontal plane straight through all lowering, specials, valves or other appurtenances. Measurement for the exploratory investigations shall be made on an individual basis.

Payment

Payment shall be made at the Unit Price bid in the Form of Tender and shall be compensated in full for all labour, equipment and materials required to supply and install the watermain including bends, fittings, excavation, disposal of excess material removed, tracer wire and couplers, joint restraining devices, sand bedding and cover material to 300mm above the pipe, granular, backfill, compaction, pressure testing, flushing and disinfecting, supporting and auguring beneath existing poles and trees during construction and complete restoration of private property as required.

2.0 WATER DISTRIBUTION SYSTEM MATERIAL SPECIFICATIONS

2.1 Watermain Pipe

Item	Size Range	Specification	Description	Approved
Polyvinyl Chloride (PVC)	100mm to 300 mm	AWWA C900	Class 150, DR 18, Cast iron OD. Blue in colour. Certified to CSA Standard B137.3.	IPEX Blue Brute & Bionax, Rehau Aqualoc, Royal Seal
	350 mm to 600 mm	AWWA C905	Class 165, DR 25, Cast iron OD. Blue in colour. Certified to CSA Standard B137.3.	IPEX Centurion.
Polyvinyl Chloride (PVC) for directional drilling	100mm to 300mm	AWWA C900	PVC SRJ pipe shall be manufactured from pipe conforming to AWWA C900 and certified to CSA-B137.3 The modified pipe and self-restrained joint system shall meet the short and long term pressure requirements of AWWA C900 and CSA-B137.3.	IPEX Terrabrute, Royal Cobra Lock, IPEX Fusible
	All sizes		All PVC pipe shall include continuous tracer wire #12 AWG conductor, solid white, TWU flame seal wire. Shall be accomplished using Dryconn.	
Concrete Pressure Pipe	600mm and larger	AWWA C207, C301, and C303	Minimum Class 14, Bell and spigot joints. All joints protected using diapers and grout. Class D flanges. Exposed joint rings to be protective coated (Rust-Oleum No. 745).	Hyprescon
High Density Polyethylene (HDPE)	100mm and larger		Class 350, DR 11. Cast iron OD. Joints shall be thermal butt fusion type. Conform to CSA B137.1, ASTM D3035 and D3350, and CGSB 41-GP-25 M.	Sclairpipe, Performance Pipe
Liquid Chlorine 12%		NSF/ANSI 60	Liquid Chlorine 12% (hypochlorinte solution)	NSF/ANSI 60
Hydrant Lubricant		Food Grade ONLY	Lubrication used in hydrant maintenance.	
Marking Tape			Non-Detectable Marking Tape 3 "x1000 ft	

2.2 Pipe Fittings

Item	Size Range	Specification	Description	Approved
Polyvinyl Chloride (PVC)	100mm to 300mm	AWWA C907	Injection molded. Push-on joints (for use with Class 150 DR18 PVC pressure pipe). Cast iron OD. Certified CSA Standard B137.2.	IPEX Blue Brute, Royal Seal
	350mm to 600mm		Fabricated. Push-on joints (for use with Class 165 DR25 PVC pressure pipe). Cast iron OD. Certified to CSA Standard B137.3;	IPEX Blue Brute, Royal Seal
Ductile Iron	All sizes	AWWA C100, C104 and C153	Class 350. Cement mortar lined. C104/A21.4. Shall have distinctly cast on them the pressure rating, nominal diametres of openings, manufacturer's identification and have "DI" or "Ductile" cast on them.	Clow, Sigma, Star Pipe, Bibby
Restrainers	All sizes		For PVC pipe and fittings shall be serrated ring type. Equipped with Type 304 stainless steel bolts, nuts and washers.	Ford, Clow ,Sigma, Star
Couplings	100mm and larger	AWWA C550	Carbon steel with fusion bonded epoxy finish. Equipped with Type 304 stainless steel bolts, nuts and washers. Nuts fluorocarbon or Teflon coated.	Smith-Blair (Rockwell), Robar , Hymax
Repair Clamps	100mm to 600mm	AWWA C207	All stainless steel. Equipped with Type 304 stainless steel bolts, nuts and washers. Nuts fluorocarbon or Teflon coated.	Ford Fast Series, Cambridge Brass
Flange Adaptors	100mm and larger		Carbon steel with fusion bonded epoxy finish. Equipped with Type 304 stainless steel bolts, nuts and washers. Nuts fluorocarbon or Teflon coated.	Uni-Flang, Clow, EBAA Iron Megaflange, Smith-Blair (Rockwell)
Tapping Sleeves	100mm to 600mm	AWWA C207	Class 150. All stainless steel. Equipped with Type 304 stainless steel bolts, nuts and washers. Nuts fluorocarbon or Teflon coated.	Ford Fast Series, Mueller, Robar

2.3 Valves

Item	Size Range	Specification	Description	Approved
Gate Valves (Resilient Seat)	100mm to 300mm	AWWA C509 and C550	Resilient wedge. Mechanical joint ends. Iron body with fusion bonded epoxy finish, bronze mounted with inside screw, non-rising spindle and a 50mm operating nut. All external bolts stainless steel Type 304. Turn direction is shown and described in figure 3.10 on page 41.	Mueller, Clow, AVK
Butterfly Valves	400mm to 600mm	AWWA C504	Class 150. Mechanical joint ends. Iron body with fusion bonded epoxy finish. 50mm operating nut. All external bolts stainless steel Type 304. Turn direction is shown and described in figure 3.10 on page 41.	Clow ,Mueller, Lineseal
	750mm and larger	AWWA C504	Class 150. Mechanical joint ends. Iron body with fusion bonded epoxy finish. 50 mm operating nut. All external bolts stainless steel Type 304. Turn direction is shown and described in figure 3.10 on page 41.	Clow ,Mueller, Lineseal
Valve Boxes			Cast iron 1300mm. Three piece, screw type to suite size of valve.	Bibby, Canada Valve, Sigma, Star Pipe
Hydrants	All sizes	AWWA C502	Two standard hose connections and one Storz pumper connection with Ontario Standard threads, opening left. 30mm square operating unit. Drain holes plugged. Shop-painted with 2 coats of enamel. 150mm mechanical joint bases. 1.65m bury depth. Storz nozzle to be bronze to ASTM B584, nozzle cap to be cast iron and painted black.	Canada Valve, Clow, McAvity, AVK
Hydrant Markers			1.2m fiberglass reinforced with 100mm hose connection ring. Red decals.	

2.4 Corrosion Protection

Item	Size Range	Specification	Description	Approved
Zinc Caps			All forged steel t-bolts shall be of sufficient length to accommodate the installation of a sacrificial zinc cap beyond the nut.	Protecto caps
Petrolatum Tape Systems			Anti-corrosion wrap shall consist of Denso paste or Denso priming Solution (for cold temperature application), Denso Profiling Mastic or Denso Blankets, and Denso LT Tape.	Denso North America Inc.
Thermal Insulation			Used to thermally insulate mains and services shall have a minimum compressive strength of 690 kPa.	Dow Chemical (StyroFoam HI 100 Brand). Owens Corning (FOAMULAR® 1000).

2.5 Water Service Pipe

Item	Size Range	Specification	Description	Approved
Copper	19mm to 50mm	ASTM B88	Type "K" soft copper.	
Polyethylene	25mm to 50mm	AWWA C901	Series 160 Potable. PE2406. Certified to CSA B137.1.	Black Series 160 Potable, IPEX Blue 904
Corporation (Main) Stop	19mm to 50mm	AWWA C800	AWWA tapered thread inlet and compression joint outlet. Equipped with electrical grounding tail nuts. NO LEAD ONLY as per attached spec.	Cambridge Brass, Ford,Mueller no-lead brass only
Union Couplings	19mm to 50mm		Compression joint ends.	Cambridge Brass, Ford ,Mueller, Ford, Philmac UTC
Service Boxes			Cast iron with a 25mm upper section. Stainless steel rods and cotter pins. Adjustable to between 1.35 metres and 2.1 metres.	Mueller, Cambridge, Star, Sigma, Clow
Service Saddles	All sizes	AWWA C207 and C800	18 Gauge Type 304 stainless steel. AWWA tapered thread. Double bolted. Minimum 50 mm bearing width. Fully contoured to the outside of the pipe.	Cambridge Brass, Ford, Romac, Robar
PVC Tapped Couplings	25mm to 50mm	AWWA C907	Class 150. Blue in colour.	
Meter Setters	16mm to 25mm		For 5/6" x 3/4" meter. Angle inlet ball valve. Angle outlet cartridge dual check valve. PET/CTS Pack Joint connections.	Ford, Cambridge Brass, no-lead brass only

2.5 Water Service Pipe

Item	Size Range	Specification	Description	Approved
Meter Pits Beneath Pavements	450mm to 600mm		Reinforced precast concrete pits, 1050mm deep. Double lid cast iron covers. IPEX Ultra-rib PVC pipe	
Meter Pits Beneath Grass	450mm to 600mm		Plastic pit setter, 1525mm deep. Double lid cast iron covers.	Ford
Water Sampling Station	19mm	ECLIPSE # 88 SAMPLING STATION	The sampling station is non-freezing type. When the sampling station is turned off, the 1/4" pet cock on the copper vent tube can be opened by turning counterclockwise and the station can be pumped free of any standing water.	The Kupferle Foundry Company
Automatic Flushing Station			****Contact Town of Tecumseh for specification****	

2.6 No Lead Specifications

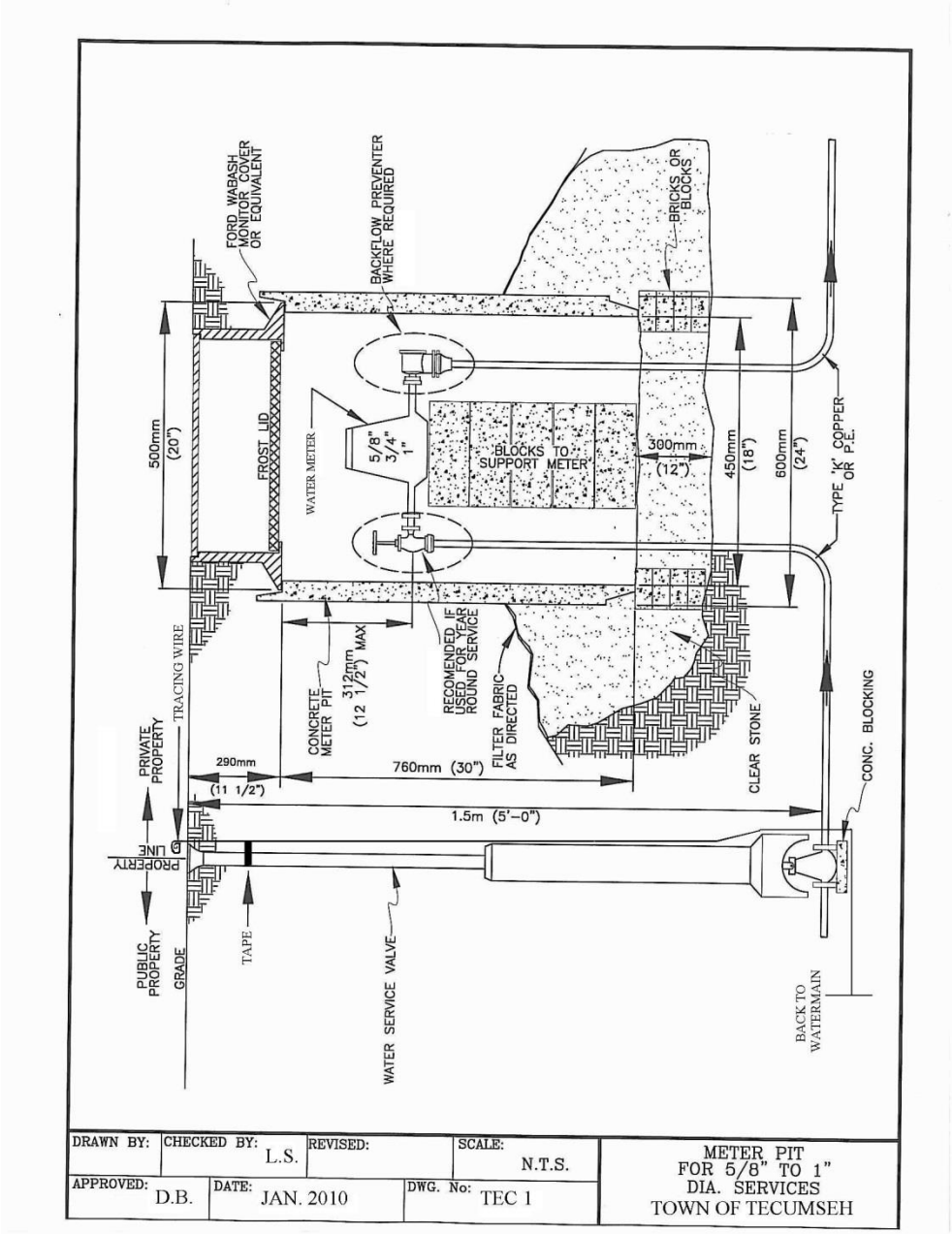
- All brass in contact with potable water will be heavy wall design made no lead material as defined in section 4 of current C800 specification.
- Treading will be in accordance with latest revisions of AWWA C800 specifications.
- Parts not in contact with potable water may be made of other material suited for buried water services as specified in AWWA C800.
- All Ball valve, Couplings and adaptors will be pressure rated for 300 PSI.
- Ball valves will be supplied with blowout proof stainless steel stems with double SBR or NBR o-ring stem seal.
- Stem and cap assembly will be two-piece design and will withstand minimum 200 ftp of torque.
- Ball seats will be made with unfilled Teflon for resilience and minimal friction.
- Ball will be uncoated lead free cast brass design.
- All waterworks fittings and ball valves will be guaranteed for a minimal 40 years against factory defects.
- All fittings will have a lifetime guaranteed against lead leach ate from the casting.
- All ball valve will be factory tested in the open and closed position.
- Yield Strength, Tensile Strength and percentage of elongation will be similar to 85-5-5-5 (Red Brass).
- No lead fittings will be Cambridge Brass or approved equal.

2.7 Water Meters

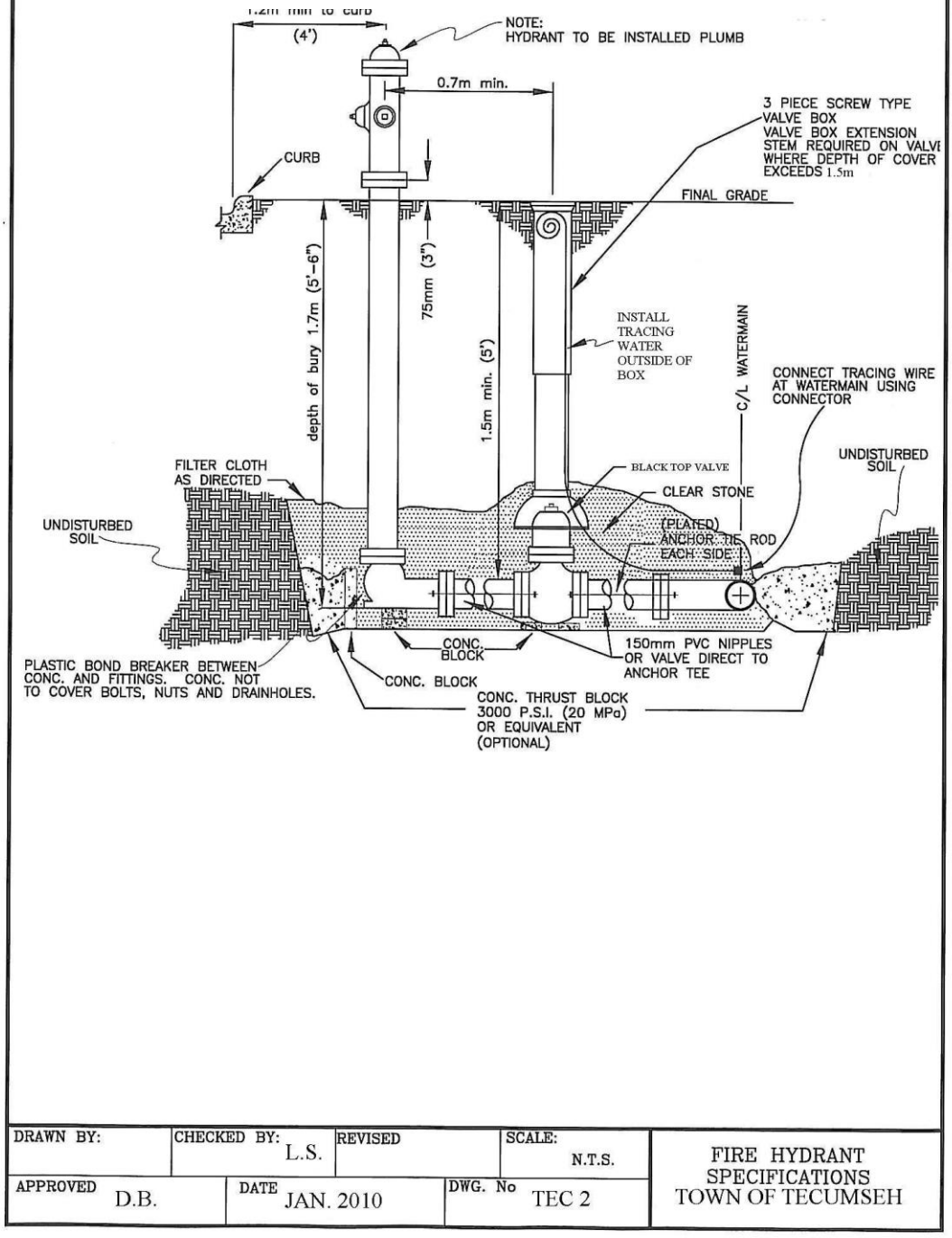
The Town of Tecumseh Water Services Division will supply Water Meter(s) for all new installations and existing water services. Contractor or Owner of Water Service(s) will be invoiced from the Town of Tecumseh for cost of Water Meter(s).Contractor is responsible for installation of Water Meter(s). At the Town's direction A/C power may be required to the Water Meter(s) at the cost of the Contractor/Owner of the Water Service(s).

3.0 DIAGRAM REFERENCES

3.1 Meter Pit for 5/8" to 1" Diameter Services



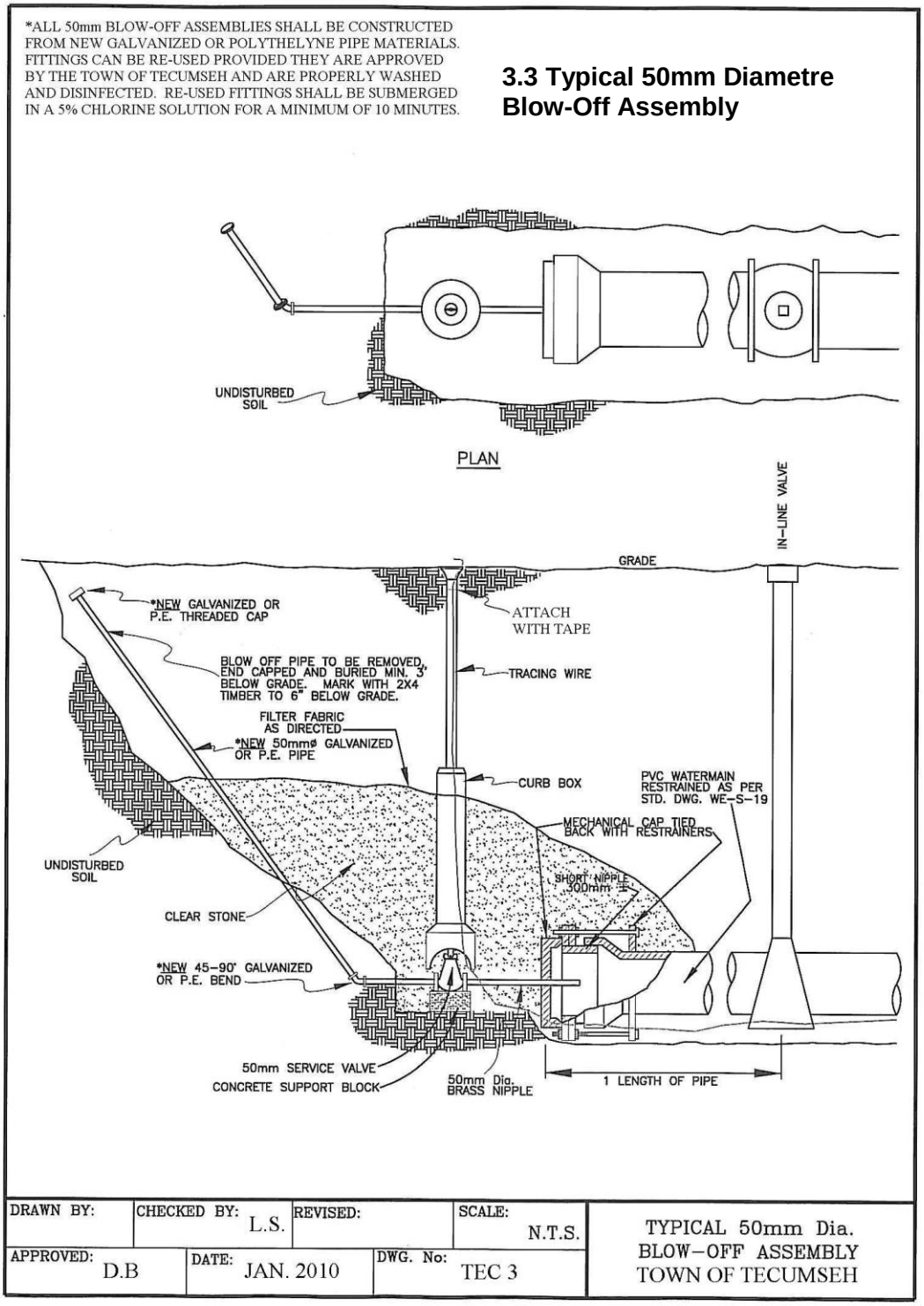
3.2 Fire Hydrant Specifications



DRAWN BY:	CHECKED BY: L.S.	REVISED	SCALE: N.T.S.	FIRE HYDRANT SPECIFICATIONS TOWN OF TECUMSEH
APPROVED D.B.	DATE JAN. 2010	DWG. No TEC 2		

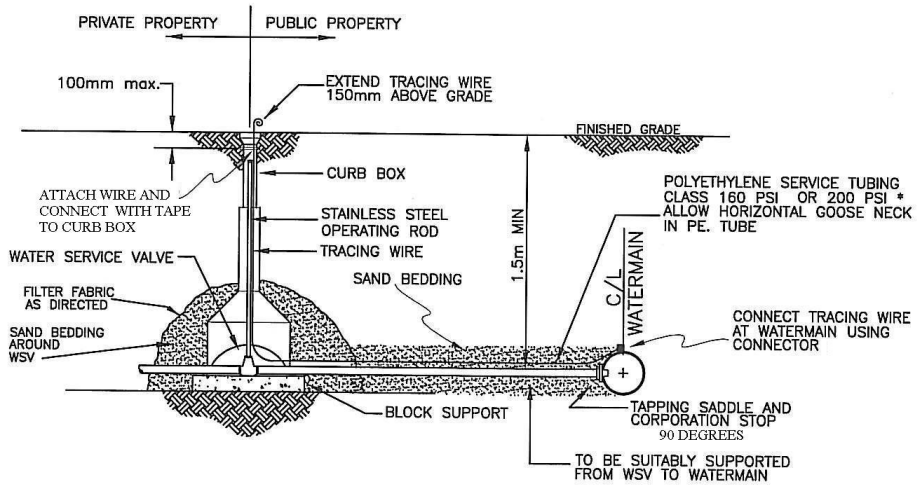
*ALL 50mm BLOW-OFF ASSEMBLIES SHALL BE CONSTRUCTED FROM NEW GALVANIZED OR POLYTHELYNE PIPE MATERIALS. FITTINGS CAN BE RE-USED PROVIDED THEY ARE APPROVED BY THE TOWN OF TECUMSEH AND ARE PROPERLY WASHED AND DISINFECTED. RE-USED FITTINGS SHALL BE SUBMERGED IN A 5% CHLORINE SOLUTION FOR A MINIMUM OF 10 MINUTES.

3.3 Typical 50mm Diametre Blow-Off Assembly



DRAWN BY:	CHECKED BY: L.S.	REVISED:	SCALE: N.T.S.	TYPICAL 50mm Dia. BLOW-OFF ASSEMBLY TOWN OF TECUMSEH
APPROVED: D.B	DATE: JAN. 2010	DWG. No: TEC 3		

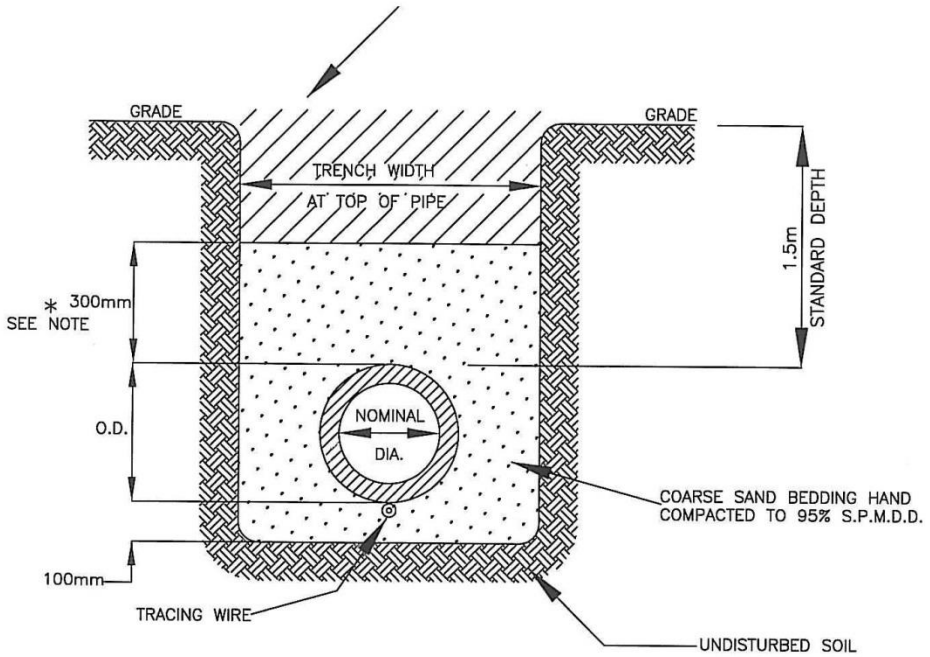
3.4 Copper/Polyethylene Service Connections



DRAWN BY:	CHECKED BY: L.S.	REVISED:	SCALE: N.T.S.	COPPER/POLYETHYLENE SERVICE CONNECTIONS TOWN OF TECUMSEH
APPROVED: D.B.	DATE: JAN. 2010	DWG. No: TEC 4		

3.5 Trench Widths for PVC Watermain up to 300mm

UNDER BOULEVARDS USE APPROVED NATIVE BACKFILL COMPACTED TO 95% STANDARD PROCTOR DENSITY. UNDER ROADWAYS AND DRIVEWAYS USE THE TOWN OF TECUMSEH APPROVED GRANDULAR MATERIAL COMPACTED TO 95% STANDARD DENSITY.



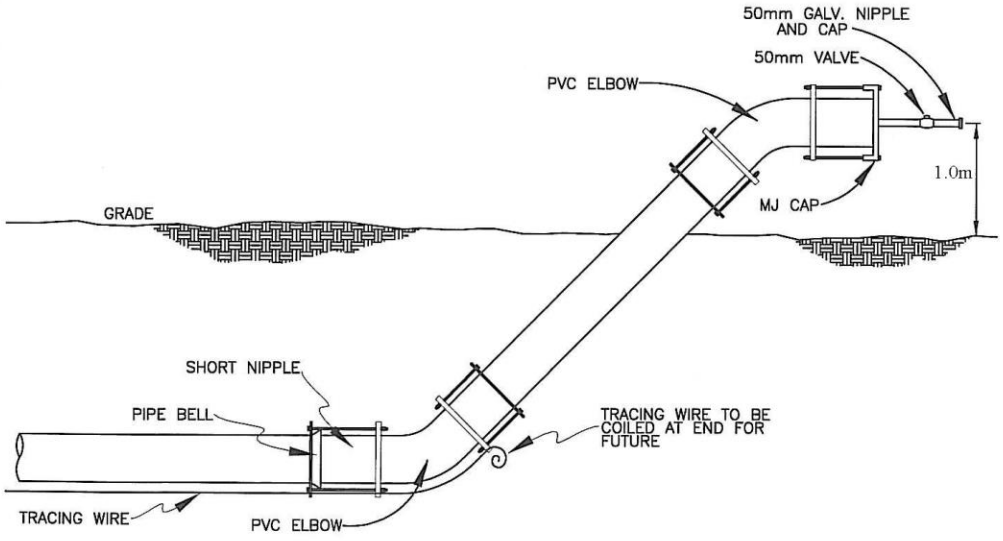
NOMINAL DIA. (mm)	TRENCH WIDTH (mm)	
	MIN.	MAX.
25	650	775
50	650	775
100	650	775
150	650	775
200	700	825
250	750	875
300	800	950

NOTE:

ALL WATERMAINS TO BE INSTALLED AT 1.5M DEPTH UNLESS OTHERWISE DIRECTED BY THE TOWN OF TECUMSEH.

DRAWN BY:	CHECKED BY: L.S.	REVISED:	SCALE: N.T.S.	TRENCH WIDTHS FOR WATERMAIN PIPING UP TO 300mm DIA. TOWN OF TECUMSEH
APPROVED: D.B.	DATE: JAN. 2010	DWG. No: TEC 5		

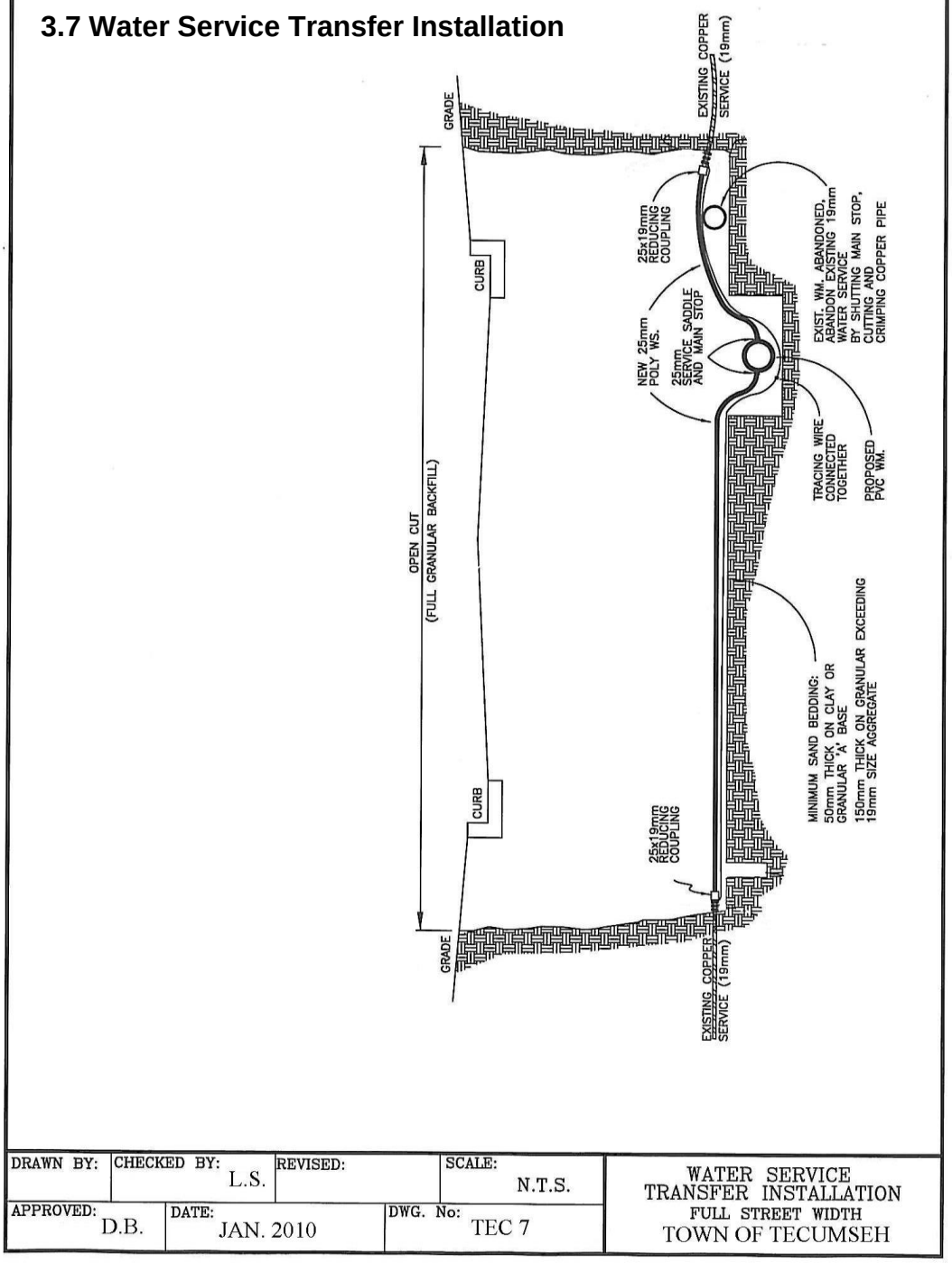
3.6 Temporary Full Size Blow-Off



NOTE:
ALL BENDS AND FITTINGS MUST BE RESTRAINED

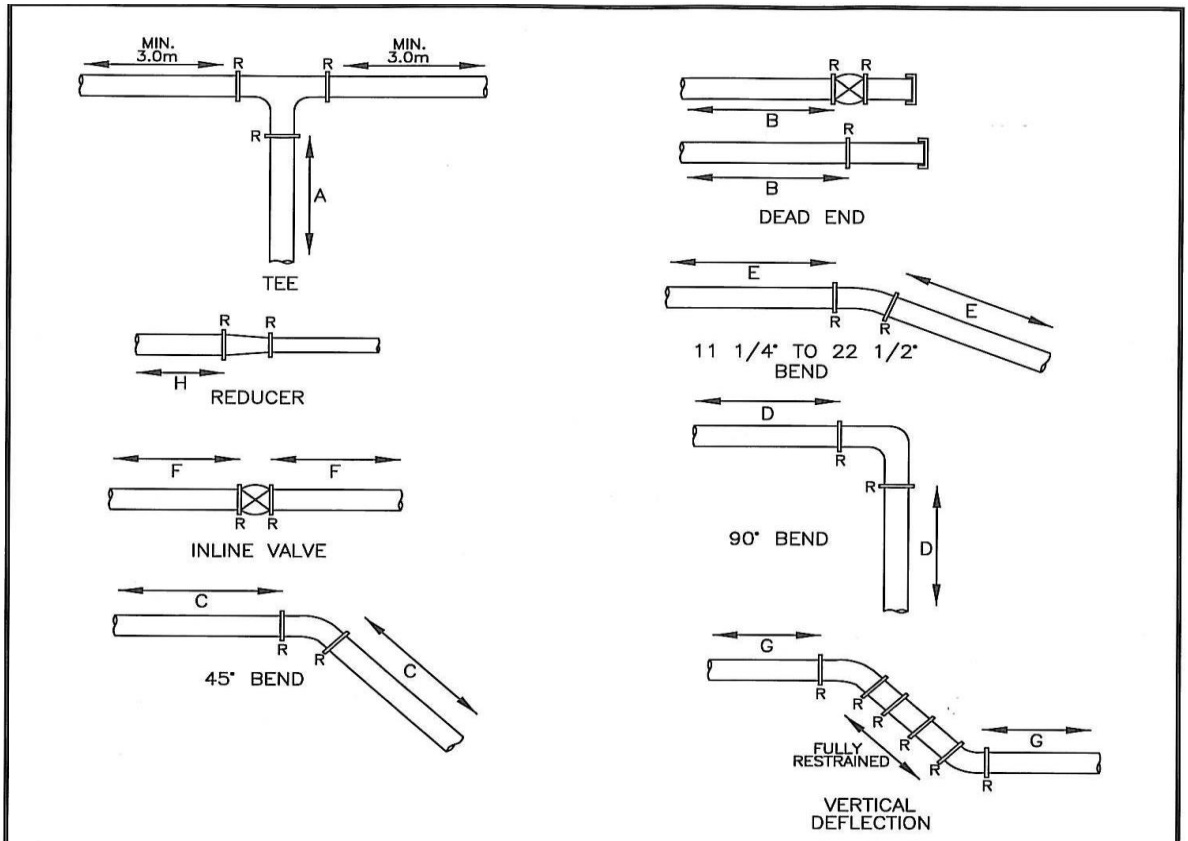
DRAWN BY:	CHECKED BY: L.S.	REVISED:	SCALE: N.T.S.	TEMPORARY FULL SIZE BLOW OFF TOWN OF TECUMSEH
APPROVED: D.B.	DATE: JAN. 2010	DWG. No: TEC 6		

3.7 Water Service Transfer Installation



DRAWN BY:	CHECKED BY: L.S.	REVISED:	SCALE: N.T.S.	WATER SERVICE TRANSFER INSTALLATION FULL STREET WIDTH TOWN OF TECUMSEH
APPROVED: D.B.	DATE: JAN. 2010	DWG. No: TEC 7		

3.8 PVC Pipe Joint Thrust Restraint



PVC PIPE THRUST RESTRAINT

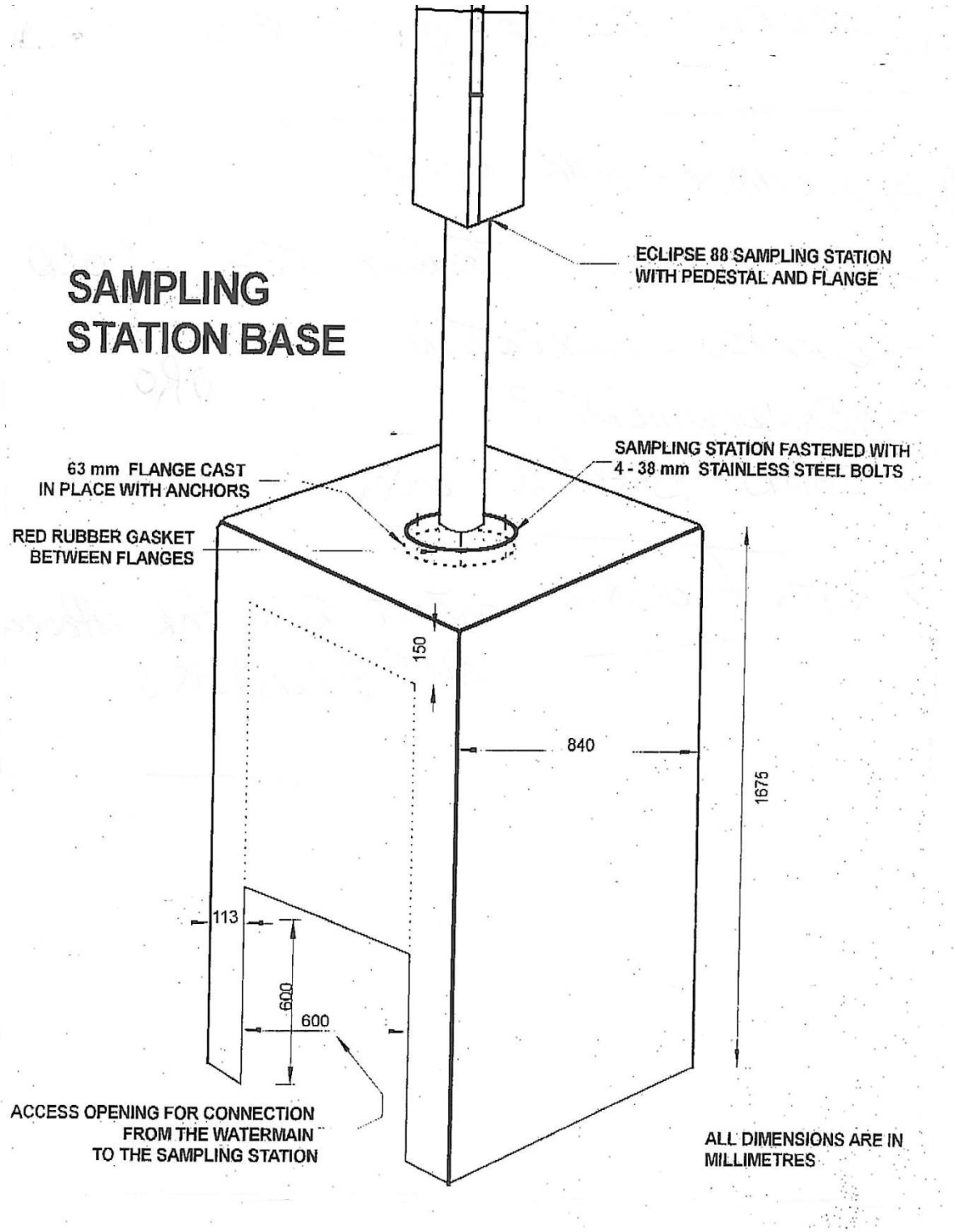
MIN. LENGTH OF PVC WM. TO BE RESTRAINED (m)

PIPE DIA. / LENGTH	100mm (4")	150mm (6")	200mm (8")	250mm (10")	300mm (12")	350mm (14")	400mm (16")	450mm (18")	500mm (20")	600mm (24")
A	0.0	0.0	3.0	6.0	9.0	12.0	15.0	18.0	21.0	27.0
B	9.0	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	39.0
C	3.0	3.0	3.0	6.0	6.0	6.0	6.0	6.0	9.0	9.0
D	6.0	6.0	9.0	9.0	12.0	12.0	15.0	15.0	18.0	21.0
E	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	6.0	6.0
F	3.0	6.0	6.0	9.0	9.0	12.0	12.0	15.0	15.0	18.0
G	3.0	6.0	6.0	9.0	9.0	12.0	12.0	15.0	15.0	18.0
H	0.0	6.0	6.0	6.0	6.0	6.0	12.0	12.0	12.0	12.0

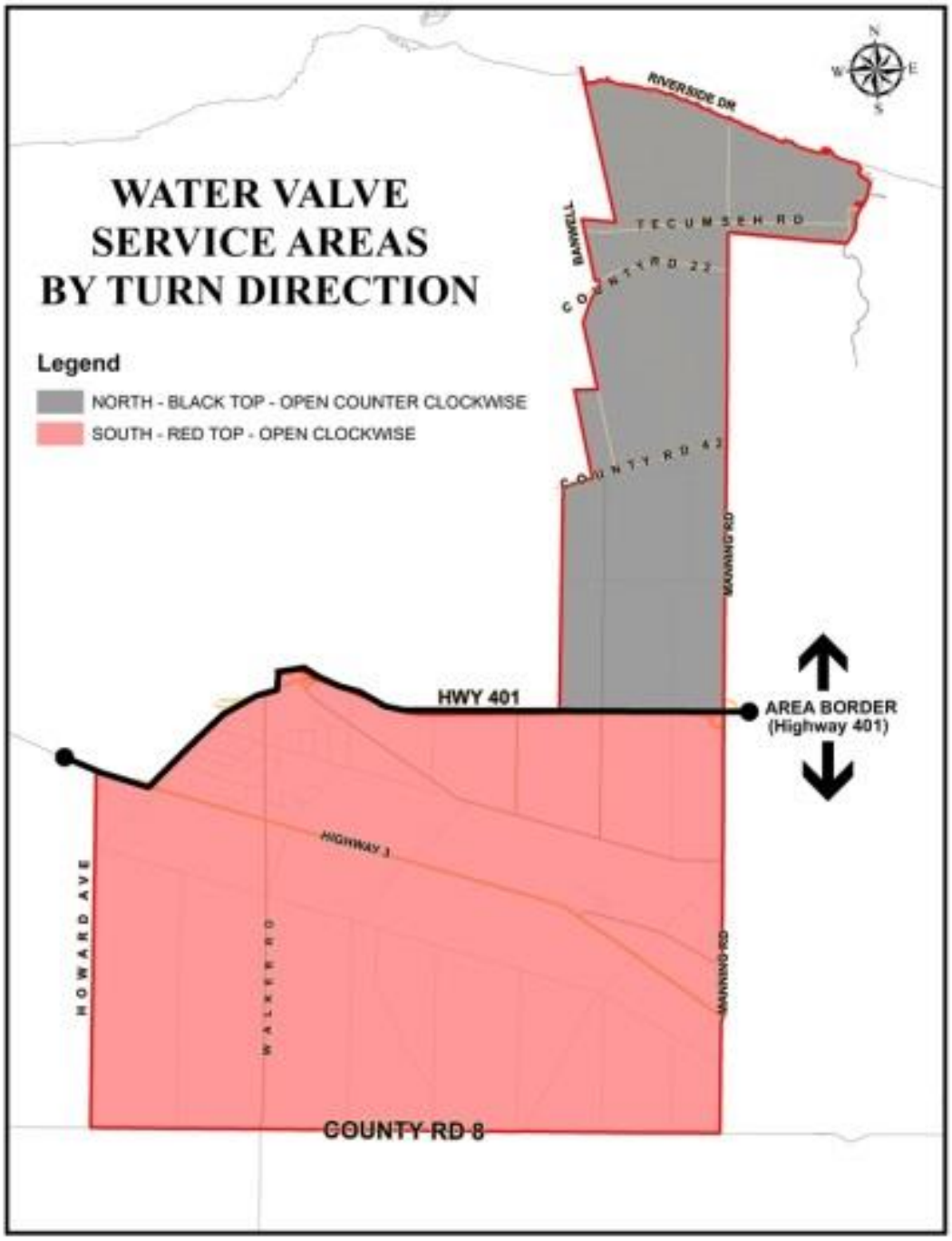
NOTE:
- 'R' DENOTES RESTRAINT DEVICE
- RESTRAINT LENGTHS BASED ON 'CL' TYPE SOIL CONDITIONS TYPICALLY FOUND AT A DEPTH OF 1.5 METERS. REFER TO ASTM D2487 FOR COMPLETE DESCRIPTION. IN AREAS WHERE SAND IS PREVELENT OR PIPE IS SITUATED BELOW WATER TABLE, RESTRAINED LENGTHS WILL BE DETERMINED BY THE ENGINEER.
- REDUCER DIMENSION 'H' ASSUMES ONE REDUCTION IN PIPE SIZE. IF REDUCTION IS GREATER THAN ONE PIPE SIZE, RESTRAINED LENGTH WILL BE DETERMINED BY THE ENGINEER.

DRAWN BY:	CHECKED BY: L.S.	REVISED:	SCALE: N.T.S.	PVC PIPE JOINT THRUST RESTRAIINT TOWN OF TECUMSEH
APPROVED: D.B.	DATE: JAN. 2010	DWG. No: TEC 8		

3.9 The Kupferle Foundry Company Sample Station & Concrete Base



3.10 - Water Valve Service Areas by Turn Direction



4.0 Town of Tecumseh Water Services Division Contact Information

Regular Hours: 7:00 AM – 3:00 PM	Phone: 519-735-4225 ext. 142
After hours: 3:00 PM – 7:00 AM	Phone: 519-735-4225 Callers will be automatically redirected to the afterhours emergency call service