



Protocol for New Watermain, Water Service and Wastewater Connections

No. WWS-DC-CP v.5.0

OPI

Errors or omissions to this Connection Protocol should be brought to the attention of the office of Primary Interest (OPI): Water/Wastewater Operations Engineer.

Distribution List

Internal: Director, Water & Wastewater Services
Water/Wastewater Operations Engineer (OPI)
Supervisor III, Distribution & Collection
Supervisors II, Distribution & Collection
Water/Wastewater Engineer
Manager, Project Engineering
Manager, Construction Services
Subdivision/Site Plan Control Engineer

External: eLinks Administrator

Approvals

OPI Signature:

Brittany Hallam

March 10/17

Date

Director Approval:

Nick Benkovich

April 20 2017

Date

[illegible]

PURPOSE

The following information is provided as a protocol to be followed when a new watermain, water service or wastewater connection is required for all projects, including CGS capital projects. The only exception for CGS capital projects is that the permits and fees may not need to be obtained or purchased, however the timeframes and methods for requesting inspection and connection still apply.

GENERAL INFORMATION

All water and wastewater connections and service installations must conform to the latest revisions of the Ontario Provincial Standard Drawings (OPSD) and Ontario Provincial Standards and Specifications (OPSS) as amended by the City of Greater Sudbury (GSSD and GSSS). All watermain work must comply with American Water Works Association (AWWA) Standard C651-14 as well as the Ministry of the Environment and Climate Change (MOECC) Watermain Disinfection Procedure.

Any valve manipulation (including service boxes) and live taps on existing mains, in accordance with the Safe Drinking Water Act 2002, must be performed by licensed Operators (City W/WW Operators) only. If it is proven that operational functions, such as hydrant operation, valve manipulation or live taps have been performed by an unauthorized person, that person and their employer will be reported to the Ministry of the Environment, in accordance with due diligence requirements for licensed operators. Any violation of the above will also be noted during the City's project evaluation procedure and included in our contractor prequalification review files. In addition, live taps (completed by licensed operators/City forces) will only be permitted if a valve is located at the property line, to isolate the system.

Vertical and horizontal separations will follow MOE Procedure F-6-1, Procedures to Govern Separation of Sewers and Watermains, and has been included in Appendix A. Minimum cover requirements for watermains, sewers, and services are set out in the City of Greater Sudbury Standard Drawings and Standard Specifications, and have been included in Appendix B. If connections to existing infrastructure cannot meet the above guidelines alternate methods may be used but must first be approved by CGS staff. Contact the Water/Wastewater Services Operations Engineer for approval of any non-standard sewer or water construction if connecting to existing infrastructure. In the case of a new subdivision the above standards must be met.

To allow a new connection, the City must be satisfied that the system has been installed as per the approved plans. All systems must be in place and all connections must be ready to connect. If City forces are called to site and the system is not installed in general conformance with the design and/or does not meet the appropriate drinking water regulations for connection, connections will be denied and the owner will be charged for the additional time required for the Construction Services Inspector and/or Operator in Charge (OIC) to return to site. All connection decisions will be at the discretion of the Overall Responsible Operator (ORO), regardless of what testing has commenced or been completed on the newly installed systems.

The City of Greater Sudbury urges the Permit Applicant / Contractor / Property Owners / Property Developers / Consultant (herein referred to as the "Applicant") to comply with all Occupational Health and Safety legislation, requiring workers to wear personal protective

equipment at all times, including but not limited to reflective safety vests, hardhats, eye protection, and approved safety footwear. All contractors and consultants working within the CGS Right of Way (ROW) are required to have the appropriate NORCAT modules as directed by a CGS representative and must be able to provide proof of training to City forces on request by carrying NORCAT issued photo ID and training credentials. City forces have been instructed by their supervisors to not enter any trench that does not meet proper trench standards; the Applicant is therefore advised to ensure proper trenching so as not to impede work and incur additional fees to have City forces return when it is safe to work.

If service interruptions are required to complete a new connection the Applicant is required to provide notice to all affected residents and businesses at least 24 hours in advance of the interruption. If the service interruption is going to affect any sensitive receptors a longer period of notice may be helpful to accommodate their needs. Service interruption notices must first be provided to the Water/Wastewater Operations Engineer or designate for preapproval prior to being distributed to the public. The Water/Wastewater Operations Engineer or designate requires at least 2 working days to review the service interruption notice.

Before any watermain, wastewater or water service inspection or connection can be requested, the applicant must ensure that he/she has obtained or purchased the following from the Engineering Services Engineering Review Technician, as required;

1. Construction Services Inspection Fee
2. Tapping Fee
3. Connection Permit
4. Road Occupancy Permit
5. Restoration Work Order and Deposit
6. OIC Deposit

The Engineering Review Technician will then inform the Manager of Construction Services/Chief Field Inspector and the Water/Wastewater Services Supervisor of Distribution and Collection that they can proceed with the inspection and connection. The Applicant will not contact Construction Services or Water/Wastewater Services directly to request an inspection or connection until the above have been obtained or paid. Once the above have been obtained or paid, Water/Wastewater Services and Construction Services require 48 hours notice for any inspection services/connection requests.

Notice to Water/Wastewater Services is not considered received until verbal confirmation has been given by the appropriate Supervisor II of Distribution and Collection; the Supervisor II of Distribution and Collection is to be contacted by telephone. Notice to Construction Services is not considered received until verbal confirmation has been given by the Manager of Construction Services/Chief Field Inspector; the Construction Services/Chief Field Inspector is to be contacted by telephone.

ROLE OF THE OIC (Operator-in-Charge)

An OIC must be present for all connections to the City's water distribution system. The OIC is only there to witness the connection and ensure appropriate measures are taken to prevent contamination to the existing drinking water system. The OIC will only advise on whether the new system has been adequately disinfected at the connection site and meets all appropriate

drinking water regulations. It is not the OIC's responsibility to inspect the new distribution system assets nor to advise on the distribution system design and construction. All questions regarding design and construction including thrust blocks, Denso products, and compaction should be directed to Construction Services or the appropriate contact in Development Services. A final inspection of the new system by Water/Wastewater will still be required after connection to verify that the system has no deficiencies.

WATERMAIN CONNECTIONS (100 mm)

PROTOCOL FOR WATERMAIN CONNECTIONS

Once the certifying engineer/consultant is satisfied that the system (complete with services) has been installed in general conformance with the design, the following protocol shall be followed (with specific details included on the City's *Watermain Test Report / Procedures* form which has been included as Appendix C):

NOTE

Prior to requesting a Construction Services Representative to inspect the testing procedures, ensure the proper permits, fees, and deposits have been obtained or paid.

1. An Inspection Fee is required from the Contractor for a Construction Services Inspector. The fee is to be placed with the Engineering Services, Engineering Review Technician. This fee is based on the amount of time required for the Construction Services Inspector to complete the inspection and if additional time is required due to the Contractor being unprepared for the Inspector, the Contractor will be charged for the additional time required of the Inspector, regardless of whether or not the inspection was completed.
2. The system is to be swabbed;
3. The system is to be disinfected in accordance with the City of Greater Sudbury's *Watermain Test Report / Procedures*;
4. The system is left undisturbed for a minimum period of 24 hours;
5. The hydrostatic pressure test is conducted and is witnessed by the City's Construction Services Inspector. Please note that the Inspector requires 48 hours notice prior to the test;
 - a. Watermain Test Report/Procedures form to be completed by the Applicant and given to the Inspector prior to the start of the test. The calculation for allowable loss is based on the length and diameter of the watermain.
 - b. Testing shall be completed in lengths not to exceed 300 meters with no more than 500 meters of watermain installed before testing must commence. Testing must progress with watermain installation so no more than 500 meters of pipe are installed ahead of testing unless otherwise approved.
 - c. Test section shall be subjected to the specified continuous test pressure for 2 hours.
 - d. Minimum specified initial test pressure shall be 1035 kPa (150 PSI).

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- e. Minimum specified test pressure shall be maintained to within 35 kPa (5 PSI), of the initial test pressure, for the duration of the test.
 - f. The final test pressure must be equal to the initial test pressure.
 - g. The allowable loss will be calculated on the actual length of watermain up to 300 meters. The allowable loss for watermain in excess of 300 meters will be calculated using a length of 300 meters.
6. The watermain is flushed into the sanitary sewer system in accordance with AWWA standards. Hydrants and swab launch stations utilized for flushing must be identified to the appropriate Supervisor II of Distribution and Collection so that the City may pump them out after testing.
 7. The first water sample is taken by the owner's consultant or representative, and witnessed by the Construction Services Inspector (48 hours notice). The sample forms and bottle labels are to be completed by the Consultant. The samples are then taken to an accredited water testing laboratory by a City representative. If a City representative is not available, approval to transport samples to the laboratory must be given by the Manager of Construction Services.
 - a. At least one set of water samples shall be collected from every 400 m of the new watermain, plus one set from the end of the line and at least one set from each branch in excess of 6 m.
 - b. Samples can be collected from hydrants at Contractors risk.
 8. The second water sample is taken, at least 16 hours after the first sample was collected, by the owner's consultant or representative, and witnessed by the Construction Services Inspector (48 hours notice). The sample forms and bottle labels are to be completed by the Consultant or Contractor. The samples are then taken to an accredited water testing laboratory by a City representative;

NOTE

If the connections are not completed within five (5) calendar days of the date the last bacteriological sample was collected, the water main will need to be flushed, disinfected, and bacteriological testing performed again.

9. The official bacteriological water testing results from an accredited water testing laboratory are faxed/emailed by the laboratory to the Manager of Construction Services/Chief Field Inspector as soon as possible for review. The Consultant is to provide all pertinent data to Construction Services before approval.
10. If acceptable, the Manager of Construction Services/Chief Field Inspector will notify the Supervisor of Distribution & Collection by e-mail that all is in order to connect to the municipal system. The e-mail shall be copied to:
 - a. The Subdivision/Site Control Plan Officer, as appropriate;
 - b. The Engineering Review Technician;
 - c. The Construction Services Chief Field Inspector; and
 - d. The responsible Applicant and/or Consulting firm.

Unless the work is associated with a Capital Project, please note that the Consultant must send the entire certification package to the Subdivision/Site Control Plan Officer at Development Approvals, including preliminary as-built drawings;

11. A deposit is required from the Contractor for the OIC service. The deposit is to be placed with the Engineering Services, Engineering Review Technician. This deposit is based on the amount of time required for the OIC to witness the connection. If the Contractor is unprepared for the OIC the Contractor will be charged for the additional time required of the Operator, regardless of whether or not the connections are completed.
12. On the day of the connection:
 - a. The Contractor supplies all equipment, labour and materials including the chlorine; Please note that chlorine must be ANSI / AWWA approved for contact with potable water;
 - b. The OIC for Distribution & Collection shall be on-site to oversee and advise as directed by the ORO for Distribution & Collection;
 - c. The Construction Services Inspector or Consultant is to be on-site for tie-in documentation;
 - d. The Consultant is to be on-site¹ and is responsible for providing all preliminary as-constructed information to the city;
 - e. The Contractor must disinfect all pipe work, fittings and the trench base (the area in the vicinity of the pipe work) with a 1% hypochlorite solution; and
 - f. It will be at the ORO's discretion to have the OIC complete a slug chlorination process on the connecting pipe and the existing isolated water main, by which the OIC will slowly fill the main and begin flushing it. Thereafter, it will be thoroughly flushed and checked by the OIC until it matches the residual concentration of the water in the local distribution system.
13. City forces ensure that the wastewater system is prepared to accept flow;
14. Once the above criteria are satisfied the connection is approved.
15. The appropriate valve/valves are opened by the OIC and the system is pressurized only once at least 1 m of compacted soils are placed over the connection site.

WATER SERVICE CONNECTIONS (<100 mm)

PROTOCOL FOR WATER SERVICE CONNECTIONS

New water service connections are inspected by the OIC from the lot line to the foundation. The Construction Services Inspector inspects from the lot line to the main. Once the certifying engineer/consultant is satisfied that the water service has been installed in general conformance with the design, the following protocol must be followed:

¹ If Consultant is not on-site, the OIC will leave the site and charges for their time will be applied.

1. The Applicant or the Applicants Contractor supplies all equipment, labour and materials including the chlorine; Please note that chlorine must be ANSI / AWWA approved for contact with potable water;
2. The OIC is to be onsite to oversee and advise as directed by the ORO;
3. The Contractor must disinfect all pipe work, fittings, and the trench base (the area in the vicinity of the pipe work) with a 1% hypochlorite solution;
4. The Construction Services Inspector will inspect the pressure side pipe material, joints, depth of cover, curbstop, service box, and corrosion protection;
5. The OIC will perform pressure test on new service;
6. The OIC will ensure that the wastewater system is prepared to accept flow;
7. Once the above criteria are satisfied the connection is deemed completed and approved.
8. The appropriate valve/valves are opened by the OIC and the system is pressurized only once at least 1 m of compacted soils are placed over the connection site.

WASTEWATER CONNECTIONS

PROTOCOL FOR WASTEWATER CONNECTIONS

New wastewater connections are inspected by the OIC from the lot line to the foundation. The Construction Services Inspector inspects from the lot line to the main. Once the certifying engineer/consultant is satisfied that the wastewater system/service has been installed in general conformance with the design, this protocol must be followed:

1. The OIC is to be onsite to oversee and advise as directed by the ORO;
2. The Construction Services Inspector will inspect wastewater pipe material, grade, alignment, bends, joints, and manholes as required;
3. The OIC will perform a falling head test with no allowable decrease and inspect the joints for leakage;
4. The test plug is removed from the test fitting at lot line and the water draining is monitored to ensure it completely drains and no backwash occurs; and,
5. Once the above criteria are satisfied the system is Approved by the OIC.

PROTOCOL FOR DISCONNECTIONS

Water and wastewater services that are to be abandoned in favor of a new connection must be disconnected before the new connection can be made.

Disconnections of existing unused water services are to be performed by the Applicant, and witnessed by City forces prior to backfilling. Domestic water services require the existing mainstop to be turned off at the main, the service line cut out at the mainstop, and the removal or abandonment of the existing curbstop. The existing service line is not to be removed. Larger water services that utilize a "T" connection are to have the "T" cut out of the existing main during a time of watermain shutdown, and removal of the existing property line curbstop. Curbstops that are removed are to be backfilled and the excavated area must be completely restored. Valve chambers to be removed are to have the chamber broken down to 1.0 m below final

grade, backfilled with granular material, drain holes made in the bottom of the structure, and the excavated area must be completely restored.

Disconnections of existing unused wastewater services are to be performed by the Applicant, and witnessed by City forces prior to backfilling. Wastewater service laterals require the existing lateral to be cut and capped directly at the main. Existing manholes to be removed are to be broken down to 1.0 m below final grade, backfilled with granular material, drain holes made in the bottom of the structure, and the excavated area must be completely restored.

Repair/reinstatement of watermains or wastewater mains that were part of the disconnection is to be completed following City standards.

If the removal of connections at the main will cause additional damage to the CGS ROW, special approval may be given to disconnect at an alternate location by the Water/Wastewater Operations Engineer.

APPENDIX A:

Procedure F-6-1

PROCEDURE F-6-1
(formerly referenced by 08-02)

**Procedures to Govern Separation
of Sewers and Watermains**

PROCEDURE F-6-1
PROCEDURES TO GOVERN THE SEPARATION
OF SEWERS AND WATERMAINS

1. Sewers/sewage works¹ and watermains located parallel to each other should be constructed in separate trenches maintaining a minimum clear horizontal separation distance of 2.5 metres.

In cases where it is not practical to maintain separate trenches or the recommended horizontal separation cannot be achieved, the Ministry of Environment and Energy or its designated "agent" may allow deviation from the above.

- 1.1 **Rationale** This is considered a good engineering and construction practice and will reduce the potential for health hazard in the event of the occurrence of conditions conducive to possible contaminated ground water flow into the water distribution system.
- 1.2 Contaminated ground and surface water may enter the water distribution system at leaks or breaks in piping, vacuum air relief valves, blowoffs, fire hydrants, meter sets, outlets, etc. with the occurrence of a negative internal or positive external pressure condition. Water pressure in a part of the system may be reduced to a potentially hazardous level due to shutdowns in the system, main breaks, heavy fire demand, high water usage, pumping, storage, or transmission deficiency.
- 1.3 It is recognized by the Ministry of Environment and Energy that health hazards may develop through relative locations of watermains and sewers. Adequate protection must be provided to prevent the occurrence of waterborne disease and chemical poisoning due to contaminated ground water and surface runoff entering the water distribution system.

2.0 Exceptions

Under unusual conditions, deviations from the "separate trench" requirement may be allowed but only in accordance with the Ministry of Environment and Energy guidelines for location of sewers and watermains set out as follows.

¹ Sewers/Sewage works includes sanitary sewers, sanitary forcemains, storm sewers, and storm forcemains, and all appurtenances/fittings thereto.

3.0 General

Ground or surface water may enter an opening in the water distribution system with the occurrence of a negative internal/positive external pressure condition. Ground water may enter the distribution system at leaks or breaks in piping, vacuum-air relief valves, blow-offs, fire hydrants, meter sets, outlets, etc. Water pressure in a part of the system may be reduced to a potentially hazardous level due to shut downs in the system, main breaks, heavy fire demand, high water usage, pumping, storage, or transmission deficiency.

The relative location of sewers and watermains (including appurtenances) and types of material used for each system are important considerations in designing a system to minimize the possibility of contaminants entering the water distribution system.

The use of, and adherence to, good engineering and construction practice will reduce the potential for health hazard in the event of the occurrence of conditions conducive to ground water flow into the water distribution system.

4.0 Parallel installations

Under normal conditions, watermains should be laid with at least 2.5 metres horizontal separation from any sewer or sewer manhole; the distance shall be measured from the nearest edges.

- a) 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.
- b) 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.
- c) 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.

5.0 Crossings

- 5.1 Under normal conditions, watermain shall cross above sewers with sufficient vertical separation to allow for proper bedding and structural support of the watermain and sewer main.
- 5.2 When it is not possible for the watermain to cross above the sewer, the watermain passing under a sewer shall be protected by providing:
- a) A vertical separation of at least 0.5 metres between the invert of the sewer and the crown of the watermain.
 - b) Adequate structural support for the sewers to prevent excessive deflection of joints and settling.
 - c) That the length of water pipe shall be centred at the point of crossing so that the joints will be equidistant and as far as possible from the sewer.

6.0 SERVICE CONNECTIONS

Wherever possible, the construction practices outlined in this guideline should apply with respect to sewer and water services.

7.0 TUNNEL CONSTRUCTION

If the "Tunnel" is of sufficient size to permit a man to enter the tunnel for the purposes of maintenance, etc., it is permissible to place the sewer and watermain through the tunnel providing the watermain is hung above the sewer.

If the tunnel is sized only to carry the pipes, or if the tunnel is subject to flooding, 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 at a pressure of 350 kPa with no leakage.

8.0 DESIGN FACTORS

When local conditions do not permit the desired spacing, or water and sewer lines or other conditions indicate that detailed investigations are warranted, the following factors should be considered in the design of the environment and relative location of water and sewer lines.

This list of factors should be considered as a guide. The list is not all-inclusive.

- a) Materials, types of joints and identification for water and sewage pipes;
- b) Soil conditions, e.g. in-situ soil and backfilling materials and compaction techniques;
- c) Service and branch connections into the watermain and sewer lines;
- d) Compensating variations in the horizontal and vertical separations;
- e) Space for repair and alterations of water and sewer pipes;
- f) Off-setting of pipes around manholes;
- g) Location of ground-water table and trench drainage techniques;
- h) Other sanitary facilities such as septic tanks and tile fields, etc.

9.0

VALVE, AIR RELIEF, METER AND BLOW-OFF CHAMBERS

- a) Chambers or pits containing valves, blow-offs, meters or other such appurtenances to a water distribution system shall not be connected directly to any sanitary sewer, but may be connected to storm sewers provided that some means of back flow prevention is included.
- b) Blow-offs or air relief valves shall not be connected directly to any sewer.
- c) Such chambers or pits shall be drained to the surface of the ground where they are not subject to flooding by surface water; to absorption pits underground or to a sump within the chamber where ground water level is above the chamber floor.

10.0

POTABLE WATER RESERVOIRS BELOW NORMAL GROUND SURFACE AND WELL SUPPLIES

Sewers, drains, and similar sources of contamination should be kept at least 15 m from potable water reservoirs below normal ground surface and well supplies. Mechanical-jointed water pipes, pressure tested, in accordance with Division 701 of the OPSS at a pressure of 350 kPa with no leakage, may be used for gravity sewers at lesser separations.

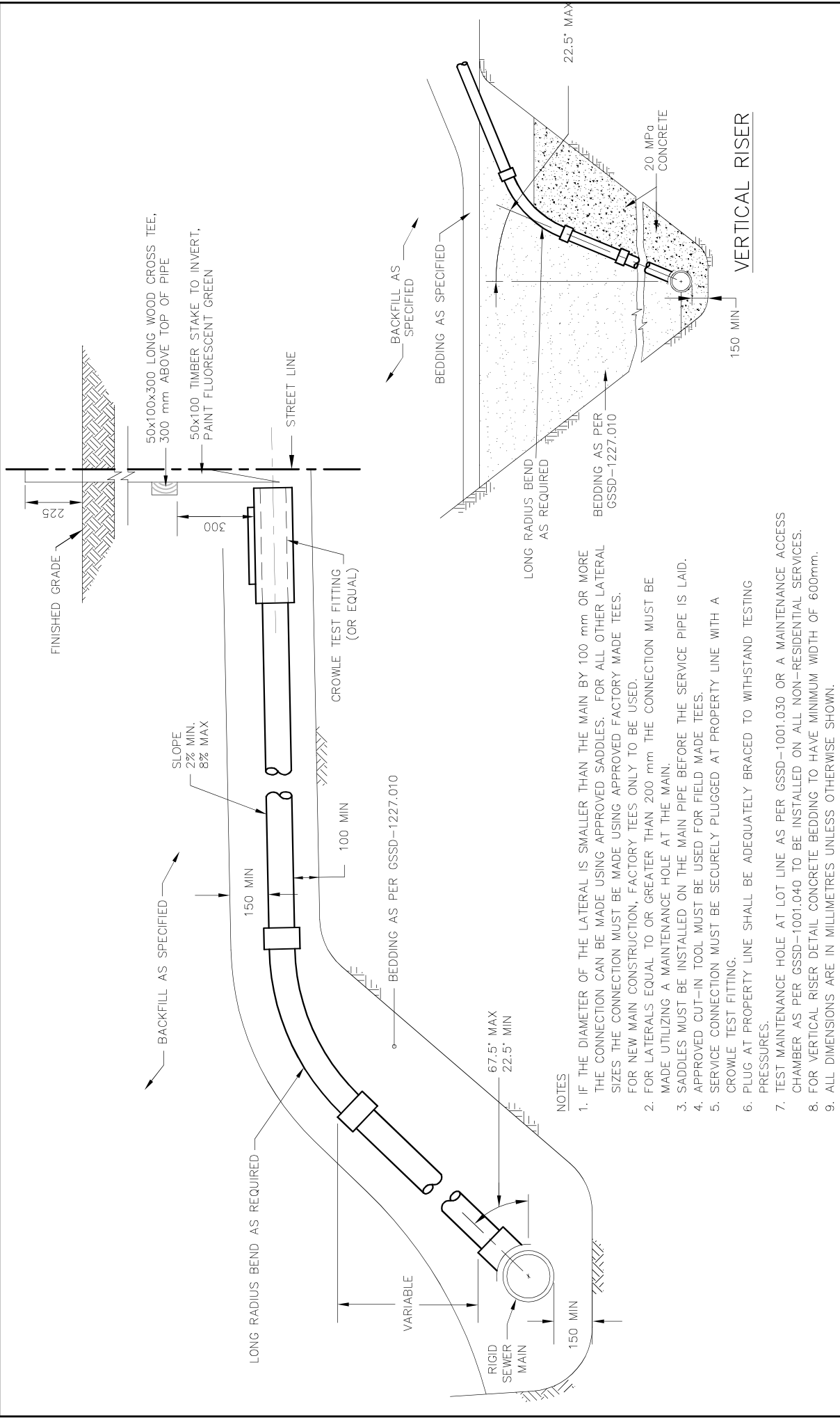
11.0

UNACCEPTABLE INSTALLATIONS

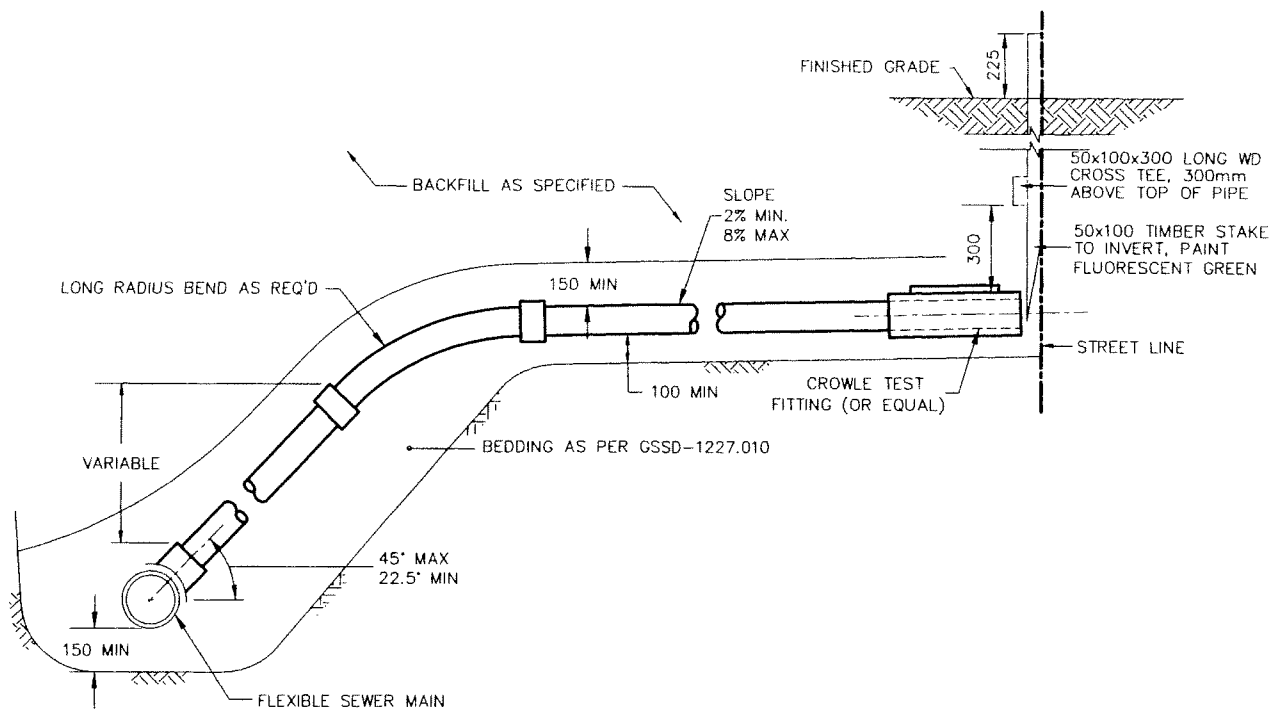
No watermain or service line shall pass through or come into contact with any part of a sewer, sewer manhole and/or septic tank and tile field or similar sources of contamination.

APPENDIX B:

City of Greater Sudbury Standard Drawings & Specifications



DRAWN BY: STS/RFRANK	REV No:	<div data-bbox="1421 1081 1518 1428"> </div> <div data-bbox="1421 514 1518 1039"> SEWER SERVICE CONNECTIONS FOR RIGID MAIN PIPE SEWER </div>
DATE: 2003-03-03	REV DATE:	
SCALE: NTS	CAD/FILE No.:	
APP'D:	A1954-1 (1 OF 1)	
		<div data-bbox="1469 1491 1575 2047"> <p>DISCLAIMER OF WARRANTY</p> <p>The data is provided "as-is", without warranty of any kind either expressed or implied. Any and all liabilities for damage, direct or indirect, however caused, and resulting in any way by use of the supplied data is the full and final responsibility of the user.</p> <p>COPYRIGHT</p> <p>All rights are reserved. No part of the supplied data may be reproduced, or transmitted to others, in any form or by any means, without the written permission of the CITY OF GREATER SUDBURY.</p> </div> <div data-bbox="1534 31 1575 262"> GSSD-1006.010 </div>



NOTES

1. IF THE DIAMETER OF THE LATERAL IS SMALLER THAN THE MAIN BY 100 mm OR MORE THE CONNECTION CAN BE MADE USING APPROVED SADDLES. FOR ALL OTHER LATERAL SIZES THE CONNECTION MUST BE MADE USING APPROVED FACTORY MADE TEES. FOR NEW MAIN CONSTRUCTION, FACTORY TEES ONLY TO BE USED.
2. FOR LATERALS EQUAL TO OR GREATER THAN 200 mm THE CONNECTION MUST BE MADE UTILIZING A MAINTENANCE HOLE AT THE MAIN.
3. SADDLES MUST BE INSTALLED ON THE MAIN PIPE BEFORE THE SERVICE PIPE IS LAID.
4. APPROVED CUT-IN TOOL MUST BE USED FOR FIELD MADE TEES.
5. SERVICE CONNECTION MUST BE SECURELY PLUGGED AT PROPERTY LINE WITH A CROWLE TEST FITTING.
6. PLUG AT PROPERTY LINE SHALL BE ADEQUATELY BRACED TO WITHSTAND TESTING PRESSURES.
7. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
8. MAINTENANCE HOLE AT LOT LINE AS PER GSSD-1001.030 TO BE INSTALLED ON ALL NON-RESIDENTIAL SERVICES.

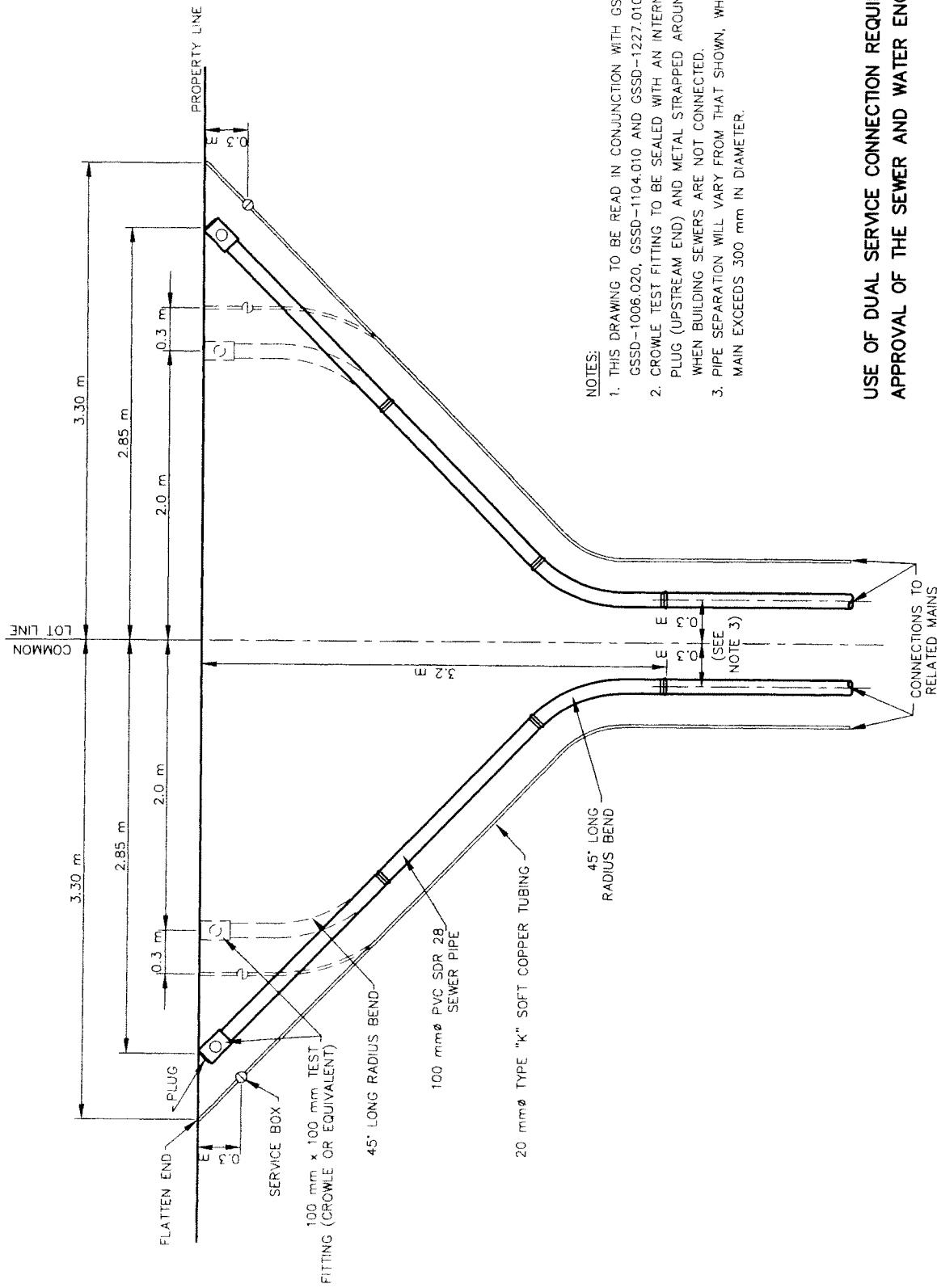


SEWER SERVICE CONNECTIONS FOR FLEXIBLE MAIN PIPE SEWER

DRAWN BY: STS/RFRANK	REV No:
DATE: 2003-03-03	REV DATE:
SCALE: NTS	CAD/FILE No.: A1955-1 (1 OF 1)
APP'D:	GSSD-1006.020

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NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH GSSD-1006.010, GSSD-1006.020, GSSD-1104.010 AND GSSD-1227.010.
2. CROWLE TEST FITTING TO BE SEALED WITH AN INTERNAL-EXPANDING PLUG (UPSTREAM END) AND METAL STRAPPED AROUND EXTERIOR WHEN BUILDING SEWERS ARE NOT CONNECTED.
3. PIPE SEPARATION WILL VARY FROM THAT SHOWN, WHEN THE SEWER MAIN EXCEEDS 300 mm IN DIAMETER.

USE OF DUAL SERVICE CONNECTION REQUIRES WRITTEN APPROVAL OF THE SEWER AND WATER ENGINEER.

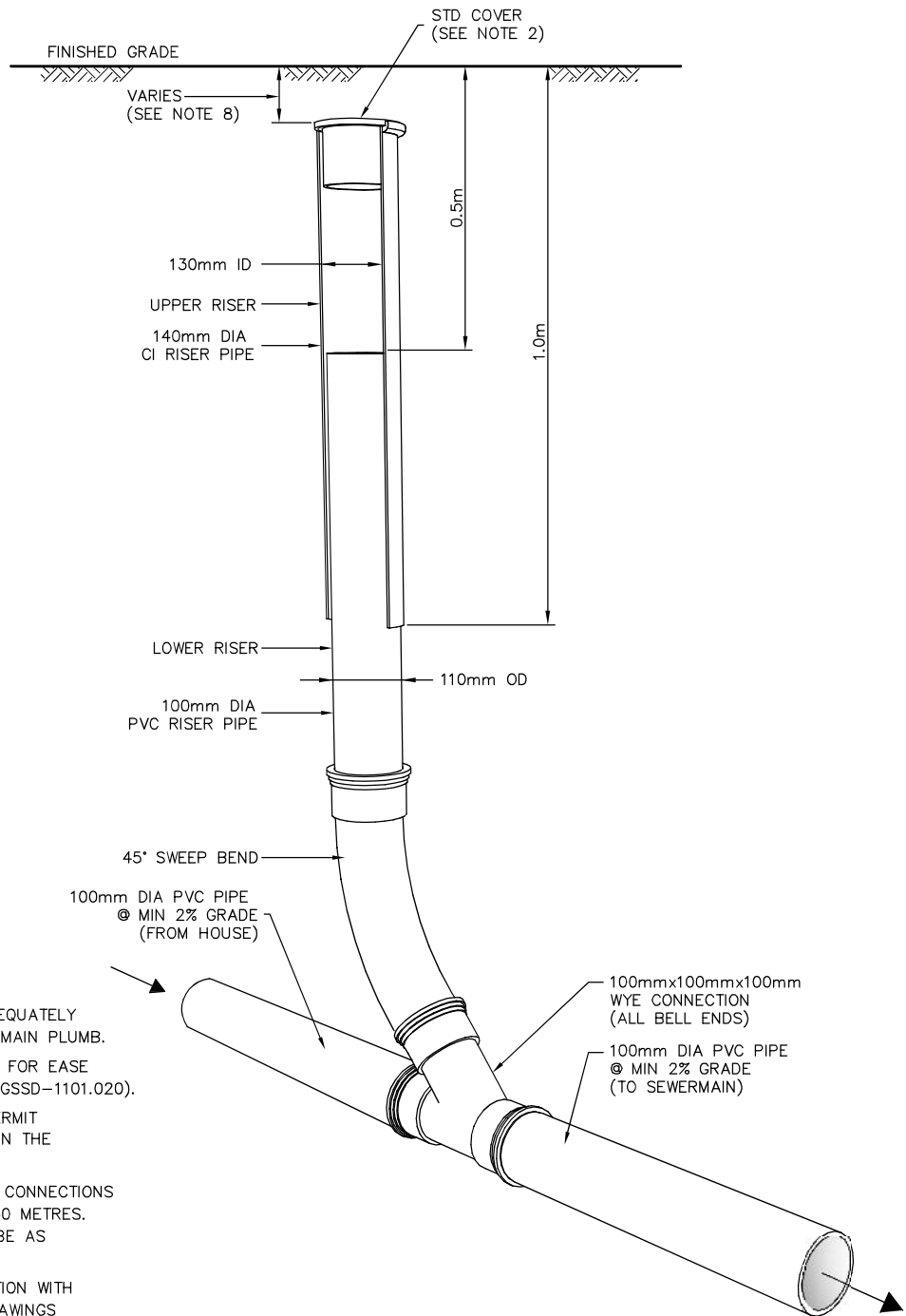
**DUAL SERVICE CONNECTIONS
IN A COMMON TRENCH
(SEWER & WATER)**



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DRAWN BY: STS/REFRANK	REV No:
DATE: 2003-03-03	REV DATE:
SCALE: NTS	CAD/FILE No:
APP'D:	A1956-1 (1 OF 1)
	GSSD-1006.030



NOTES:

1. UPPER AND LOWER ASSEMBLIES TO BE ADEQUATELY BRACED WHILE BACKFILLING, AND MUST REMAIN PLUMB.
2. CLEANOUT COVER SHALL BE OF STD. IRON FOR EASE OF LOCATING WITH DIP NEEDLE (SEE STD. GSSD-1101.020).
3. DEPTH OF WYE MUST BE ADEQUATE TO PERMIT CONNECTION TO OUTLET PIPE AND MAINTAIN THE MINIMUM GRADE OF 2%.
4. THIS STANDARD SHALL APPLY FOR SEWER CONNECTIONS WHEN THE LENGTH OF SERVICE EXCEEDS 30 METRES. LOCATION OF VERTICAL CLEANOUT SHALL BE AS SPECIFIED BY THE ENGINEER.
5. THIS STANDARD TO BE READ IN CONJUNCTION WITH CITY OF GREATER SUDBURY STANDARD DRAWINGS GSSD-1006.030 AND GSSD-1227.010.
6. ALL PVC PIPE SHALL BE S.D.R. 28.
7. BACKFILL MATERIAL SHALL CONSIST OF COMPACTED SAND BEDDING IN 300 mm LAYERS.
8. COVER SHALL BE 100mm BELOW FINISHED GRADE IN SODDED OR GRAVEL AREAS. COVER SHALL BE FLUSH WITH FINISHED GRADE IF IN ASPHALT OR CONCRETE.



STANDARD VERTICAL CLEANOUT ON A SANITARY SEWER SERVICE

DRAWN BY: SAG

REV No: 2

DATE: 2003-03-03

REV DATE: JAN/2013

SCALE: NTS

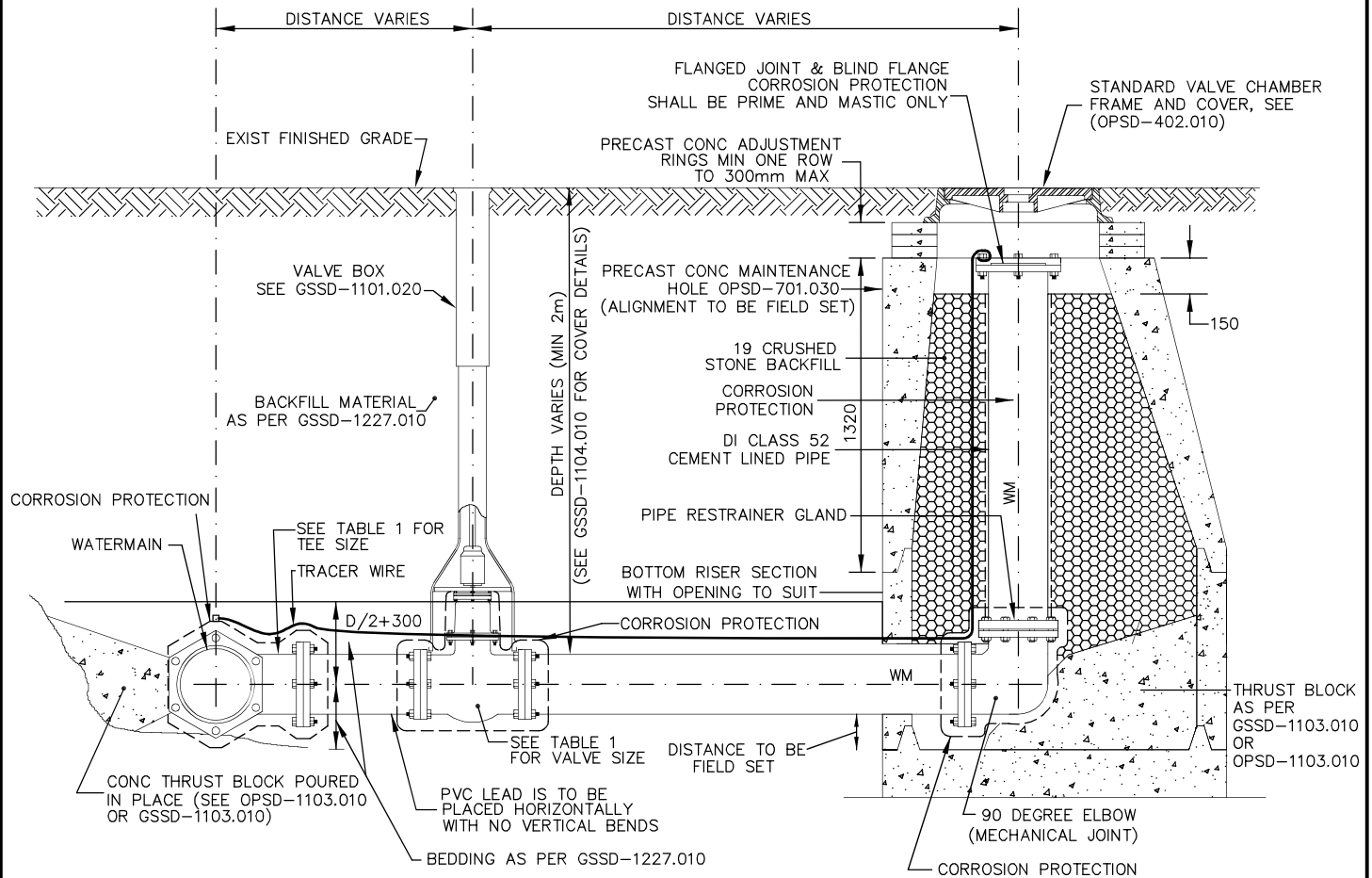
CAD/FILE No.:
A1957-1 (1 OF 1)

APP'D:

GSSD-1025.010

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NOTE:

1. A POLYETHYLENE BOND BREAKER IS TO BE USED BETWEEN ALL CONCRETE THRUST BLOCKS AND FITTINGS.
2. ALL METALLIC FITTINGS & VALVES SHALL HAVE CORROSION PROTECTION
3. FROST STRAP INSTALLATION, AS PER OPSD-701.100.
4. ADJUSTMENT UNITS TO BE SET IN 12 mm MORTAR MIX.
5. TRACER WIRE AS PER GSSD-1110.000
6. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS OTHERWISE INDICATED.

TABLE 1

WM SIZE	SIZE OF TEE, PIPING, GATE VALVE AND FITTING
100	100
150	150
200	200
250	250
300	300
400	300



**VALVE AND SWAB
LAUNCHING STATION
WATERMAIN SIZES
100 mm TO 400 mm**

DRAWN BY: BWK/MHD

REV No: 5

DATE: 2003-03-03

REV DATE: 2013-01-01

SCALE: NTS

CAD/FILE No.:

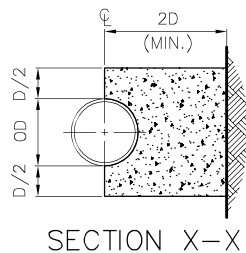
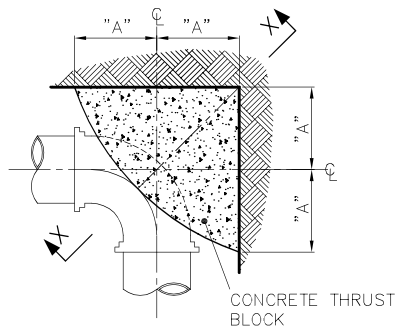
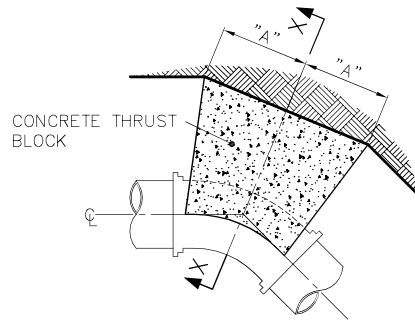
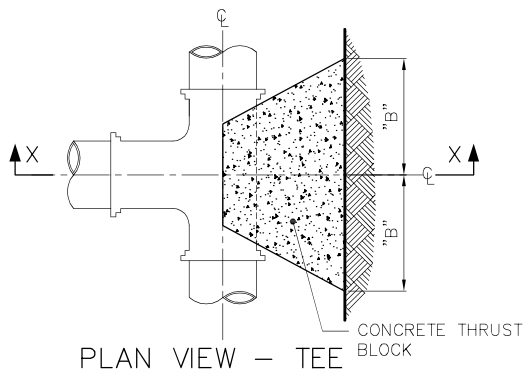
A1964-1 (1 OF 1)

APP'D: PETER CHIESA

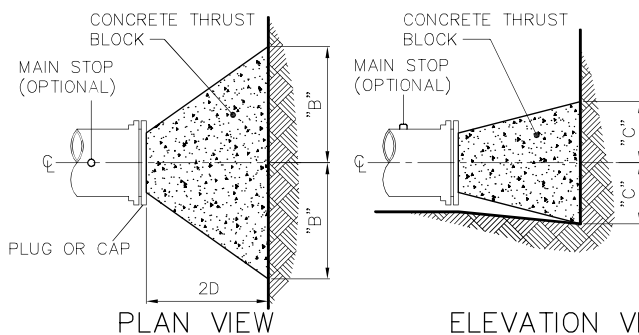
GSSD-1100.030

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NOTE:
D = INSIDE DIAMETER OF PIPE
OD = OUTSIDE DIAMETER OF PIPE



NOTES:

1. ALL CONCRETE THRUST BLOCKS TO BE POURED AGAINST UNDISTURBED GROUND.
2. CLEARANCE OF 80 mm TO BE MAINTAINED FROM FACE OF BELL TO CONCRETE.
3. POLYETHYLENE BOND BREAKER TO BE USED BETWEEN CONCRETE AND CORROSION PROTECTION.
4. THIS BLOCKING DESIGN APPLIES ONLY WHERE 1100 kPa PRESSURE IS NOT EXCEEDED.
5. PRIOR TO POURING CONCRETE, ALL METALLIC FITTINGS SHALL HAVE CORROSION PROTECTION.

ROCK, GRAVEL, COMPACT SAND

PIPE SIZE (mm)	BEND ANGLE				DEAD END/TEE		MINIMUM DIMENSIONS
	W I D T H		"A" (m)		"B" (m)	"C" (m)	
	11.25'	22.5'	45'	90'			
400	0.3	0.3	0.3	0.3	0.3	0.4	
450	0.3	0.3	0.3	0.3	0.3	0.5	
500	0.3	0.3	0.3	0.3	0.3	0.5	
600	0.3	0.3	0.3	0.3	0.3	0.7	
750	0.3	0.3	0.3	0.3	0.4	0.8	
900	0.3	0.3	0.3	0.3	0.4	1.0	
1050	0.3	0.3	0.4	0.3	0.5	1.1	
1200	0.3	0.3	0.4	0.4	0.6	1.3	

HARD DRY CLAY, COMPACT SAND

PIPE SIZE (mm)	BEND ANGLE				DEAD END/TEE		MINIMUM DIMENSIONS
	W I D T H		"A" (m)		"B" (m)	"C" (m)	
	11.25'	22.5'	45'	90'			
400	0.3	0.3	0.3	0.3	0.4	0.4	
450	0.3	0.3	0.3	0.3	0.4	0.5	
500	0.3	0.3	0.4	0.3	0.5	0.5	
600	0.3	0.3	0.4	0.4	0.6	0.7	
750	0.3	0.3	0.5	0.5	0.7	0.8	
900	0.3	0.3	0.6	0.6	0.8	1.0	
1050	0.3	0.4	0.7	0.7	1.0	1.1	
1200	0.3	0.4	0.8	0.8	1.0	1.3	

FIRM OR STIFF CLAY, MEDIUM COMPACT SAND/SILT

PIPE SIZE (mm)	BEND ANGLE				DEAD END/TEE		MINIMUM DIMENSIONS
	W I D T H		"A" (m)		"B" (m)	"C" (m)	
	11.25'	22.5'	45'	90'			
400	0.3	0.3	0.6	0.6	0.8	0.4	
450	0.3	0.3	0.7	0.6	0.9	0.5	
500	0.3	0.4	0.7	0.7	0.9	0.5	
600	0.3	0.4	0.9	0.8	1.1	0.7	
750	0.3	0.6	1.1	1.0	1.4	0.8	
900	0.3	0.7	1.3	1.2	1.7	1.0	
1050	0.4	0.8	1.5	1.4	1.9	1.1	
1200	0.4	0.9	1.7	1.6	2.2	1.3	

MEDIUM SOFT CLAY, LOOSE SATURATED SAND/CLAY

PIPE SIZE (mm)	BEND ANGLE				DEAD END/TEE		MINIMUM DIMENSIONS
	W I D T H		"A" (m)		"B" (m)	"C" (m)	
	11.25'	22.5'	45'	90'			
400	0.5	0.9	1.8	1.6	2.3	0.4	
450	0.5	1.0	2.0	1.8	2.6	0.5	
500	0.6	1.1	2.2	2.0	2.8	0.5	
600	0.7	1.3	2.6	2.4	3.4	0.7	
750	0.8	1.6	3.2	3.0	4.2	0.8	
900	1.0	2.0	3.8	3.6	5.0	1.0	
1050	1.1	2.2	4.4	4.1	5.8	1.1	
1200	1.3	2.6	5.0	4.7	6.6	1.3	

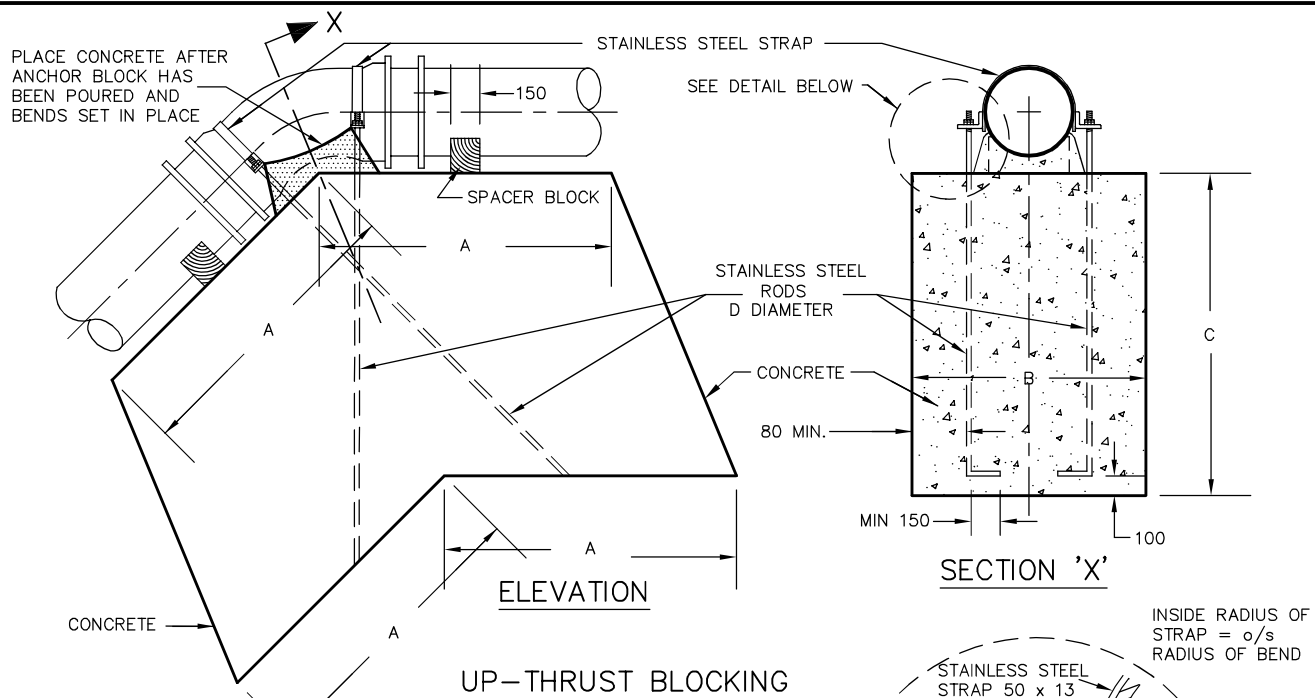


CONCRETE THRUST BLOCKS
FOR TEES, PLUGS,
HORIZONTAL BENDS,
AND DEAD ENDS

DRAWN BY: WJK/STS/RF	REV No: 1
DATE: 2003-03-03	REV DATE: MAY/08
SCALE: NTS	CAD/FILE No.: A1966-1 (1 OF 1)
APP'D:	GSSD-1103.010

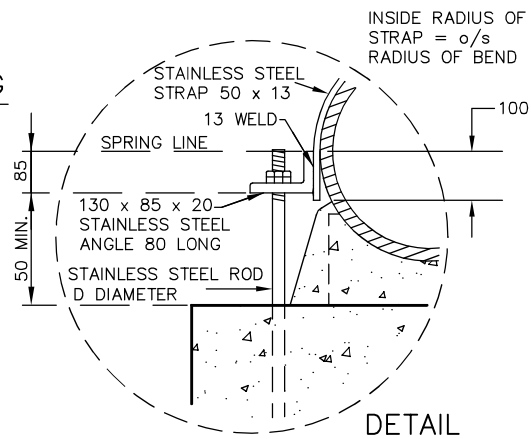
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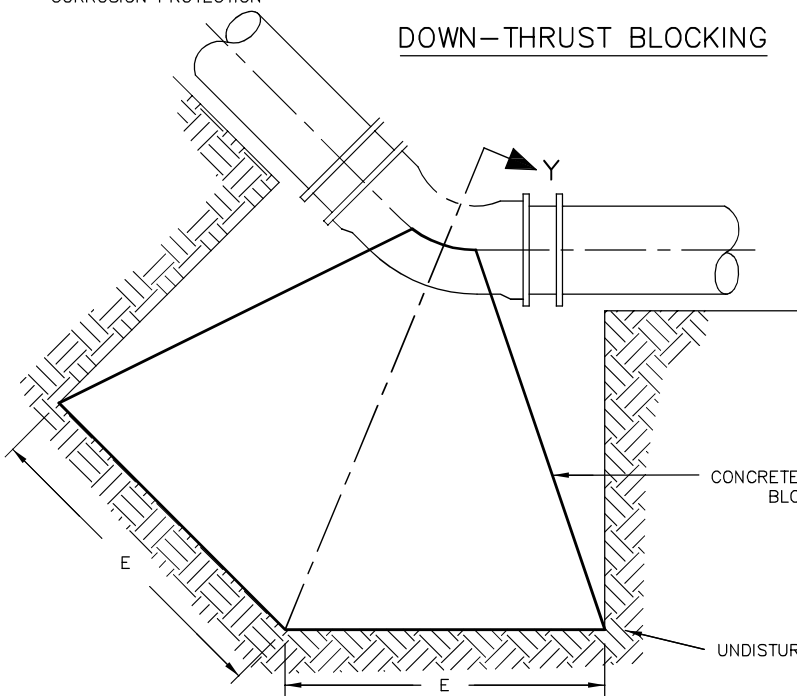


NOTES:

1. ALL CONCRETE THRUST BLOCKS TO BE POURED AGAINST UNDISTURBED GROUND.
2. CLEARANCE OF 80 mm TO BE MAINTAINED FROM FACE OF BELL TO CONCRETE.
3. POLYETHYLENE BOND BREAKER TO BE USED BETWEEN CONCRETE AND FITTINGS.
4. THIS BLOCKING DESIGN APPLIES ONLY WHERE 1100 kPa PRESSURE IS NOT EXCEEDED.
5. THIS BLOCKING IS FOR BENDS UP TO 45° ONLY.
6. THIS BLOCKING DESIGN APPLIES WHERE THE SOIL HAS A MINIMUM SOIL BEARING CAPACITY OF 50 kPa.
7. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
8. CLASS OF CONCRETE: 32 MPa (AIR ENTRAINED) AT 28 DAYS.
9. PRIOR TO POURING OF CONCRETE, ALL METALLIC FITTINGS SHALL HAVE CORROSION PROTECTION

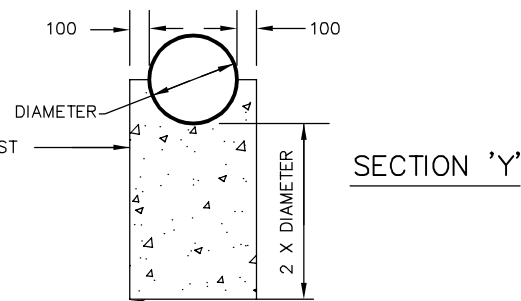


DOWN-THRUST BLOCKING



MINIMUM DIMENSIONS					
PIPE SIZE (mm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
400	1300	1200	1650	25	1650
450	1500	1200	1650	25	2050
500	1500	1500	1650	25	2100
600	2000	1650	1650	2-25*	3000

*USE DOUBLE WIDTH STRAPS (100 mm x 13 mm)

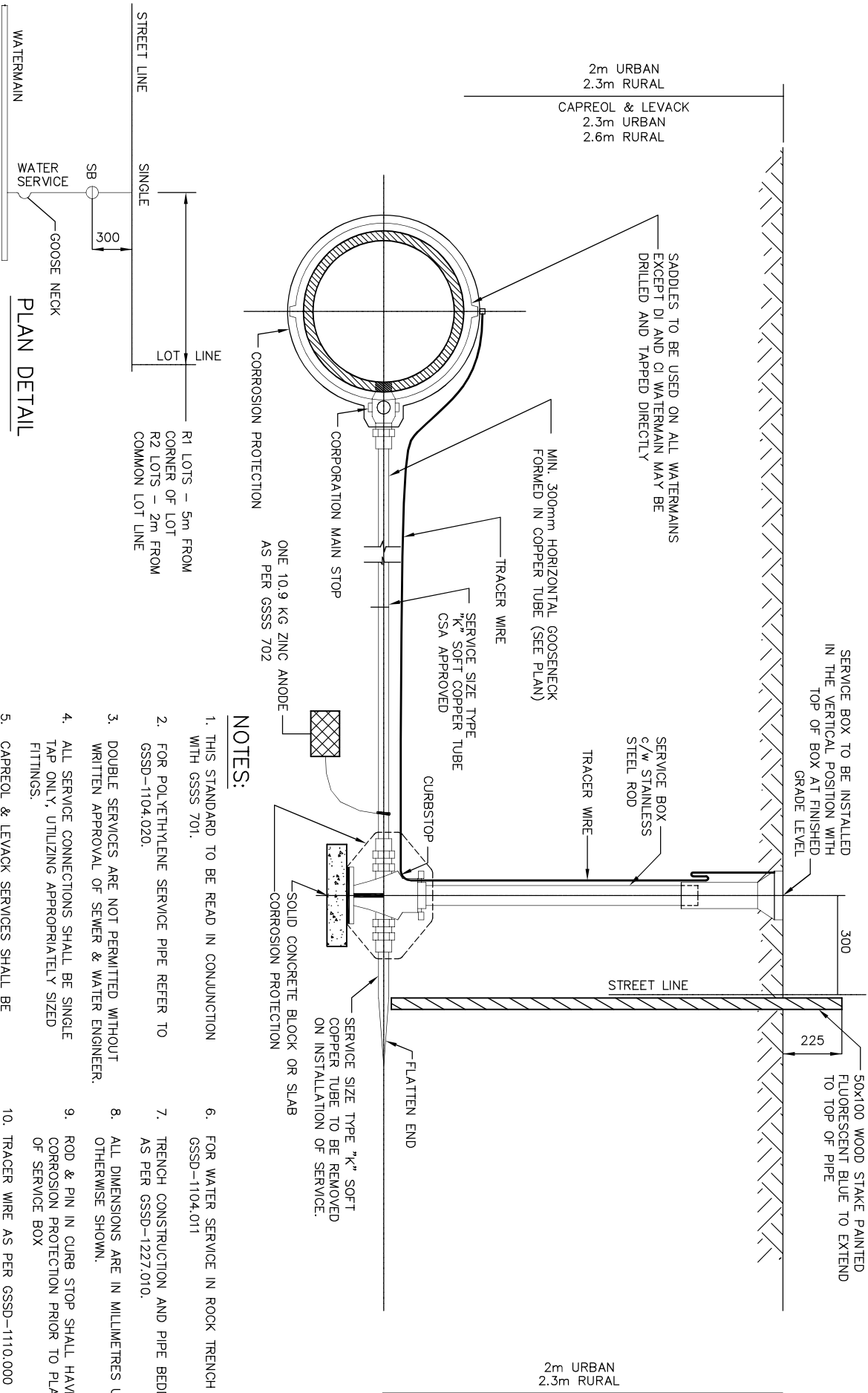


CONCRETE THRUST BLOCKS FOR VERTICAL BENDS

DRAWN BY: STS/RFRANK	REV No: 2
DATE: 2003-03-03	REV DATE: JAN/2013
SCALE: NTS	CAD/FILE No.: A1967-1 (1 OF 1)
APP'D:	GSSD-1103.020

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NOTES:

1. THIS STANDARD TO BE READ IN CONJUNCTION WITH GSSS 701.
2. FOR POLYETHYLENE SERVICE PIPE REFER TO GSSD-1104.020.
3. DOUBLE SERVICES ARE NOT PERMITTED WITHOUT WRITTEN APPROVAL OF SEWER & WATER ENGINEER.
4. ALL SERVICE CONNECTIONS SHALL BE SINGLE TAP ONLY, UTILIZING APPROPRIATELY SIZED FITTINGS.
5. CAPREOL & LEVACK SERVICES SHALL BE INSULATED. SEE GSSD-1104.011.
6. FOR WATER SERVICE IN ROCK TRENCH SEE GSSD-1104.011
7. TRENCH CONSTRUCTION AND PIPE BEDDING AS PER GSSD-1227.010.
8. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
9. ROD & PIN IN CURB STOP SHALL HAVE CORROSION PROTECTION PRIOR TO PLACEMENT OF SERVICE BOX
10. TRACER WIRE AS PER GSSD-1110.000

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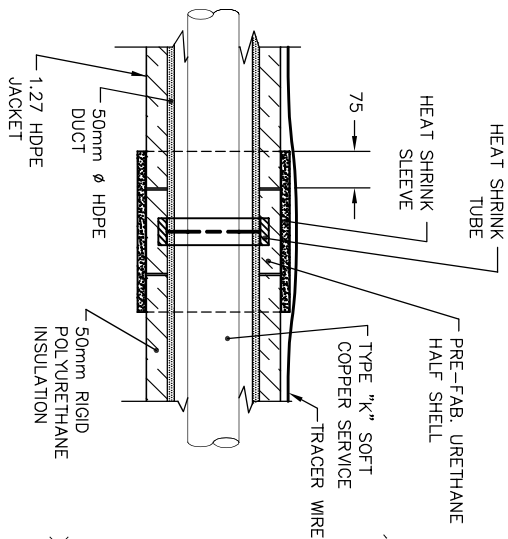
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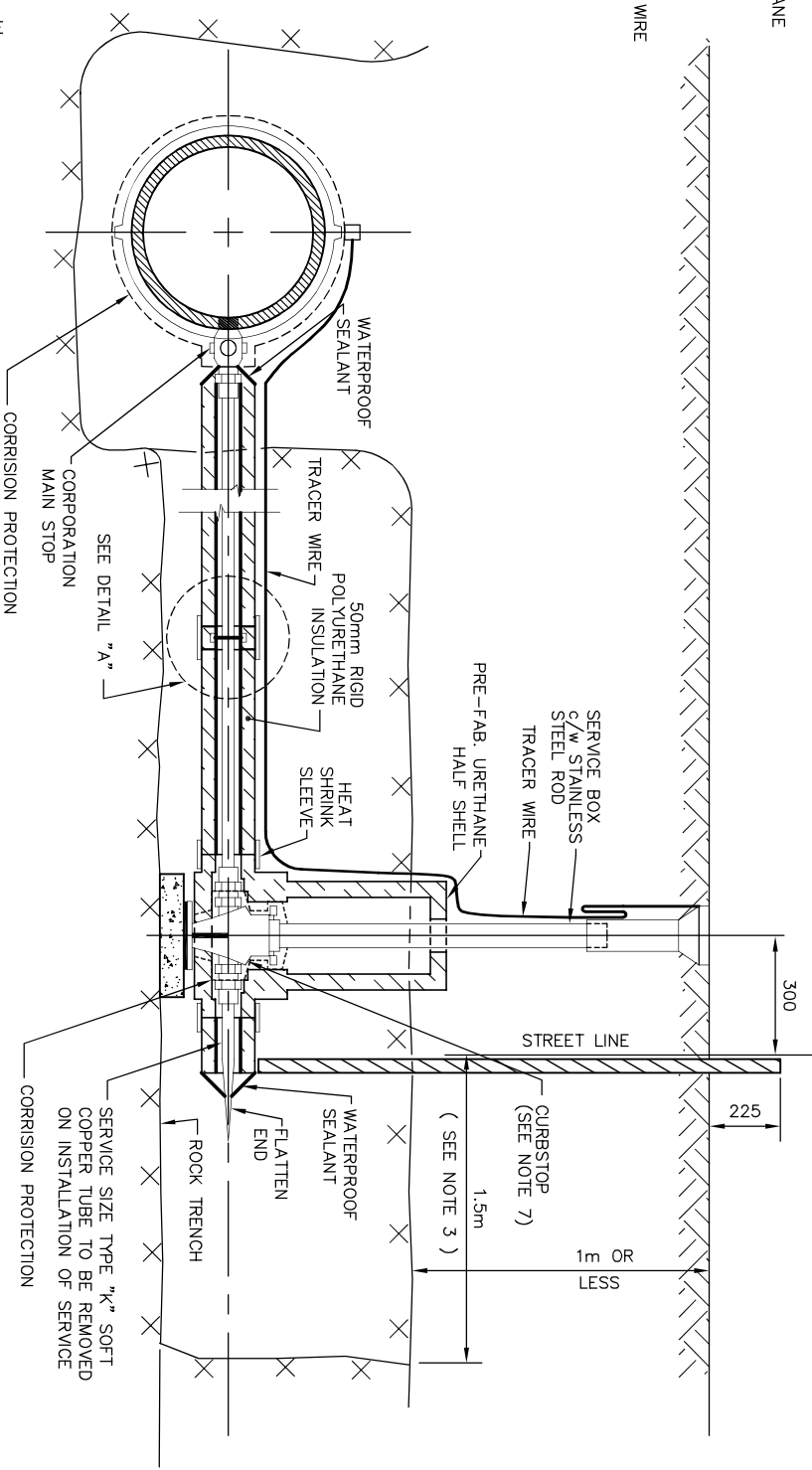


WATER SERVICE CONNECTION
DETAIL IN EARTH TRENCH
20 mm TO 50 mm DIA SIZES

DRAWN BY: STS/RF/MHD	REV No: 4
DATE: 2003-03-03	REV DATE: 2013-01-01
SCALE: NTS	CAD/FILE No.: A1968-1 (1 OF 1)
APP'D:	GSSD-1104.010



DETAIL "A"
INSULATION JOINT



NOTE

1. THIS STANDARD TO BE READ IN CONJUNCTION WITH GSSS-701 & GSSD-1104.010.
2. FOR POLYETHYLENE SERVICE PIPE REFER TO GSSD-1104.020.
3. ROCK SHALL BE BLASTED AND REMOVED TO 1.5 m BEYOND STREET LINE.
4. DOUBLE SERVICES ARE NOT PERMITTED WITHOUT WRITTEN APPROVAL OF THE SEWER AND WATER ENGINEER.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
6. THIS DRAWING TO BE USED IN CONJUNCTION WITH GSSD-1104.010.
7. ROD & PIN IN CURB STOP SHALL HAVE CORROSION PROTECTION PRIOR TO PLACEMENT OF SERVICE BOX.
8. TRACER WIRE AS PER GSSD-1110.000

PLAN DETAIL

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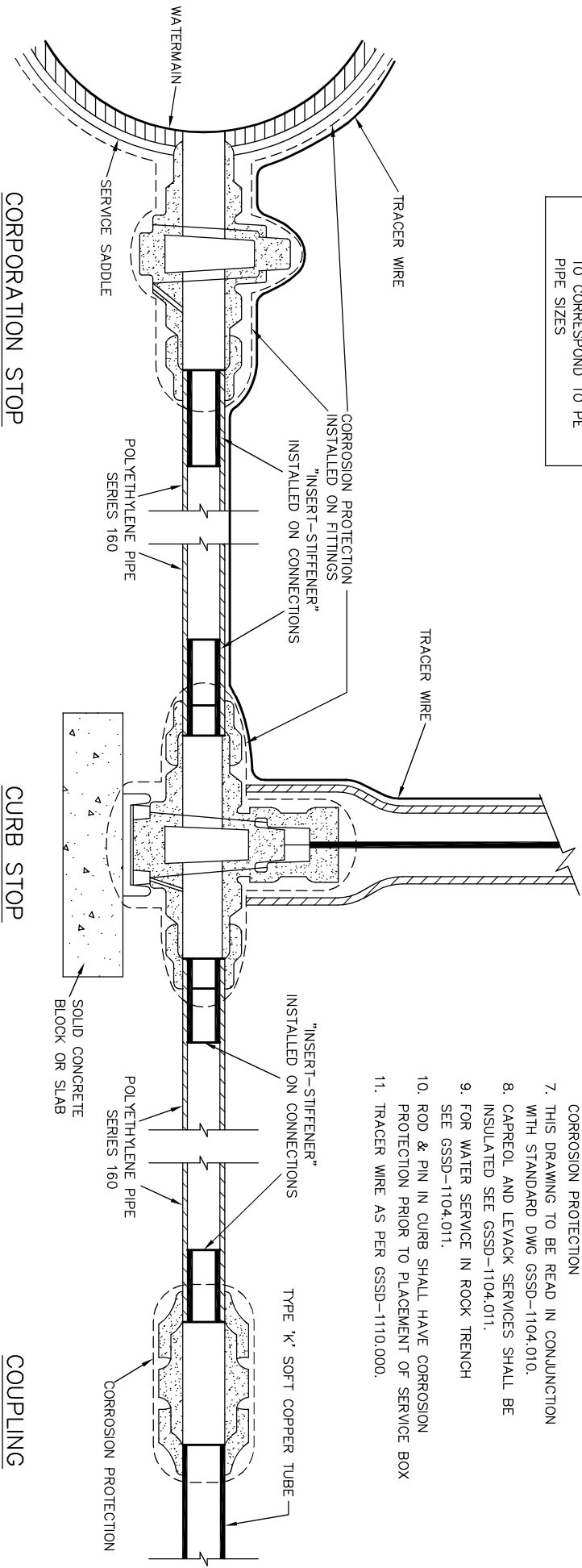


INSULATED DUCT FOR
WATER SERVICE CONNECTION
20 mm TO 50 mm DIA SIZES

DRAWN BY: RF/RK/MHD	REV No.: 4
DATE: 2003-03-03	REV DATE: 2013-01-01
SCALE: NTS	CAD/FILE No.: A1969-1 (1 OF 1)
APP'D: PETER CHIESA	GSSD-1104.011

ALLOWABLE SIZE FOR PE PIPE			
COPPER	POLYETHYLENE (PE)	I.D.	
SIZE	SIZE		
20 mm	25 mm	21 mm	
25 mm	40 mm	31 mm	
40 mm	50 mm	41 mm	
50 mm	50 mm	41 mm	

NOTE: SIZES OF STOPS (CURB &/OR CORPORATION) & FITTINGS TO BE INCREASED TO CORRESPOND TO PE PIPE SIZES



SERVICE BOX

- NOTES:
1. THIS STANDARD TO BE READ IN CONJUNCTION WITH GSSS 701.
 2. "INSERT-STIFFENERS" TO BE USED INSIDE POLYETHYLENE (PE) PIPE FOR WATER SERVICES.
 3. "INSERT-STIFFENERS" TO BE MADE OF QUALITY STAINLESS STEEL.
 4. "INSERT-STIFFENERS" TO BE USED AT ALL CORPORATION STOPS, CURB STOPS, COUPLINGS AND ADAPTERS.
 5. ALL CONNECTIONS TO BE MADE WITH COMPRESSION FITTINGS.
 6. ALL METALLIC COMPONENTS SHALL HAVE CORROSION PROTECTION
 7. THIS DRAWING TO BE READ IN CONJUNCTION WITH STANDARD DWG GSSD-1104.010.
 8. CAPREOL AND LEVACK SERVICES SHALL BE INSULATED SEE GSSD-1104.011.
 9. FOR WATER SERVICE IN ROCK TRENCH SEE GSSD-1104.011.
 10. ROD & PIN IN CURB SHALL HAVE CORROSION PROTECTION PRIOR TO PLACEMENT OF SERVICE BOX
 11. TRACER WIRE AS PER GSSD-1110.000.

CORPORATION STOP

CURB STOP

COUPLING

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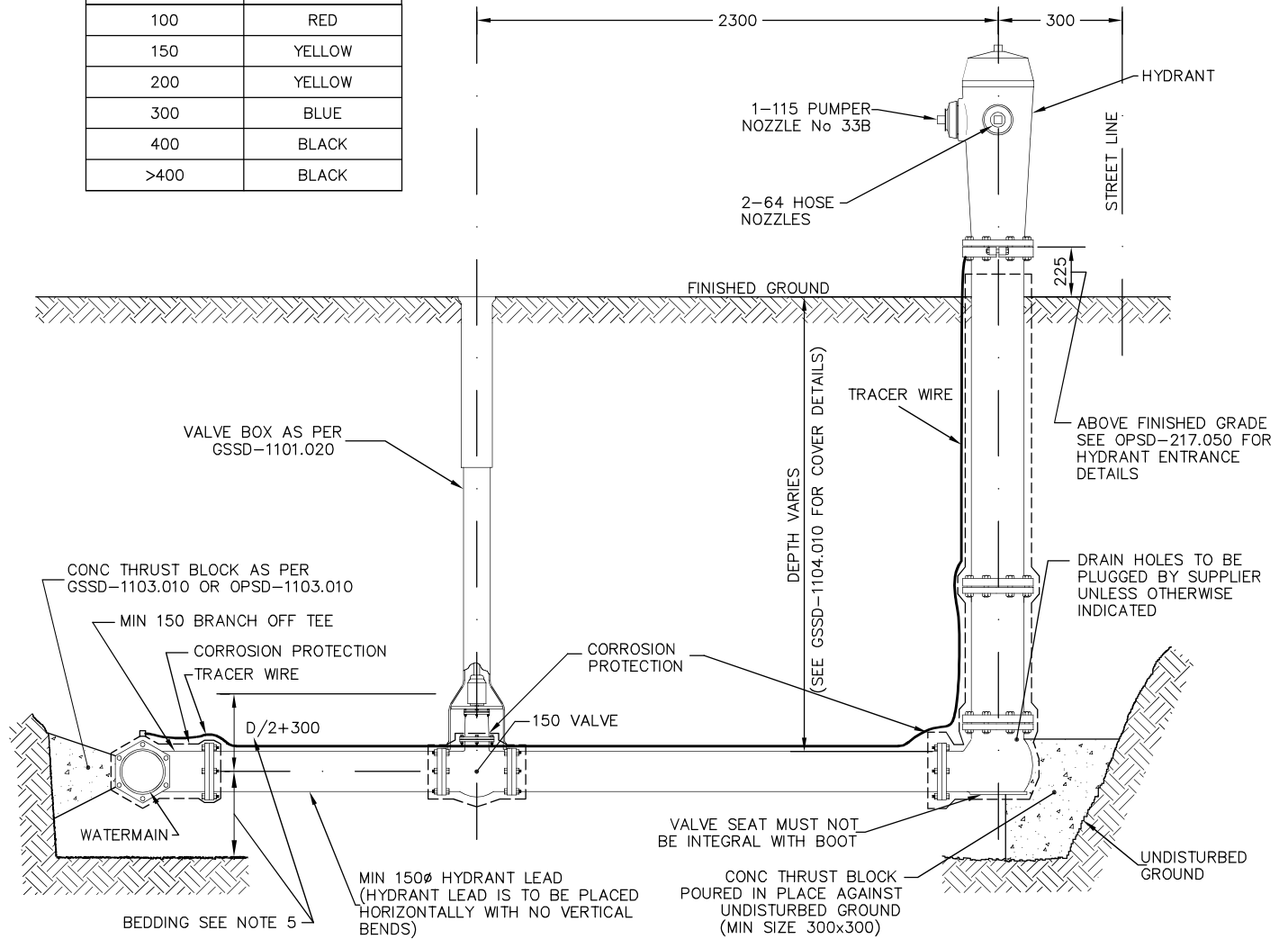
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**POLYETHYLENE WATER SERVICE
CONNECTION DETAIL FOR
25 mm TO 50 mm DIAMETER SIZES**

DRAWN BY: STS/RF /MHD	REV No: 3
DATE: 2003-03-03	REV DATE: 2013-01-01
SCALE: NTS	CAD /FILE No.: A1970-1 (1 OF 1)
APP'D:	GSSD-1104.020

WATERMAIN SIZE	BONNET COLOUR
100	RED
150	YELLOW
200	YELLOW
300	BLUE
400	BLACK
>400	BLACK



NOTE:

1. ALL HYDRANTS TO CONFORM TO AWWA C502.
2. ALL HYDRANTS ARE TO BE INSTALLED WITH ONE FACTORY COAT OF YELLOW PAINT. AFTER INSTALLATION AN ADDITIONAL FAST DRYING WHITE PRIMER COAT (PITTSBURG PAINT "MULTIPRIME" OR APPROVED EQUAL) AND A FINAL YELLOW TOP COAT (PITTSBURG PAINT "FAST DRY ALKYD" OR APPROVED EQUAL) IS TO BE APPLIED TO ALL HYDRANTS. BONNET OF HYDRANT TO BE PAINTED AS PER GSSD-1105.030.
3. HYDRANT EXTENSIONS IF REQUIRED MUST BE PLACED AT THE BOOT OF THE HYDRANT (MAX. ONE EXTENSION PER HYDRANT). INTERNAL ROD EXTENSIONS ARE TO BE PLACED AT THE TOP OF THE HYDRANT SO THE VALVE BALL RUBBER REMAINS AT THE BOTTOM.
4. A POLYETHYLENE BOND BREAKER IS TO BE USED BETWEEN ALL CONCRETE THRUST BLOCKS AND CORROSION PROTECTION
5. BEDDING FOR HYDRANT INSTALLATION AS PER GSSD-1227.010.
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.
7. CORROSION PROTECTION FOR HYDRANT AS PER GSSD-1105.030.
8. TRACER WIRE AS PER GSSD-1110.000



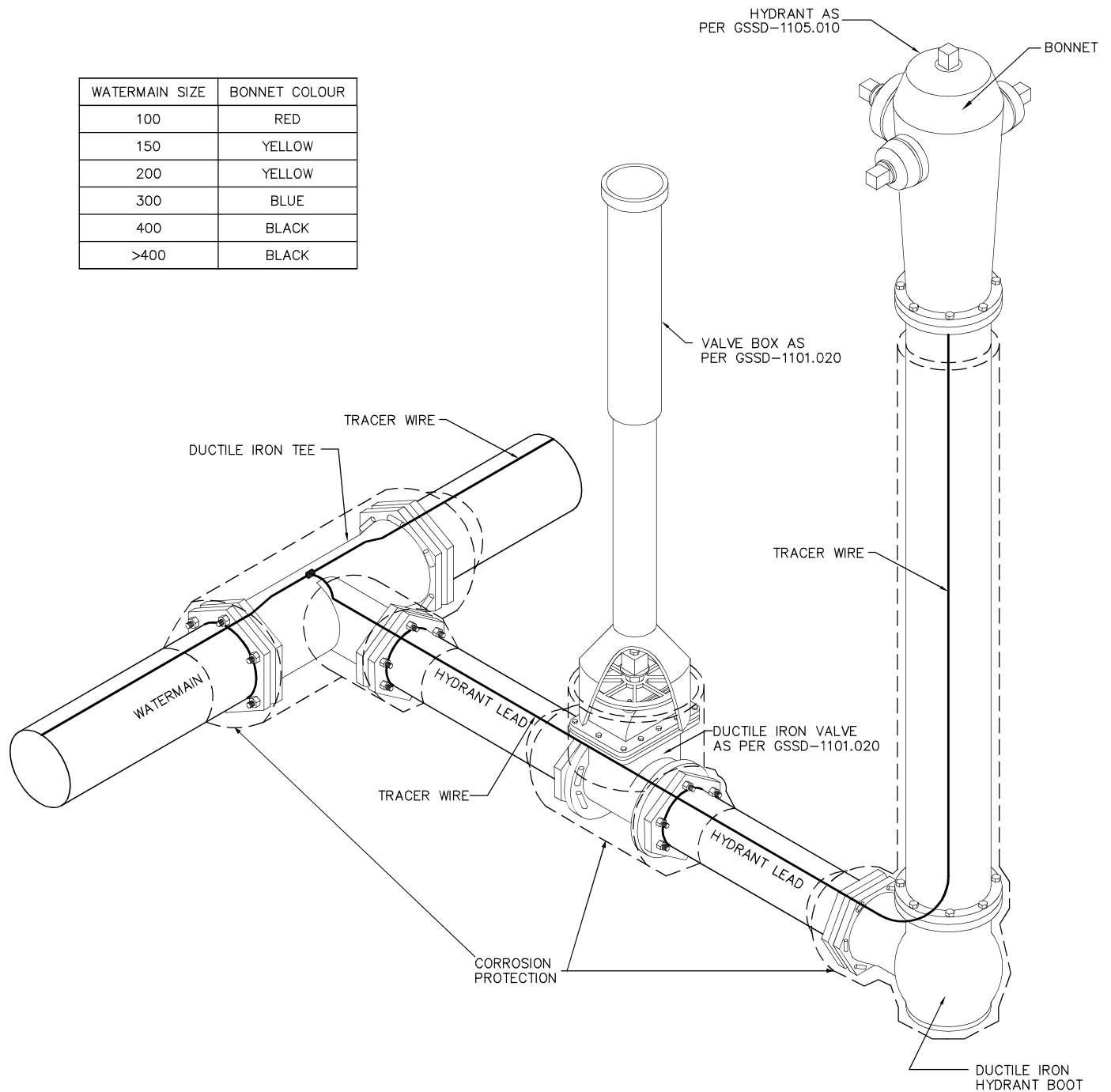
HYDRANT INSTALLATION

DRAWN BY: RF/BK/MHD	REV No: 4
DATE: 2003-03-03	REV DATE: 2013-01-01
SCALE: NTS	CAD/FILE No.: A1971-1 (1 OF 1)
APP'D: PETER CHIESA	GSSD-1105.010

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WATERMAIN SIZE	BONNET COLOUR
100	RED
150	YELLOW
200	YELLOW
300	BLUE
400	BLACK
>400	BLACK



NOTES

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS OTHERWISE INDICATED.
2. THIS STANDARD DRAWING IS TO BE READ IN CONJUNCTION WITH GSSS 703.
3. TRACER WIRE AS PER GSSD-1110.000



CORROSION PROTECTION ON HYDRANT INSTALLATIONS

DRAWN BY: STS/RF/MHD	REV No: 5
DATE: 2003-03-03	REV DATE: 2013-01-01
SCALE: NTS	CAD/FILE No.: A1972-1 (1 OF 1)
APP'D:	GSSD-1105.030

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441.07.21 Shutting Down or Charging Mains

Delete existing paragraph:

Add in the following:

At no time shall watermain that are connected to the existing system be shut down or charged, or valves operated by anyone other than City forces.

441.07.22 Connection to Existing Watermains

Delete second paragraph:

Add in the following:

Prior to making any connection, all requirements of section 441.07.24 "Field Testing" must be met.

Final connections shall be less than 6 metres and shall be swabbed with 1% to 5% chlorine solution.

The watermain shall be immediately connected to the existing distribution system after field testing.

All connections to existing watermains must be supervised by a certified City Operations Representative or his designate after having received a minimum 48 hour advance notification.

Where connections to existing piping require the abandonment of part of the existing piping, all abandoned pipes shall be bulkheaded with concrete as part of the work of constructing the new pipeline.

Where the Contractor fails to locate a particular watermain or service, for the purpose of connecting to, within 3 metres of the plan view, payment shall be made in accordance with the appropriate item for "Test Dig".

441.07.23 Thrust Restraints

Delete in its entirety and replace with the following:

For all PVC pressure pipe installation greater than 350 mm in diameter, thrust restraints shall be provided at all fittings, bends, tees, couplings, valves, hydrants, crosses, reducers and plugged or capped ends in accordance with the contract drawings.

Thrust restraints shall be mechanical restraint devices. Concrete thrust blocking shall be used in addition to mechanical restraints as per GSSD 1103.010 & 1103.020.

In addition to the above thrust restraint requirements, the Contractor shall be responsible to provide Shop Drawings for PVC pressure pipe installations greater than 350 mm in diameter. PVC Shop Drawings shall include the following:

- Letter of Compliance;
- Pipe design calculations;
- Summary of fittings;
- Installation guide;
- Tabulated layout drawings indicating restrained lengths for fittings and valves, signed and stamped by a Professional Engineer licensed to practice engineering in the Province of Ontario.

PVC Shop Drawings shall be provided to the General Manager prior to construction.

441.07.24 Hydrostatic Testing

Delete all subsections and replace with the following:

Add in the following subsection:

441.07.24.01 General

Testing shall be completed in lengths not to exceed 300 metres with no more than 500 metres of watermain installed before testing must commence. Testing must progress with watermain installation so no more than 500 metres of pipe are installed ahead of testing unless otherwise approved by the General Manager.

Water used for cleaning, flushing, testing and disinfecting of the temporary potable water system and/or new watermain shall not be obtained from an existing hydrant. Water may be obtained from one of the five bulk water loading stations located in the City.

441.07.24.02 Cleaning and Swabbing

Prior to disinfecting and hydrostatic testing of the new watermain, the Contractor shall remove all debris from the interior of the watermain with the use of a hydraulically propelled foam swab (of a diameter larger than the watermain).

Cleaning and swabbing to be carried out in stages as sections of the system are completed. Flushed sections shall be protected from contamination.

441.07.24.03 Disinfecting and Hydrostatic Testing

The forms of chlorine that may be used in the disinfection operations are liquid chlorine, sodium hypochlorite solution, and sodium hypochlorite solution and calcium hypochlorite granules or tablets. **Use of calcium hypochlorite intended for swimming pool disinfection shall not be permitted.**

After cleaning and swabbing is completed, liquid chlorine solution shall be introduced slowly expelling all air by opening fire hydrants and blow offs at high points, dead ends and side street laterals so that the chlorine is distributed throughout the section being disinfected. This water shall not be introduced from a direct connection from the existing distribution system.

The chlorine shall be applied so that the chlorine concentration is 50 mg/L minimum throughout the system.

The chlorinated water shall be retained in the main for a minimum of 24 hours during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances.

Sampling and testing for chlorine residual will be carried out by the Contractor. The chlorine residual will be tested in the section at all hydrants, blow offs and sample points after 24 hours. The maximum allowable decrease in chlorine concentration is 40% of the Initial Chlorine Concentration to a Maximum of 50 mg/L. Therefore, if the initial chlorine concentration is 50mg/L, and at least 30 mg/L of chlorine is present after 24 hours, proceed with the hydrostatic testing. If the test does not meet the requirements, the chlorination procedure shall be repeated until satisfactory results are obtained.

All hydrostatic testing shall be conducted under the supervision of a Representative of Construction Services after having received a minimum 48 hours advance notification.

The test section shall be subjected to the specified continuous test pressure for 2 hours.

The minimum initial specified test pressure shall be 1035 kPa (150 psi) or as specified in the contract.

The minimum initial specified test pressure shall be maintained to within ± 35 kPa (5 psi) of the initial test pressure for the duration of the test.

The final test pressure reading must be equal to the initial test pressure reading.

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 0.082 litres per millimetre of pipe diameter per kilometre of watermain for the 2-hour test.

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

The section shall be flushed until chlorine measurements at the extremities of all branches show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system (generally less than 1 mg/litre).

All test data is to be recorded on the City of Greater Sudbury's Watermain Test Report and once completed, a copy shall be forwarded to the Manager of Construction Services.

If the hydrostatic test has met the requirements and the chlorine residual is acceptable, then the Contractor shall be responsible for obtaining satisfactory bacteriological tests which must be obtained from an approved independent lab prior to connections to the existing system. The first of two sets of bacteriological test samples may be taken immediately. A second set of test samples shall be taken at least 24 hours after the first set of samples and immediately following (1) minute flush of water from the sampling line. The set of samples shall consist of at least one from approximately every 400 metres of new watermain, plus one sample from the end of the line and at least one sample from each branch, in excess of 6 metres.

No hose or fire hydrant shall be used in the collection of bacteriological samples. A corporation cock shall be installed in the main or end cap with a copper tube gooseneck assembly. The sampling tube must be dedicated, clean, disinfected and flushed prior to sampling.

The collection of all samples must be witnessed by the Representative of Construction Services (48 hours notice).

The samples shall then be taken to an accredited water testing laboratory by the Representative of Construction Services.

If there is an indication of contamination in the first set of samples, a third set may be taken 24 hours after the second set.

If there is indication of contamination in the second or third set of samples, the mains must be disinfected again, flushed and bacteriological samples taken as above.

Successful bacteriological test results for all samples must be forwarded to the Manager of Construction Services who shall issue written authorization to connect the new watermain to the existing municipal system.

If the connections are not completed within five (5) calendar days of the date the last bacteriological sample was collected, the watermain shall be flushed, disinfected, and bacteriological testing performed again.

441.07.25 Flushing and Disinfecting Watermains

Delete entire section.

441.07.28 Depth of Cover

Add in the following:

Watermains shall be constructed as shown on the plan and profile drawings.

DEPTH OF COVER OVER WATERMAINS

AREA	STANDARD COVER (m)	DEAD END COVER (m)
Urban	2.0	2.2
Rural	2.3	2.5
Urban Capreol & Levack	2.3	2.5
Rural Capreol & Levack	2.6	2.8

Watermains may require installation at greater depths to avoid conflict with other services, existing and proposed.

441.07.29 Camera Inspection

Prior to the placement of the final lift of asphalt, the following camera work shall be performed by the Contractor and the video report provided to the City.

- i) Where blasting occurs, all sanitary and storm sewer mains within the limits of construction. The Contractor shall be paid for the camera work.
- ii) All sanitary and storm sewers, laterals and mains, which were crossed above or below by the watermain and all laterals and mains repaired during construction. The Contractor shall be paid for the camera work.

All sewers mentioned above found to be deficient shall be repaired and re-cameraed at the Contractor's expense until acceptable to the General Manager.

Add in the following:

441.07.30 Adjustment of Valve Boxes

Where existing valve boxes require adjustment, the Contractor shall excavate to sufficient depths around the valve box to allow for movement of the upper section. Should there be insufficient length available for adjustment, the Contractor shall dig down to below the first section and replace with a section of adequate length. The Contractor shall ensure that when complete all valve boxes are vertical and flush to final grade.

Where the valve box is plumb, adjustments in height may be made using cast iron road levellers. A maximum of one road leveller will be allowed per box.

APPENDIX C:

Watermain Test Report/Procedures Form

WATERMAIN TEST REPORT/PROCEDURES

NOTE – ALL TESTS REQUIRE COMPLETION OF PARTS A, B, C, AND D

PART A – PROJECT DATA

DATE: _____

STREET: _____

AREA: _____

PROJECT: _____

CONTRACT NO.: _____

INSPECTOR: _____

CONTRACTOR: _____

FOREPERSON: _____

CONSULTANT: _____

CONSULTANT REP.: _____

PART B - KEY PLAN (Indicate Valves, Hydrants, Blow offs & Position - Open or Closed)

TEST LOCATION: _____


NORTH

PART C - TESTS (All tests are to be completed and filled out)

Refer to OPSS 441 for information regarding test procedures and GSSS 441 for additional information

C1 - SWABBING

DATE: _____

LOCATION: _____

REMARKS: _____

SWAB SIZE: _____

MAIN SIZE & TYPE: _____

MAIN LENGTH: _____

NO. INSERTED: _____

NO. RETRIEVED: _____

NOTE: SWABS OF A LARGER DIAMETER THAN THE MAIN MUST BE USED – SEE GSSS 441

C2 - HYDROSTATIC LEAKAGE

DATE: _____

☐ PASS☐ FAIL

INSPECTOR'S SIGNATURE: _____ (AS WITNESSED)

MAIN SIZE (mm)	TYPE	LENGTH (km)	x	*LOSS FACTOR	=	ALLOWABLE LOSS (L)
100	_____	_____		8.20		_____
150	_____	_____		12.30		_____
200	_____	_____		16.40		_____
250	_____	_____		20.50		_____
300	_____	_____		24.60		_____
400	_____	_____		32.80		_____
500	_____	_____		41.00		_____
600	_____	_____		49.20		_____
_____	_____	_____		_____		_____
TOTAL ALLOWABLE LOSS						<div></div>

*CALCULATION FOR ALLOWABLE LOSS FACTOR – GSSS 441.07.24.03

0.082 (liters) x pipe dia. (mm) x pipe length (km) = ALLOWABLE LOSS

ALLOWABLE LOSS _____

ACTUAL LOSS _____

INITIAL PRESSURE READING

psi

psi

psi

psi

kpa

kpa

kpa

kpa

Time: _____

Time: _____

Time: _____

Time: _____

FINAL PRESSURE READING

psi

kpa

Time: _____

This form does not apply to Polyethylene Pipe, see OPS standards.

This test must be conducted under the supervision of a representative from Construction Services, after having received a minimum of 48 hours advanced notification, on all work performed under the direction of a Consultant.

- 1) Test section shall be subjected to the specified continuous test pressure for 2 hours.
- 2) Minimum specified initial test pressure shall be 150 P.S.I. (1035 kPa)
- 3) Minimum specified test pressure shall be maintained to within 5 P.S.I. (35 kPa) of the initial test pressure, for the duration of the test.
- 4) The final pressure reading must be equal to the initial test pressure.
- 5) For test procedure with polyethylene pipe, please refer to OPSS 441.07.24.02.

C3 – CHLORINATION TEST

DATE: _____

CHLORINE RESIDUAL FULL: _____ mg/L (ppm)
CHLORINE RESIDUAL AFTER 16 HOURS: (25 mg/L OR 25 ppm) _____ mg/L (ppm)
CHLORINE RESIDUAL AT HOOK-UP: _____ mg/L (ppm)

- 1) The forms of chlorine that may be used in the disinfection operations are liquid chlorine, sodium hypochlorite solution, and sodium hypochlorite solution and calcium hypochlorite granules or tablets. Use of calcium hypochlorite intended for swimming pool disinfection shall not be permitted.
- 2) After cleaning and swabbing is completed, liquid chlorine solution shall be introduced slowly expelling all air by opening fire hydrants and blow offs at high points, dead ends and side street laterals so that the chlorine is distributed throughout the section being disinfected. The water shall not be introduced from a direct connection from the distribution system.
- 3) The chlorine shall be applied so that the chlorine concentration is 100 mg/L minimum throughout the system.
- 4) The section shall be flushed until chlorine measurements at the extremities of all branches show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system.

C4 – BACTERIOLOGICAL TEST

SAMPLES TAKEN BY: INSPECTOR CONTRACTOR . . . CONSULTANT . . . OTHER

1 st SAMPLE	2 nd SAMPLE	3 rd SAMPLE
DATE: _____	DATE: _____	DATE: _____
TIME: _____	TIME: _____	TIME: _____
WORK ORDER #: _____	WORK ORDER #: _____	WORK ORDER #: _____
RESULT: _____	RESULT: _____	RESULT: _____
WITNESSED BY: _____	WITNESSED BY: _____	WITNESSED BY: _____

- 1) Sampling shall be conducted under the supervision of a representative from Construction Services, after having received a minimum of 48 hours advanced notification, on all work performed under the direction of a Consultant.

PART D – SIGNATURES – VERIFICATION THAT TESTING IS COMPLETE

INSPECTOR: _____	_____	_____
PLEASE PRINT	SIGNATURE	DATE
CONTRACTOR: _____	_____	_____
PLEASE PRINT	SIGNATURE	DATE
CONSULTANT: _____	_____	_____
PLEASE PRINT	SIGNATURE	DATE

SPECIFIC NOTES

- 1) The Consultant shall forward copies of this report, completed, with copies of the Bacteriological Test Reports, to the Manager and the Chief Field Inspector of Construction Services.
- 2) Prior to any connection of the new watermain to the existing municipal system, the Consultant must first receive written permission from the Manager of Construction Services.
- 3) All connections to existing watermains must be supervised by a certified representative of operations, or his designate.
- 4) The Supervisor of Distribution and Collection shall be given a minimum 48 hours notice, prior to the hook-up date.
- 5) Construction Services shall be given a minimum 48 hours notice, to have a representative on site, prior to the hook-up date.
- 6) The Consultant shall be responsible for arranging a meeting with the Supervisor of Distribution and Collection, Construction Services, and the Contractor to review the proposed hook-up. The discussion shall deal with the type of hook-up, homes affected, scheduling and any other matters concerning the hook-up that may arise.
- 7) The Consultant shall still be responsible for submitting, to Development Services, this completed form along with copies of the Bacteriological test results and the results of any other mandated or required tests. The Consultant shall also be responsible for collecting, organizing and submitting, to Development Services, all relevant information required for as-built preparation and / or updating.
- 8) The Consultant shall be on site as well as an Operator in Charge (OIC) from Water/Wastewater, Construction Services (at their discretion), on the day, of the hook-up to the existing municipal system.