



# Protocol for New Watermain, Water Service and Wastewater Connections

No. WWS-DC-CP v.6.0

## OPI

Errors or omissions to this Connection Protocol should be brought to the attention of the office of Primary Interest (OPI): Distribution & Collection Operations Engineer.

## Distribution List

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

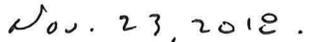
External: eLinks Administrator

## Approvals

OPI Signature:   
Brittany Hallam

  
Date

Director Approval:   
Randy Halverson

  
Date



**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 D&C 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, Conservation and Parks, 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 MECP 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 Distribution and Collection 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 Distribution and Collection Operations Engineer or designate for preapproval prior to being distributed to the public. The Distribution and Collection Operations Engineer or designate requires at least two (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/Construction Services Coordinator and the Linear Infrastructure Services Supervisor of Distribution and Collection that they can proceed with the inspection and connection. The Applicant will not contact Construction Services or Linear Infrastructure Services directly to request an inspection or connection until the above have been obtained or paid. Once the above have been obtained or paid, Linear Infrastructure Services and Construction Services require 48 hours notice for any inspection services/connection requests.

Notice to Linear Infrastructure 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/Construction Services Coordinator; the Construction Services/Construction Services Coordinator 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 Linear Infrastructure Services 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 watermains 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 Contractor. 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 370 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 sixteen (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 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/Construction Services Coordinator 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/Construction Services Coordinator 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 Coordinator; and
  - d. The responsible Applicant and/or Consulting firm.

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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-site<sup>1</sup> 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:

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<sup>1</sup> 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 Distribution and Collection 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 works<sup>1</sup> 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.

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<sup>1</sup> 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, watermains 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**

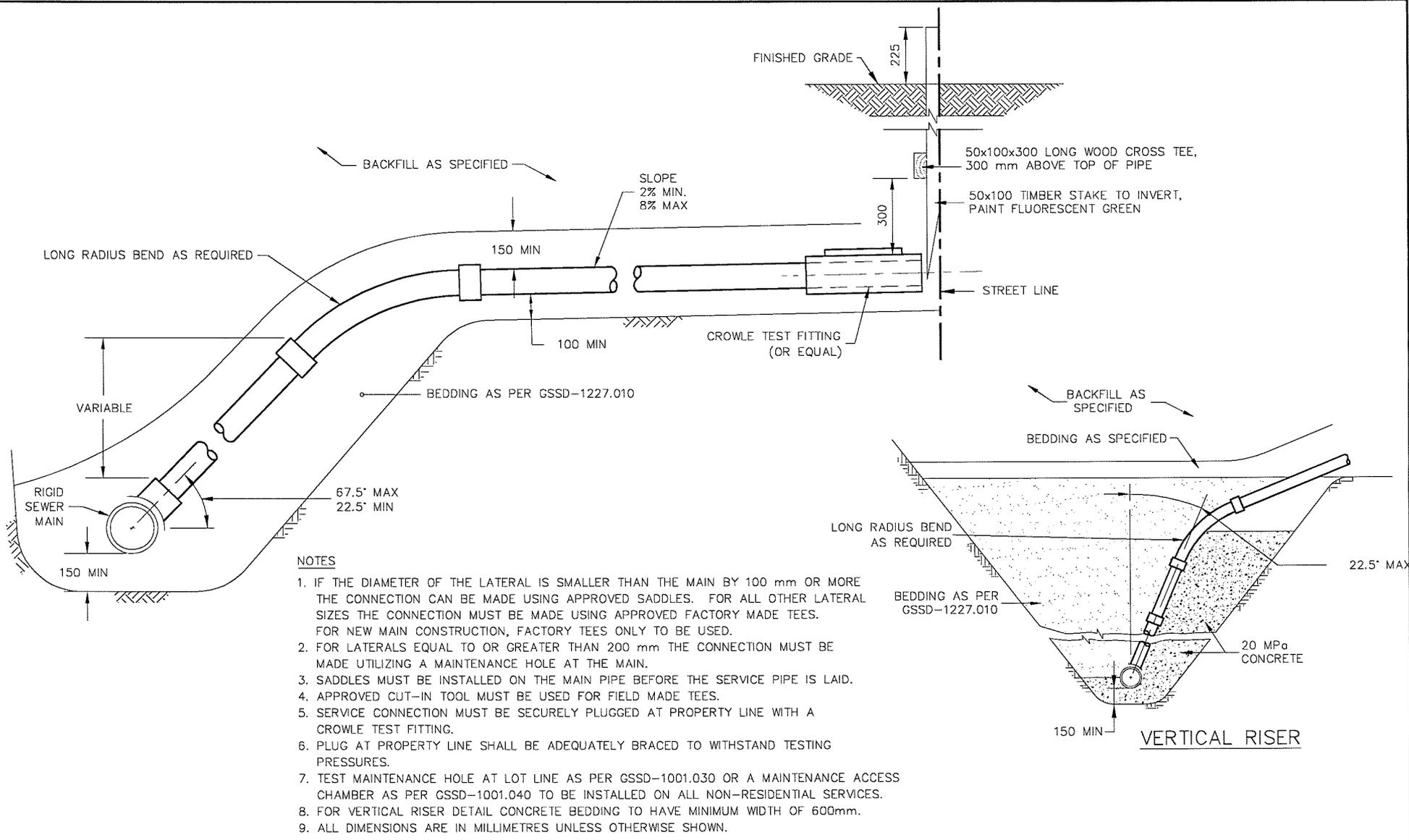
Sewers, drains, and similar sources of contamination should be kept at least 15 m from potable water reservoirs below normal ground surface and well supplies. Mechanical-jointed water pipes, pressure tested, in accordance with Division 701 of the OPSS at a pressure of 350 kPa with no leakage, may be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



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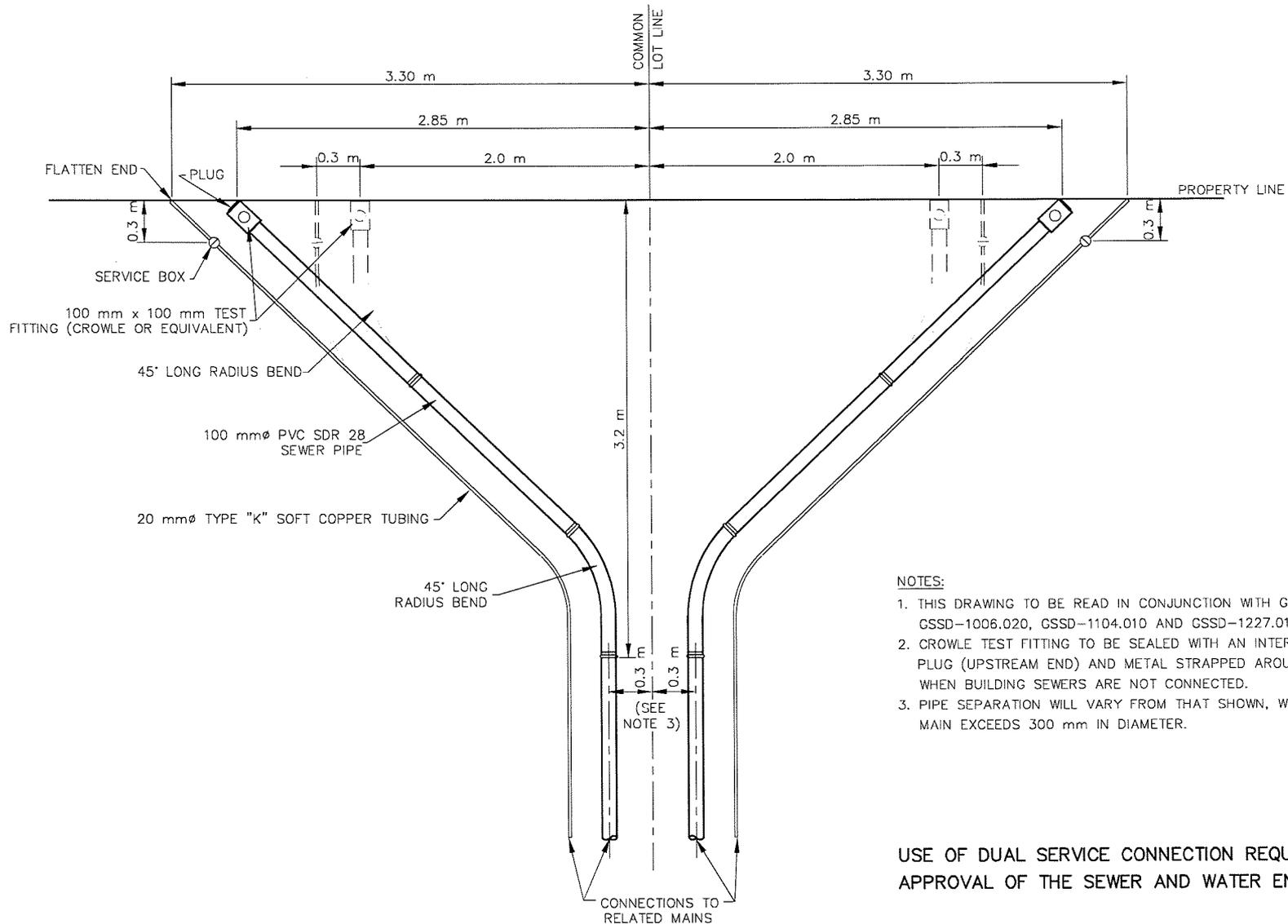
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**SEWER SERVICE CONNECTIONS  
 FOR RIGID MAIN PIPE SEWER**

DRAWN BY: STS/RFRANK	REV No:
DATE: 2003-03-03	REV DATE:
SCALE: NTS	CAD/FILE No.: A1954-1 (1 OF 1)
APP'D:	GSSD-1006.010





**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.**

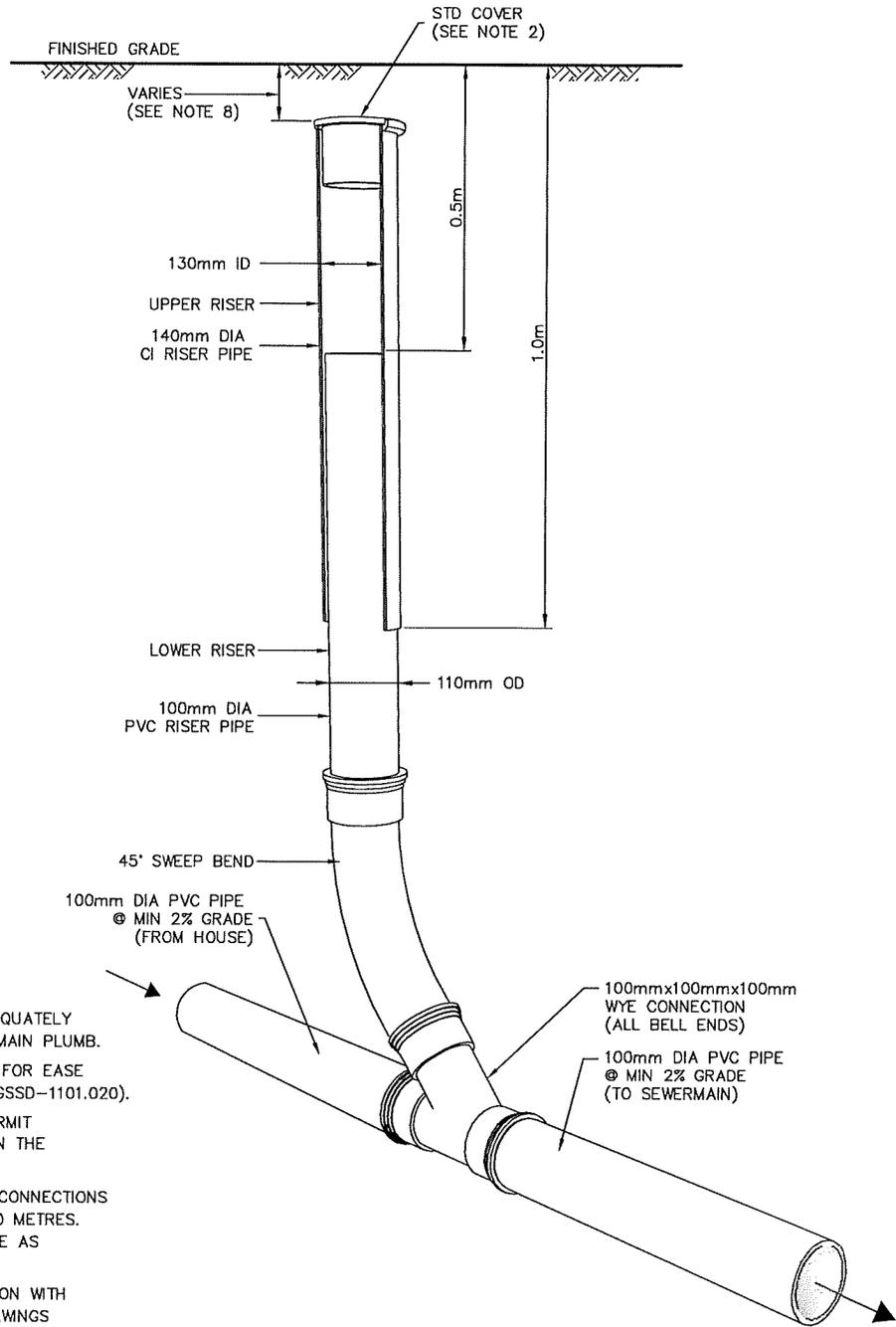
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**DUAL SERVICE CONNECTIONS  
 IN A COMMON TRENCH  
 (SEWER & WATER)**

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



**NOTES:**

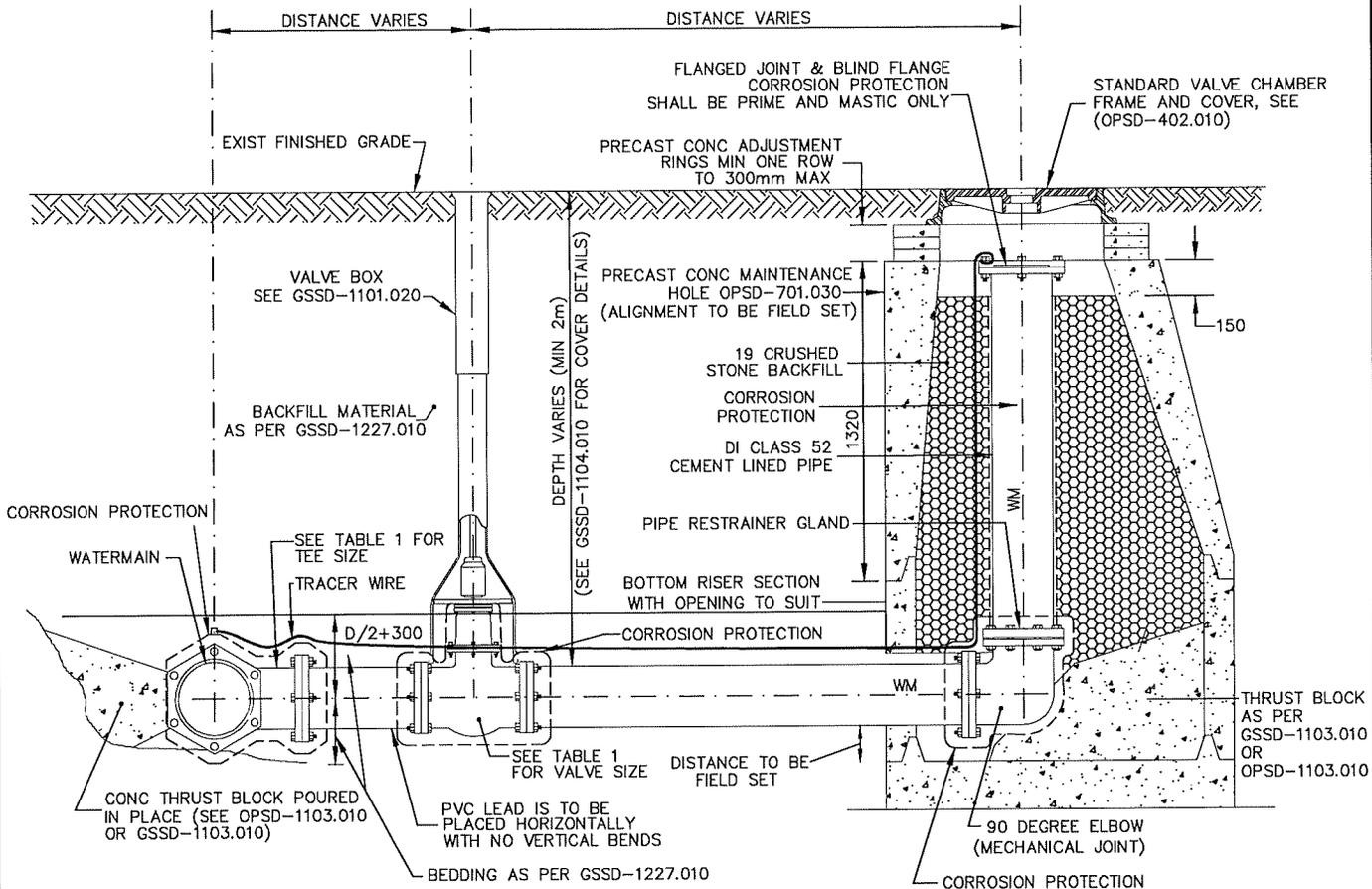
1. UPPER AND LOWER ASSEMBLIES TO BE ADEQUATELY BRACED WHILE BACKFILLING, AND MUST REMAIN PLUMB.
2. CLEANOUT COVER SHALL BE OF STD. IRON FOR EASE OF LOCATING WITH DIP NEEDLE (SEE STD. GSSD-1101.020).
3. DEPTH OF WYE MUST BE ADEQUATE TO PERMIT CONNECTION TO OUTLET PIPE AND MAINTAIN THE MINIMUM GRADE OF 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 DRAWNGS 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.

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

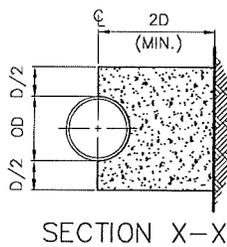
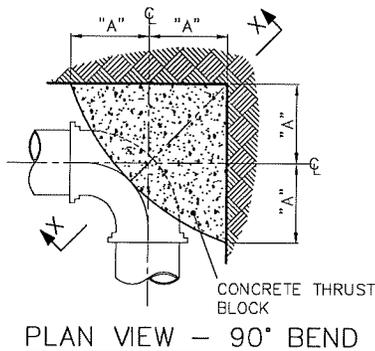
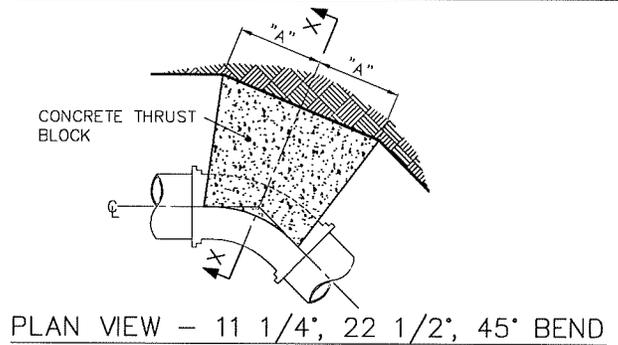
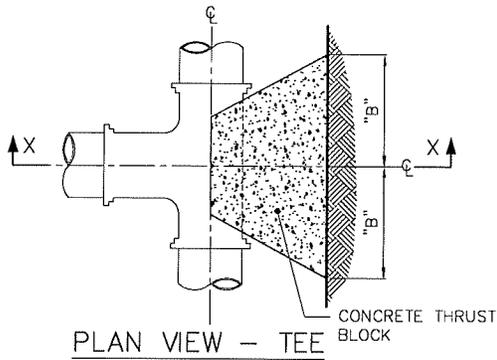


**VALVE AND SWAB  
LAUNCHING STATION  
WATERMAIN SIZES  
100 mm TO 400 mm**

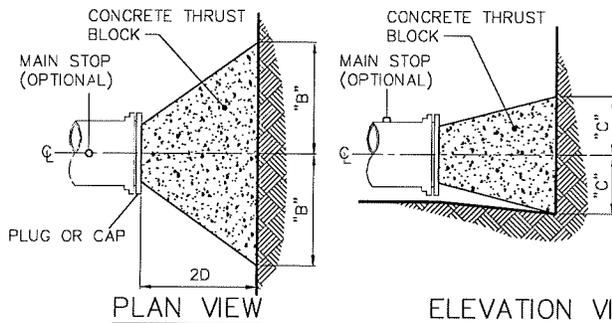
DRAWN BY: BWK/MHD	REV No: 5
DATE: 2003-03-03	REV DATE: 2013-01-01
SCALE: NTS	CAD/FILE No.: A1964-1 (1 OF 1)
APP'D: PETER CHIESA	<b>GSSD-1100.030</b>

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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 11.25'	22.5'	"A" (m)		"B" (m)	"C" (m)	
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 11.25'	22.5'	"A" (m)		"B" (m)	"C" (m)	
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 11.25'	22.5'	"A" (m)		"B" (m)	"C" (m)	
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 11.25'	22.5'	"A" (m)		"B" (m)	"C" (m)	
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	



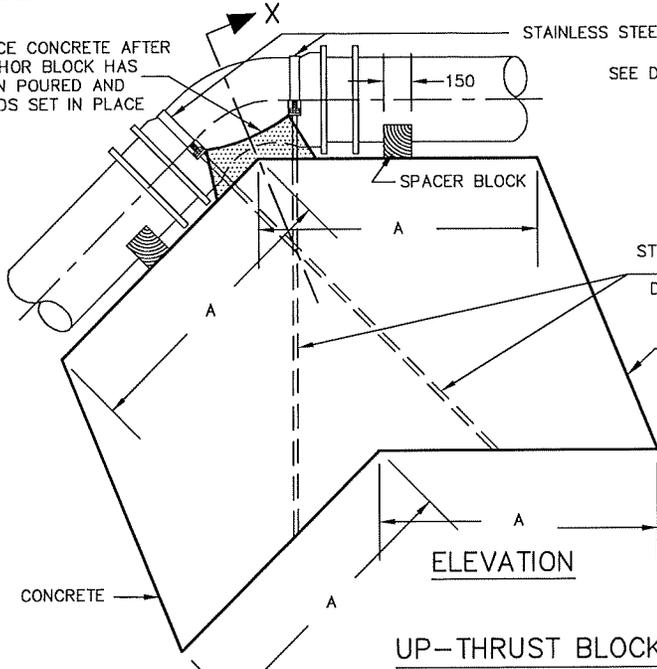
CONCRETE THRUST BLOCKS  
FOR TEES, PLUGS,  
HORIZONTAL BENDS,  
AND DEAD ENDS

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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PLACE CONCRETE AFTER ANCHOR BLOCK HAS BEEN POURED AND BENDS SET IN PLACE



STAINLESS STEEL STRAP

SEE DETAIL BELOW

STAINLESS STEEL RODS  
D DIAMETER

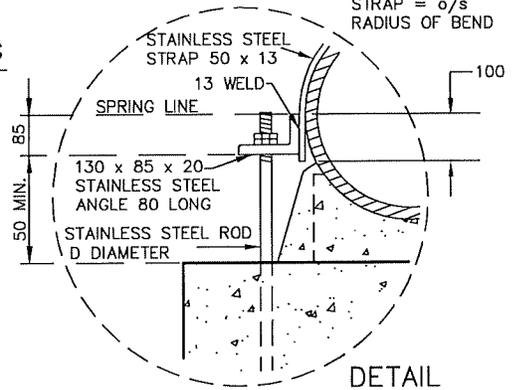
CONCRETE

80 MIN.

MIN 150

SECTION 'X'

INSIDE RADIUS OF STRAP = o/s  
RADIUS OF BEND



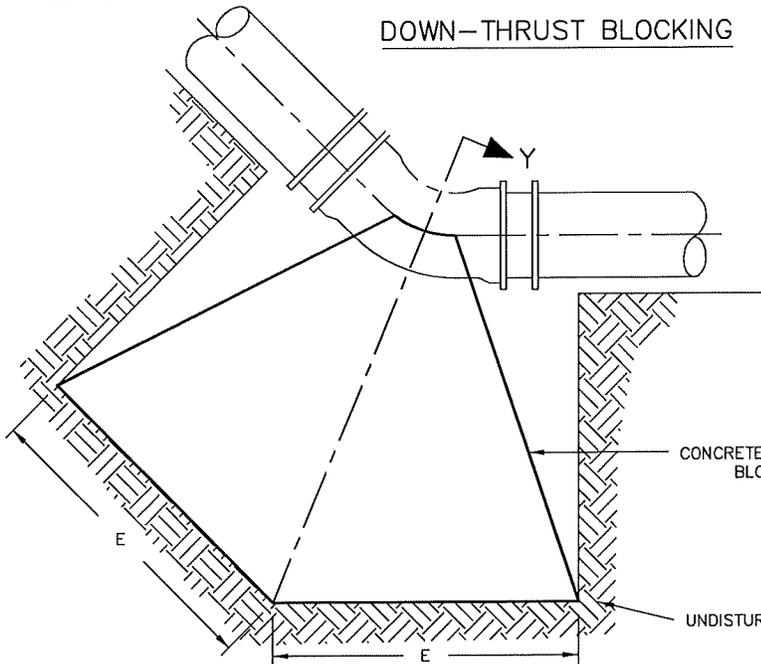
DETAIL

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

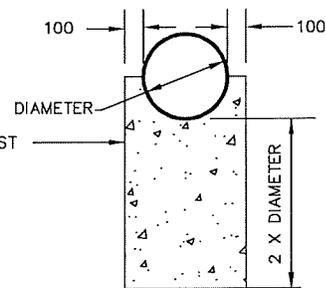
UP-THRUST BLOCKING

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)



SECTION 'Y'

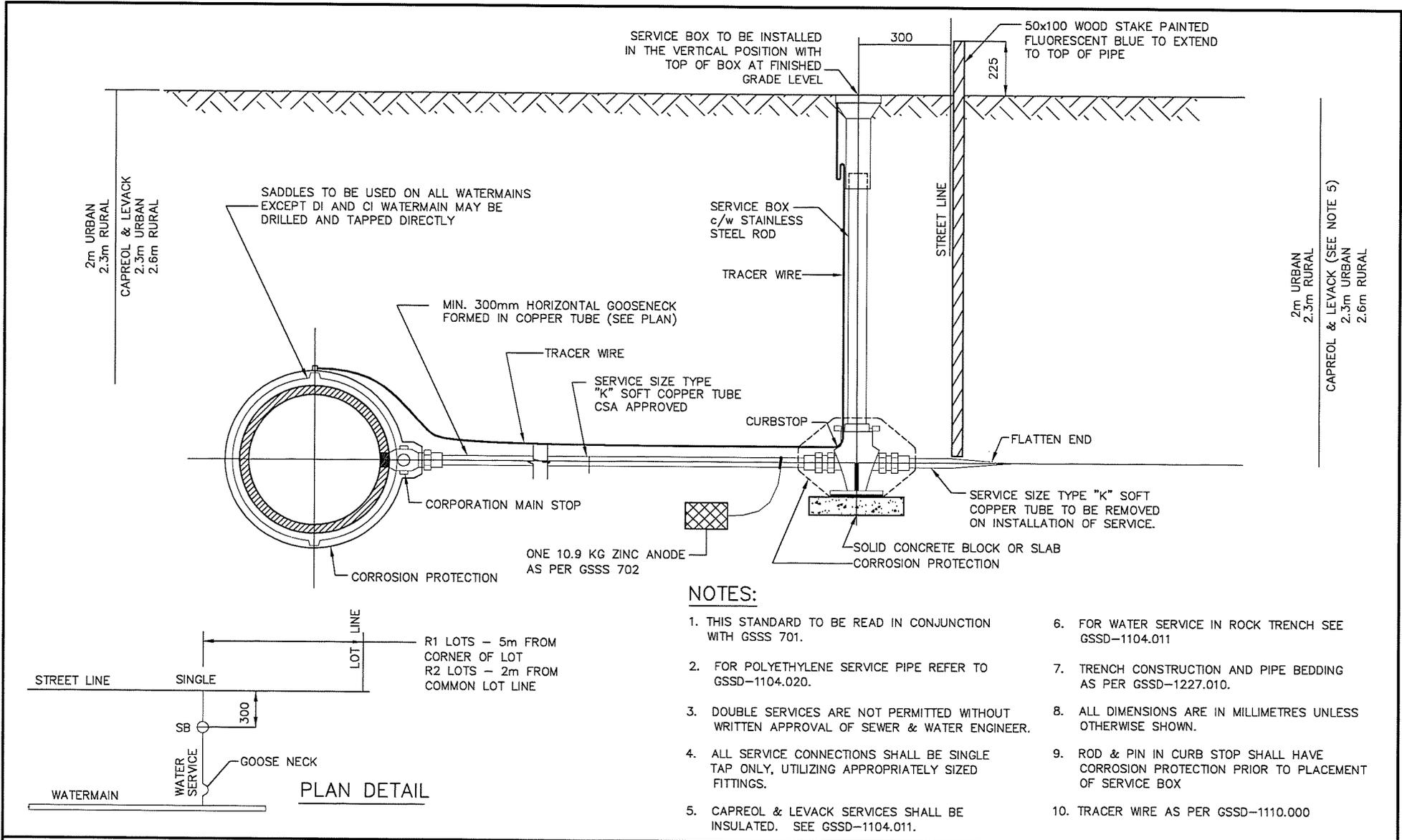


CONCRETE THRUST BLOCKS FOR VERTICAL BENDS

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

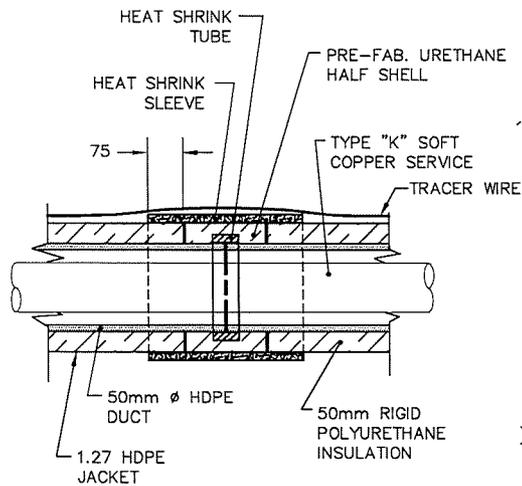
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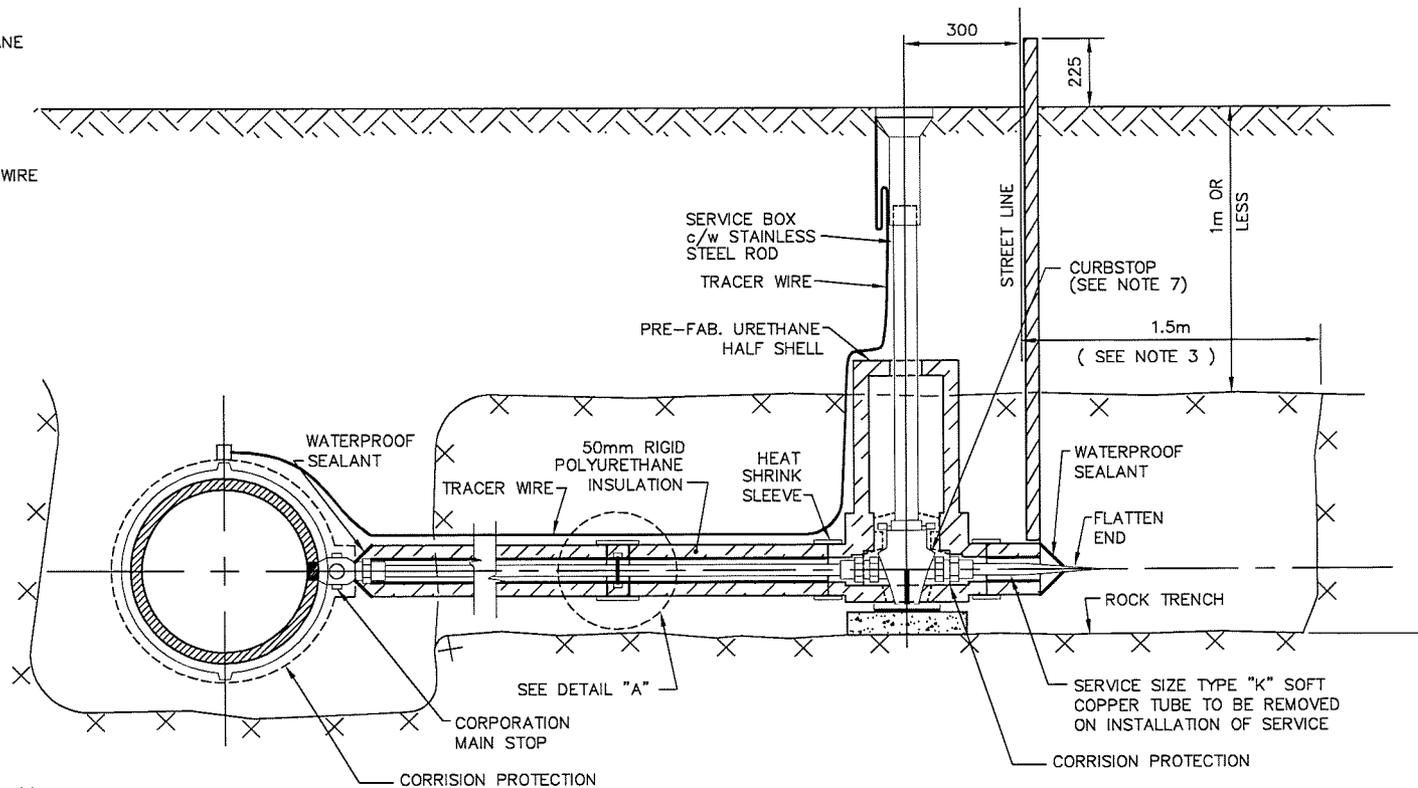


**WATER SERVICE CONNECTION  
DETAIL IN EARTH TRENCH  
20 mm TO 50 mm DIA SIZES**

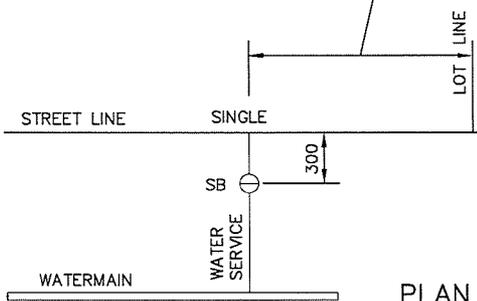
DRAWN BY: STS/RF/MHD	REV No: 4
DATE: 2003-03-03	REV DATE: 2013-01-01
SCALE: NTS	CAD/FILE No.: A1968-1 (1 OF 1)
APP'D:	<b>GSSD-1104.010</b>



**DETAIL "A"**  
INSULATION JOINT



R1 LOTS - 5m FROM  
CORNER OF LOT  
R2 LOTS - 2m FROM  
COMMON LOT LINE



**PLAN DETAIL**

**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

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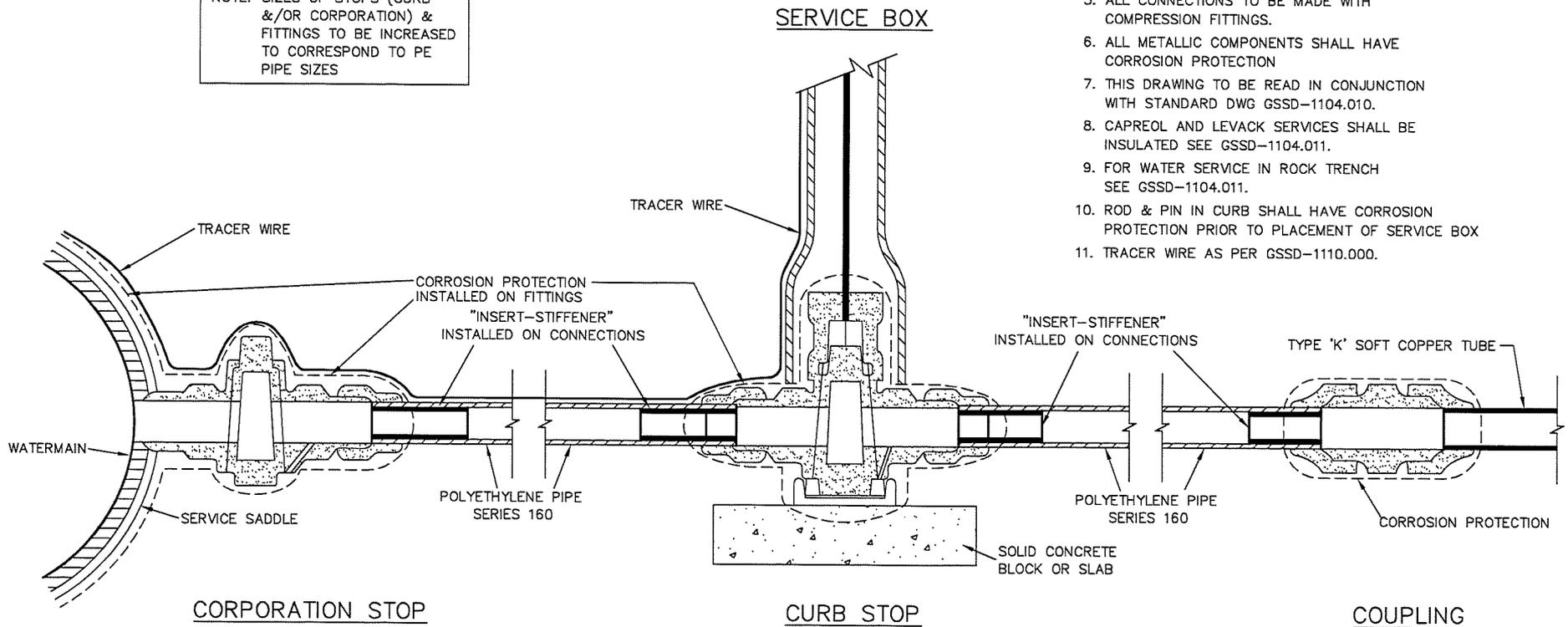


**INSULATED DUCT FOR  
WATER SERVICE CONNECTION**  
20 mm TO 50 mm DIA SIZES

DRAWN BY: RF/BK/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	<b>GSSD-1104.011</b>

ALLOWABLE SIZE FOR PE PIPE		
COPPER SIZE	POLYETHYLENE (PE) SIZE I.D.	
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



**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.

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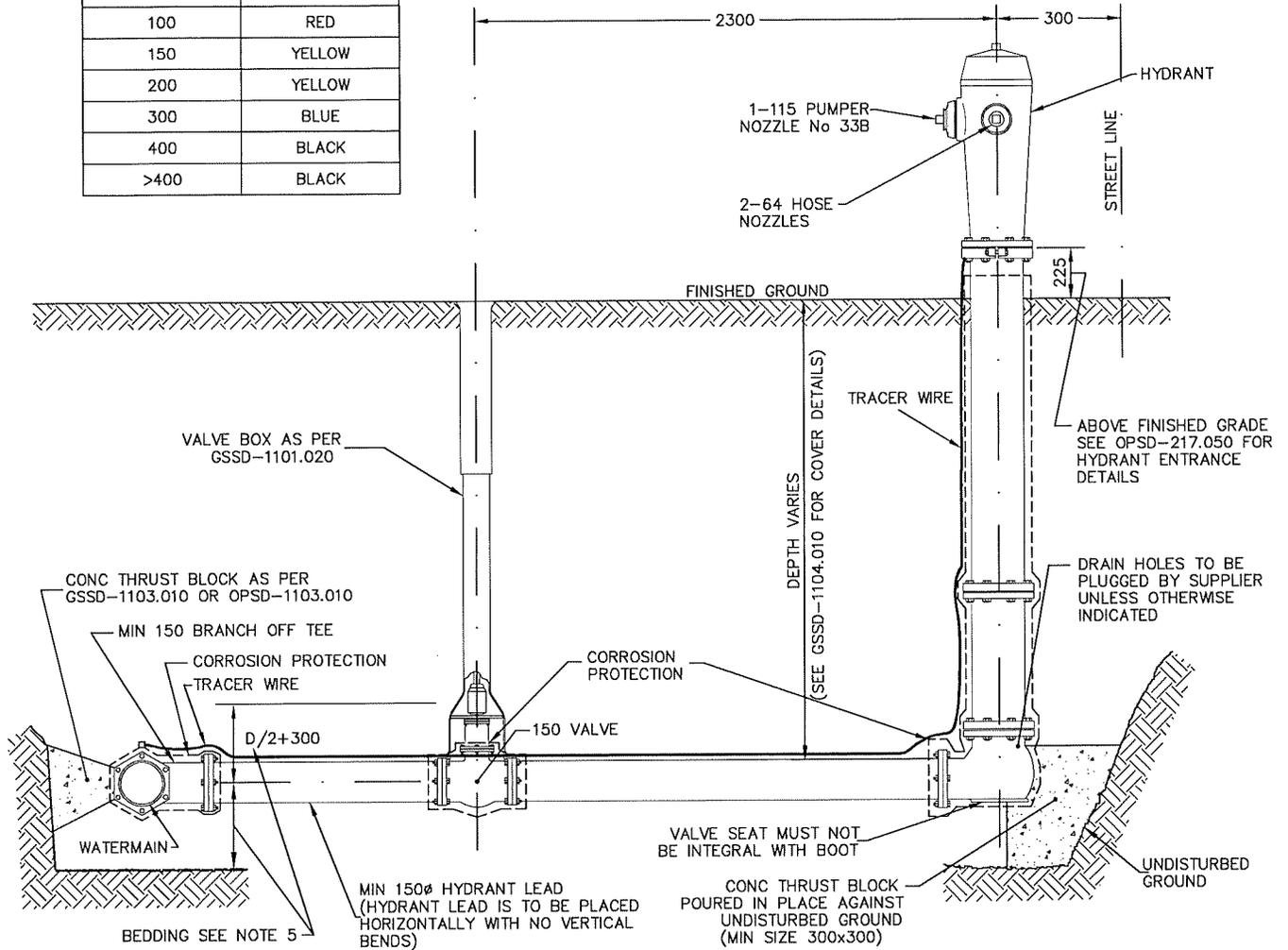
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**POLYETHYLENE WATER SERVICE CONNECTION DETAIL FOR 25 mm TO 50 mm DIAMETER SIZES**

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



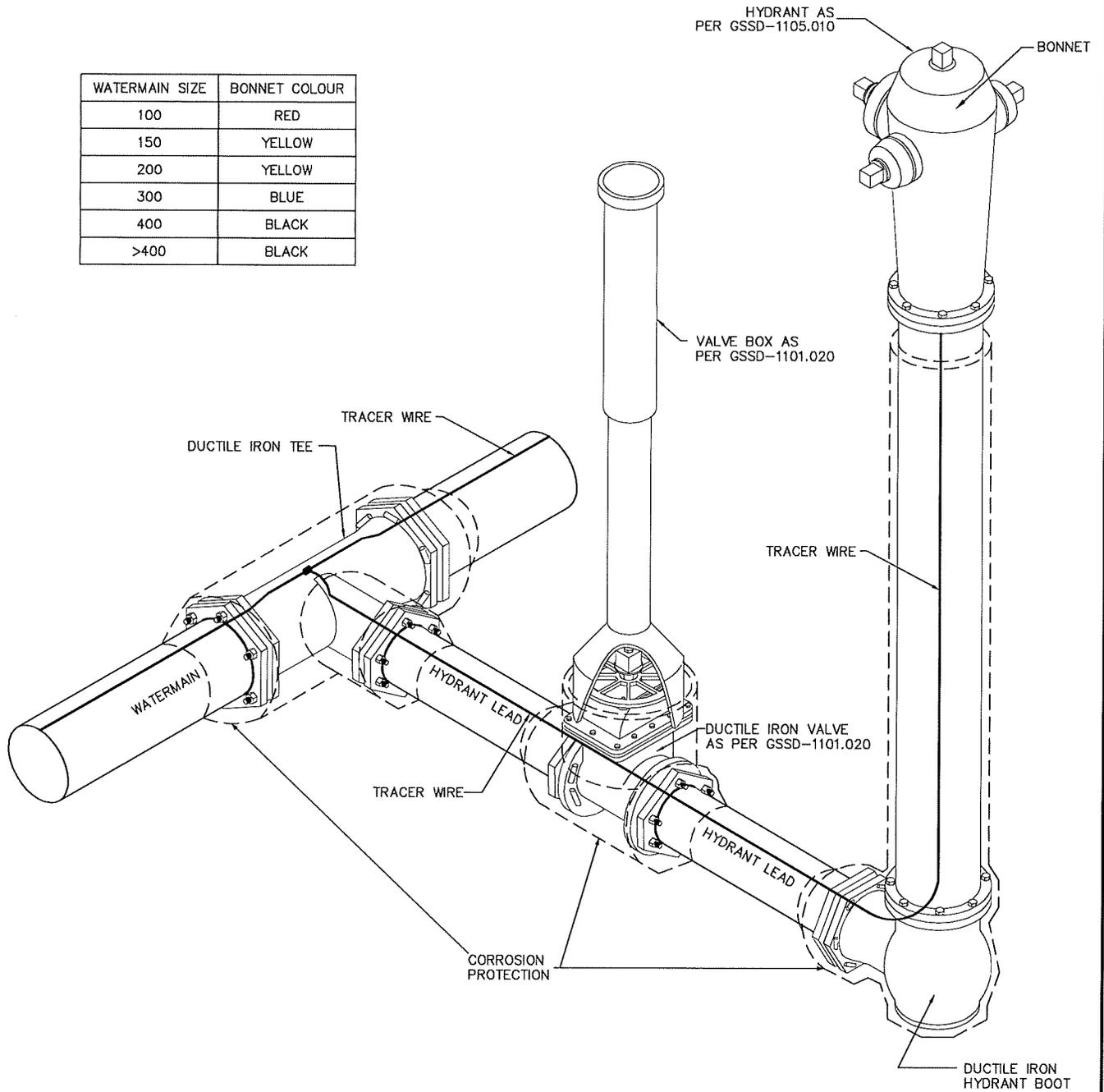
**HYDRANT  
INSTALLATION**

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:	<b>GSSD-1105.030</b>

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## **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: _____	INSPECTOR: _____
STREET: _____	CONTRACTOR: _____
AREA: _____	FOREPERSON: _____
PROJECT: _____	CONSULTANT: _____
CONTRACT NO.: _____	CONSULTANT REP.: _____

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

TEST LOCATION: \_\_\_\_\_

 <b>NORTH</b>	
---	--

**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: _____	SWAB SIZE: _____
LOCATION: _____	MAIN SIZE & TYPE: _____
REMARKS: _____	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**

\*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	kpa	Time:	
	_____	_____	_____	
	psi	kpa	Time:	
	_____	_____	_____	
	psi	kpa	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 / TIME**

INITIAL CHLORINE CONCENTRATION: ( ≥ 25 mg/L) \_\_\_\_\_ mg/L (ppm) \_\_\_\_\_  
 CHLORINE RESIDUAL AFTER 24 HOURS: \_\_\_\_\_ mg/L (ppm) \_\_\_\_\_  
 ACTUAL CHLORINE DECREASE: ( ≤ Allowable Decrease or 50 mg/L) \_\_\_\_\_ mg/L (ppm) \_\_\_\_\_  
 ALLOWABLE DECREASE: Initial Concentration \_\_\_\_\_ mg/L x 0.4 (Max 50 mg/L) \_\_\_\_\_ mg/L (ppm) \_\_\_\_\_

RESULT:  Pass  Fail WITNESSED BY: \_\_\_\_\_

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 concentration is greater than 25 mg/L throughout the system.
- 4) The maximum allowable decrease in chlorine concentration after 24 hours is 40% of the initial chlorine concentration to a maximum decrease of 50 mg/L.
- 5) 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 (0.2 mg/L – 1.2 mg/L) or no higher than that generally prevailing in the distribution system.

**C4 – BACTERIOLOGICAL TEST**

SAMPLES TAKEN BY: INSPECTOR \_\_\_\_\_ CONTRACTOR \_\_\_\_\_ CONSULTANT \_\_\_\_\_ OTHER \_\_\_\_\_

<p>1<sup>st</sup> SAMPLE                  DATE: _____                  TIME: _____                  WORK ORDER #: _____                  RESULT: _____                  WITNESSED BY: _____</p>	<p>2<sup>nd</sup> SAMPLE                  DATE: _____                  TIME: _____                  WORK ORDER #: _____                  RESULT: _____                  WITNESSED BY: _____</p>	<p>3<sup>rd</sup> SAMPLE                  DATE: _____                  TIME: _____                  WORK ORDER #: _____                  RESULT: _____                  WITNESSED BY: _____</p>
---	---	---

- 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.