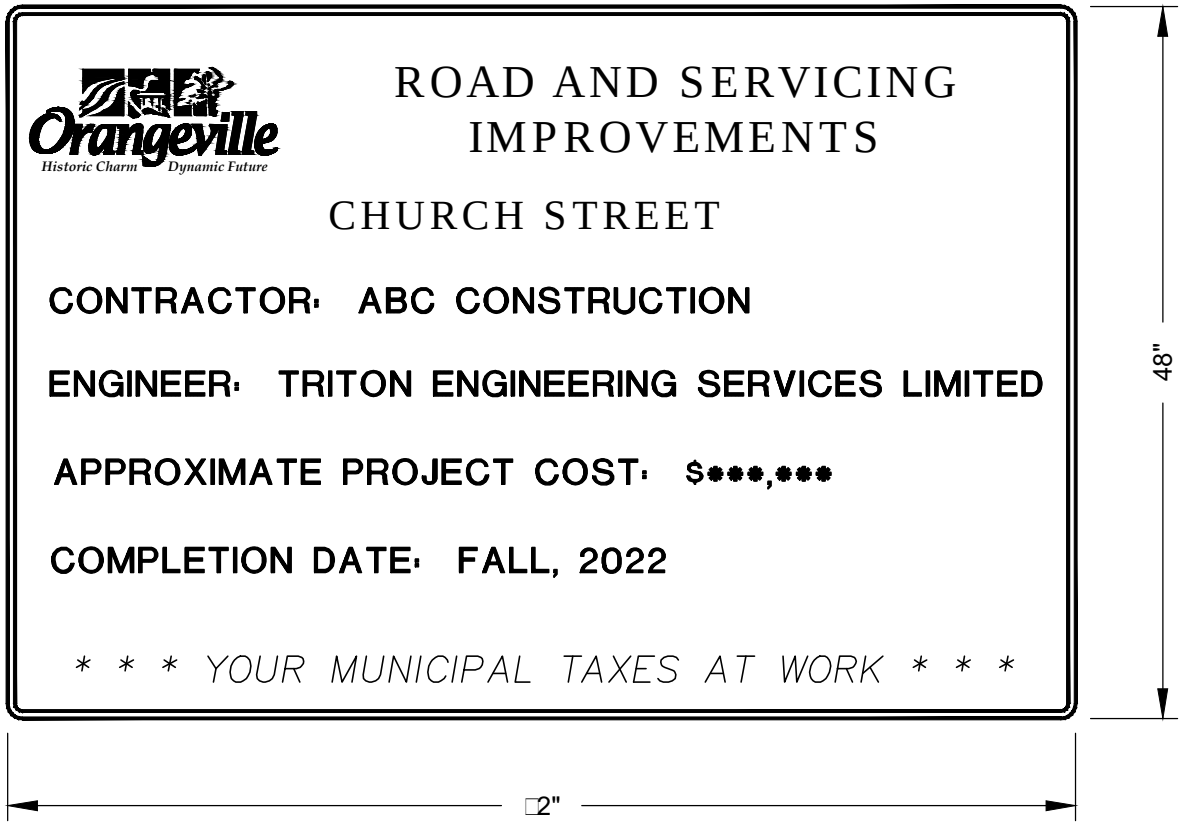
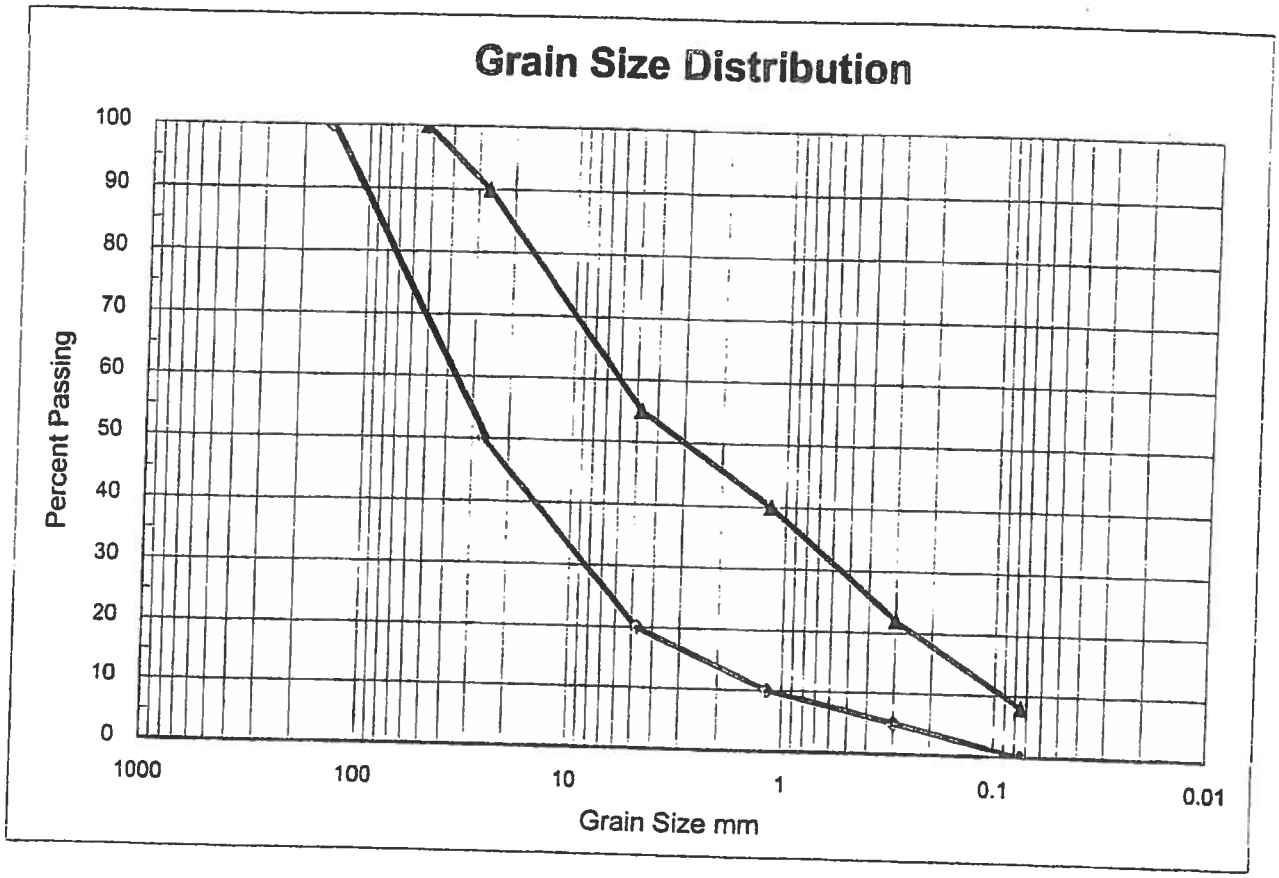
Sample Only - To be revised for specific project



CONSTRUCTION □INFORMATION SI□N

TOWN OF ORANGEVILLE
MODIFIED GRANULAR "B" SPECIFICATION
FOR GRAIN SIZE DISTRIBUTION



SIEVE SIZE mm	PERCENT PASSING MINIMUM	MAXIMUM
150	100	-
53	-	100
26.5	50	90
4.75	20	55
1.18	10	40
0.3	5	22
0.075	0	8

NOTE: ALL MATERIAL MUST BE SCREENED

DATE: MAY 14, 1997
REVISION: 1 FEB 11, 1999

Procedure for Watermain Commissioning and Final Connection

Table of Contents

1. Purpose

The following procedure describes the requirements for development of a site-specific disinfection plan for the construction and installation of watermains and service connections greater than 100 mm in the Town of Orangeville.

This procedure is to be used in conjunction with the Watermain Disinfection Procedure prepared by the Ministry of the Environment and Climate Change, Safe Drinking Water Branch and revised from time to time. That document will be used for situations not specifically covered by this procedure.

2. Definitions

Project Engineer - shall be licensed by, and in good standing with, the Professional Engineers of Ontario. They shall be designated by the Town or Developer, and could be the Consulting Engineer, or their designate.

Contractor – Person undertaking the watermain commissioning and testing

Town - refers to the Municipal Inspector, Maintenance and Operation Certified Drinking Water Operator, or their designate.

Disinfectant - use only NSF 60/61 Calcium or Sodium Hypochlorite that meets or exceeds ANSI/AWWA Standard B300, as amended from time to time.

Neutralizing Agent - use only powder Sodium Thiosulfate that meets or exceeds AWWA Standard C651.

3. Scope

This procedure applies to the commissioning of all new watermain installations, including, but not limited to the watermain, valves, hydrant leads, hydrants, dry barrels, service connections and sample ports and will focus on pressure testing, swabbing, disinfecting, sampling, and final connections.

Applicable American Water Works Association (AWWA) standard procedures, Safe Drinking Water Act, and the Town of Orangeville Municipal Drinking Water License, as amended from time to time, should be referred to in conjunction with this document.

4. Submission of a Watermain Commissioning Plan and Final Connection Plan

4.1. Watermain Commissioning Plan

a) The Contractor/Consultant/Developer shall prepare and submit a watermain commissioning plan to the Town's Public Works Department for review and comment prior to the construction of the watermain. The watermain commissioning plan shall be specific to the project and shall capture all the elements relating to pressure testing, swabbing, disinfecting, and sampling. The watermain commissioning plan shall be submitted for review and approval at least two weeks prior to the commencement of on-site activities.

b) Once the watermain commissioning plan has been prepared, the developer/contractor/consultant shall hold a co-ordination meeting to review the watermain commissioning plan prior to the commencement of work. The meeting shall

be attended by a representative from the Town's Water Works department (Certified Drinking Water Operator), the Town's Public Works Department and supervisory field staff representing the Contractor/Consultant/Developer. Any sub-contractors completing this work should also be present at this meeting.

Minutes of the meeting shall be documented by the consultant and all attendees shall sign an attendance sheet. Minutes of the meeting and attendance sheet shall be submitted by the consultant to the Town and retained in the project file.

c) Approval of the watermain commissioning plan by the Town shall be by e-mail, letter or documentation in meeting minutes.

d) The Contractor/Consultant/Developer's watermain commissioning plan must be performed in chronological order as documented. It should be noted that failure to meet a requirement at any step means that there is a deficiency. Before proceeding, the Contractor/Consultant/Developer must submit a detailed plan to the Town outlining the steps to be taken to correct the deficiency. Deficiencies must be corrected before proceeding to the next step.

e) Form 1 sign-off by Director of Public Works will occur upon approval of the watermain commissioning plan by the Town.

4.2. Final Connection Plan

a) The Contractor/Consultant/Developer shall prepare and submit a commissioning plan for review by the Town of Orangeville that includes details of how the new pipe is connected to the existing water distribution system. The plan shall be submitted at least two weeks prior to the commencement of on-site activities. The connection will not be made until the plan is approved by the Town. Once approved, a co-ordination meeting to review the connection commissioning plan prior to the commencement of work will be held on site. The meeting shall be attended by a representative from the Town's Water Works department (Certified Drinking Water Operator), the Town's Public Works Department and supervisory field staff representing the Contractor/Consultant/Developer. Any sub-contractors completing this work should also be present at this meeting.

5. Watermain Commissioning Procedure Requirements

a) Work shall be organized to facilitate efficient testing, commissioning and connections to the existing water system.

b) The procedure shall document (where required) that during the construction of the watermain that all surfaces shall be prepared by hand swabbing all tools, flow meters, backflow preventers, valves, parts, material and existing pipe with an approved disinfectant.

c) The connection between new and existing works shall be isolated with an isolation valve, a reduced pressure double zone assembly, flow meter and sample ports immediately upstream and downstream of the reduced pressure double zone assembly and isolation valve (refer to diagram 1 attached). The reduced pressure double zone assembly shall be tested as installed by a certified tester. A Town of Orangeville Certified Water Operator must be onsite to witness the installation of the reduced pressure double zone assembly and all associated testing. The Contractor/Consultant/Developer shall submit the results of the reduced pressure

double zone assembly test to the Town and the test results are to be kept in the project file. See Form 1 for BFPD Inspection Form.

d) The procedure shall document that the assembled watermain and appurtenances will be completely filled with potable water ensuring that all surfaces come in contact with water. The assembled watermain and appurtenances are to be soaked for a minimum of 24 hours prior to pressure testing, swabbing or flushing. This includes all dry barrel hydrants. The water must be held in the hydrants for the full 24-hour soaking period. During the soaking process, the hydrants should be open, and the leads and barrels treated the same as the watermain.

   The starting soak time and completed soak times must be recorded and provided to the Town. Results are to be kept in the project file.

e) The procedure shall document a leak and pressure test for the new watermain and appurtenances. It is recommended that the AWWA Manual of Water Supply Practices for the Installation, Field Testing, and Maintenance of Fire Hydrants (M17) be consulted for fire hydrant testing procedures.

   The leak and pressure testing procedure has to include all water connections (including service connections).

   The leak and pressure testing procedure shall include all hydrants. The Town's preference is for hydrants to be tested at the same time as the watermain. The allowable leakage for this test will based on only the standards set for pipe and exclude any additional allowable leakage for hydrants. Under special circumstances, the Town may allow the hydrants to be pressure tested individually. However, the total allowable leakage for the watermain and hydrants will remain the same as the combined test.

   The pressure test shall be held at 150 psi or 1050 kPa for a minimum for 2 hours in accordance with OPSS. If the pressure during the test falls below 140psi or 980kPa, the pressure test is deemed to have failed and shall be repeated until such time as the Town is satisfied that the watermain can be connected to the water distribution system.

   A Town of Orangeville Certified Water Operator must be on site to witness the pressure test. Leakage calculations must be provided prior to the test by the Contractor/Consultant/Developer. All results are to be reviewed on site and submitted in writing afterwards to the Town for its files.

f) The procedure shall describe a method for swabbing the watermain. The watermain shall be swabbed with a minimum of two (2) new and unused swabs, pipes to be full of water between swabs with a minimum distance of 2 metres between swabs. All swabs shall be numbered using an NSF approved marker. The calculations for the minimum and maximum swabbing velocities should be given to the Town of Orangeville Certified Water Operator before the swabbing begins. Reference attached.

   i. Swabs shall be polyurethane Foamite #1543 or equivalent.
   ii. Swabs shall be minimum 50 mm greater in diameter than the watermain and have a minimum length 1.5 times the diameter of the pipe.
   iii. Swabs shall be propelled at a velocity of 0.5 to 1.0 m/s.
   iv. Swabbing shall continue until the water runs clear 10 seconds after the last swab exits the watermain.

A Town of Orangeville Certified Water Operator must be onsite to witness the swabbing process. The swabbing procedure shall include all calculations for all branches of pipe and swab spec sheet (available from Foamite). The Contractor/Consultant/Developer shall submit the swabbing velocities complete with calculations as well as the specifications of the swabs used to the Town and the results are to be kept in the project file. Swabs should be presented to the Town representative for inspection before and after swabbing. The contractor shall verify the clarity of the water by obtaining a sample in a clear container and present to Town representative for verification by looking at it against a contrasting background.

g) The procedure shall document that all hydrant leads, service connections, and all appurtenances that were not swabbed, shall be flushed with potable water at a minimum velocity of 0.91 m /s, in accordance with AWWA C-651. A minimum of 2 times the pipe volume must be achieved and verified that water runs clear at completion of flushing.

   The Contractor/Consultant/Developer shall submit the flushing velocities per site complete with all field data and calculations and a detailed list of sites flushed to the Town. The results are to be kept in the project file.

h) The procedure shall document the installation and location of sample ports. Sample ports shall be installed prior to disinfection to ensure that they receive the full benefit of the disinfection. Sample ports shall be constructed of stainless steel or copper to ensure that the ends of the sample ports can be heated with a torch to achieve sterilization prior to sampling. Ports must be cleaned and disinfected prior to installation. The spout shall be a “goose neck” design so that water can be completely drained from the spout and shall be no less than 60 cm off the ground. There shall be a valve with a handle at the sample port so that the sample port does not need to be turned on and off with a valve key at the curb stop. The procedure must address the installation and location of sample ports on all branches of pipe.

i) The procedure shall document that the batch disinfection method will be used, either by tanker truck or by other potable water source. All surfaces of the watermain and appurtenances, including hydrants, shall come into contact with water having a free chlorine residual of 50 to 100 mg/L, for a minimum of 24 hrs. The starting residual and the time the chlorinated water finished entering the watermain shall be documented by the Contractor/Consultant/Developer. At the end of the 24-hour period, the chlorine residual shall decrease by no more than 40% of original free chlorine residual per sample location. The final residual shall be documented by the Contractor/Consultant/Developer.

   During the disinfection process, the hydrants should be open, and the leads and barrels treated the same as the watermains.

   A Town of Orangeville Certified Water Operator must be onsite to witness the watermain being filled with disinfectant, and to collect the starting free chlorine residual measurement and the final free chlorine residual measurement after the 24-hour hold.

   If the free chlorine residual decreases by more than 40% of the original concentration, at a minimum and at the Town’s discretion, the contractor shall flush

the watermain, appurtenances, and disinfection must be repeated until an acceptable chlorine residual is achieved at the end of the 24-hour period.

Fresh NSF 60/61 compliant, 12% Sodium Hypochlorite will be supplied by the Town for the disinfection process.

j) The disinfection procedure shall document that all moving parts, including valves and hydrants, shall be operated though their full range of motion when being loaded and solution has been verified. Documentation, that includes a detailed list identifying all items operated, including the time it was operated shall be provided to the Town and kept in the project file.

k) The disinfection procedure shall document a method for de-chlorinating of all chlorinated water that will be flushed from the watermain at the end of the 24-hour contact period and any other flushing events to a concentration of 0.00 mg/L total chlorine. The newly constructed watermain shall be flushed until the water in the watermain and all associated appurtenances is representative of the water in the distribution system.

l) Flushing is done to completely remove the disinfectant. The flushing procedure shall document that all moving parts, including valves and hydrants, shall be operated through their full range of motion while the system is being flushed. The moving parts shall be operated in water fresh to the system and flushing shall continue until all water flushed over the moving parts exits the system. Documentation that includes a detailed list identifying all items operated including time performed, shall be provided to the Town and kept in the project file.

m) The watermain commissioning procedure will identify that all chlorine residuals and microbiological samples shall be collected and measured by a Town Certified Drinking Water Operator.

n) After the disinfectant has been totally flushed from the watermain and replaced with water representative of that in the distribution system, the first of two sets of microbiological samples shall be taken at locations selected by the Town's Certified Drinking Water Operator and tested for E. coli, Total Coliforms, Background (membrane filtration method) and HPC. Once the first set of microbiological samples has been taken it is imperative that no water be run through any part of the disinfected watermain.

Maximum acceptable microbiological test results are:

- 0 CFU/100ml E. coli,
- 0 CFU/100ml Total Coliforms,
- 20 CFU/100ml Background; and
- 20 CFU/1ml HPC.

Chlorine residual will be tested at the same time that microbiological samples are collected. There shall be no appreciable decrease in free chlorine residual from the first set of samples to the time of the second set.

o) The Town will provide testing for chlorine residual and microbiological parameters for the first two sets of samples at the Town's expense. Fees associated with any additional testing will be the responsibility of the Contractor/Developer.

p) Microbiological samples are time sensitive and must be taken between 07:00 and 14:00 Monday to Thursday.

q) All microbiological samples shall be sent to and analyzed by a lab approved by the Town of Orangeville.

r) The second set of samples shall be collected and tested at least 24 hours after the first set.

s) Once two consecutive sets of acceptable microbiological results have been received, approval to connect new works to existing works will be at the discretion of the Director of Public Works. **NOTE**: Final connection will not proceed until all field notes/observations have been verified and accepted by the Town.

6. Final Connection Procedure Requirements

a) The final connection procedure shall document outline the connection procedure that will be implemented by the Contractor. If the new watermain is less than 6 metres in length, the Town will permit the Contractor to use hand swabbing with 12% chlorine NSF 60/61 on all new parts. If the new watermain is greater than 6 metres in length, the Contractor will be required to follow AWWA standard C-651 section 4.10.2 (as amended from time to time) for final connections. A Town of Orangeville Certified Drinking Water Operator shall be on site to witness the final connection.

b) The final connection procedure will identify that all chlorine residuals and microbiological samples shall be collected and measured by a Town Certified Drinking Water Operator.

c) Two consecutive sets of microbiological samples shall be taken at locations selected by the Town's Certified Drinking Water Operator and tested for E. coli, Total Coliforms, Background (membrane filtration method) and HPC.

Maximum acceptable microbiological test results are:

- 0 CFU/100ml E. coli,
- 0 CFU/100ml Total Coliforms,
- 20 CFU/100ml Background; and
- 20 CFU/1ml HPC.

Chlorine residual will be tested at the same time that microbiological samples are collected. There shall be no appreciable decrease in free chlorine residual from the first set of samples to the time of the second set.

d) The Town will provide testing for chlorine residual and microbiological parameters for the first two sets of samples at the Town's expense. Fees associated with any additional testing will be the responsibility of the Contractor/Developer.

e) The isolating valve shall remain closed until two consecutive sets of acceptable microbiological results have been received.

f) A summary report of all activities including details of anomalies and remedial actions taken shall be submitted to the Town by the Contractor/Consultant/Developer.

7. Documentation/Record Keeping

a) The Contractor/Consultant/Developer shall provide written documentation to the Town throughout and at the completion of the project noting that each requirement

has been satisfactorily completed during the commissioning and final connection of the watermain. The documentation shall be retained in the project file.

b) The volume of water used from the municipal water system during the project must be measured with a flow meter and the recorded volumes are to be documented and reported to the Town of Orangeville Water Division in cubic metres. The Contractor will supply all required flow meters. All flow meters must be disinfected with a 1% to 5% chlorine solution prior to its installation.

8. On-site Requirements

a) A copy of the watermain commissioning plan and final connection plan must be available for review on the work site.

b) All material and equipment shall arrive on site protected from contamination. Work areas, tools, and equipment shall be maintained in a state that prevents potential contaminants from entering the watermain and appurtenances.

c) All watermain pipes shall be new and capped at the factory for shipping to the job site and remain capped on site until connections can be made. Watermains shall be stored in such a way that they remain elevated off the ground and remain in good repair until time of installation.

d) When works are not monitored, caps must be placed on open pipes to prevent entrance of contaminants.

9. Responsibilities

a) All Contractors/Consultants hired by the Town of Orangeville and owners of developments (including subdivisions and property) must comply with this procedure and applicable Regulations.

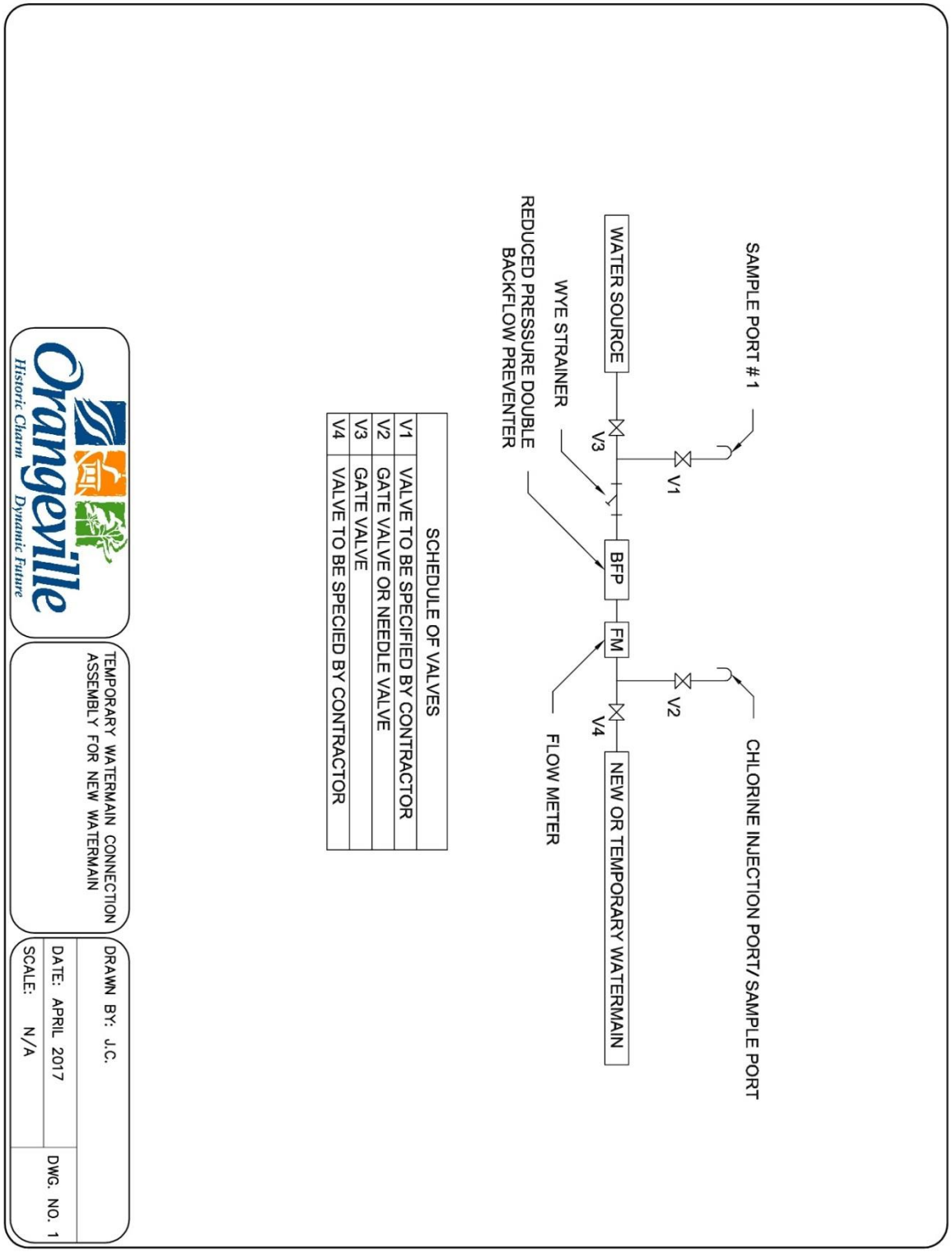
b) At all times, and immediately, full disclosure to the Town must be provided by the Contractor/Consultant/Developer if an event or anomaly occurs at any time during the process.

c) It is the responsibility of the Contractor/Consultant/Developer to contact the Water Works Supervisor, or his designate at least **2 business days (Monday – Friday) in advance** of connecting a flow meter, reduced pressure double zone assembly, loading the main, pressure test, swabbing, flushing, disinfection and the final connection. The Town is available to provide Certified Drinking Water Operator services during the hours of 07:30 and 16:00 Monday through Thursday, and Friday 07:00 to 11:30.

d) It is the responsibility of the Contractor/Consultant/Developer to develop a plan to demonstrate a safe connection of the new pipe to the existing watermain. Only new parts shall be used to make this connection.

e) Traffic and pedestrian protection will be the responsibility of the contractor. It is strongly suggested that a tailgate meeting be held for all parties involved so that plans and procedures can be reviewed and vetted as required including the notification of residents and businesses. Typical notifications shall be a minimum of 2 business days unless otherwise determined by the Town.

Diagram 1: Watermain Connection Procedure



Attachment 1: Watermain Commissioning Checklist

Date: _____ Project Name: _____

Contractor:_____Project Engineer/Firm: _____

Procedure	Action By	Completion Date	Witnessed or Received by (Initial)*
Acceptance of Watermain Commissioning Procedure	Contractor: Town:		
Form 1 Signoff	Contractor: Town:		
Sample Location Drawings	Project Engineer:		
Confirm BFPD certified; Flow Meter Installed	Contractor:		
Loading of Watermain	Contractor:		
Hydrostatic Testing and Summary Report, incl. allowable leak calculations based on 150 psi for 2 hrs.	Contractor: Project Engineer:		
Swabbing	Contractor: Project Engineer:	# In # Out	
Flush to Remove Turbidity (min velocity 0.91 m/s (see attached chart)	Contractor: Project Engineer:		
Disinfection Procedure	Contractor: Project Engineer:		
Verification of valve, hydrant and curb stop operation	Contractor: Project Engineer:		
First and second set of high range chlorine residuals with decrease no more than 40%	Contractor: Town:		

Procedure	Action By	Completion Date	Witnessed or Received by (Initial)*
Discharge Procedure: Removal and Disposal of Super Chlorinated Water	Contractor: Project Engineer:		
Verification of valve, hydrant and curb stop operation	Contractor: Project Engineer:		
Commissioning Microbiological Sampling, 2 consecutive sets meet minimum requirements	Town/Operator:		
Acceptance of Final Connections Procedure	Contractor: Town:		
Final Connections complete, including flushing	Contractor: Project Engineer:		
Final Connection Bacteriological Sampling, 2 consecutive sets	Town/Contractor:		
Sample Results and Acceptance	Town/Contractor:		
Amount of Town water used during this project/process	Contractor/Town:		

Please Note:

This form is to be accompanied by the Chlorine Residual / Turbidity counts, Hydrostatic Testing Summary, and all sample reports.

Project Engineer's Confirmation:

We hereby confirm that the above noted works for New Watermain as included in the construction or development agreement has been completed in accordance with the Town of Orangeville Procedures and witnessed by a Town of Orangeville Licensed Water Works Operator.

Project Engineer Signature and Stamp _____

Attachment 2: Chlorine Residual Report

Date: _____

Project Name: _____

Contractor: _____ Project Engineer: _____

Watermain Location and Size (Supply): _____

The chlorine residuals are to be confirmed with a testing device; litmus paper is not acceptable. Chlorine residuals will be confirmed used HACH colourimeter.

Location or Sample	Turbidity Count	High Count	24 hr. Count	Low Count

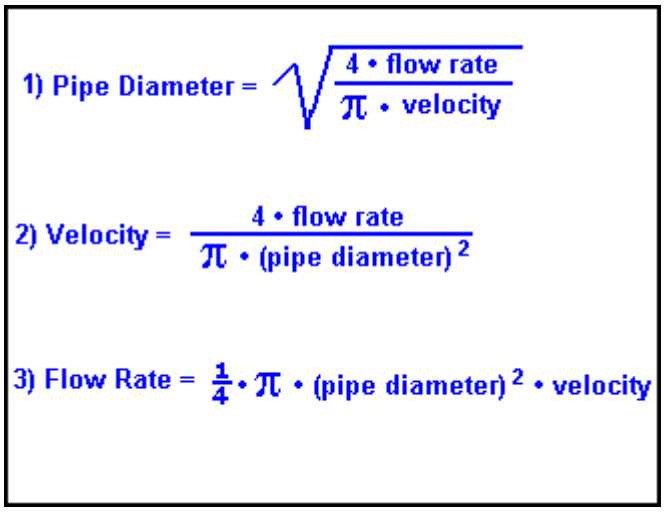
_____

Project Engineer

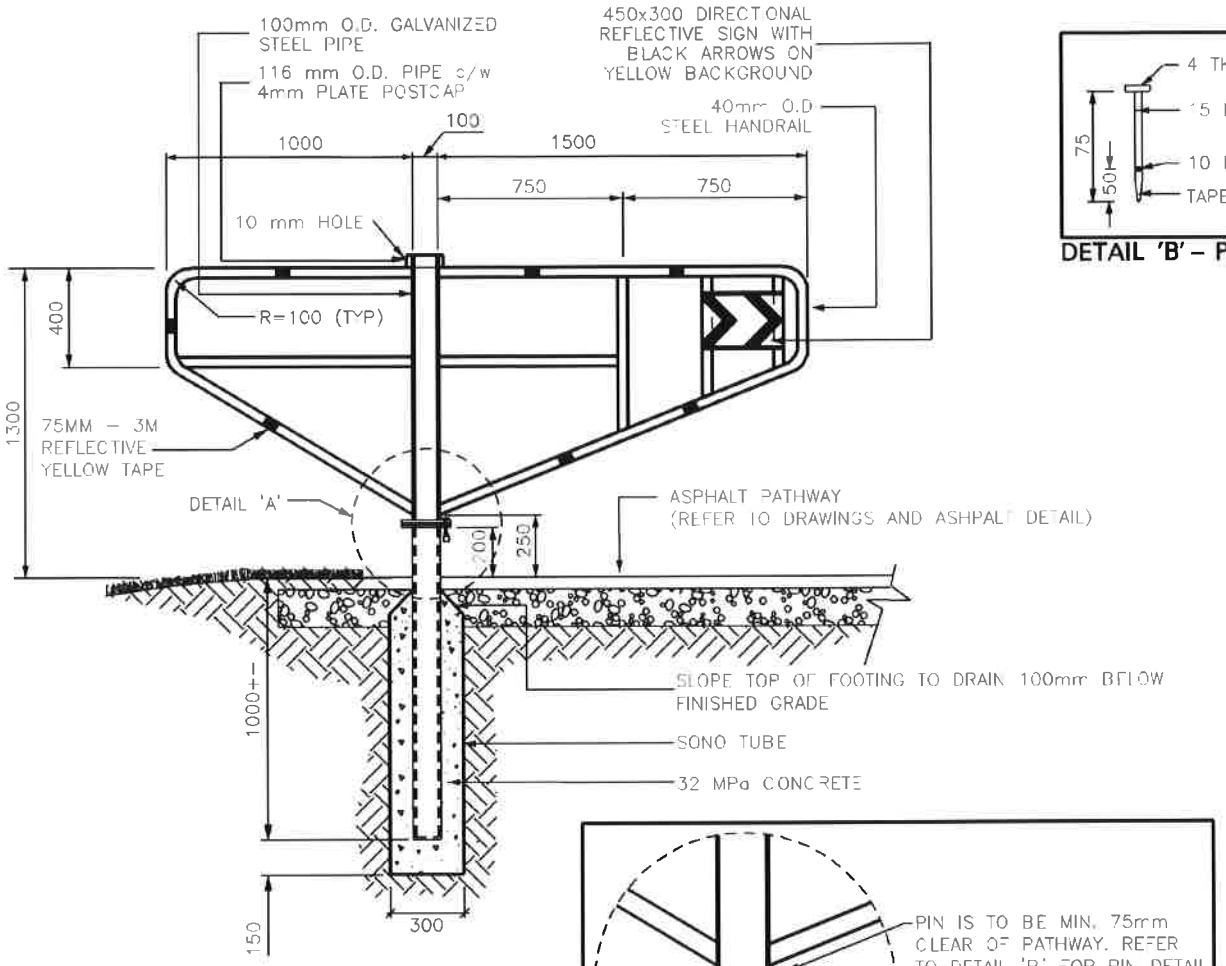
Table 2 – Bypass Requirements for Swabbing and Flushing of New Watermains

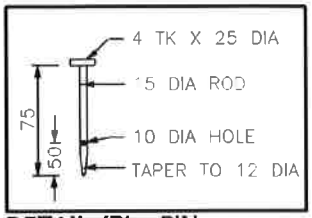
PIPE DIAMETER	FLOW REQUIRED TO PRODUCE 0.91 m/s (APPROX) VELOCITY IN MAIN	SIZE OF TAP (mm)			NUMBER OF OPEN 64 mm HYDRANT OUTLETS
		25	38	50	
mm	Litres per second	NUMBER OF TAPS ON PIPE			
100	7.1	One 50 mm Ø			1
150	16.1				1
200	28.6	-	-	1	1
250	44.7	-	-	2	1
300	64.3	-	-	2	2
400	114.4	-	-	4	2

REQUIRED FLOW AND OPENINGS TO FLUSH PIPELINES (276 kPa – 40 psi RESIDUAL PRESSURE IN WATERMAIN)

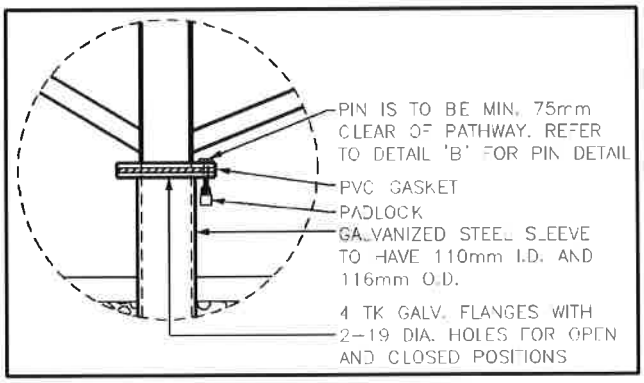


Typical calculations for flushing based on pipe size.





DETAIL 'B' – PIN



DETAIL 'A' – SLEEVE CONNECTION

NOTES:

1. ALL GATE MATERIAL MUST BE GALVANIZED AFTER FABRICATION.
2. ALL 40 DIA. PIPE MUST BE STD. SCHEDULE 40 NEW BUTT WELD PIPE.
3. GATE POST TO EXTEND A MIN. OF 1000mm INTO FOUNDATION SLEEVE PIPE.
4. ALL EXPOSED SURFACES MUST BE PRIMED AND PAINTED WITH 1 COAT TREMCLAD GALVANIZED PRIMER AND TWO COATS OF TREMCLAD RUST INHIBITIVE PAINT (YELLOW AND BLACK).
5. PIN IS WELDED TO GATE WITH A 300 LONG GALV. CHAIN.
6. DIRECTIONAL SIGN TO BE MIN. 1.5mm THICK ALUMINUM OR GALVANIZED METAL RIVETED TO GATE AT EACH CORNER.
7. ALL WELDING AND GALVANIZING DRIPS AND SPLATTERS TO BE REMOVED.
8. ALL DIMENSIONS ARE IN MILL METRES UNLESS OTHERWISE NOTED.
9. THE LOCATION OF THE GATE IS TO BE APPROVED BY PUBLIC WORKS PRIOR TO INSTALLATION OF REMOVABLE OFFSET GATES.

REMOVABLE OFFSET GATES DETAIL

N.T.S.

SANITARY SEWER DESIGN SHEET

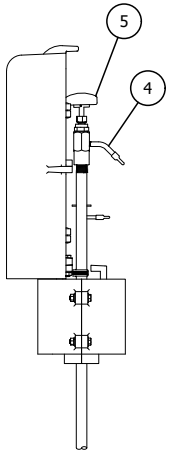
TRITON ENGINEERING SERVICE LTD.
CONSULTING ENGINEERS
229 Broadway, Unit 1
Orangeville, ON, L9W 1K4

Densities (ppha): R1, R2= 80; RM1= 254; R3, R4, R6= 80; RM2= 179; R5, R7= 156
Peak Flow Factors: Res.= 2.0; Com.= 2.0; Ind.= 2.0
Sewage Flow Rates: Com. 28 m3/(ha*day); Inst. 28 m3/(ha*day); 2 peaking factor
Infiltration= 0.15 l/ha per second; 450 l/cap per day; Min. Diameter= 200mm; Friction Coefficient= 0.013

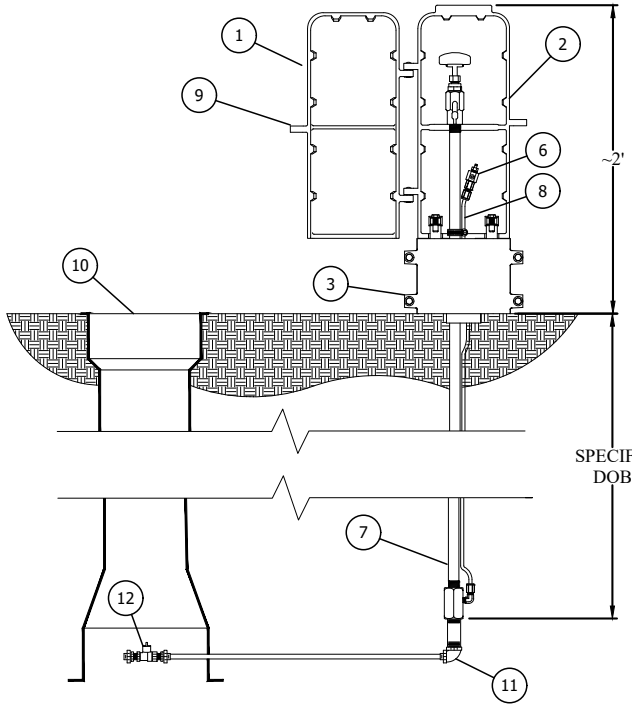
PROJECT NAME: Reconstruction of Church Street
PROJECT NUMBER: M5783
MUNICIPALITY: Town of Orangeville
DATE: December 2022

Location					Residential					Commercial/Industrial/Institutional						Design Flow				Velocity					
Figure #	Street	From MH	To MH	Length (m)	Area (ha)		Total Area (ha)	Pop.	Accum. Pop.	Comm.		Ind.		Inst.		Peak Factor	Res. Accum. Flow	Infil.	Max Q	Slope	Diameter	Capacity Flow	Full Flow Velocity	Qf/Qcap	Remarks
						ha				ha	lps	ha	lps	ha	lps		lps	lps	lps	%	mm	lps	mps		
	Church Street	A1	S1	59.4	R2	1.59		128																	
					R3	0.68		55																	
					RM1	0.19	2.46	49	232							4.124	4.983	0.369	5.352	4.61	200	70.42	2.24	0.08	
	Centennial ECA 2604-C79JMJ																		20.169						
	Church Street	S1	S2	99.8	R2	9.1		728																	
					RM1	1.36		346																	
					RM2	1.1		197																	
					R5	2.79	14.35	436	1707	1.76	1.141		20.169	5.06	3.28	3.638	37.698	3.176	65.463	4.10	300	195.80	2.77	0.33	Outlets to S1 via railway sewer
	Church Street	S2	S3	31.3	R2	0.18	0.18	15	15							4.396	65.807	0.027	65.834	1.50	300	118.43	1.68	0.56	
	Church Street	S3	S4	21.5	R2	0.1	0.1	8	8							4.423	66.018	0.015	66.033	1.63	300	123.46	1.75	0.53	
	Church Street	S4	A3	82.6	R2	0.08		7																	
					RM1	1.28	1.36	326	333	0.15	0.097					4.059	73.072	0.227	73.396	0.65	375	141.36	1.28	0.52	

#88-SS SAMPLING STATION SPEC SHEET



A SIDE VIEW
Scale: 3/4"=1'-0"



1 88-SS INSTALL
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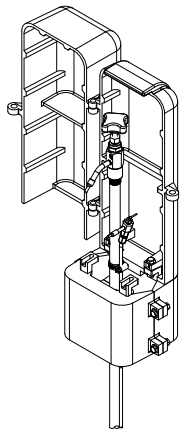
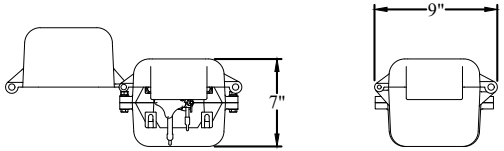


C ISO VIEW
Scale: 3/4"=1'-0"

GENERAL SPECIFICATIONS	
MAXIMUM OPERATING PRESSURE	220 PSI
STATION MATERIALS:	303, 316, & 18-8 STAINLESS STEEL, BUNA-N
ENCLOSURE MATERIAL:	CAST AL 319 ALUMINUM
ENCLOSURE COLOR:	GREEN
WETTED MATERIALS:	BUNA-N RUBBER, 303 & 18-8 STAINLESS STEEL
DEPTH OF BURY:	SPECIFY
WEIGHT:	~35 LBS at 3' DOB
CUSTOM LOGO:	

ITEM	DESCRIPTION	NOTES
1	88 FRONT DOOR (COVER A)	
2	88 REAR DOOR (COVER B)	
3	88 BASE	2 PIECES
4	3/8" UNTHREADED NOZZLE	
5	OPERATING HANDLE	
6	PETCOCK	
7	1/2" S.S. WATERWAY	
8	1/4" S.S TUBING	
9	LOCKING HOLE	
10	VALVE BOX	BY OTHERS
11	3/4" S.S. ELBOW	BY OTHERS
12	BALL VALVE CURBSTOP	BY OTHERS



OPEN CLOSED

B TOP VIEWS
Scale: 3/4"=1'-0"

Sampling Station shall be _____' bury, with a 3/4" FIP inlet, and 3/8" unthreaded blow off and sampling bibb. Station shall be enclosed in a lockable, aluminum box with hinged openings.

When open, the station shall require no key for operation, and all water flow shall pass thru an all stainless steel waterway. Seat rubber and all operational components shall be serviceable / replaceable from above ground with no digging or excavation needed.

A secondary valve (stainless steel petcock) shall be located on the evacuation line, independent of the sampling bibb and when open shall allow for evacuation of any water remaining inside the station, via pump or compressed air blow off, to prevent freezing.

The station shall be model #88-SS as manufactured by The Kupferle Foundry, St. Louis MO. 63102 or approved equal.

Notes:
1.) If the color shall be any color other than green, check with the manufacturer for color options, and specify accordingly.
2.) When installed on or with concrete, Kupferle recommends the use of a gasket or barrier between the enclosure and the concrete surface. when purchasing the station, if concrete install is specified on the order Kupferle will provide said gasket. the enclosure clamp on the bottom of the enclosure base will fit inside a 4" pvc pipe.
3.) Prolonged exposure to strong chlorides which can be present in concrete, cleaning agents, and sometime even potable water can lead to possible enclosure corrosion. regular maintenance and drying the station after use are the best methods for optimal station longevity.
4.) In corrosive solids the buried pipe should be prepped for additional resistance to corrosion. kupferle recommends spraying all underground piping and fittings with bituminous spray tar, allowing proper time to dry, and then wrapping the parts.
5.) Some sites, typically at higher pressures, turbulant flow can cause station vibration. Should this occur after installation, please contact manufacturer for remediation.

DD/MM/YY	ISSUED FOR ...
DATE	STATUS / REVISION

	INITIALS	DATE
DRAWN	KJW	1/23/23
APPROVED	DCL	1/24/23
MODIFIED		

88-SS SAMPLING STATION | SHEET SIZE: A | SCALE: 3/4"=1'-0"

KUPFERLE
Since 1857

2511 NORTH 9TH STREET
ST. LOUIS, MO 63102
1-800-231-3990
FAX 314-231-2820
www.hydrants.com

Town of Orangeville
Utility Tracer Wire Standard

Revision 1
March 2023

Table of Contents

1. Introduction

This standard was prepared to provide guidance to meet the requirements of the Town of Orangeville regarding the installation of tracer wire on Town owned buried Water, Sewer, and Storm Sewer infrastructure. The Town of Orangeville's primary objective with this standard is to protect and secure infrastructure from unnecessary damages and repairs. Tracer wire installed as per this standard shall provide the Town of Orangeville with a continuity lifespan equal to the lifespan of the municipal infrastructure it is installed on.

This standard will be periodically reviewed and amended as required by the Town of Orangeville.

2. Installation Process

The installation process will consist of the following steps:

1. Pre-Construction Meeting
2. Construction – Tracer Wire Installation
3. Continuity Testing and Inspection – Performed by Town of Orangeville Water Works Division
4. Acceptance/Rejection of Tracer Wire after Continuity Testing and Inspection
5. Repair of Tracer Wire Deficiencies (if required)

3. General Requirements

The Town of Orangeville requires all tracer wire to be installed so that the Town can accurately locate all municipal infrastructure without loss or degradation of signal using RF locating equipment. Materials used to build tracer wire systems are listed in Part 12, Approved Products List. Equivalent products may be considered for approval on a case-by-case basis by the Town of Orangeville Infrastructure Services Department.

All newly installed tracer wire shall connect to existing tracer wire using approved wire connectors, and existing tracer wire when found must be extended to an approved test station.

The Town of Orangeville may request that additional test stations beyond the standards requirements are to be installed where there may be difficulties in locating infrastructure. Extenuating circumstances that require changes to be made in the field to the requirements of this standard require the approval of the Town of Orangeville's Infrastructure Services department.

The consultant, contractor or developer shall clearly indicate tracer wire, test station locations, splices in the tracer wire, and grounding anodes on all infrastructure no later than at 90% completion in contract drawings, site servicing plans, and as-built drawings that are showing the infrastructure that the tracer wire is to be installed on. All contract drawings, site servicing plans, and as-built drawings when specifying testing stations, must indicate whether it is a flush mount or above-grade testing station.

4. Municipal Water, Sanitary Sewer, and Storm Sewer Infrastructure

- Tracer wire shall be installed on all Watermain infrastructure, including, but not limited to:

    - Watermains
    - Hydrant laterals
    - Water services (including fire services)
    - Auto-flushers
    - Blow-offs
- Tracer wire shall be installed on all Sanitary Sewer infrastructure, including but not limited to:
    - Sanitary sewer gravity mains
    - Sanitary sewer force mains
    - Sanitary sewer laterals
- Tracer wire shall be installed on all Storm Sewer mains.
- Tracer wire shall be laid flat and securely affixed to the top of the Water, Sewer, or Storm Sewer main with mastic tape at a maximum of 3-meter intervals. Care shall be made to protect the tracer wire from damage during installation.
- Tracer wire shall not be placed under any pipe components.
- Tracer wire shall not be wrapped around bolts or other components.
- When crossing service lines, tracer wire shall not be placed between the tapping saddle and main for water or sanitary sewer.
- No splices are permitted between tracer wire test points other than connections to laterals, crosses, or tees.
- Dead end mains must have either a test station or grounding anode installed. This is to be determined by the Town on a case-by-case basis.
- All tracer wire ends must be connected, no unconnected wires are permitted.
    - Underground wires must connect to existing tracer wire or grounding anode.
    - Above ground wires must be connected inside a Hydrant Three Terminal Test Station on post, on a terminal board of a Test Station, or on a set screw of Flushmount Test Station.
- Any splices made in tracer wire must be recorded in the As-Built Drawings, to be submitted to the Town of Orangeville Infrastructure Services department.
- Tracer wire shall be colour coded as follows:
    - Water = Blue
    - Sanitary and Storm Sewers = Green

5. Test Stations

- Test stations shall be installed at all chamber locations.
- The maximum allowable length of wire between tracer wire access points (above or below grade test stations, or hydrants) is 250m.
- All test stations, including hydrants situated in concrete or asphalt must have a grounding rod installed to the appropriate grounding rod connector of the test station.
- The contractor/developer shall install test stations or grounding anodes and connect to existing tracer wire at all limits of construction, and these shall be indicated on contract drawings no later than at 90% completion.
- Should a water, sanitary sewer, or storm sewer main terminate in a boulevard or within 1m of a boulevard, a test station shall be installed by the contractor/developer. The contractor/developer shall place the test stations at least 1.0 meters behind the sidewalk (when possible). If not possible, they should be installed in locations where they will be protected from above grade damage by winter control or maintenance activities.

- All test stations shall be colour coded by utility:
    - Water = Blue
    - Sanitary and Storm Sewers = Green
- Tracer wire running from a water, sanitary sewer, or storm sewer main to a test station is to be in a minimum 25mm diameter plastic conduit and buried at the depth of the main or at a minimum of 1.7m below grade until it is directly under the test station. The tracer wire is to then travel straight up to the test station and connect to the termination point.
- All bends that need to be used in the conduit are to be of a long radius type.
- 2m of slack from the tracer wire shall be left inside the bottom 400mm of the test station as a pigtail.
- All tracer wire that terminates at a test station shall be labelled to identify the infrastructure the wire is installed on and the direction the wire is travelling from the test station.
- Only the main of storm sewers require tracer wire.
    - For the purposes of test station installation for storm sewers, test stations must be positioned directly behind a catch basin using an approved flushmount test station in the boulevard in residential zones, where possible.
    - Test stations for storm sewers in non-residential areas or heavily vegetated areas may use an above-grade test station.

6. Directional Drilling Installations

- Heavier gauge wire shall be used for directional drilling applications as indicated in the Approved Products List.
- Contractors are required to pull a minimum of four tracer wires when completing a directional drilling installation. At least one working tracer wire must be in place for the entire installations upon construction completion.
- Where a hydrant, service, lateral, crosses or tees are installed as part of a directional drilling project, the contractor shall install tracer wire on these appendices as per the standards set aside in this document and make an approved connection with approved connectors to the directionally drilled tracer wire on the main.

7. ICI Properties

- A test point for all infrastructure shall be installed at property line directly on top of the pipe.
- The tracer wire coming from the water and sanitary sewer mains shall be kept separate from the tracer wire leading into private property.
- If there is a domestic water and fire service to the property, they will each require separate test stations.
- The Town of Orangeville is not responsible for continuity testing of tracer wire on private property.

8. Grounding Anodes

- Grounding anodes shall be installed where any tracer wire terminates in asphalt or concrete.
- Grounding anodes must be selected from the Approved Products List.

- Grounding anodes shall be connected to tracer wire with a connector listed in the Approved Products List.
- Grounding anode shall be installed at all dead ends where a test station is not being installed.
- A grounding anode shall be installed whenever there is a transition between a metallic pipe without tracer wire, and pipe requiring tracer wire.
- Grounding anode shall be driven into the ground vertically perpendicular to the watermain.

9. Hydrants

- Tracer wire is not permitted to go up inside any valve box or chamber.
- Tracer wire shall be brought from the pipe's bury depth to grade inside a plastic conduit and looped.
    - At least two meters of slack is required of tracer wire inside the conduit as a pigtail.
- The tracer wire that follows the watermain shall be looped at each hydrant.
    - The tracer wire shall run from the main on the hydrant lead, all the way up above ground at the back of the hydrant, and back down to the main following the hydrant lead.
    - The looped tracer wire shall be taped together tightly to ensure a singular conductor/signal.
    - Splices in the tracer wire from a hydrant to a main is only allowed when the main has been directionally drilled.
- Test stations shall be bolted to the flange at the back of each hydrant.
- When a tracer wire reel ends and a new reel begins at a fire hydrant, the two wires must be connected to the terminals inside the test station.

10. Water Services and Sanitary Sewer Laterals

- For plastic water services under 4" in diameter:
    - Tracer wire shall run between the electrical shoulder set screw on the main stop to the electrical shoulder set screw on the curb stop.
    - No splices are permitted between the main stop and curb stop.
    - A grounding anode shall be installed at each main stop by clamping the wire running from the anode to the main stop electrical shoulder set screw.
    - Profiling mastic shall be used to pack any voids in the main stop electrical shoulder set screw once the grounding anode and tracer wire have been secured. The connection shall then be wrapped in petrolatum tape.
    - Profiling mastic shall be used to pack any voids in the curb stop electrical shoulder set screw once the tracer wire has been secured. The connection shall then be wrapped in petrolatum tape.
    - Tracer wire on private property shall not be connected to the Town of Orangeville tracer wire.
    - When necessary, a piece of tracer way may be installed from the curb stop to the coupler on the private side if the existing service is copper or galvanized steel.
- For water services 4" and greater:
    - Tracer wire is not permitted to go up inside any valve box.

    - Tracer wire shall be brought from the pipe's bury depth to grade inside a plastic conduit and looped.
        - At least two meters of slack is required of tracer wire inside the conduit as a pigtail.
    - The tracer wire that follows the watermain shall be looped at each water service 4" and greater.
    - Tracer wire shall be looped where possible.
        - The tracer wire shall run from the main on the service line, all the way up above ground at property line, and back down to the main following the service line.
        - The looped tracer wire shall be taped together tightly to ensure a singular conductor/signal.
        - Splices in the tracer wire from a water service to a main is only allowed when the main has been directionally drilled, or;
            - Splices from service lines to mains must be pre-approved by the Town of Orangeville.
    - Test stations shall be a Town of Orangeville approved flush mount or above ground test station at property line.
    - When a tracer wire reel ends and a new reel begins at a test station, the two wires must be connected to the terminals inside the test station.
    - Where a new water service is being tapped to an existing main, the Town of Orangeville will determine whether a connection to existing tracer wire is to be allowed.
- For sanitary sewer services:
    - Tracer wire shall be looped where possible.
    - The tracer wire that follows the sanitary sewer main shall be looped at each lateral.
        - The tracer wire shall run from the main on the service lateral to property line and back to the main.
        - The looped tracer wire shall be taped together tightly to ensure a singular conductor/signal.
        - Splices in the tracer wire from a sanitary sewer lateral to a main is only allowed when the main has been directionally drilled, or;
            - Splices from sanitary sewer laterals to mains must be pre-approved by the Town of Orangeville.
    - Test stations shall be a Town of Orangeville approved flush mount or above ground test station at property line, where applicable.
    - If installation of a test station is required at a sanitary sewer lateral to conform with the minimum 250m between testing stations, it shall be installed at property line.
        - Tracer wire shall be brought from the pipe's bury depth to grade inside a plastic conduit and looped.
        - At least two meters of slack is required of tracer wire inside the conduit as a pigtail.
    - When a tracer wire reel ends and a new reel begins at a test station, the two wires must be connected to the terminals inside the test station.

11. Continuity Testing

- The Town of Orangeville shall perform continuity testing on all tracer wire at the following intervals:
    - Prior to asphalt installation.
    - Prior to the end of the warranty/maintenance period.
    - Any other times as deemed necessary by the Town.
- Acceptance will be determined by the Town of Orangeville, where:
    - Complete continuity of all installed tracer wire on water, sanitary sewer, and storm sewer with,
    - No breaks in continuity at any point inside the project's limits,
    - No signal degradation as determined by not requiring more than 50% power output on 512Hz frequency on the Town's utility locating equipment,
    - Properly selected, labelled and coloured test stations within acceptable distance intervals,
    - Properly selected, labelled and coloured tracer wire, with no open ends (outside of test station connections), and,
    - Where applicable, all flush mount test stations are level with grade.
- Any deficiencies identified by the Town of Orangeville during Continuity Testing procedures will be the responsibility of the developer/contractor to identify the faults or issues and rectify them within a reasonable timeframe as determined by the Town of Orangeville.
- The developer/contractor shall be responsible for all repairs and site remediation as required.
    - The developer/contractor shall produce a report on their findings, and repairs completed. A digital copy of this report must be provided to the Town of Orangeville.
    - The Town of Orangeville shall then provide post repair Continuity Testing inspections at no cost after submission of the digital report.

12. Approved Products List

Tracer Wire for Open Cut Installations:

- #12 AWG (0.0808" diameter) high strength copper clad steel conductor (HS-CCS) insulated with a 30mm, high density polyethylene (HDPE) insulation, rated for direct burial use at 30 volts.
- Wire to be colour coded:
    - Blue = Water
    - Green = Sanitary or Storm Sewer

Manufacturer	**Catalogue #**
Electrical Suppliers	HF-CCS PE45
DomTech	Specified as per above requirements
Canada Wire	Specified as per above requirements
Phillips	Specified as per above requirements
Maple	Specified as per above requirements
Pirrelli	Specified as per above requirements
Copperhead	Specified as per above requirements
Pro-Line	Specified as per above requirements

Tracer Wire for Directional Drilling Installations:

- Minimum of four wires to be pulled.
- Manufactured specifically as extra high strength for use in drilling applications.

Manufacturer	Catalogue #
Copperhead	845x-EHS
Copperhead	1045B-EHS/1045G-EHS
Copperhead	1245B-EHS/1245G-EHS

Grounding Anodes:

- Magnesium.
- ANO-12, Anode, Magnesium Drive.
- Minimum 17" grounding rod length.
- #12 AWG wire tail.

Manufacturer	Catalogue #
Copperhead	Ground Rod 12-AWG

Tracer Wire Connectors:

- Must be a waterproof connector.
- To be used for all tracer wire connections.

Manufacturer	Catalogue #
Copperhead	Low Voltage Ace Connectors (SC-PB-01)
Copperhead	Low Voltage Ace Connectors (SC-3WPB)

Above Grade Test Stations:

- Posts to be colour coded:
    - Blue = Water
    - Green = Sanitary or Storm Sewer
- Posts to contain warning stickers:
    - Water = "Warning Water Pipeline"
    - Sanitary = "Warning Sanitary Pipeline"
- Posts to come with a Cap Lock to prevent vandalism.

Manufacturer	Catalogue #
Rhino	72" RhinoDome Test Station RDR-TS

Flush Mount Test Stations:

- Test stations to be colour coded:
    - Blue = Water
    - Green = Sanitary or Storm Sewer
- Metallic head or collar to allow for detection by ferrous metal detector.

Manufacturer	Catalogue #
Pro-Line	ProTP5 Tracer Pit with ISO-Switch 5 Terminal
Copperhead	Snake Pit Switchable Access Box RB14B2TSW

Hydrant Three Terminal Test Stations:

- 5/8".

- Blue in colour.
- Must be installed at the back of the hydrant, mounted to the flange.

Manufacturer	**Catalogue #**
Copperhead	Cobra T3 Hydrant Flange Package