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## CONSTRUCTION AND MATERIALS SPECIFICATIONS MANUAL

### REVISION # 3 – APRIL 2012

#### INFORMATION SHEET

This revision shall take effect on April 18, 2012. Each Manual holder is responsible for determining implementation dates and directions for use of these revisions. It is recommended that you retain superseded versions of specifications for future reference.

#### **Access to Hamilton Standards**

All specifications and drawings are available free of charge online at the City of Hamilton website at:

[hamilton.ca/CityDepartments/PublicWorks/Environment Sustainable Infrastructure/Design/Construction and Material Specifications](http://hamilton.ca/CityDepartments/PublicWorks/Environment%20Sustainable%20Infrastructure/Design/Construction%20and%20Material%20Specifications)

Here you will find the latest versions of the published standards, archives of the previously published standards and Revision Information Sheets for currently published standards.

Hard-copy paper versions of the standards are available for a fee of \$89.65 through our offices located at:

Public Works Department – Reception  
77 James Street North, Suite 320  
Hamilton, Ontario, L8K 6E9  
Call 905 546-2424, Ext. 4170.

#### **Approved Products Lists also available on “The Road Authority” website**

All approved products in the Road, Watermain and Sewer related product category will also be posted on the City of Hamilton’s “Pre-qualified Products” List on *The Road Authority’s* (TRA’s) web site at [www.roadauthority.com](http://www.roadauthority.com). This “online” list will be updated periodically throughout the year as revisions are made. Any Approved Products List may be revised at any time to suit specific project or tendering requirements, at the sole discretion of the City.

Where conflicts arise, the Approved Product List contained in the Construction and Material Specifications Manual shall take precedence.

**Revisions to the Construction and Materials Specifications Manual:**

Superseded / Cancelled (Remove)		Revised / New (Insert)		Comments
Document	Dated	Document	Dated	
Construction and Material Specification Manual Index	January 2011	Construction and Material Specification Manual Index	April 2012	Updated
Form 400, Specification for the Installation of Watermains – Appendix A	January 2011	Form 400, Specification for the Installation of Watermains – Appendix A	April 2012	Appendix A updated
Approved Watermain Products List	January 2011	Approved Watermain Products List	April 2012	Updated
Approved Sewer Products List	January 2011	Approved Sewer Products List	April 2012	Updated
Approved Street Lighting Products List	---	----	April 2012	New List
Standard Road Drawing Index	January 2011	Standard Road Drawing Index	April 2012	Updated
DT:0111-01	December 2008	DT:0111-01	April 2011	Updated
----	---	DT:0111-02	April 2011	New
Standard Watermain Drawing Index	January 2011	Standard Watermain Drawing Index	April 2012	Updated
WM-212.01	November 2005	DELETED	---	No longer in production
WM-212.02	November 2005	DELETED	---	No longer in production

**Revision Summaries**

These summaries are for information purposes and will highlight major or substantial changes only. Each revision and specification should be reviewed in its entirety.

**Construction and Materials Specification Manual Index**

- Approved Street Lighting List added. (interim location)

**Form 400 – Specification for the Installation of Watermains – Appendix A**

- Existing section 2.5, Disinfection of Watermains, 2<sup>nd</sup> paragraph - new wording added:

Once this has been achieved, the watermain shall be flushed and sampled for appropriate chlorine residual levels. Minimum acceptable levels; Combined chlorine residual: 0.25mg/L and Free chlorine residual: 0.05mg/L.

- Existing section 2.7, Bacteriological Sampling, 1<sup>st</sup> paragraph - wording revised:

Existing wording: Before the watermain, or temporary above ground by-pass system can be approved for connection to the existing water distribution system, two (2) consecutive rounds of water samples, taken 24 hours apart, shall pass both the chlorine residual and bacteriological requirements.

Revised wording: Before the watermain or temporary above ground by-pass system can be approved for connection to the existing water distribution system all water samples shall pass both the appropriate chlorine residual and bacteriological requirements as per City of Hamilton Environmental Laboratory testing procedures.

- Existing section 2.8, Sampling Results, last paragraph - wording revised:

Existing wording: If sample results do not meet requirements the failed section must be flushed or re-disinfected, as directed by the Project Manager and re-sampled at sample locations determined by The City of Hamilton until two (2) consecutive rounds of water samples, taken 24 hours apart pass both chlorine residual and bacteriological requirements.

Revised wording: If sample results do not meet requirements the failed section must be flushed or re-disinfected, as directed by the Project Manager and re-sampled at sample locations determined by The City of Hamilton until all water samples pass both the appropriate chlorine residual and bacteriological requirements as per City of Hamilton Environmental Laboratory testing procedures.

### **Summary of Revisions to the Approved Watermain Products List**

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- Reduced lead content products by Cambridge Brass listed (NL)
- The Smith Blair Omni 441 removed from the list. The use of this product is currently suspended and under review;
- Tyler/Union added as an approved manufacturer for ductile iron fittings;
- Tyler/Union TUFGRip added as an approved manufacturer for joint restraint;
- Ebaa, Ford, Smith Blair added as approved manufacturers for bell and spigot joint restraint for DI and PVC pipe;
- WM-212 replacement manufactured by EJ (McCoy). WM-212 no longer in production.

### **Summary of Revisions to the Approved Sewer Products List**

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- Co-Pipe added as an approved manufacturer in the catch basin, maintenance hole and pipe categories.

### **Approved Street Lighting Products List**

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- Newly created list for street lighting and associated products. Insert immediately after the Approved Sewer Products List. (Temporary location)

### **Summary of Revisions to the Standard Road Index and Drawings**

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- Index updated.
- Existing drawing DT-0111-01 has been updated. (Size 24" x 36")
- DT:0111-02 Traffic Signal Standards – Typical Installation of Grounding and Bonding for Traffic Control Devices issued with this revision. (Size 24" x 36")

### **Summary of Revisions to the Standard Watermain Index and Drawings**

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- Index updated.
- WM-212 removed from the index. Replacement 750mm valve chamber frame and cover listed in the Approved Watermain Products List.

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## CONSTRUCTION AND MATERIAL SPECIFICATIONS MANUAL INDEX

<u>DATE</u>	<u>DESCRIPTION / TITLE</u>
<b><u>General Conditions</u></b>	
January 2011	Form 200 - General Conditions
June 2006	Form 300 - General Construction Requirements
<b><u>Standard Specifications</u></b>	
January 2011	Form 400 - Specifications for the Installation of Watermains
April 2012	Form 400 – Appendix A – Specification for Connection to Existing Watermains, Swabbing, Flushing, Disinfection, Leakage and Bacteriological Testing of Watermains
January 2011	Form 500 - Specification for Sewer Pipe Materials
June 2006	Form 600- Specification for Granular Fill Materials
June 2006	Form 700 - Specification for Portland Cement
June 2006	Form 800 - Specification for Hot Mix Asphalt
June 2006	Form 900 - Specification for Standard Compaction Requirements
June 2006	Form 1000 - Amendments to OPSS and OPSD
<b><u>Approved Products</u></b>	
April 2012	Approved Watermain Product List
April 2012	Approved Sewer Product List
April 2012	Approved Street Lighting List
<b><u>Standard Drawings</u></b>	
April 2012	RD Road Standard Drawings
April 2012	WM Waterworks Standard Drawings
January 2011	SEW Sewer Standard Drawings
June 2006	PK Park Standard Drawings

## 1. INTRODUCTION

### 1.1 Scope: Watermain Installation and Testing Procedures

This procedure covers the cleaning, disinfection, hydrostatic testing and sampling of watermains. Unless specified otherwise this procedure applies to all new watermains, above ground by-pass watermains and relined watermains.

### 1.2 Definitions

Project Manager – shall be the City of Hamilton, Public Works, Capital Planning, Development Engineering and Implementation Project Manager.

Construction Inspector – shall be the City of Hamilton, Public Works, Environment and Sustainable Infrastructure construction inspector.

Development Engineering Inspector - shall be the City of Hamilton's Planning and Economic Development construction inspector.

Specialist – shall be a company specializing in regulated water systems or a company approved by the Project Manager, whose personnel hold a minimum MOE, O.Reg. 170/03 Water Distribution Licence or licenced City of Hamilton Staff.

Contractor – shall be the person, partnership or corporation undertaking the Work as identified in the agreement.

CHEL – shall be the City of Hamilton Environmental Laboratory

CSR – shall be a City of Hamilton Customer Service Representative

CS&C0 – shall be City of Hamilton Customer Service and Community Outreach section

Disinfectants – shall be Calcium or Sodium Hypochlorite that meets or exceeds AWWA Standard B300.

LIMS – shall be the City of Hamilton Environmental Laboratory work order database

LWO Number – shall be the City of Hamilton Environmental Lab Work Order Number

Neutralizing Agent – shall be Sodium Thiosulfate that meets or exceeds AWWA Standard C651.

SDWA- Ontario Safe Drinking Water Act.

NSF 61 – National Sanitation Foundation

### **1.3 References**

These procedures are based on, and shall be used in conjunction with, the Ontario Provincial Specifications (OPS), the American Waterworks Association (AWWA C651) Standards, and the Ontario Safe Drinking Water Act, City of Hamilton Design Criteria, CAN/CSA-B64.10

### **1.4 General Requirements For Watermain Installation**

Keep pipes clean and dry. Take precautions to protect the interiors of pipes, fittings, and valves against contamination. Night plugs to be install when work is not in progress. Remove plugs only when connecting next pipe or appurtenance or continuing work. Pipes shall not be laid in water. Existing watermains, which are dead ended during construction, shall have a minimum 25 mm bleeder installed at the dead end. New watermains which are temporarily dead ended shall have a minimum 50mm blow off installed with a temporary cap if there is no hydrant "downstream" of the last water service on the watermain.

### **1.5 Supervision, Testing and Records**

The City of Hamilton's Construction Inspector shall witness all cleaning, hydrostatic testing, disinfection, and sampling activities. The Specialist / qualified person carrying out the cleaning and disinfection in conjunction with the City's Construction Inspector shall take and record measurement on The City of Hamilton approved Watermain Disinfection, Pressure Testing and Acceptance form.

### **1.6 Valve Operation**

The Contractor should note that The City of Hamilton Water Distribution staff must perform the operation of all existing valves inclusive of hydrant secondary valves. In an emergency the City of Hamilton's Inspector may direct or operate valves.

The opening and closing of any valve should be coordinated with The City of Hamilton's Construction Inspector. All residences shall be notified 48 hours prior to a planned disruption of water service.

### **1.7 Forms**

The following forms are attached to this document: "Watermain Disinfection, Hydrostatic Testing and Acceptance", "Chlorine Residual", and "Schedule".

### **1.8 Connection and Testing Procedures Plan**

The Contractor shall provide a plan to the Project Manager and Construction Inspector, detailing the connection locations, swabbing locations, hydrostatic testing, chlorination and dechlorination methods, disposal of water, and final connection methods. If the project is being constructed in phases, this plan shall detail each of these items for each phase.

## **2. WATERMAIN TESTING PROCEDURE**

This document to be read in conjunction with the forms entitled “Watermain Disinfection, Pressure Testing and Acceptance”, “Chlorine Residual”, and “Schedule”. These procedures are to be used in conjunction with the Ontario Provincial Specifications (OPS), the American Waterworks Association (AWWA) and the Ontario Safe Drinking Water Act (SDWA).

All required low-end chlorine residual tests shall be performed by the Specialist / Construction Inspector, with an electronic tester such as a Hach Pocket Colourimeter or equivalent, which is to be supplied by the Contractor/Specialist and witnessed by the Construction Inspector.

All works associated with leakage, testing, swabbing, chlorination, dechlorination and sterilization of the watermain are to be performed by a company specializing in this work or a company approved by the Project Manager.

Temporary by-pass piping shall meet all procedures and requirements of new watermain with the exception of hydrostatic pressure testing. A visual check shall be performed at line pressure on a temporary by-pass to ensure that it is leak free.

### **2.1 Temporary Connection and Backflow Preventer**

The temporary connection is to be used for all water supplies to maintain continuous supply of water, unless otherwise noted. The size of the temporary connection shall be; 50mm diameter for watermains up to and including 200mm diameter, and 100mm diameter for watermains 250mm diameter to 400mm diameter inclusive. (All materials for the temporary connections are to conform to The City of Hamilton Approved Watermain Products List.). Watermains larger than 400mm in diameter shall be as per design standards.

The hydrant adapter (backflow preventer / meter) shall be a reduced pressure principle type and shall be supplied by the City of Hamilton upon receipt of request from the Project Manger on behalf of the contractor. Development Engineering will have special considerations as per the City of Hamilton Development Inspector. The adapter shall be installed and hydrant charged by a City of Hamilton Water Distribution Operator. The hydrant(s) that will be utilized as the source for the temporary by pass will be determined by the City of Hamilton Project Manager in consultation with City of Hamilton Water Distribution staff.

The existing distribution systems and the backflow preventer shall be physically disconnected from the test section during hydrostatic testing.

### **2.2 Charging of Watermains**

The watermain is to be loaded via a temporary connection equipped with a backflow preventer.

### **2.3 Swabbing**

The watermain is to be loaded (charged or pressurized) prior to the commencement of swabbing. The Construction Inspector is to record, on the “Watermain Disinfection Pressure Testing and Acceptance form”, the number of swabs inserted and retrieved. The main valve

seat of the hydrant must be removed and a blind seat installed to prevent undermining the soil at the hydrant boot. Full reinstatement of the hydrant shall begin immediately after the swabbing process is completed. All swabs must be inspected prior to insertion and immediately after they exit the watermain to ensure that they have remained intact and that pieces of the foam do not stay in the watermain. The swabs should also be numbered and carefully controlled by the Specialist and Construction Inspector to ensure that all swabs that are introduced into the watermain are retrieved and accounted for. Only new swabs will be permitted for use and under no circumstances will used swabs be allowed.

All watermain pipes must be swabbed with a minimum of THREE swabs plus a minimum of one swab shall be passed through each hydrant lead, large diameter water service, stub or blow-off. Additional swabs shall be used as directed by the Project Manager or Construction Inspector if discharge water does not run clear within ten seconds of the swab exiting the discharge point. No additional payment shall be made for subsequent swabbing. Swabs shall be forced through the watermain using potable water so that they maintain a minimum velocity of 0.6 to 1 meter per second. The Project Manager must approve all methods of disposal of the discharged water. The Contractor shall take the necessary precautions to minimize soil erosion and shall reinstate the area upon completion.

The swabs must be new open cell polyurethane foam, having a density of 1.5 pounds per cubic foot (24 kilograms per cubic meter), and are to be a minimum of 50mm larger than the nominal pipe diameter with a length at least one and a half times its diameter. Watermains 300mm or smaller shall be swabbed through hydrants on approval by the Project Manager. Procedures for swabbing watermains larger than 300mm must also be approved by the Project Manager.

## **2.4 Hydrostatic Testing**

Leakage tests shall be applied to the section of watermain after the swabbing. The Contractor shall ensure that no air pockets are present in the section of watermain. The existing distribution systems and the backflow preventer shall be physically disconnected from the test section during hydrostatic testing. All hydrant assemblies shall be removed and a "blind flange" installed prior to conducting the pressure test. The ends of the mains shall be capped and the main filled with potable water under a pressure of 1035 kPa after which all visible leaks shall be stopped. Leakage shall then be measured by a calibrated meter with readings taken at fifteen minute intervals for a period of two hours and recorded on the "Watermain Disinfection, Pressure Testing and Acceptance form". The average rate of leakage shall not exceed 1.54 litres per mm of pipe diameter per km of pipe per day, and if the leakage exceeds this figure the contractor shall locate and correct the leaks. The watermain is to be tested in sections, where a section is a length of watermain between two valves, or a valve and a dead end. Should the contractor wish to test more than one section at a time, the Project Manager/ Inspector will calculate the allowable leakage for all sections within the tested portion and the smallest calculated leakage will become the allowable for the entire tested portion. The cost of the labour and the materials required shall be borne by the Contractor.

If the test is not successful the leak is to be found, repaired and the hydrostatic test to be applied again until it is successful.

Temporary above ground by-pass piping shall meet all procedures and requirements of new watermain with the exception of hydrostatic pressure testing. A visual check shall be performed

at line pressure on a temporary by-pass to ensure that it is leak free.

## **2.5 Disinfection of Watermains**

The method of disinfection to be used is the continuous feed method. The chlorine is to be injected into the system through the access point on the temporary connection. The chlorine solution is to be thoroughly mixed prior to pumping it into the system. The Specialist shall ensure that no air pockets are present in the section of watermain. The chlorine solution shall be applied so that the chlorine concentration is a minimum of 50mg/L throughout the system and does not exceed 100mg/L and recorded. The chlorine solution is to be flowed through each hydrant and blow-off. The high chlorine residual is to be measured by the Specialist at each sample location and recorded by the Construction Inspector.

The high chlorine concentration will be isolated in the system for a minimum of 24 hours and recorded on the "Watermain Disinfection, Pressure Testing and Acceptance form". After the required contact time, the chlorine residual is to be taken at each sample location by the Specialist and recorded by the Construction Inspector. Flow required to take the chlorine residuals shall be provided through the temporary connection. If the chlorine residual is at or above 10mg/L the chlorine is ready to be discharged. In the event that the chlorine residual is less than 10mg/L, the chlorine in the system is to be discharged, and the system is to be rechlorinated. The Construction Inspector has the authority to require further swabbing if the residual is less than 10mg/L. Once this has been achieved, the watermain shall be flushed and sampled for appropriate chlorine residual levels. Minimum acceptable levels; Combined chlorine residual: 0.25mg/L and Free chlorine residual: 0.05mg/L.

## **2.6 Removal/Disposal of Super Chlorinated Water**

The Contractor shall be capable of de-chlorinating the discharge water to protect receiving streams and other bodies of water, via catch basins or other points of entry, as per the Ministry of Environment (MOE) regulations and ANSI/AWWA C651 as amended. Dechlorination is not required when discharging directly into a Sanitary Sewer or Combined Sanitary Sewer system. If in near proximity to the sewer treatment plant, the plant is to be notified and approve receiving the water. The Contractor will be required to supply all labour, equipment and materials to dechlorinate water which includes, but is not limited to, dechlorination mats, diffusers, dechlorination chemicals and techniques. There shall be no separate payment for de-chlorination.

## **2.7 Bacteriological Sampling**

Before the watermain or temporary above ground by-pass system can be approved for connection to the existing water distribution system all water samples shall pass both the appropriate chlorine residual and bacteriological requirements as per City of Hamilton Environmental Laboratory testing procedures. Prior to chlorine residual and bacteriological testing, all other testing and disinfection shall be completed and any super chlorinated water removed from all portions of the watermain system under consideration including hydrant leads, stubs, branches, services, etc.

The City of Hamilton will ensure the temporary connection is open and take a bacteriological sample at each sample location and deliver it to the City of Hamilton Environmental Laboratory.



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FORM 400 - APPENDIX A  
SPECIFICATION FOR CONNECTION TO EXISTING WATERMAINS,  
SWABBING, FLUSHING, DISINFECTION, LEAKAGE  
AND BACTERIOLOGICAL TESTING OF WATERMAINS

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April 2012

The watermain test section shall be immediately shut down and must not be disturbed or flushed for the period between this sample round and the next bacteriological sample round 24 hours later.

Samples shall be taken from the end of every dead end and from every 360 metres or less of new watermain pipe. No hose or hydrant shall be used in the collection of bacteriological samples.

The watermain must remain continually pressurized from the start of bacteriological testing until the connection to the existing system is undertaken.

## 2.8 Sample Results

### Procedure

Once the new watermain is installed and pressure tested, the proper number of water samples are to be collected by Construction Inspectors & Development Engineering Inspectors. Inspectors shall drop off sample bottles at CHEL along with the completed chain of custody form(s).

Lab staff will process and log in the bottle(s). Each chain of custody form will be assigned an "LWO Number". In addition to the LWO, sample bottles will be assigned their own unique "record number".

Samples delivered after 3:30pm on working days will be set up the same day, but may not be logged in until the next day. Samples delivered after 4:00pm on working days may not be set up for analysis nor logged in until the next day.

Lab staff, using the LIMS database, will generate an email that will be sent to the Inspector. The email will contain the LWO and record numbers that can then be used by the Inspector when calling in to the lab.

If special arrangements are made to bring sample bottles to the lab on a weekend, Construction Inspectors & Development Engineering Inspectors are to call CHEL on the Friday and provide the sample location, account number and the project/permit number (if applicable). In this case, CHEL will pre-log the samples into LIMS.

Construction Inspectors & Development Engineering Inspectors can call the CHEL after 24 hours and 48 hours to determine the status of water quality testing, with the understanding that these results are still provisional data until they have gone through the data approval process. The new watermain cannot be put into service until the Final Approved Lab Report from the CHEL has been obtained.

After the 48-hour testing period, data are entered into the LIMS database and go through a data approval process. CHEL will create a PDF file of the Final Approved Lab Report for each LWO and save the file at the following locations:

For CS&CO staff, the PDF file is saved at N: \ environmental laboratory reports\CSCO\_WmRech

For Planning and Economic Development, the PDF file is saved at N: \ environmental laboratory reports\ Development\_Engineering



FORM 400 - APPENDIX A  
SPECIFICATION FOR CONNECTION TO EXISTING WATERMAINS,  
SWABBING, FLUSHING, DISINFECTION, LEAKAGE  
AND BACTERIOLOGICAL TESTING OF WATERMAINS

April 2012

For Environment and Sustainable Infrastructure, the PDF file is saved at N: \ environmental laboratory reports \Construction

The files will be named as follows:

ROADS-PRIVATE\_#\_#####\_YYYY-MM-DD HH-MM-SS Final Report.pdf

where:

##### represents the LWO Number

YYYY-MM-DD is the date that the PDF was created

HH-MM-SS is the time that the PDF was created

If changes are required to the staff permissions for the files above, the Project Manager Lab Services must be contacted (ext 7804).

Construction Inspectors and Development Engineering Inspectors shall also contact a CSR 24 hours and/or 48 hours ahead of the proposed watermain shutdown, depending on the project, to facilitate the connection of the new watermain to the source watermain and inform the CSR of the following information: Name of the Inspector, Contract Number or Development Site, Where/When to meet WDO, Duration of Shutdown and LWO number.

The CSR will create a Service Request containing (as a minimum) information listed above. The CSR will also attach by OLE the corresponding LWO PDF file from the network drive N: \ environmental laboratory reports\CSCO\_WmRech . The CSR will then create the Service Request for a WDO to connect the new watermain to the existing water distribution system.

If sample results are successful the system will be put into service once a certified copy of the form entitled "Watermain Disinfection, Pressure Testing and Acceptance" has been received and accepted. A single failed bacteriological parameter will constitute a failure of the entire sampling round. If sample results do not meet requirements the failed section must be flushed or re-disinfected, as directed by the Project Manager and re-sampled at sample locations determined by The City of Hamilton until all water samples pass both the appropriate chlorine residual and bacteriological requirements as per City of Hamilton Environmental Laboratory testing procedures.

ACCEPTABLE BACTERIOLOGICAL TEST RESULTS

E. Coli	0 CFU/100ml
Total Coliform	0 CFU/100ml
Total Coliform Background	200 CFU/100ml
Heterotrophic Plate Count	500 CFU/ml

### **3. CONNECTION TO EXISTING WATER DISTRIBUTION SYSTEM**

#### **3.1 Procedure**

Once the final rounds of bacteriological tests have passed, the connection to the existing watermain shall be performed.

A sump, minimum 300mm depth, shall be excavated in the trench bottom, and filled with clear stone, to provide a location to collect water and pump water.

Watermains shall be cut back to remove any temporary taps. The Contractor shall disinfect the connection watermain pipe as outlined below and shall, using all means possible, dewater the watermains and trench in a controlled manner as to not allow backflow of water into the watermains.

If trench water, dirt, or debris has entered the watermain during the final connection, the watermain shall be aggressively flushed and additional bacteriological samples shall be taken as directed by the Construction Inspector.

#### **3.2 Connections Equal to or Less than One Pipe Length**

For a final connection length equal to or less than one pipe length, the new pipe, fittings and valves required for the connection shall be spray-disinfected and swabbed with a minimum 1% to maximum 5% solution of chlorine, immediately prior to being installed. As well the existing watermain being connected to shall be cleaned in the immediate area of the connection and spray-disinfected with the same solution.

The Contractor shall make every possible effort to ensure that the final connection is no more than one pipe length.

#### **3.3 Connections Greater than One Pipe Length**

For a final connection that is greater than one pipe length, the new pipe required for the connection shall be set up above ground, disinfected and bacteriological sample rounds taken as required for new watermain. After two consecutive rounds of satisfactory sample results have been received for the 'pre-disinfected' pipe, the pipe can be used in connecting the new main to the active distribution system. Between the time the satisfactory bacteriological sample results are received and the time that the connection piping is installed, the ends of the piping must be sealed with clean, disinfected, watertight plugs or caps.

All caps shall be kept in place during the installation procedure until immediately prior to making the connection.

The existing watermain in the immediate area of the connection as well as the newly required fittings and valves, shall be cleaned, and spray-disinfected with a minimum 1% to maximum 5% solution of chlorine immediately prior to the connection.

#### **4. WATER SERVICES**

Service connections shall be tapped and connected under pressure. Inspect connections to ensure drip tight prior to backfilling. The pipe shall be left exposed where directed by the Construction Inspector, after which backfilling shall be completed.

All new water service pipe 38mm in diameter up to but not including 100mm diameter, as well as all sized of temporary by-pass service hose, shall be disinfected. The chlorine solution shall be applied so that the chlorine concentration is a minimum of 25mg/1 and does not exceed 100mg/1. Pre-disinfected pipe shall be sealed immediately following disinfection until immediately prior to connection.

All services shall be thoroughly and aggressively flushed prior to connecting to existing service.

Required fittings and valves shall be cleaned and spray-disinfected with a minimum 1% to maximum 5% solution of chlorine immediately prior to the connection.

Services 100mm in diameter and larger shall be considered mainline and shall meet all mainline procedures and testing requirements.

All by-pass services hoses to be used will be of potable water grade and shall meet the requirements of NSF 61 Standard.

- Service hoses to be capped on both ends with brass caps until installed.
- Service hoses will not be installed on by-pass piping until the day of the change over from distribution watermain to the above ground by-pass watermain.

#### **5. WATERMAIN BREAKS**

Watermain breaks shall be treated the same as noted in "Connection to Existing Water System".



FORM 400 - APPENDIX A  
 SPECIFICATION FOR CONNECTION TO EXISTING WATERMAINS,  
 SWABBING, FLUSHING, DISINFECTION, LEAKAGE  
 AND BACTERIOLOGICAL TESTING OF WATERMAINS

April 2011

**Watermain Disinfection, Pressure Testing, and Acceptance Form**

Contract / Development No.: \_\_\_\_\_ Date: \_\_\_\_\_

Location: \_\_\_\_\_

Contractor: \_\_\_\_\_

Construction Inspector / Development Engineering Inspector: \_\_\_\_\_

√	Description	Performed By	Date	Witnessed By
<input type="checkbox"/>	Loading Watermain - Location			
<input type="checkbox"/>	Swabbing – Number(s)		Re-swabbing – Number(s)	
<input type="checkbox"/>	Swabs Retrieved – Number(s)			
<input type="checkbox"/>	Hydrostatic Pressure Tests (record on attached table)			
<input type="checkbox"/>	Chlorination			
	High Chlorine Residual (50 mg/L to 100 mg/L) _____		24 hr Chlorine Residual (> Or = 10 mg/L)	
	If 24 hr residual fails, flush, re-chlorinate, note further residual results			
	High Chlorine Residual (50 mg/L to 100 mg/L) _____		24 hr Chlorine Residual (> OR = 10mg/L)	
<input type="checkbox"/>	Removal / Disposal of Super Chlorinated Water			
<input type="checkbox"/>	Sample Round #	Sample Number(s)		<input type="checkbox"/> pass <input type="checkbox"/> fail
<input type="checkbox"/>	Sample Round #	Sample Number(s)		<input type="checkbox"/> pass <input type="checkbox"/> fail
<input type="checkbox"/>	Sample Round #	Sample Number(s)		<input type="checkbox"/> pass <input type="checkbox"/> fail
<input type="checkbox"/>	Sample Round #	Sample Number(s)		<input type="checkbox"/> pass <input type="checkbox"/> fail
<input type="checkbox"/>	Results - Passed			
<input type="checkbox"/>	Valves operated - Location			
Comments:				

We acknowledge that this section of water system was constructed, cleaned, disinfected, and sampled as per the City of Hamilton Standards and Specifications and as outlined in the Procedure For Disinfection of Watermains In Ontario

Contractor Signature: \_\_\_\_\_

Water Distribution Operator Signature: \_\_\_\_\_

Construction Inspector / Development Engineering Inspector Signature: \_\_\_\_\_



PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<b>Backflow Preventers</b>		Watts	009 (16mm to 50mm) 909 (75mm to 200mm)
<b>Backwater Valve</b>		Bibby-Ste-Croix	69060
<b>Corrosion Protection</b>	Zinc Anodes: 5.4 Kg and 10.5 Kg ASTM B-418, Type 2		
	Magnesium Anodes: 14.5 Kg - B-107, ASTM 843, Type M1 OPSS 442		
	Protective coatings for metal fittings	Denso North America	Denso Wrap (primer, mastic and tape)
		Trenton	No. 1 Wax Tape
Polyethylene encasement for ductile iron watermain pipe and fittings			
ANSI/AWWA C105 A21.5-99 - 8 mil low density Poly-Tube with overlap			
<b>Couplings</b>	Water Service Couplings 19mm to 50mm AWWA C800, NSF-61 compression fit copper to copper connections	Cambridge Brass	118, 118NL, 119, 119NL
		Ford Meter Box Co.	C44, – Q type
		Mueller	H-15403
	Water Service Couplings 19mm to 50mm AWWA C800 copper to lead or alloy connection	Ford Meter Box Co.	Q14 Series, Q24 Series and Q34 Series With internal stop

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<b>Couplings Cont'd...</b>	Watermain Pipe Couplings AWWA C219-06 epoxy coated with stainless steel straps, nuts and bolts	Ford	FC1 and FC2 100mm to 300mm DI and PVC
		Robar Industries	1506 (4 or 5 bolt model) 100mm to 400mm DI and PVC
		Straub Tadco	Straub-Flex, non-restrained up to 1200mm (modified for Hamilton)
		Victaulic	Vic 31 400mm DI only
		Viking Johnson	MaxiFit (100mm to 1200mm)
<b>Curb Stops</b>	19mm to 50mm AWWA C800 compression ends ball type, non-draining	Cambridge Brass	202 and 202NL Series
		Ford Meter Box Co.	B44 Series – Q Type
		Mueller	300 B-25209
<b>Fittings</b>	Ductile Iron Up to 300mm Pressure Class 350, cement lined, AWWA C104, C110 / A21.10, C153/A2.53, OPSS 441, NSF-61	Bibby	
		Sigma	
		Star Pipe Products	
		Tyler/Union	DM, DFF and XM
	Ductile Iron 400mm and larger Class 52, cement lined restrained mechanical joint AWWA C104 C110 / A21.10, OPSS 441.05.02	Bibby	
		Sigma	
		Star Pipe Products	
		Tyler/Union	DM, DFF and XM
	PVC 100mm, 150mm and 200mm, injection molded AWWA C907, B137.3 OPSS 441	Ipex	Blue Brute
		Royal Pipe	Royal Seal
	PVC 250 mm to 750mm CSA B137.3 250 mm and 300 mm shall use AWWA C900 and C905 PVC pipe, bonded and over- wrapped with fiberglass- reinforced polyester	Ipex	Blue Brute, Big Brute
		Royal Pipe	Royal Seal

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<b>Hydrants</b>	3 way hydrants AWWA C502	American AVK	Style 2780
	CAN / ULC S-520-07 2-63.5 mm side ports, CSA standard thread, stainless steel nuts, bolts and studs	Clow Canada Ltd.	Brigadier Series M -67
	100mm "STORZ" pumper connection  25mm hydrant operating nut - open left (Counter clockwise)  Extensions permitted at boot only	Mueller Canada Inc.	Darling B-50-B
<b>Insulation</b>	Extruded Polystyrene	Dow	Styrofoam Highload 100
		Owens Corning	Foamular 1000 (Pink)
<b>Joint Restraint</b>	Ductile Iron Pipe	Ebaa Iron	Mega-Lug Series 1100 Black epoxy coated wedges and nuts (100mm to 1200mm)
			Tru-Dual Series 1500TD (100mm to 300mm)
		Ford	Uni-Flange Series 1390 (100mm to 300mm)
		Smith-Blair	Cam-Lock Series 111 - epoxy coated wedges and nuts (100mm to 600 mm)
			Bell-Lock 115 and 165 (100mm to 300mm)
		Sigma	One-Lok –SLD (100mm to 600mm)
		Star	Stargrip Series 3000 (100mm to 400mm)
	Tyler/Union	TUFGrip TLD (black)	
PVC Pipe ASTM F1674-05	Ebaa Iron	Tru-Dual Series 1500TD (100mm to 300mm)	

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<b>Joint Restraint Cont'd...</b>	PVC Pipe ASTM F1674-05 Cont'd...	Ford	Uni-Flange Series 1390 (100mm to 300mm)
		Sigma	PV-Lok – SLC (100mm to 600mm)
		Star	Stargrip Series 4000 Top breakaway nut same size as the T-bolt (100mm to 750mm)
		Smith Blair	Bell-Lock 115 (100mm to 300mm)
			Cam-Lock Series 120 (100mm to 600 mm)
		Tyler/Union	TUFGrip TLP (red)
<b>Main Stops (Corporations)</b>	19mm to 50mm AWWA C800 compression end, ball Type non-draining	Cambridge Brass	301 and 301NL Series A3H3, A4H4, A6H6, A7H7
		Ford Meter Box Co.	FB1000 Series, Q Type
		Mueller	300 B-25008
<b>Pipe</b>	Concrete Pressure Pipe 500mm and larger AWWA C300, C301, C302 and C303, OPSS 441 Plant pre-qualified by the OCPA	Hyprescon	
		Munro Concrete	
	Ductile Iron Pipe 100mm to 300mm Pressure Class 350, tyton joint, AWWA C104 / A21.3, C110 / A21.10, OPSS 441	Canada Pipe Company	Includes polyethylene encasement of pipe and fittings AWWA C105 / A21.5
	Ductile Iron Pipe 400mm to 1050mm tyton joint, Class 52 AWWA C104 / A21.3, C110 / A21.10, OPSS 441	Canada Pipe Company	Includes polyethylene encasement of pipe and fittings AWWA C105 / A21.5
	Polyvinyl Chloride (PVC) 100mm to 300mm AWWA C900 - DR18 OPSS 441	Ipex	Blue Brute
		Royal Pipe	Royal Seal
		National Pipe and Plastics	AWWA C900
	Molecularly Oriented Polyvinyl Chloride (PVCO) 100mm to 300mm AWWA C909 - DR18 PC150, OPSS 441	Ipex	Bionax

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<b>Pipe Cont'd...</b>	Polyvinyl Chloride (PVC) 400mm AWWA C905 – DR18 OPSS 441	Ipex	Big Brute, Centurion
		Royal Pipe	Royal Seal
	Polyvinyl Chloride (PVC) 500mm to 750mm AWWA C905, OPSS 441	Ipex	Big Brute, Centurion
		Royal Pipe	Royal Seal
<b>Repair Clamps</b>	clamps to be supplied with conductivity strip	Robar Industries	5616, 5626, 5636
		Ford Meter Box Co.	Style FS1, Style FS2, Style FS3
<b>Service Boxes</b>	Slide adjustment type Stainless steel rods brass cotter pin	Mueller	H-10300 Series
		Clow	"D" Series
<b>Service Saddles</b>	DI, PVC Pipe Outlet size: 19mm to 50mm	Cambridge Brass	403 and 812 Series
		Ford	FS202
	stainless steel straps Denso protection at installation AWWA taper (cc)	Robar Industries	2506 DS, 2616
		Romac	202 BS (2 strap model)
		Smith Blair	317
Concrete Pressure Pipe Outlet size:19mm to 50mm	Ayotte Enterprises	A-900 with A-571 thermoplastic coating (400 mm only)	
<b>Tapping Sleeves</b>	Outlet size 100mm to 400mm  Sleeves will be permitted on the following branch and main sizes:  400mm branch off 400mm w/m 300mm branch off 300mm w/m 250mm branch off 250mm w/m 200mm branch off 200mm w/m 150mm branch off 150mm w/m 100mm branch off 100mm w/m  Protective coating shall be applied to all steel sleeves.	Ayotte Enterprises	A-600 with A-571 thermoplastic coating, stainless steel nuts and bolts - concrete pipe only
		JCM Industries	JCM 415 epoxy coated with stainless steel nuts and bolts, concrete pipe only
		Smith Blair (Steel)	#622 epoxy coated (up to 750mm) Ductile Iron and PVC
		Robar Industries (Steel)	6808 epoxy coated 6906 epoxy coated (100mm to 500mm) Ductile Iron, C900 PVC only
		Romac (Steel)	FTS420 epoxy coated Ductile Iron
<b>Tracer Wire</b>	Solid 12 gauge copper		TWU75 or RWU90XLPE

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<b>Valves</b>	<p><b>Butterfly Valve 450mm to 600mm</b></p> <p>AWWA C504, Class 150B manual actuator - traveling nut type with external position indicator nuts, bolts, and bolt studs to be stainless steel</p> <p>Former City of Hamilton: 25mm operating nut, open right (clockwise)</p> <p>Former Municipalities: 50mm operating nut, open left (counter clockwise)</p>	Clow Canada	<p>M &amp; H 504 (450mm to 500mm)</p> <p>M &amp; H AWWA Large Diameter (600mm and larger)</p> <p>Valve seat adjustment to face spool piece side</p>
		Mueller	Lineseal
	<p><b>Gate Valve* Resilient Wedge 100mm to 300mm</b></p> <p>AWWA C509, C515 nuts, bolts, and bolt studs to be stainless steel, bronze pin top adjustment not permitted</p> <p>Former City of Hamilton: 25mm operating nut, open right (clockwise)</p> <p>Former Municipalities: 50mm operating nut, open left (counter clockwise)</p> <p>*includes hydrant secondary valves</p>	Clow	F-6100, F-6102, F-6106,
		Mueller	A2360-6, A2360-19, A2360-23
		American AVK Co.	Series 45
	<p><b>Gate Valve Resilient Wedge 400mm</b></p> <p>AWWA C509, C515</p> <p>nuts, bolts, and bolt studs to be stainless steel</p> <p>Former City of Hamilton: 25mm operating nut, open right (clockwise)</p> <p>Former Municipalities: 50mm operating nut, open left (counter clockwise)</p>	Clow	F-6102
		Mueller	A2361-6

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
Valves Cont'd...	Combination Air Release and Vacuum Breaker Valves AWWA C512 with surge protection	A.R.I Flow Control Accessories	D-060 C HF NS
		Vent-O-Mat	Water RBX Series
	Tapping Valves 100mm to 300 mm AWWA C509	Clow	F-6106
		Mueller	A2360-19
	Tapping Valves 400mm to 600mm AWWA C509	Clow	F-6106BG
		Mueller	A-2361-19
Valve Boxes	Sliding Type with 6mm pre- drilled tracer wire hole and grommet in upper section	Bibby Ste. Croix	VB1000 Series
Valve Chambers	OPSS 407, 1351  Plant must be pre-qualified by the Ontario Concrete Pipe Association	Anchor	
		Con Cast	
		Hanson	
		M-Con	
		Munro Concrete	
		Wilkinson	
Valve Chamber Frame and Cover	OPSS 1850 OPSD 402.011 WM 212.03	Bibby	
		R.B. Agarwalla	
		Mueller	
		EJ (McCoy)	
	750mm cover OPSS 1850 10 - 25mm vent holes "WATER" cast into cover 4 lifting keyways	EJ (McCoy)	Frame 1220Z1, Product No. 00122016  Cover 1220B, Product No. 00122028
Water Meter Reader Enclosure		Hoffman Nema 4x, fiberglass	Includes internal mounting plate

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<b>Catch Basins</b>	CSA A257.4 OPSS 407 OPSS 1351  Supplied from a plant listed as prequalified by the OCPA	Co-Pipe	
		Con Cast	
		Hanson	
		M-Con	
		Munro	
		Wilkinson	
<b>Catch Basin Frames &amp; Covers</b>	OPSD 400.100 ASTM A48 OPSS 1850	Bibby	
		Labco	
		EJ (McCoy)	"All in one" cover
		Mueller Canada	
		R.B. Agarwalla	
<b>Couplings</b>	CSA B182.2 CSA B182.4 OPSS 1841	Fernco Connectors	
		Kwik Connectors	
		Mission Rubber Co.	
		Pipe Conx	
		Preper-PLS Tech	
<b>Culvert Pipe</b>	Corrugated Steel (CSP) Riveted or Spiral CSA G401 galvanized or aluminized (Type 2)  OPSS 1801 and 1841  up to 1000mm - 1.6 Gauge over 1000mm - 2.0 Gauge	Armtec	Hel-Cor, Ultra Flo
		Atlantic Industries	
		Canada Culvert	Steelcor
	HDPE and PVC OPSS 1840, ASTM F 894	Armtec	Big "O", Boss 2000
		Ideal Drain Tile Ltd.	Challenger 2000
<b>Goss Traps</b>	SEW-304	EJ (McCoy)	
		Hanson	Poet
		CB Trap	

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.	
<b>Maintenance Holes</b>	CSA A257.4-M92 OPSS 1351 1200mm to 3000mm  Supplied from a plant listed as prequalified by the OCPA	Coldstream		
		Co-Pipe		
		Con Cast		
		Hanson		
		M-Con		
		Munro		
		Wilkinson		
<b>Maintenance Hole Frames &amp; Covers</b>	OPSD 401.010 Type A and B ASTM A48	Bibby		
		EJ (McCoy)		
		Mueller Canada		
		R.B. Agarwalla		
<b>Sewer Pipe</b>	Vitrified Clay Pipe 150mm to 600mm CSA A60.1M-1976 Form 500	Logan	T-Tap (without flanges)	
		Concrete Pipe - Reinforced 300mm or greater  CSA A257.2 65-D, 100-D, 140-D  Form 500 OPSS 1820  Supplied from a plant pre-qualified by the OCPA	Co-Pipe	
			Con Cast Pipe	
	Hanson		Concrete Bell (mortared in)	
	Hyprescon			
	M-Con			
	Munro			
	Polyvinyl Chloride Pipe (PVC) Smooth Wall DR-28 / DR-35 CSA B182.2 200mm to 375mm  Form 500 OPSS 1841	Ipex	Ring-Tite	
		Rehau Pipe	Duraloc	
		Royal Pipe Co.	Royal Seal	

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<p><b>Saddles / Connections</b></p>	<p>CSA B182.2 CSA B182.4 100mm to 300mm</p>	<p>Ipex</p>	<p>Inserta – Tee Saddle Tee (2 straps) Saddle Wye (2 straps) Wing Adapter Universal Sewer Saddle 22 ½° to 45° bends</p>
		<p>Fernco 100mm and 150mm</p>	<p>EZ Tap</p>
		<p>Specialty Products 2000 Inc. (150mm)</p>	<p>Core Bell Adaptor</p>
<p><b>Valves</b></p>	<p>Combination Air / Vacuum Breaker AWWA C512</p>	<p>A.R.I</p>	<p>D-020 (stainless steel)</p>

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<b>High Pressure Sodium Lamps – all wattages, medium and mogul base</b>	Non-cycling, TCLP compliant including lead-free brass base. 30,000+ hours life, universal operating position. Meet ANSI specification corresponding to wattage.	General Electric	Ecolux NC
		Osram Sylvania	Lumalux Plus/Eco
		Philips	Ceramalux ALTO Non-Cycling
<b>Metal Halide Lamps – all wattages, medium and mogul base</b>	Inclusive of probe start, pulse start and ceramic metal halide. Operating position designation as per luminaire requirements. Meet ANSI specification corresponding to wattage.	General Electric	Multi-Vapor
		Osram Sylvania	Metalarc
		Philips	Metal Halide (standard)
<b>Metal Halide Lamps – 200W</b>	200W pulse start lamps	Venture	Unit-Form
<b>Photocell – Standard life, twist-lock type</b>	Standard Life – for in-field replacement only Photoelectric controller with NEMA rated locking type blades. OPSS 2485	Fisher-Pierce	FP-N770 Series Instant Response
		DTL	DSS Series
		Precision	
<b>Photocell – Long life, twist-lock type</b>	Long Life Photoelectric controller with NEMA rated locking type blades.  OPSS 2485	Fisher-Pierce	TRS Series
		SELC	8483 Range
<b>Photocell – Standard life, button type</b>	Photoelectric controller – button/mirco  CSA C239	Fisher-Pierce	B Series
		DTL	DBE Series
<b>Cobra-head Luminaires – drop glass, all wattages</b>	Prismatic drop glass high pressure sodium and metal halide 'cobra-head' luminaires Integral twist-lock photocell socket  CSA C22.2 No. 9.0-96 CSA C653-08, OPSS 2432	Cooper Lighting	OVZ Series
		American Electric Lighting	115 Series
		General Electric	M-250R2 Series

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<b>Cobra-head Luminaire – sag/flat glass, all wattages</b>	Sag glass/flat glass (cut-off) high pressure sodium and metal halide 'cobra-head' luminaire. Integral twist-lock photocell socket  CSA C22.2 No. 9.0-96 CSA C653-08 OPSS 2432	Cooper Lighting	OVF Series
		American Electric Lighting	115 Series
		General Electric	M-250R2 Series
<b>Decorative Luminaire – Carriage Style, all wattages</b>	Decorative carriage (4-sided lantern) high pressure sodium luminaire. Integral twist-lock photocell socket CSA 22.2 No. 9.0-96 CSA C653-08	King Luminaire	K601 Empress Series
		Cooper Lighting	Springdale Series
		Cyclone	Elencia Series
<b>Decorative Luminaire – Tear Drop Style, all wattages</b>	Decorative tear-drop (lantern) high pressure sodium luminaire. Integral twist-lock photocell socket  CSA 22.2 No. 9.0-96 CSA C653-08	King Luminaire	K211 Manchester Series
		Holophane	Memphis Series
		Philips Lumec	Renaissance Series
<b>Decorative Luminaire – Acorn Style, all wattages</b>	Decorative post-top (lantern) high pressure sodium luminaire. Integral twist-lock photocell socket  CSA 22.2 No. 9.0-96 CSA C653-08	King Luminaire	K118 Washington Series
		Cooper Lighting	ARN Acorn Series
<b>Power Supply Pedestal Feeder Wiring</b>	Single conductor, stranded copper wire 90 degree Celsius, 600V rated Type RWU90-XLPE #2 AWG (minimum)  CSA C22.2 No.38	Anixter Canada	6CN Series (or equal)
		General Cable	
		Southwire	

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<b>Pole-to-pole and Branch Feeder Wiring</b>	Single conductor, stranded copper wire 90 degree Celsius, 600V rated Type RWU90-XLPE #6 AWG (minimum) CSA C22.2 No.38	Anixter Canada	6CN Series (or equal)
		General Cable	
		Southwire	
<b>In-pole/In-arm (internal) Wiring</b>	Single conductor, solid copper wire 90 degree Celsius, 600V rated Type TWU #12 AWG (minimum)  CSA C22.2 No.75	Anixter Canada	6CA Series (or equal)
		General Cable	
		Southwire	
<b>Electrical Conduit and Fittings</b>	Type II rigid polyvinyl chloride (PVC) 50mm (minimum) CSA C22.2 No.211.2-06	Ipex	Scepter
		Royal	Rigicon
<b>Concrete Pole – Standard Duty, all lengths</b>	Direct buried, spun concrete pole – street lighting use. Class B (minimum)  CSA A14-M1979 CSA C22.2 No. 206-M OPSS 2421 OPSD 2225.01	Stresscrete Group	
		Utility Structures Inc. (USI)	
<b>Concrete Pole – Heavy Duty, all lengths</b>	Direct buried, spun concrete pole – combined use (street lighting & traffic signals).  Class D (minimum) CSA A14-M1979 CSA C22.2 No. 206-M OPSS 2421 OPSD 2225.01	Stresscrete Group	
		Utility Structures Inc. (USI)	

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<b>Concrete Pole – Decorative Octagonal, all lengths</b>	Direct buried, spun concrete pole – street lighting use. Class B (minimum) Octagonal decorative tapered profile, midnight black etched finish  CSA A14-M1979 CSA C22.2 No.206-M OPSS 2421 OPSD 2225.01	Stresscrete Group	
		Utility Structures Inc. (USI)	
<b>Concrete Pole – Decorative Communication Light Pole (CLP), all lengths</b>	Direct buried, spun concrete pole – combined use (street lighting and communication systems) Integral (cast-in) depth of embedment indication marker.  CSA A14-M1979 CSA 22.2 No.206 OPSS 2421 OPSD 2225.01	Stresscrete Group	Alexander Collection Series
<b>Concrete Pole – Decorative Post/Top Mount, all lengths</b>	Direct buried, spun concrete pole – street lighting use. Decorative, including profiled decorative base, midnight black etched finish – post top luminaire mounting.  CSA A14-M1979 CSA22.2 No.206-M OPSS 2421 OPSD 2225.01	Stresscrete Group	Sheridan Collection Series
<b>Street Light Luminaire Bracket Arm - Standard, all projection lengths</b>	Aluminum tapered sidemount elliptical bracket arms.  OPSS 2428 OPSD 2250.01 OPSD 2420.01	Aluminous Lighting Products	
		Stresscrete Group	
		Dynapole	

PRODUCT	SPECIFICATION	MANUFACTURER	DESCRIPTION/ MODEL No.
<b>Street Light Luminaire Bracket Arm – Decorative, all projection lengths</b>	Decorative metal ‘Victorian’ scroll arm – side mount configuration – midnight black painted finish	Stresscrete Group	17x Series
<b>Pole Identification Tag</b>	Aluminum Engraved modular number/letter insert type pole ID tags.	Almetek	E-Z Tag V400-TH-A
	25mm letter/numbers, black text on white or natural aluminum background.  Vertical orientation, affixed with aluminum banding	Electromark	
<b>Power Supply Pedestal</b>	Complete pedestal assembly consisting of the following:  - 100A rated meter socket c/w blank/shorting meter socket insert  - 120/240V, 100A panelboard c/w 60A-2P main breaker, 6x40A-1P branch breakers and provision for up to 12 breakers	Pedestal Solutions Inc.	HSLM271-6-40
	- All equipment contained within a weather proof, tamper proof, dark green in colour metal ground/pad mounted enclosure  - Enclosure door and internal panelboard door shall have provision for pad-locking CSA or ESA Approved	Keltour Controls Inc.	
<b>Ground Rod Inspection Well</b>	Polymer 254mm dia. Light duty inspection well/handwell ASTM C857 – A0.3 SCTE – Light Duty	Carson	L Series 910

<b>DRAWING No.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>RD-100.01</b>	November 2005	Road Restoration Over Utility Cuts –Sheet 1of 2
<b>RD-100.02</b>	November 2005	Road Restoration Over Utility Cuts - Sheet 2 of 2
<b>RD-101</b>	November 2005	100 mm Dia. Perforated Drain Pipe Detail
<b>RD-102</b>	November 2005	Wheelchair Ramp Locations
<b>RD-103</b>	January 2011	Combined Concrete Walk and Curb and Independent Concrete Walk
<b>RD-104</b>	January 2011	Asphalt Sidewalk
<b>RD-105</b>	November 2005	Interlocking Paving Stone Sidewalk
<b>RD-106</b>	November 2005	Standard Approach
<b>RD-107</b>	November 2005	California Style Approach
<b>RD-108</b>	November 2005	Asphalt Driveway Approach
<b>RD-109</b>	November 2005	Concrete Apron Approach
<b>RD-110.01</b>	November 2005	Offset Curb & Gutter Detail at Single Catchbasin
<b>RD-110.02</b>	November 2005	Offset Curb & Gutter Detail at Double Catchbasin
<b>RD-111</b>	November 2005	Shoulder Paving for Manholes and Chambers in Shoulders
<b>RD-112</b>	November 2005	Concrete Alleyway
<b>RD-113.01</b>	November 2005	Typical Road Cross Section - Local Urban Residential (20.0 m Right-of-Way)
<b>RD-113.02</b>	November 2005	Typical Road Cross Section - Local Urban Residential (18.0 m Right-of-Way)
<b>RD-113.03</b>	November 2005	Typical Road Cross Section Local Urban Residential - Without Sidewalk For Cul De Sacs (18.0 m Right-of-Way)
<b>RD-113.04</b>	November 2005	Standard Road Section For Private Townhouses
<b>RD-113.05</b>	November 2005	Rural Cross Section
<b>RD-114</b>	November 2005	Unsignalized Industrial & Commercial Entrance - Urban Section
<b>RD-115</b>	November 2005	Hammerhead Turning Movement Diagram
<b>RD-116.01</b>	November 2005	Permanent Cul-De-Sac For Local Residential Streets – Symmetrical (18.0 m Right-of-Way)

Note: 24' x 36' size drawings are not bound in this document

<b>DRAWING No.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>RD-116.02</b>	November 2005	Permanent Cul-De-Sac For Local Residential Streets – Offset Left (18.0 m Right-of-Way)
<b>RD-116.03</b>	November 2005	Cul-De-Sac For Industrial & Commercial Streets
<b>RD-116.04</b>	November 2005	Temporary Turning Circle (20.0 m R.O.W.)
<b>RD-117</b>	November 2005	Rural Residential Entrances
<b>RD-118</b>	November 2005	Rural Industrial & Commercial Entrances
<b>RD-119.01</b>	November 2005	Measurement for Payment Diagram – Road Reconstruction Only
<b>RD-119.02</b>	November 2005	Measurement for Payment Diagram – Road Reconstruction and Combined Walk and Curb Reconstruction
<b>RD-119.03</b>	January 2011	Measurement for Payment Diagram – Widening / Realignment /Narrowing
<b>RD-119.04</b>	November 2005	Measurement for Payment Diagram – Road and Independent Curb and Gutter Reconstruction
<b>RD-120</b>	November 2005	Typical Transit Shelter Pad for 1.2 m by 3.0 m Shelter
<b>RD-121</b>	November 2005	Rear Yard Swale Detail
<b>RD-122</b>	November 2005	Typical Toe of Excavation Swale & Berm Detail
<b>RD-123.01</b>	November 2005	Privacy Fence
<b>RD-123.02</b>	November 2005	Privacy Fence Details
<b>RD-124</b>	November 2005	Urban Braille Sidewalk – Typical Details (Size 24" x 36")
<b>RD-125.01</b>	November 2005	Heritage Poles and Details (Size 24" x 36")
<b>RD-125.02</b>	November 2005	Heritage Poles and Details (Size 24" x 36")
<b>RD-126</b>	November 2005	Irrigation – Typical Details (Size 24" x 36")
<b>DT:0111-01</b>	April 2011	Typical Installation of Underground Traffic Control Devices (Size 24" x 36")
<b>DT:0111-02</b>	December 2010	Typical Installation of Grounding and Bonding for Traffic Control Devices (Size 24" x 36")

Note: 24' x 36' size drawings are not bound in this document

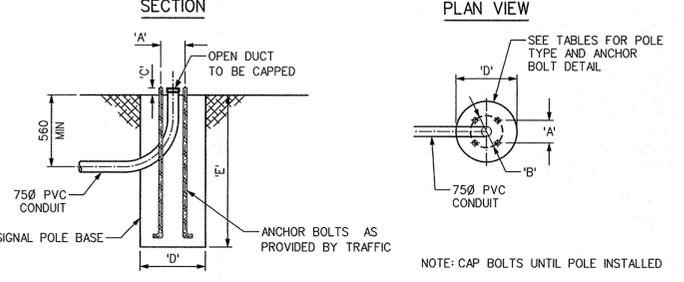
**POLE TYPE & ANCHOR BOLT TABLES**

ALUMINUM SIGNAL UTILITY POLES		
POLE SIZE	POLE No.	BASE TYPE
SU4.6T	TP-6415-AB	1
SU5.8T	TP-8619-AB	2
SU5.8T HEAVY DUTY	TP-10819H-AB	3

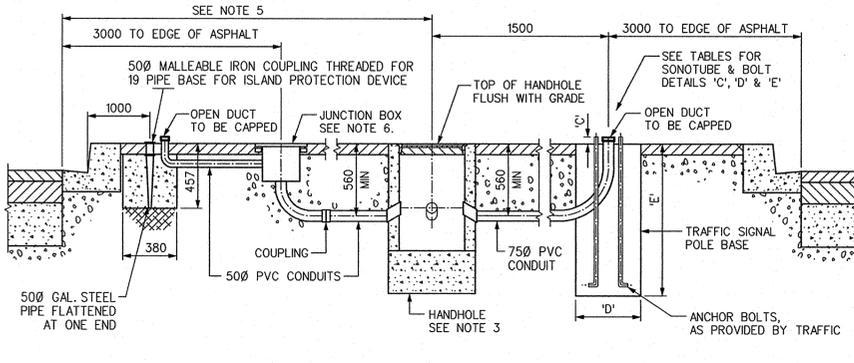
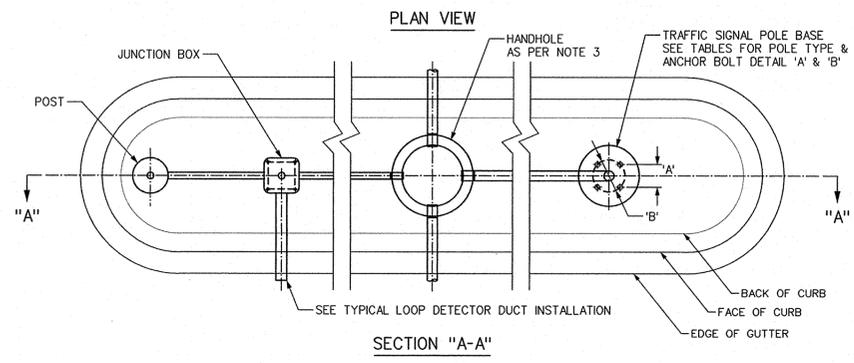
TABLE OF ANCHOR BASE DETAILS			
DIMENSION	BASE TYPE 1	BASE TYPE 2	BASE TYPE 3
'A' BOLT SPACING	171 (6 3/4")	206 (8 1/8")	287 (11 3/8")
'B' BOLT CENTRE DIAMETER	241 (9 1/2")	292 (11 1/2")	406 (16")
* 'C' BOLT PROJECTION	100	100	100
'D' SONOTUBE DIAMETER	450	760	760
'E' SONOTUBE DEPTH	1200	1200	1200
ANCHOR BOLT SIZE	19 x 610 (3/4" x 24")	25 x 762 (1" x 30")	32 x 1219 (1 1/4" x 48")

\* ABOVE FINISHED GRADE

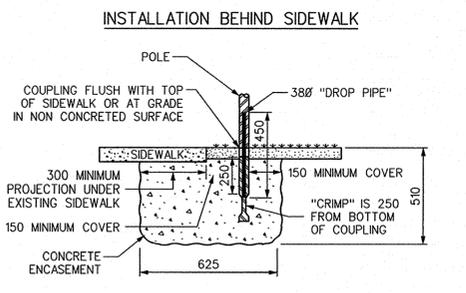
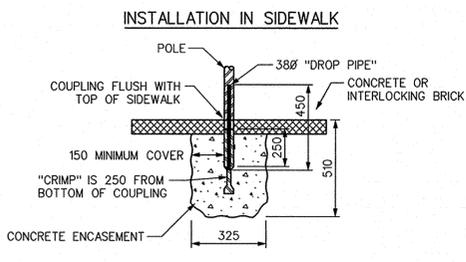
**ALUMINUM SIGNAL UTILITY POLE - BASE INSTALLATION**



**TYPICAL INSTALLATION IN TRAFFIC ISLAND**



**500 ROUND POLE & INSERT**



**STANDARD PRACTICES, UNLESS NOTED**

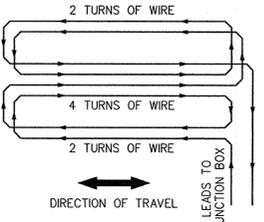
DIMENSIONS WITH DECIMAL PLACES ARE METRES, DIMENSIONS IN WHOLE NUMBERS ARE MILLIMETRES, UNLESS NOTED

**NOTES**

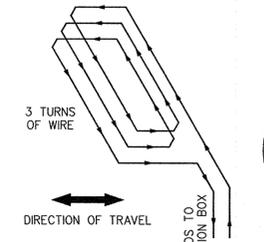
- SEE DRAWING DT-0111-02, TYPICAL INSTALLATION OF GROUNDING & BONDING FOR TRAFFIC CONTROL DEVICES
- PVC CONDUIT & FITTINGS ARE TO BE HEAVY DUTY, NEMA STANDARD TC-2 SCHEDULE 80 OR EQUIVALENT, CSA APPROVED. NO CONCRETE ENCASUREMENT.
  - 600 MINIMUM RADIUS ON ALL 500 AND 750 PVC CONDUIT, 90 DEGREE BEND.
  - ALL JOINTS FOR PVC DUCT TO BE CEMENTED USING IPEX 100 CONDUIT SOLVENT CEMENT, PRODUCT CODE 074717.
  - NYLON CORD "FISH" SHALL BE PULLED INTO ALL INSTALLED DUCTS, HANDHOLE TO HANDHOLE TO ALLOW FOR CONFIRMATION OF DUCT INTEGRITY AND TO REMAIN FOR CABLE INSTALLATION. ALL DUCT OPENINGS SHALL BE CAPPED TO ALLOW FOR CABLE INSTALLATION.
  - MINIMUM DIMENSION FACE OF CURB TO FACE OF POLE IS TO BE 230.
  - HANDHOLE, COVER & FRAME TO MEET OPSD SPEC. 2112.02, UNLESS OTHERWISE SPECIFIED. HANDHOLE CLOSEST TO CONTROLLER TO BE LARGE POLYMER, TYPE III - LARGE, RECTANGULAR HANDHOLE 850 x 550 x 660 TO MEET OPSD 2113.010.
  - CONCRETE FOR ALL TRAFFIC WORK TO BE CLASS 'A' CONCRETE AS PER RHW FORM 1200.
  - ISLAND PROTECTION DEVICE, JUNCTION BOXES AND 500 CONDUIT IN ISLAND TO BE INSTALLED AS PER CONSTRUCTION DRAWING.
  - JUNCTION BOXES TO BE FLANGED WITH COVER, H-10 HIGHWAY LOADING FIBRE REINFORCED PVC - 205 x 205 x 185 (8" x 8" x 7 1/4"). JUNCTION BOXES SHALL BE DRILLED TO MATCH DUCT CONNECTIONS SHOWN ON DRAWING.
  - LOOP WIRE SHALL BE RWU-90 "X-LINK" #14 STRANDED BLACK WIRE, AND SHALL BE SUPPLIED BY THE VENDOR. WIRE SHALL BE INSTALLED BY LAYING IN THE BOTTOM OF THE CUT AND CLEANED SLOT. WIRE SHALL BE CONTINUOUS, LOOPED AROUND THE SLOT IN THE NUMBER OF TURNS INDICATED IN THIS DRAWING. WIRES SHALL BE EXTENDED CONTINUOUSLY TO THE BACK OF CURB. SUFFICIENT LENGTH OF WIRE SHALL BE COILED AND STORED AT THE BACK OF CURB TO ALLOW FOR CONNECTION TO ELECTRICAL EQUIPMENT, AS DETAILED BY TRAFFIC OPERATIONS. NO ELECTRICAL CONNECTIONS ARE REQUIRED OF THE CONTRACTOR.
  - LOOP SEALANT SHALL BE INSTALLED AFTER WIRE INSTALLATION. SEALANT SHALL BE CHEMQUE CANADA LTD. Q-SEAL 290-S, DETECTOR LOOP SEALANT, OR EQUIVALENT AS APPROVED BY TRAFFIC OPERATIONS. LOOP SEALANT SHALL BE PROVIDED BY THE CONTRACTOR. LOOP SEALANT SHALL BE AS PER CHEMQUE PRODUCT BULLETIN, AND SHALL BE FILLED TO TOP OF ROAD SURFACE. CONTRACTOR SHALL BE RESPONSIBLE TO CONDUCT INSTALLATION OF LOOP SEALANT IN A MANNER THAT PREVENTS TRACKING.
  - TRAFFIC OPERATIONS SHALL VERIFY THE CONDUCTIVE INTEGRITY OF THE WIRE INSTALLED AFTER WIRE INSTALLATION IS COMPLETE AND LOOP SEALANT IS CURED. NO PAYMENT SHALL BE MADE FOR EITHER SLOT CUTTING OR WIRE INSTALLATION/SEALING IN CASES WHERE WIRE IS FOUND TO BE NON-CONDUCTIVE.

**DETECTOR LOOP WIRING AND SET-UP**

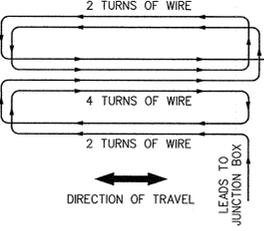
**PRESENCE LOOP WIRING**



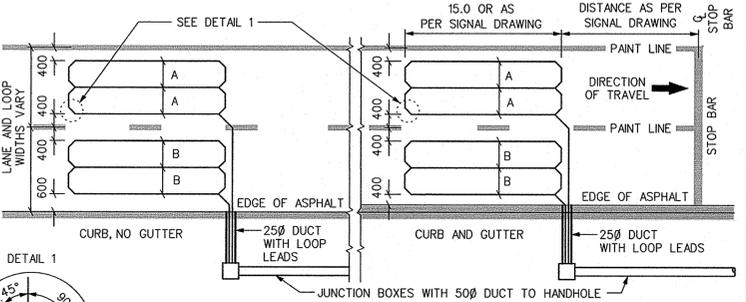
**PULSE LOOP WIRING**



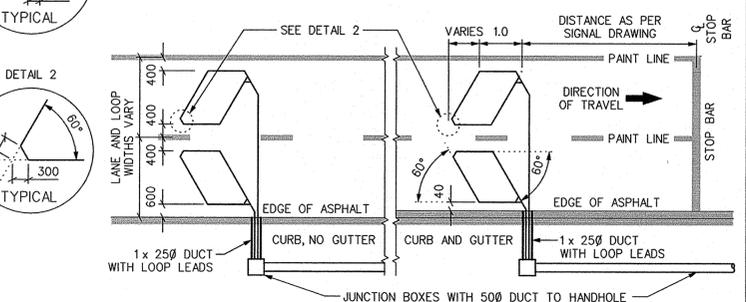
**BICYCLE LOOP WIRING**



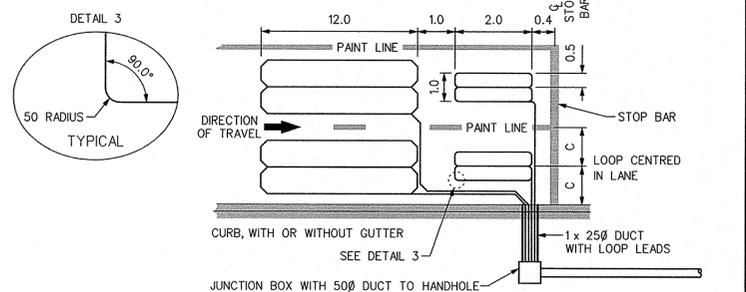
**PRESENCE LOOP SET-UP**



**PULSE LOOP SET-UP**

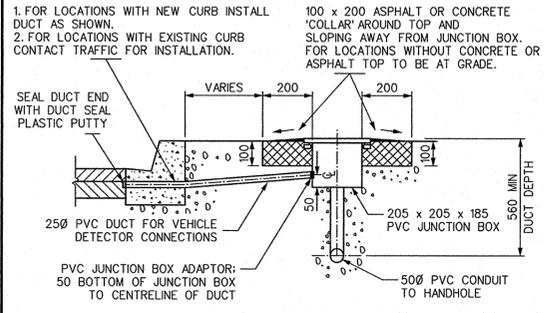


**BICYCLE LOOP SET-UP**

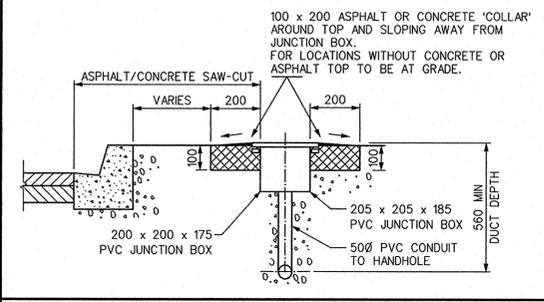


**LOOP DETECTOR DUCT INSTALLATION: CONTACT TRAFFIC FOR INSTALLATION OPTION**

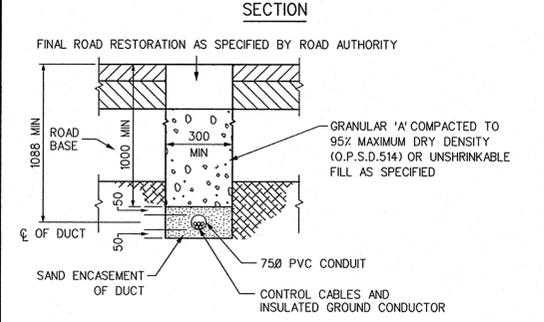
**OPTION 1: DUCT INSTALLATION TO ROAD**



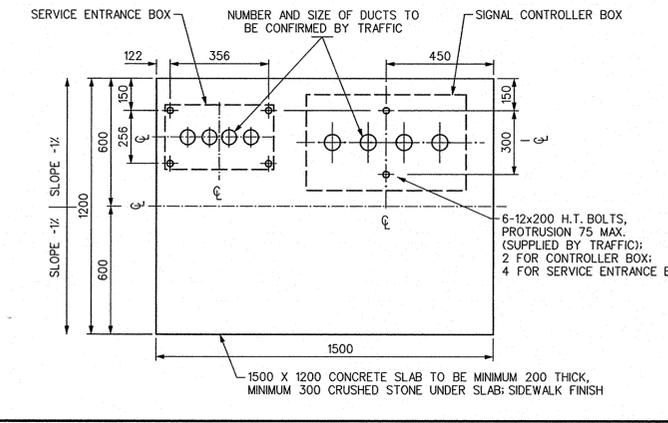
**OPTION 2: SAW-CUT TO ROAD (WHEN SPECIFIED)**



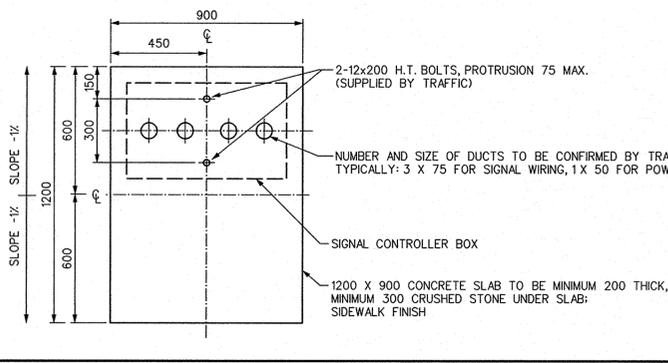
**ROAD CROSSING DUCT INSTALLATION**



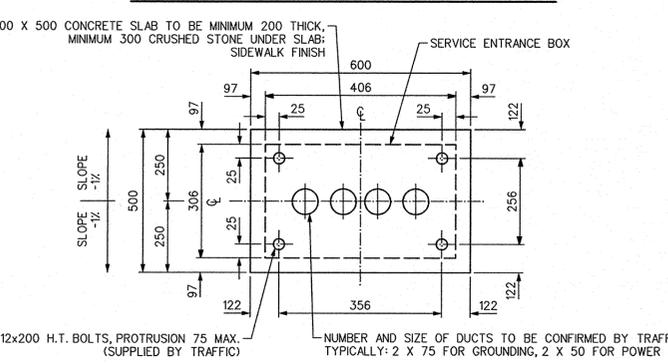
**CONTROLLER AND SERVICE ENTRANCE PAD - COMBINED**



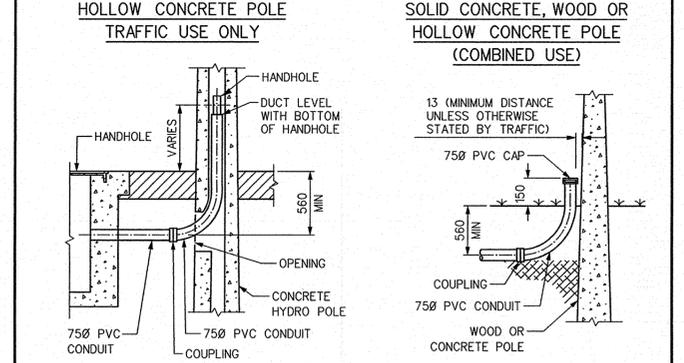
**CONTROLLER PAD - SEPARATE**



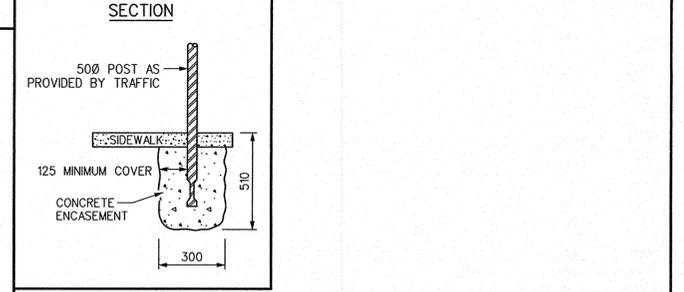
**SERVICE ENTRANCE PAD - SEPARATE**



**DUCT CONNECTION TO POLES**



**METER POST**



8	2011.03	SAL	ISSUED FOR CONSTRUCTION. REMOVED PANEL 'SIGNAL DISCONNECT-PEDESTAL BASE'; ADDED PANELS 'SERVICE ENTRANCE PAD - SEPARATE', 'CONTROLLER AND SERVICE ENTRANCE PAD - COMBINED', 'BICYCLE LOOPS'. NOTES REVISED.
No.	DATE	DRAWN	REVISION DETAILS

**TRAFFIC SIGNAL STANDARDS**  
**TYPICAL INSTALLATION OF UNDERGROUND TRAFFIC CONTROL DEVICES**  
 IN THE CITY OF HAMILTON  
 PREPARED BY THE CITY OF HAMILTON, TRAFFIC ENGINEERING SECTION  
 ENVIRONMENT AND SUSTAINABLE INFRASTRUCTURE DIVISION  
 PUBLIC WORKS DEPARTMENT

APPROVALS LEGAL APPROVAL PURSUANT TO SECTION 144 (31) OF H.T.A.

SCALE: N.T.S.  
 CHECKED: [Signature]  
 Plotted: March 23, 2011  
 DRAWING No.: DT:0111-01

SENIOR PROJECT MANAGER, SIGNALS AND SYSTEMS  
 02/23/11  
 MANAGER OF TRAFFIC ENGINEERING  
 04/01/11

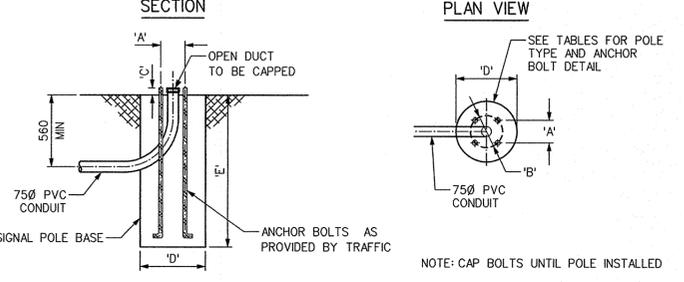
**POLE TYPE & ANCHOR BOLT TABLES**

ALUMINUM SIGNAL UTILITY POLES		
POLE SIZE	POLE No.	BASE TYPE
SU4.6T	TP-6415-AB	1
SU5.8T	TP-8619-AB	2
SU5.8T HEAVY DUTY	TP-10819H-AB	3

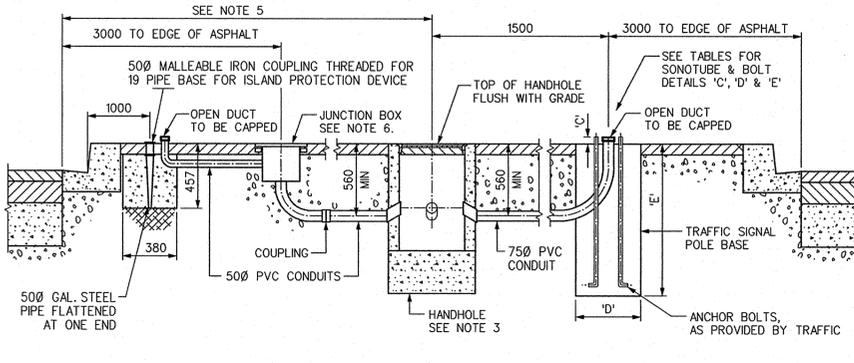
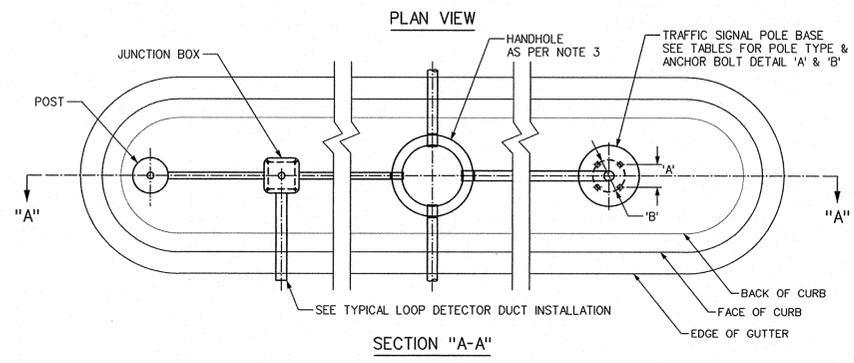
TABLE OF ANCHOR BASE DETAILS			
DIMENSION	BASE TYPE 1	BASE TYPE 2	BASE TYPE 3
'A' BOLT SPACING	171 (6 3/4")	206 (8 1/8")	287 (11 3/8")
'B' BOLT CENTRE DIAMETER	241 (9 1/2")	292 (11 1/2")	406 (16")
* 'C' BOLT PROJECTION	100	100	100
'D' SONOTUBE DIAMETER	450	760	760
'E' SONOTUBE DEPTH	1200	1200	1200
ANCHOR BOLT SIZE	19 x 610 (3/4" x 24")	25 x 762 (1" x 30")	32 x 1219 (1 1/4" x 48")

\* ABOVE FINISHED GRADE

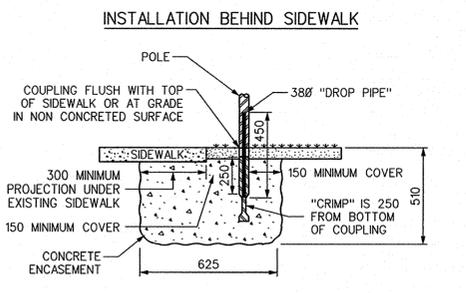
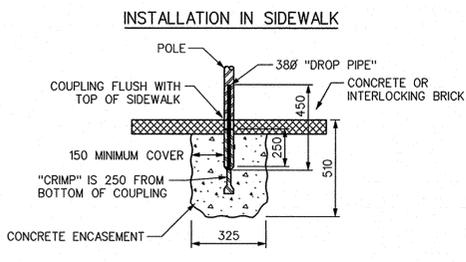
**ALUMINUM SIGNAL UTILITY POLE - BASE INSTALLATION**



**TYPICAL INSTALLATION IN TRAFFIC ISLAND**



**500 ROUND POLE & INSERT**



**STANDARD PRACTICES, UNLESS NOTED**

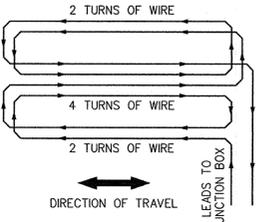
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**NOTES**

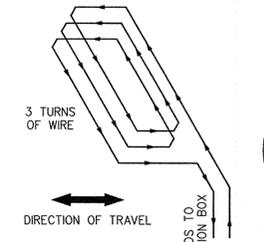
- SEE DRAWING DT-0111-02, TYPICAL INSTALLATION OF GROUNDING & BONDING FOR TRAFFIC CONTROL DEVICES
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  - 600 MINIMUM RADIUS ON ALL 500 AND 750 PVC CONDUIT, 90 DEGREE BEND.
  - ALL JOINTS FOR PVC DUCT TO BE CEMENTED USING IPEX 100 CONDUIT SOLVENT CEMENT, PRODUCT CODE 074717.
  - NYLON CORD "FISH" SHALL BE PULLED INTO ALL INSTALLED DUCTS, HANDHOLE TO HANDHOLE TO ALLOW FOR CONFIRMATION OF DUCT INTEGRITY AND TO REMAIN FOR CABLE INSTALLATION. ALL DUCT OPENINGS SHALL BE CAPPED TO ALLOW FOR CABLE INSTALLATION.
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**DETECTOR LOOP WIRING AND SET-UP**

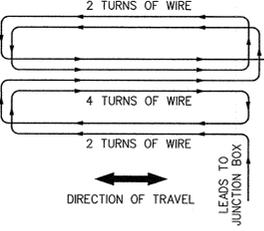
**PRESENCE LOOP WIRING**



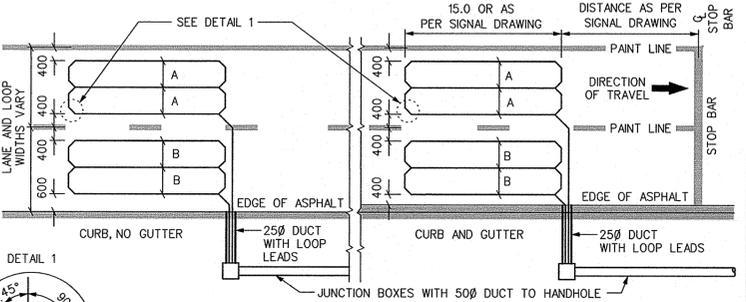
**PULSE LOOP WIRING**



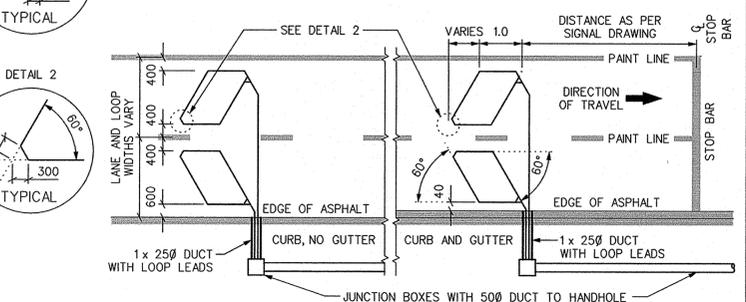
**BICYCLE LOOP WIRING**



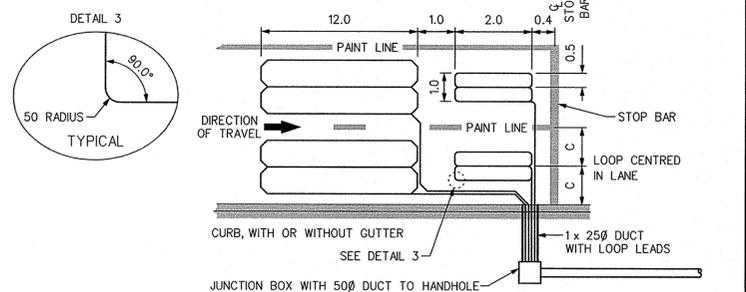
**PRESENCE LOOP SET-UP**



**PULSE LOOP SET-UP**

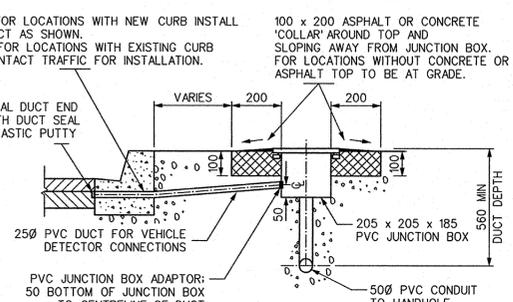


**BICYCLE LOOP SET-UP**

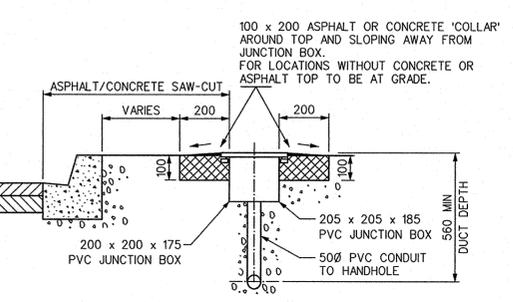


**LOOP DETECTOR DUCT INSTALLATION: CONTACT TRAFFIC FOR INSTALLATION OPTION**

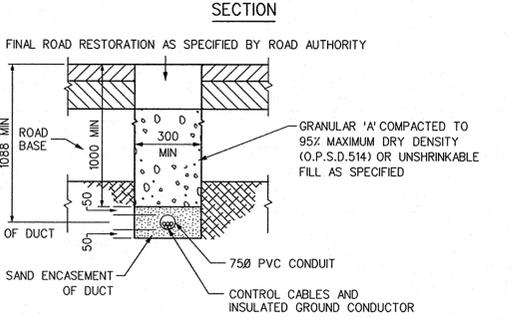
**OPTION 1: DUCT INSTALLATION TO ROAD**



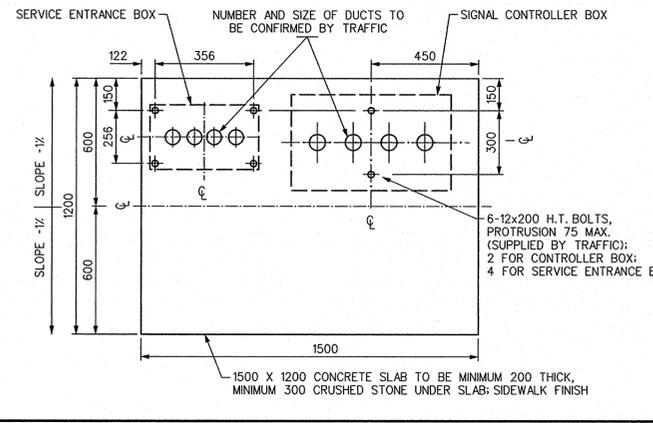
**OPTION 2: SAW-CUT TO ROAD (WHEN SPECIFIED)**



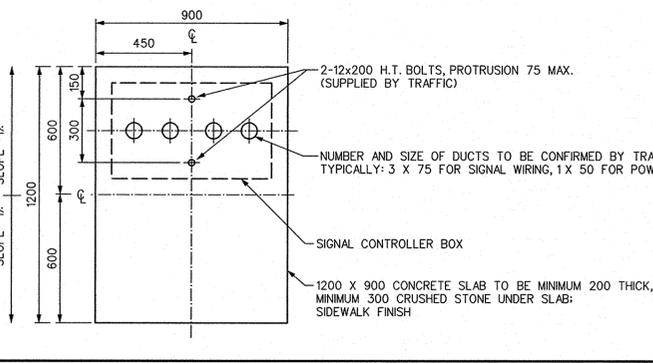
**ROAD CROSSING DUCT INSTALLATION**



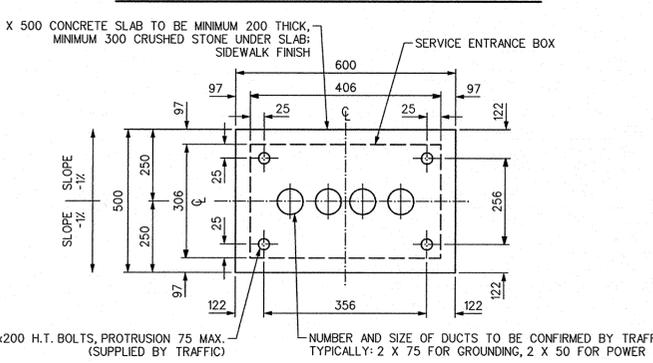
**CONTROLLER AND SERVICE ENTRANCE PAD - COMBINED**



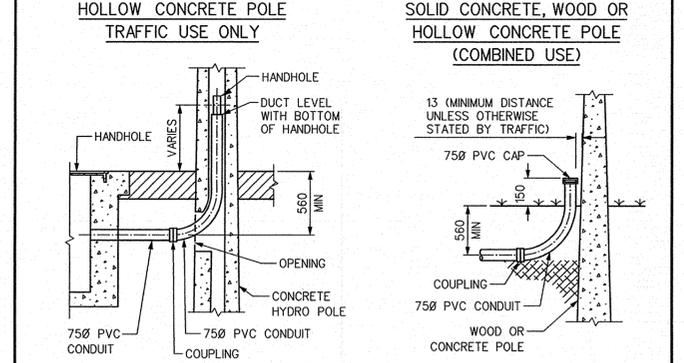
**CONTROLLER PAD - SEPARATE**



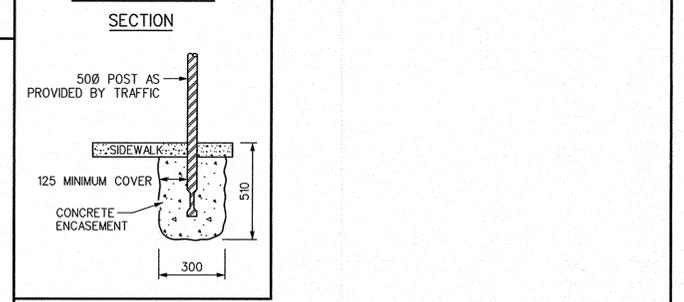
**SERVICE ENTRANCE PAD - SEPARATE**



**DUCT CONNECTION TO POLES**



**METER POST**



8	2011.03	SAL	ISSUED FOR CONSTRUCTION. REMOVED PANEL 'SIGNAL DISCONNECT-PEDESTAL BASE'; ADDED PANELS 'SERVICE ENTRANCE PAD - SEPARATE', 'CONTROLLER AND SERVICE ENTRANCE PAD - COMBINED', 'BICYCLE LOOPS'. NOTES REVISED.
No.	DATE	DRAWN	REVISION DETAILS

**TRAFFIC SIGNAL STANDARDS**

**TYPICAL INSTALLATION OF UNDERGROUND TRAFFIC CONTROL DEVICES**  
 IN THE CITY OF HAMILTON  
 PREPARED BY THE CITY OF HAMILTON, TRAFFIC ENGINEERING SECTION  
 ENVIRONMENT AND SUSTAINABLE INFRASTRUCTURE DIVISION  
 PUBLIC WORKS DEPARTMENT

APPROVALS LEGAL APPROVAL PURSUANT TO SECTION 144 (31) OF H.T.A.

SCALE: N.T.S.  
 CHECKED: [Signature]  
 Plotted: March 23, 2011  
 DRAWING No.: DT:0111-01

SENIOR PROJECT MANAGER, SIGNALS AND SYSTEMS  
 02/23/11  
 MANAGER OF TRAFFIC ENGINEERING  
 04/01/11

<b>DRAWING No.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>WM-200.01</b>	November 2005	Bedding & Backfill for Concrete & PVC Watermains and Water Services
<b>WM-200.02</b>	November 2005	Bedding & Backfill for Ductile Iron Watermains and Water Services
<b>WM-201.01</b>	November 2005	1200mm Dia. Precast Valve Chamber for 300mm Dia. Watermains & Smaller
<b>WM-201.02</b>	November 2005	Tapping Valve Installation for D.I. Watermain 300mm Dia. and Smaller
<b>WM-202</b>	November 2005	Valve Box Installation For 100mm to 300mm Dia. Watermains
<b>WM-203.01</b>	November 2005	Hydrant Installation
<b>WM-203.02</b>	November 2005	Hydrant Installation using Anchor Tee
<b>WM-203.03</b>	November 2005	Relocation of Ditches at Hydrants
<b>WM-203.04</b>	January 2011	Operating Nut Adaptor for Use on Open Right (Clockwise) Valves
<b>WM-204.01</b>	January 2011	Concrete Anchor Blocks For 300mm Dia. Watermains And Smaller
<b>WM-204.02</b>	January 2011	11-1/4° & 22-1/2° Angle Anchor Block Details for 400mm to 600mm Dia. D.I. Watermains
<b>WM-204.03</b>	January 2011	45° Angle Anchor Block Details for 400mm to 600mm Dia. D.I. Watermains
<b>WM-204.04</b>	January 2011	45° Angle Anchor Block with Leg for 400mm to 600mm Dia. D.I. Watermains
<b>WM-204.05</b>	January 2011	90° Angle Anchor Block Details for 400mm to 600mm Dia. D.I. Watermains
<b>WM-204.06</b>	January 2011	90° Angle Anchor Block with Leg for 400mm to 600mm Dia. DI Watermains
<b>WM-204.07</b>	January 2011	Tee Anchor Block Details for 400mm to 600mm Dia. D.I. Watermain Branches
<b>WM-204.08</b>	January 2011	Tee Anchor Block with Leg for 400mm to 600mm Dia. D.I. Branch Watermains
<b>WM-204.09</b>	January 2011	Concrete Thrust Block for 400mm to 600mm Dia. D.I. Watermains

\*24' x 36' size drawings are not bound in this document

<b>DRAWING No.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>WM-204.10</b>	January 2011	Concrete Anchor Blocks for 100mm to 300mm Dia. D.I. Watermains at 11 1/4° & 22 1/2° Vertical Bends
<b>WM-204.11</b>	January 2011	Concrete Anchor Blocks for 100mm to 300mm Dia. D.I. Watermains at 45° Vertical Bend
<b>WM-204.12</b>	January 2011	Vertical Bend Anchor Block 7 1/2° to 22 1/2° for 400mm Dia.D.I. Watermain
<b>WM-204.13 (1 of 2)</b>	November 2005	Concrete Anchor Block for 100mm to 300mm Dia. Watermain Lowering
<b>WM-204.13 (2 of 2)</b>	January 2011	Concrete Anchor Block for 100mm to 300mm Dia. Watermain Lowering
<b>WM-205.01</b>	March 2008	50mm Dia. Watermain Looping in Cul De Sacs (20.0 m R.O.W.)
<b>WM-205.02</b>	March 2008	50mm Dia. Watermain Looping in Cul De Sacs (18.0 m R.O.W.)
<b>WM-206</b>	November 2005	50mm Dia. Dead End Blow-Off
<b>WM-207.01</b>	November 2005	Piping Arrangement for 19-25mm Dia. Water Service Connection and Yard Service
<b>WM-207.02</b>	November 2005	Piping Arrangement for 19-25mm Dia. Water Service Connections in a Common Trench
<b>WM-207.03</b>	November 2005	Insulation Details for Water Services at Gooseneck
<b>WM-207.04</b>	November 2005	Piping for 100mm to 300mm Dia. Water Service Connection & Yard Service to Meter with Cut in Tee & Sleeve
<b>WM-207.05</b>	November 2005	Piping for 100mm to 300mm Dia. Water Service Connection & Yard Service to Meter using Tapping Sleeve & Valve
<b>WM-208</b>	November 2005	Remote Receptacle Installation for Meter Chambers
<b>WM-209</b>	November 2005	Piping & Chamber for 16-50mm Dia. Meter Installation
<b>WM-210</b>	November 2005	Piping for 16-250mm Dia. Meter for Internal Installation
<b>WM-211.01</b>	November 2005	Standard Remote Installation for 16-25mm Dia. Meters
<b>WM-211.02</b>	November 2005	Alterations of Existing 16-25mm Dia. Piping Prior to Meter Installation

\*24' x 36' size drawings are not bound in this document

<b>DRAWING No.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>WM-211.03</b>	November 2005	Single Family Residential Water Meter Installation for 16-25mm Dia. Services
<b>WM-211.04</b>	November 2005	Meter Pipe Spacer Installation
<b>WM-212.03</b>	November 2005	Valve Key Frame & Cover
<b>WM-213</b>	November 2005	Chamber End Plates for 100mm Dia. to 300mm Dia. Watermains
<b>WM-214</b>	November 2005	Removable Slab Lifting Hole Details & Lifting Hook Detail for Chambers
<b>WM-215.01</b>	November 2005	Valve Support
<b>WM-215.02</b>	November 2005	Pipe & Valve Support
<b>WM-216</b>	November 2005	Blow-Off Connection at Access Chamber
<b>WM-217</b>	November 2005	Pitometer Connection for Steel & Concrete Pipe
<b>WM-230</b>	January 2011	2400mm Precast Valve chamber for 400mm Dia. Concrete or Ductile Iron Pipe with 50mm Air Valve & 100mm Blow-Off (Size 24" x 36")
<b>WM-231</b>	January 2011	1800mm x 2400mm Precast Valve Chamber for 450mm Dia. or 500mm Dia. Concrete or Ductile Iron Pipe *(Size 24" x 36")
<b>WM-232</b>	January 2011	1800mm Precast Valve Chamber for 400mm to 500mm Dia. Concrete or Ductile Iron Pipe with 50mm Air Valve & 100mm Blow-Off *(Size 24" x 36")
<b>WM-233</b>	January 2011	1800mm x 3000mm Precast Valve Chamber for 400mm Dia. Concrete or Ductile Iron Pipe with 100mm Dia. to 300mm Dia. Branch *(Size 24" x 36")
<b>WM-234</b>	November 2005	1800mm x 2400mm and 1800mm x 3000mm Precast Meter Chambers for 100mm Dia. To 250 mm Dia. Water Services *(Size 24" x 36")
<b>WM-235</b>	November 2005	1800mm x 2400mm Precast Tapping Valve Chamber for 100mm to 300mm Dia. D.I. Pipe Tapping off 400mm to 600mm Dia. Watermain *(Size 24" x 36")

\*24' x 36' size drawings are not bound in this document