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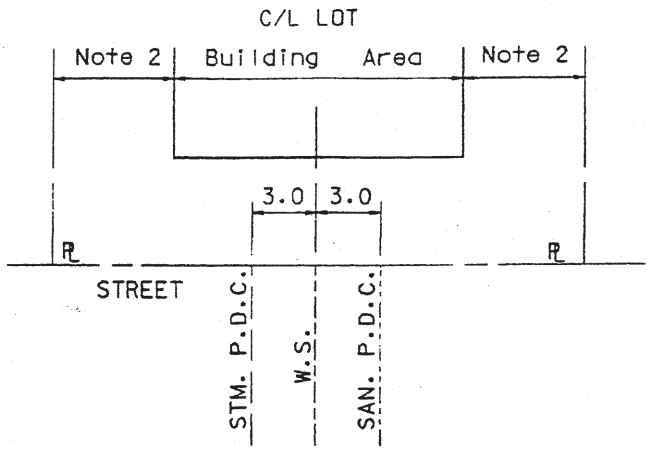
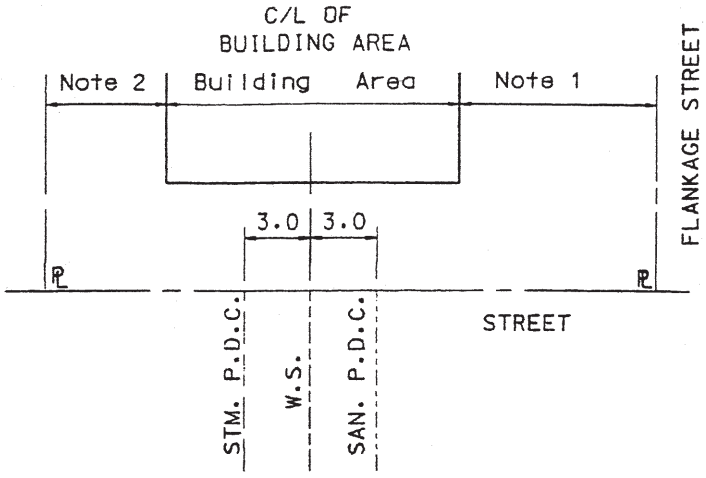
INFRASTRUCTURE DESIGN STANDARDS – FIGURES

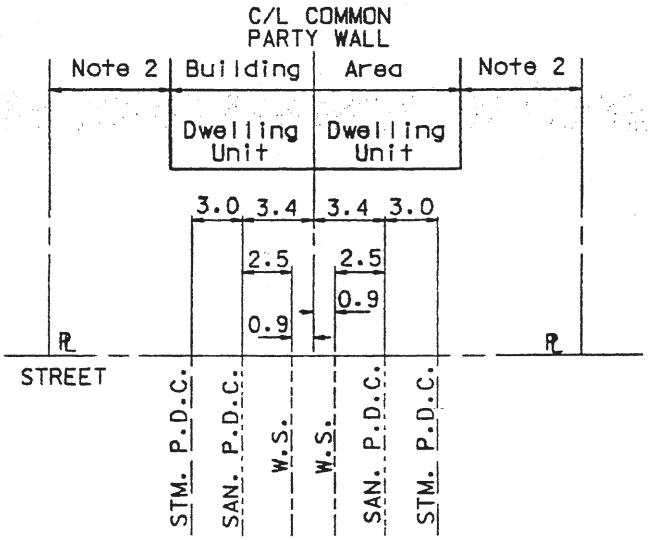
SECTION 5 – WATER DISTRIBUTION SYSTEM



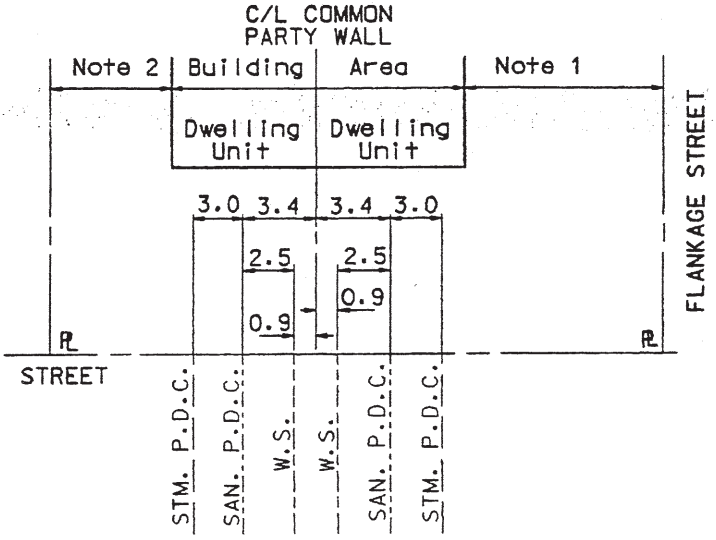
SINGLE



SINGLE CORNER LOT



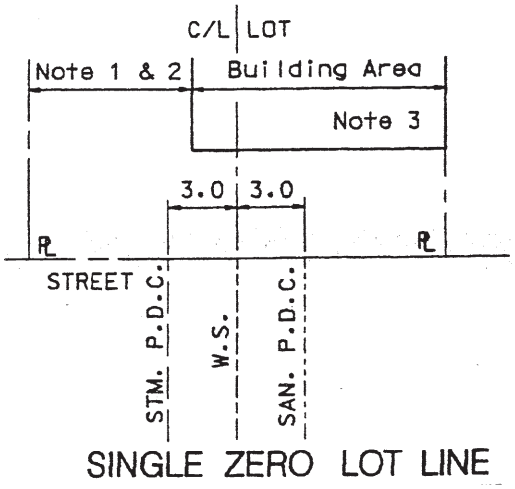
SEMI-DETACHED



SEMI-DETACHED CORNER LOT

NOTES:

1. External building setbacks to reflect current applicable zoning by-laws.
2. Internal building setbacks to reflect current applicable zoning by-laws.
3. If the building area is located on the opposite side of zero lot line lot, then show the services in reversed location (i.e. Sanitary and Storm).
4. Storm PDCs are required except where exempt by the drainage by-law.
5. STM. PDC - Storm Private Drain Connection
   SAN PDC - Sanitary Private Drain Connection
   WS - Water Service



SINGLE ZERO LOT LINE

All dimensions are in metres unless othewise shown.

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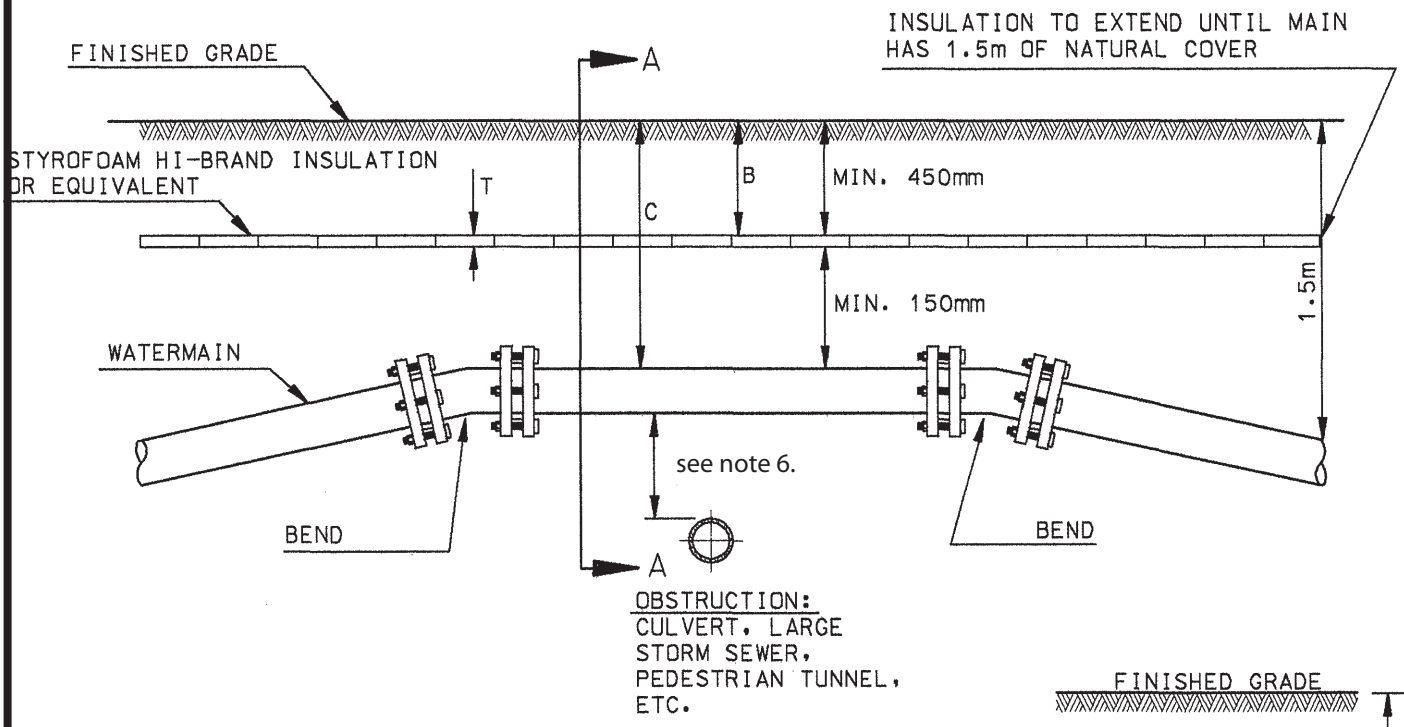
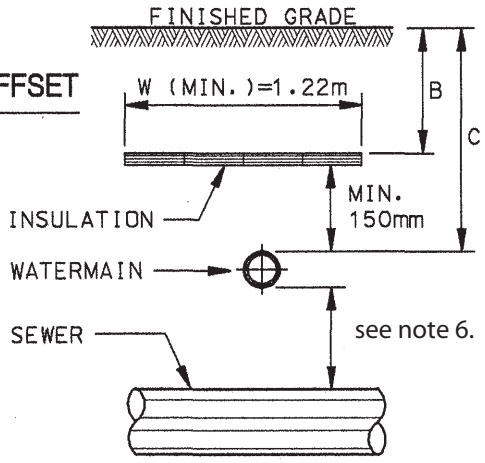
STANDARD SERVICING LOCATIONS FOR SINGLE FAMILY AND SEMI-DETACHED LOTS

DATE: 2017-04

FIGURE 5.1



ELEVATION OF JOINT DEFLECTION OFFSET



SECTION "A – A"

NOTES:

1. Minimum compressive strength of insulation to be 690Kpa. Insulation shall be installed in thickness required in strict accordance with insulation manufacturer's directions. Insulation shall be installed over 150mm of fine granular fill screened soomth.

2. Butt insulation tightly together without gaps. Stagger end joints if more than one layer used.

3. To hold in place skewer insulation board to ground with 200mm hardwood skewers. Minimum 6mm dia., and 200mm long. 2 skewers per board.

4. If 2 layers of insulation are used skewer only the top layer through the first layer using a skewer 150mm longer than the combined thickness of the 2 layers of insulation. Insert skewers at approximately 30 degree angle.

5. Place at least 200mm of fine granular fill over insulation before using compaction equipment.

6. Minimum Clearance as per MOECC Procedure F-6-1.

INSULATION THICKNESS		INSULATION WIDTH	
C(m)	T(mm)	B(m)	W(m)
0.60	75	0.45	2.44
0.75	75	0.60	1.83
0.90	50	0.75	1.54
1.09	50	0.90	1.22
1.20	25		
1.35	25		

All dimensions are in millimetres unless shown otherwise.

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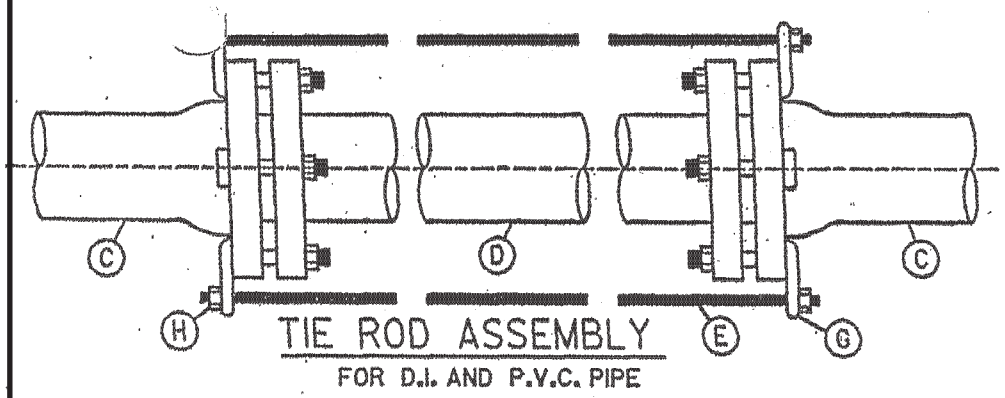
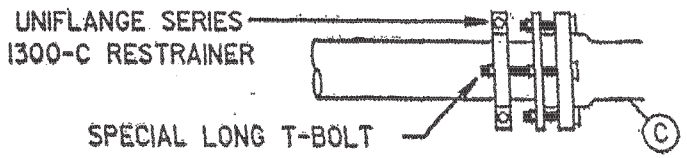
INSULATION STANDARD FOR SHALLOW MAINS AND OFFSETS

DATE: 2017-04

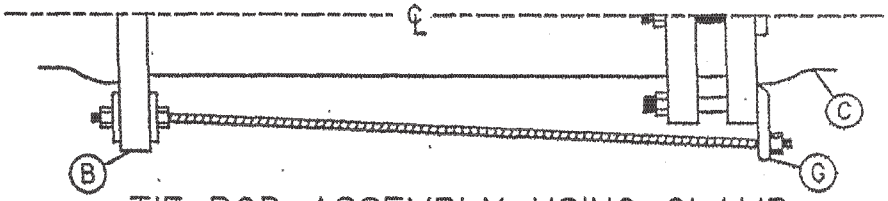
FIGURE 5.2



TIE ROD ASSEMBLY
FOR D.I. AND P.V.C. PIPE

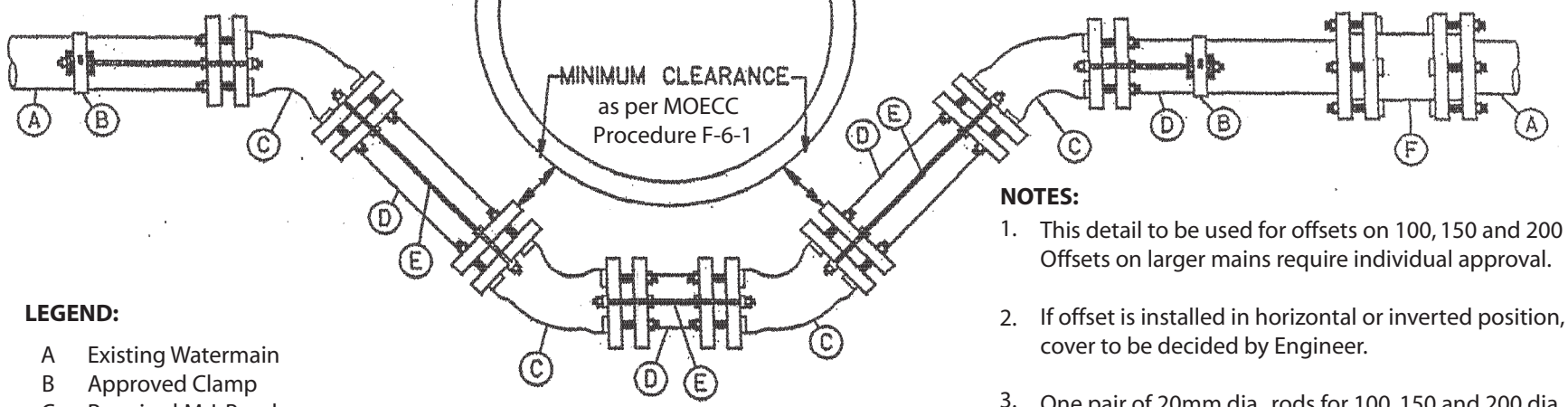


RESTRAINER ASSEMBLY
FOR P.V.C. PIPE



TIE ROD ASSEMBLY USING CLAMP
FOR D.I. PIPE

TIEBOLT JOINT RESTRAINER



LEGEND:

- A Existing Watermain
- B Approved Clamp
- C Required M.J. Bend
- D Filler Piece
- E Approved Tierod (threaded COR-TEN Steel)
- F M.J. Sleeve
- G Approved Tiebolt Joint Restrainer
- H Approved Tienut

NOTES:

1. This detail to be used for offsets on 100, 150 and 200 dia., mains. Offsets on larger mains require individual approval.
2. If offset is installed in horizontal or inverted position, minimum cover to be decided by Engineer.
3. One pair of 20mm dia., rods for 100, 150 and 200 dia., pipe.
4. Cover tiebolt assembly with Denso paste, mastic and tape.
5. Detail drawing for restraint system to be provided on contract drawing.

All dimensions are in millimetres unless otherwise shown.

FIGURE 5.3

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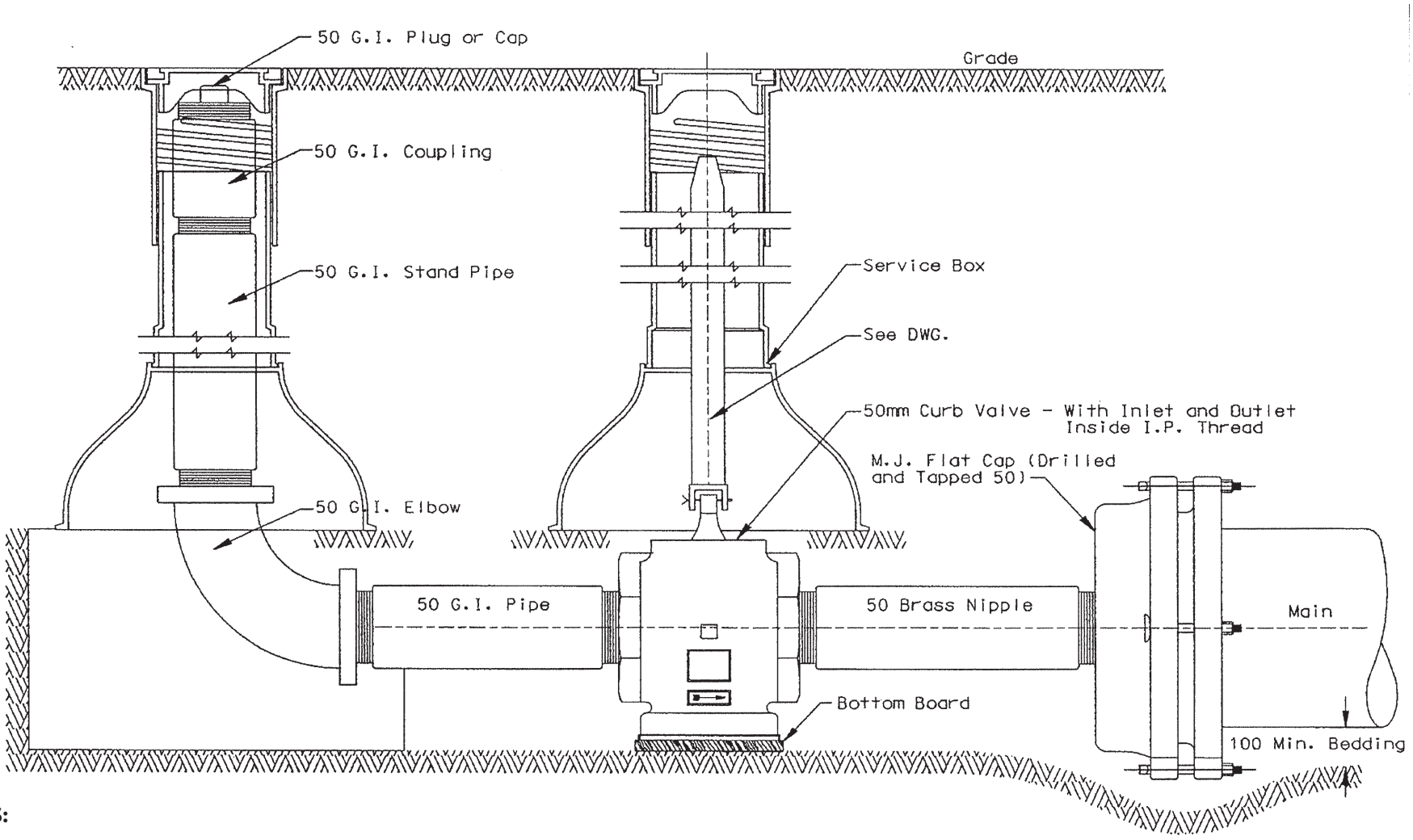
STANDARD MECHANCIAL JOINT OFFSET INSTALLATION USING TIEBOLT COUPLINGS

DATE: 2017-04

FIGURE 5.3



NOTES:

1. All concrete to be minimum 20mpa. compressive strength
2. Polyethylene Bond Breaker to be used between concrete and fittings.
3. Mechanical thrust restraint required as per Figure 5.5.

All dimensions are in millimetres unless otherwise shown.

FIGURE 5.4

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in the centre of it all

STANDARD 50mm BLOW OFF INSTALLATION

DATE: 2017-04

FIGURE 5.4

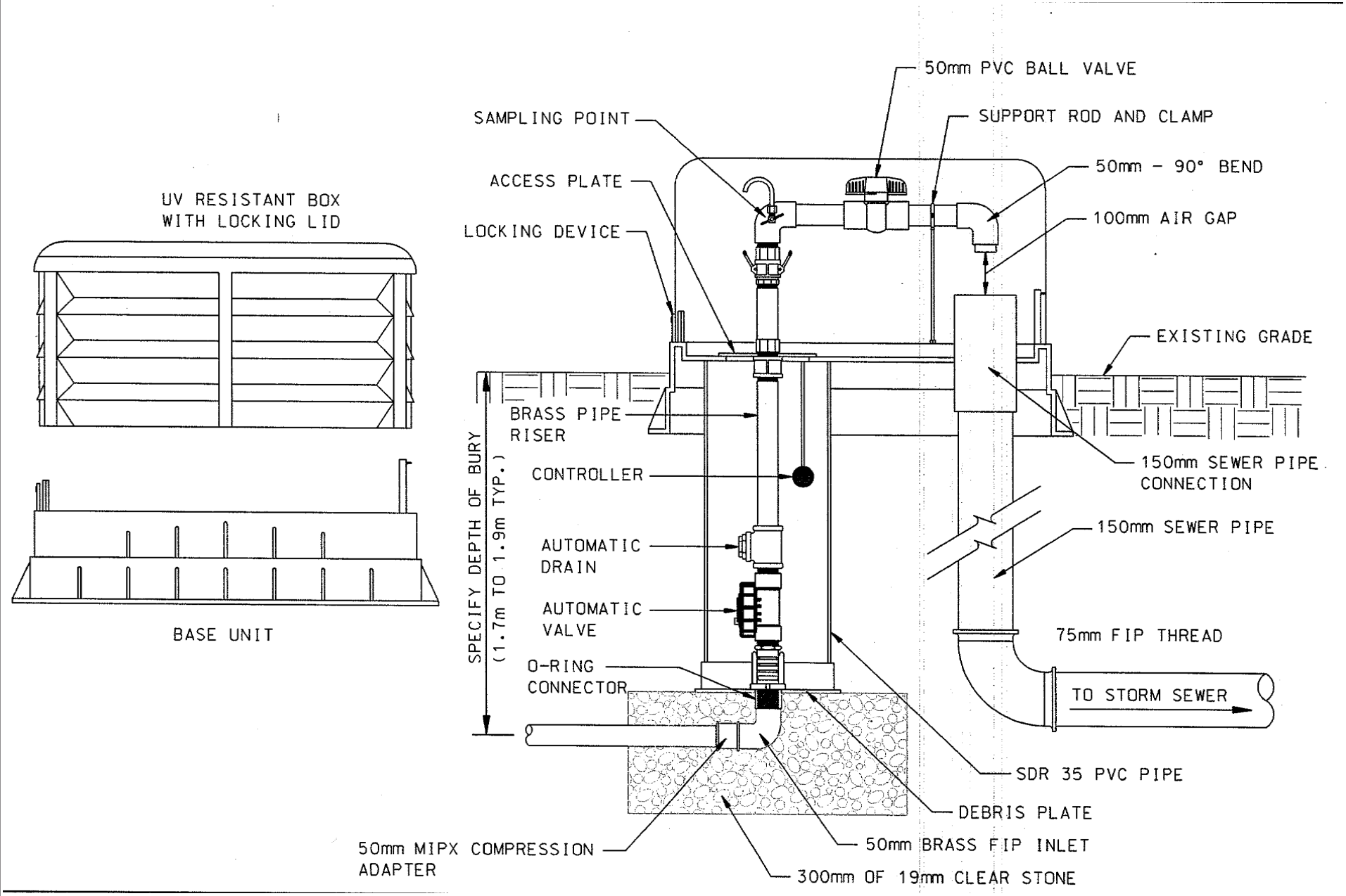


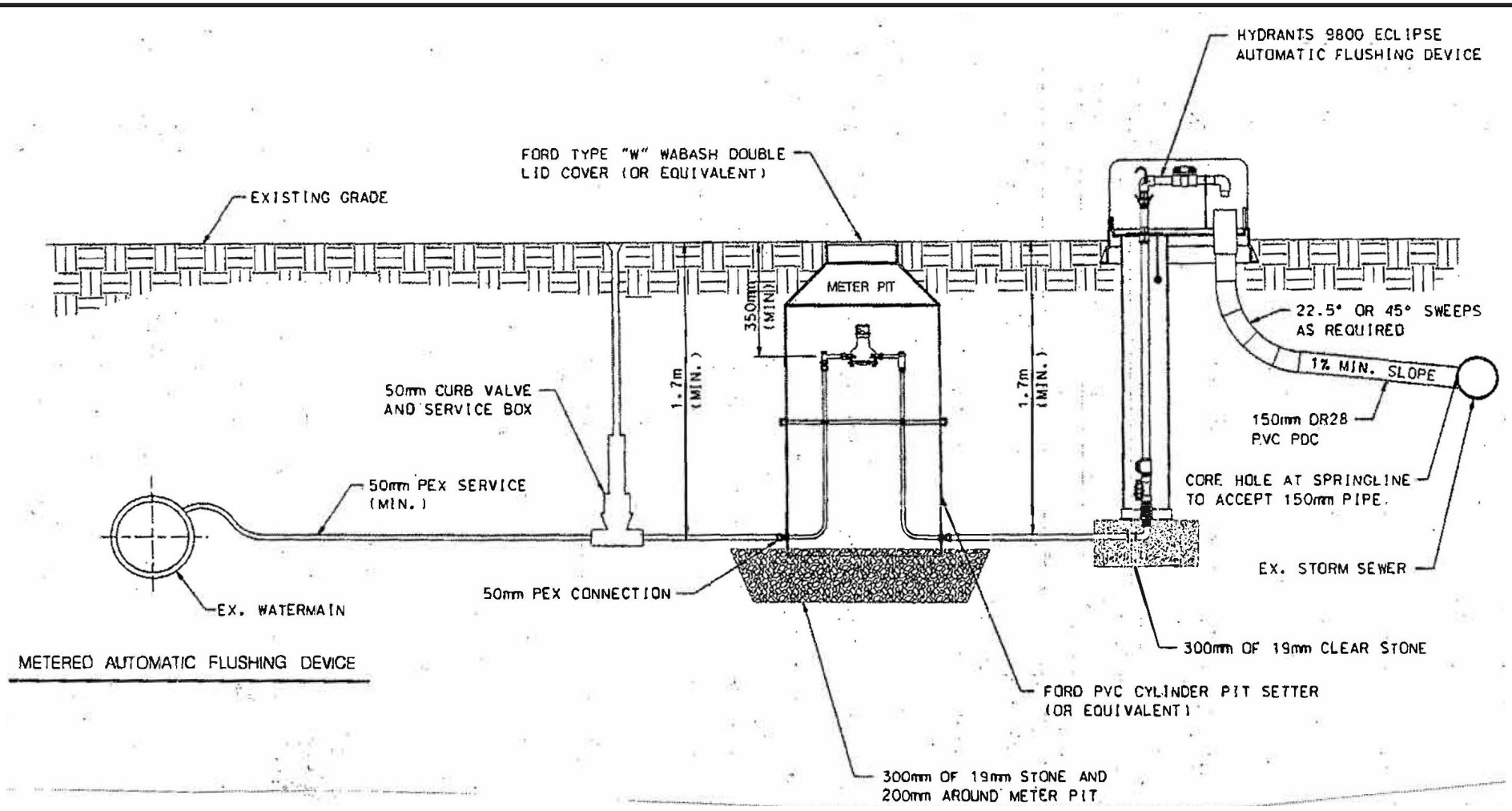
FIGURE 5.5

middlesex centre
in the centre of it all

9800 AUTOMATIC FLUSHING DEVICE DETAIL

DATE: 2017-04

FIGURE 5.5



METERED AUTOMATIC FLUSHING DEVICE

WATERMAIN AND WATERMAIN NETWORKS SHALL BE DESIGNED SO THAT WATER SHALL NOT REMAIN UNUSED IN THE WATERMAIN FOR MORE THAN THREE (3) DAYS UNDER AVERAGE DAY DEMAND. THE MUNICIPALITY HAS PRIMARY RESPONSIBILITY TO ENSURE THAT THE MINIMUM CHLORINE RESIDUALS ARE MAINTAINED IN THE DISTRIBUTION SYSTEM AND THEREFORE RESERVES THE RIGHT TO REQUIRE WATERMAIN LOOPING AND /OR AUTOMATIC FLUSHING DEVICES AND /OR BLOW-OFFS TO FACILITATE THE MAINTENANCE OF THE CHLORINE RESIDUAL. WATER METER PITS ARE TO BE IN ACCORDANCE WITH THE MUNICIPAL STANDARDS

FIGURE 5.6

middlesex centre
in the centre of it all

METERED AUTOMATIC FLUSHING DEVICE DETAIL

DATE: 2017-04

FIGURE 5.6

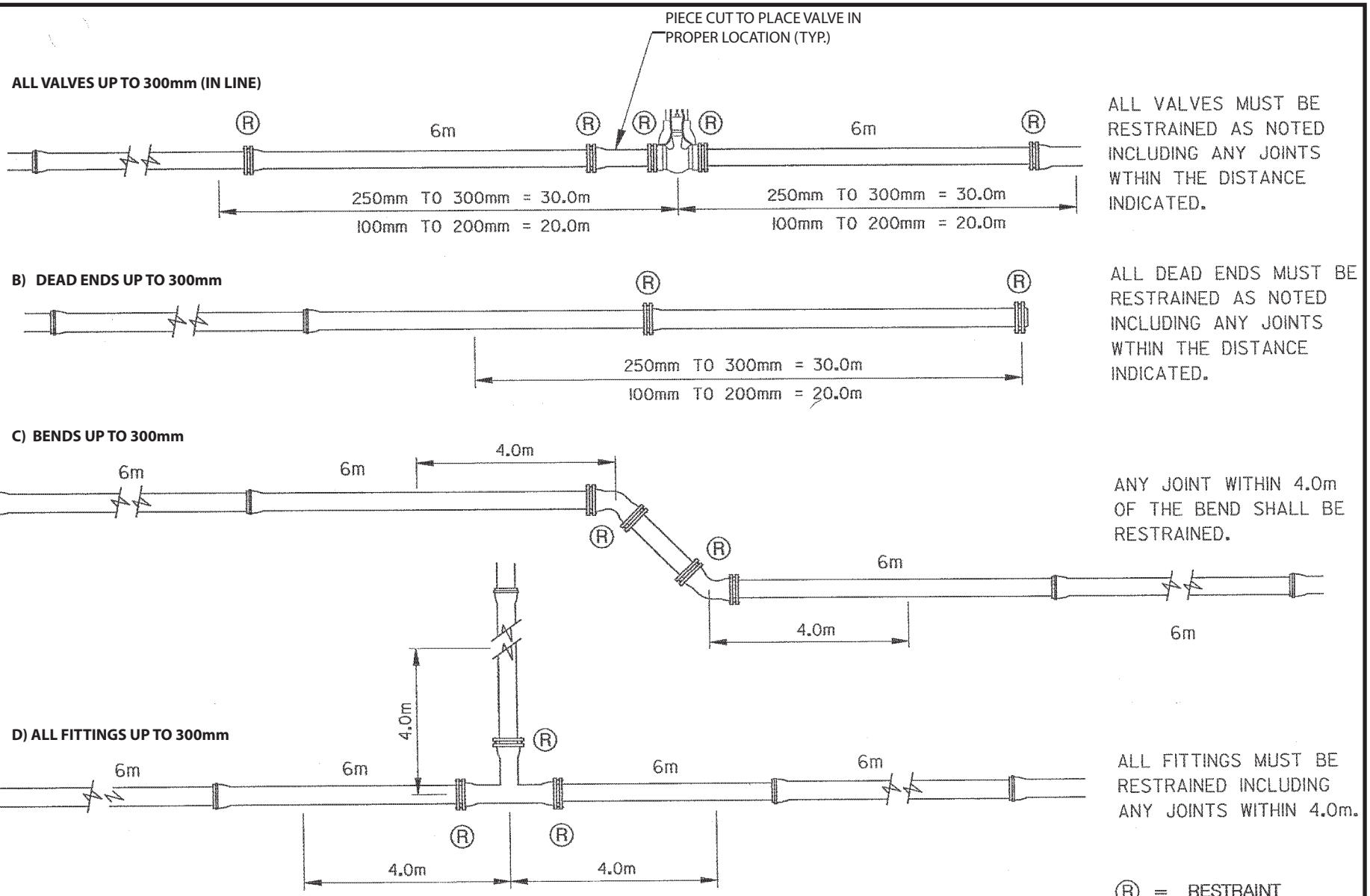


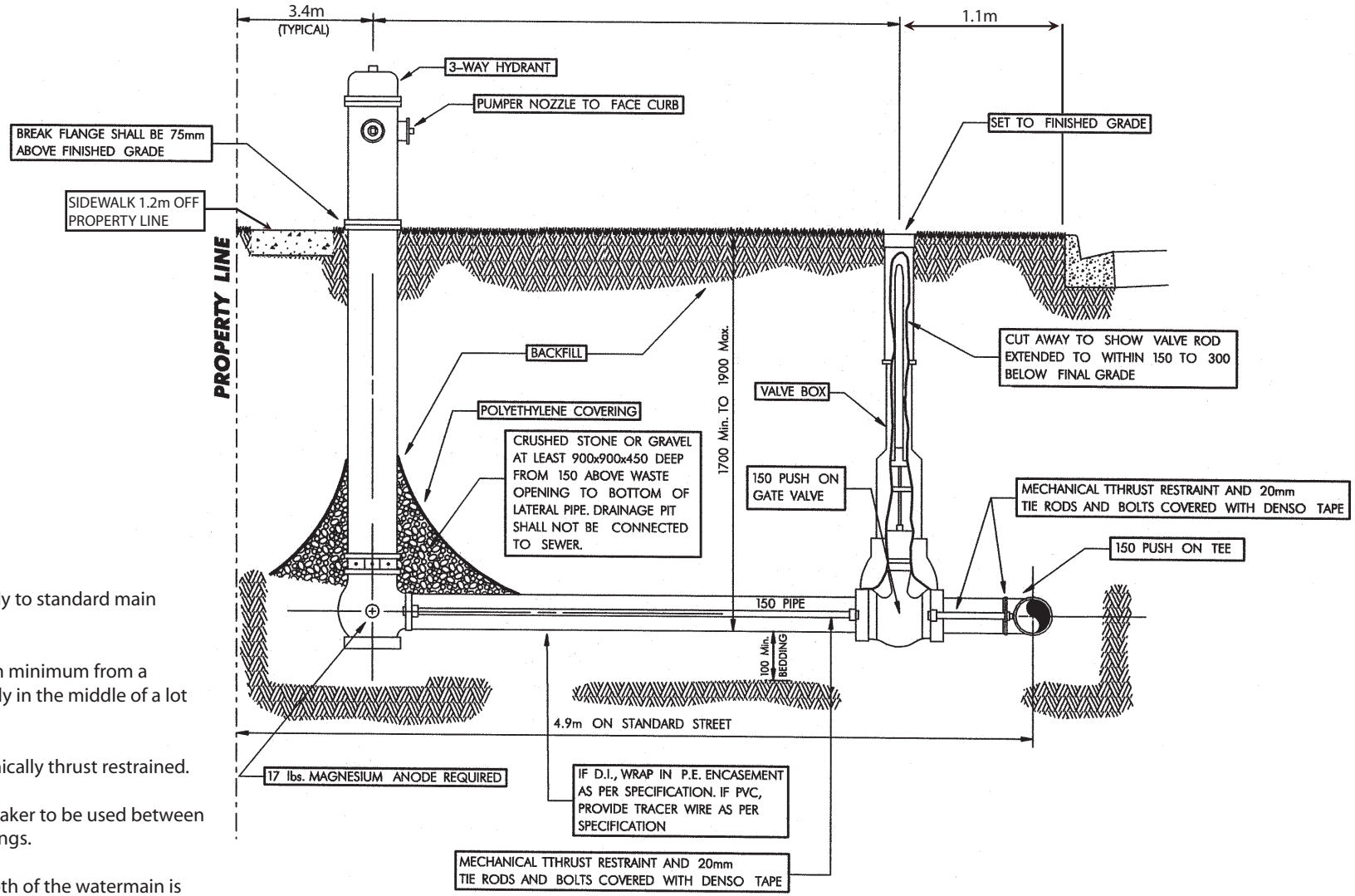
FIGURE 5.7

middlesex centre
in the centre of it all

TYPICAL RESTRAINT DETAILS

DATE: 2017-04

FIGURE 5.7



NOTES:

1. Dimensions given apply to standard main location.
2. Hydrant to be 1500mm minimum from a driveway and preferably in the middle of a lot frontage.
3. All joints to be mechanically thrust restrained.
4. Polyethylene bond breaker to be used between crushed stone and fittings.
5. In cases where the depth of the watermain is greater than 1.9 metre bends may be used to offset the hydrant boot depth.
6. The use of 300mm, minimum, fire hydrant barrel extension may also be used.

All dimensions are in millimetres unless otherwise shown.

FIGURE 5.8

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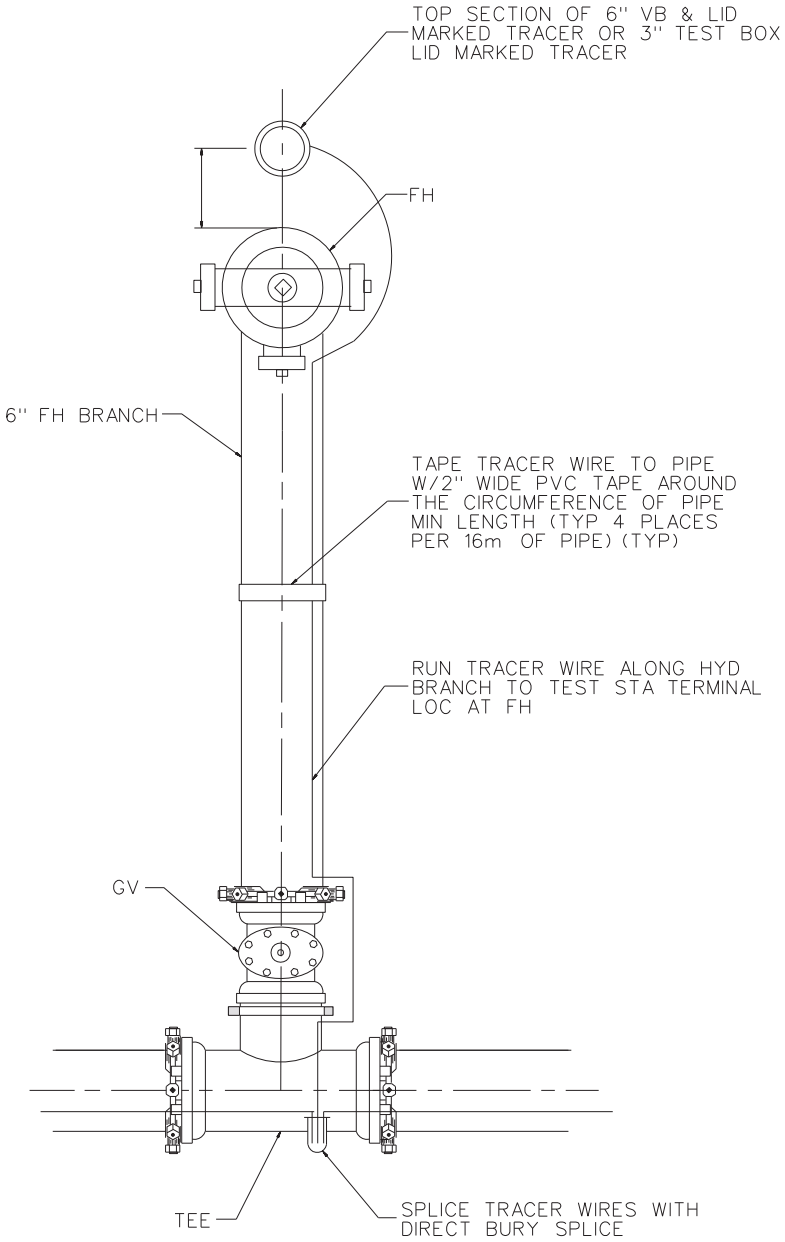
in the centre of it all

HYDRANT AND VALVE INSTALLATION

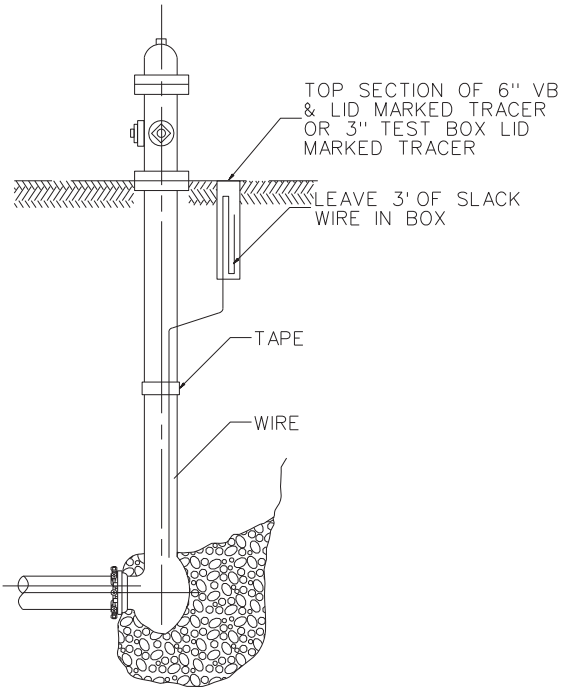
DATE: 2017-04

FIGURE 5.8



FIRE HYDRANT

PLAN VIEW



ELEVATION

All dimensions are in millimetres unless shown otherwise.

middlesex centre

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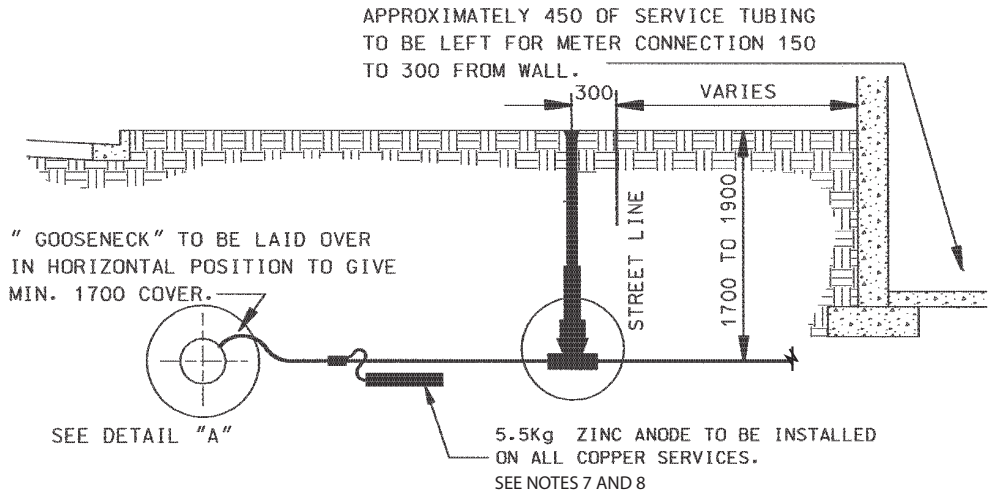
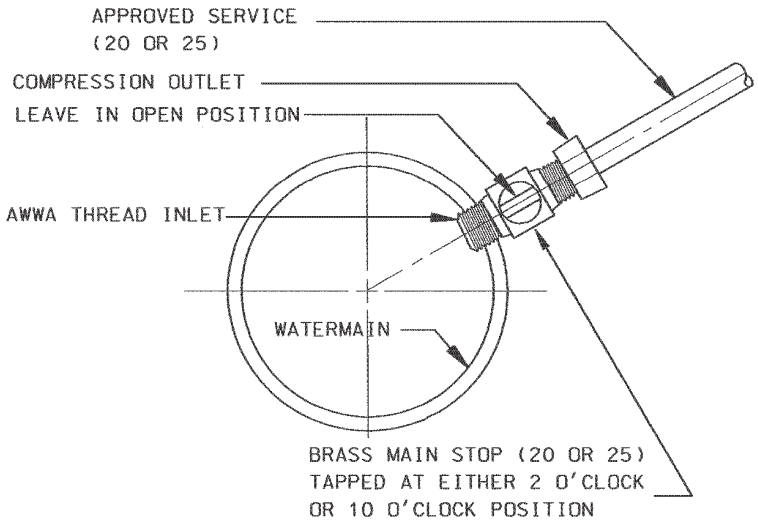
TRACER WIRE INSTALLATION

DATE: 2017-04

FIGURE 5.9



SECTION VIEW



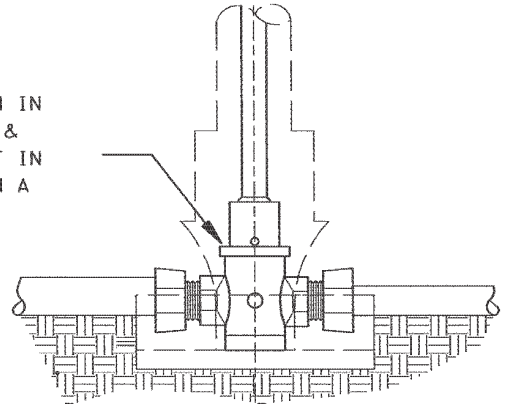
MAIN STOP – DETAIL "A"

(FOR D.I. PIPE ONLY, FOR P.V.C. SEE NOTE 6)

NOTES:

1. Main stops shall be spaced on main not closer than 450mm. If main is PVC taps shall not be on a common line parallel to the axis of the pipe and no closer than 450mm from the spigot end of the pipe.
2. Approved service tubing Rehau Municipex . For material on private property refer to Ontario Building Code.
3. Service tubing to be the same material from the main to the water meter.
4. Any joint made in service tubing shall be made with approved couplings.
5. No joints shall be made under pavement.
6. Approved service saddles must be used to tap 25mm main stops into 100mm pipe and all main stops into PVC pipe.
7. 5.5Kg zinc anode must conform to ASTM B418-73 Type II.
8. Anode must be supplied with a 3m AWG 12 gauge solid copper lead wire with TWH insulation and attached to the copper service with a silicon bronze clamp.

BRASS CURB STOP (20 OR 25) SHOWN IN OPEN POSITION–WITH BOTTOM BOARD & SERVICE BOX IN PLACE. TO BE LEFT IN CLOSED POSTION WHEN INSTALLED ON A STUB SERVICE.



CURB STOP – DETAIL "B"

All dimensions are in millimetres unless otherwise shown.

FIGURE 5.10

middlesex centre
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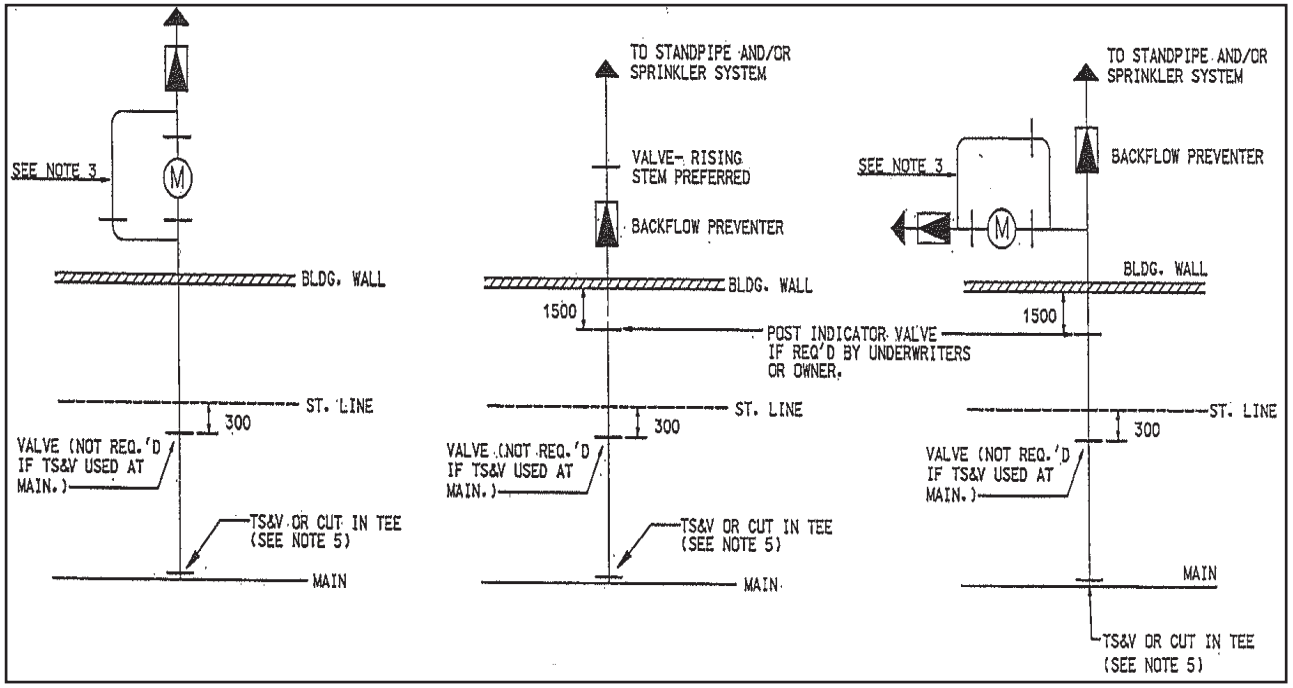
STANDARD INSTALLATION OF <50 mm WATER SERVICE CONNECTION AND LAYOUT DETAIL

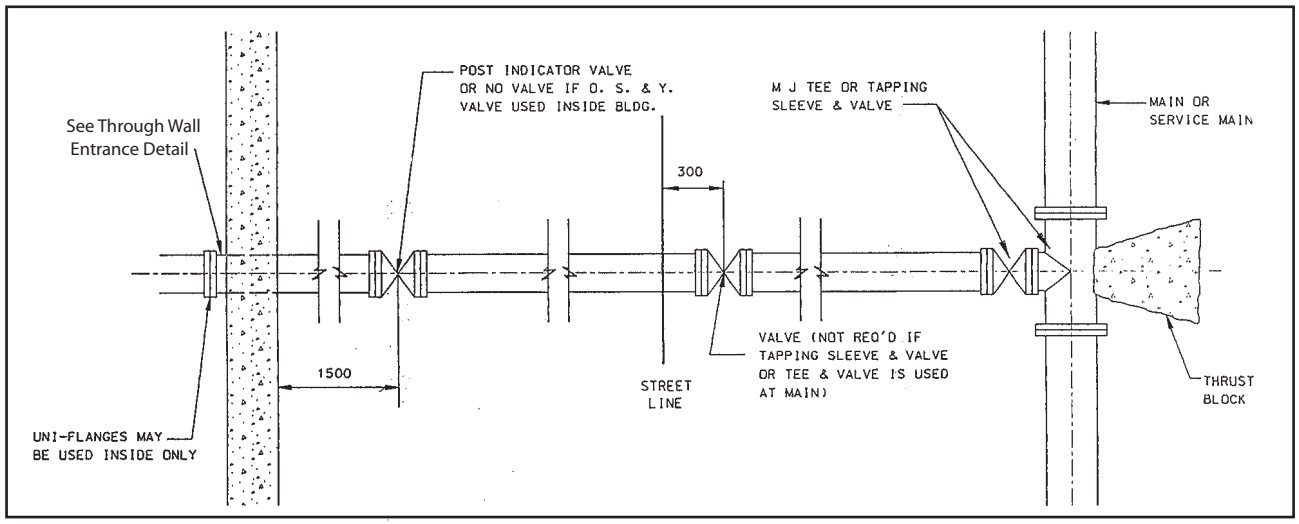
DATE: 2017-04

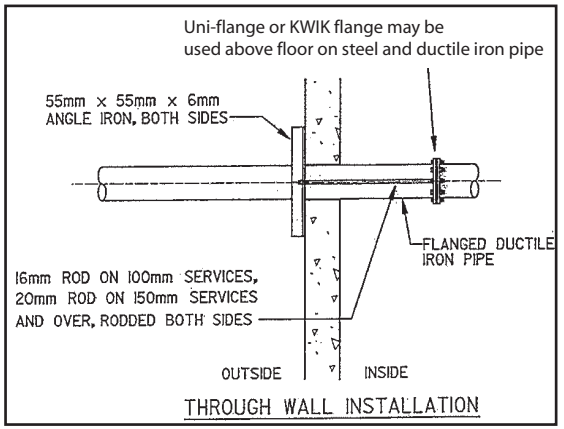
FIGURE 5.10



NOTES:

1. The domestic water may be taken from the sprinkler service and/or the standpipe service inside the building if approved by the fire underwriters. If not, the domestic service shall be installed to the main as shown with a minimum of 300mm separation from the fire service.
2. Control and check valves on fire services shall be as required by Ontario Building Code.
3. Domestic valves, meter and by-pass, if by-pass is required. Valves are prreferred to be rising stem.
4. For backflow preventer requirements refer to Ontario Plumbing Code.
5. If the service is off a service main, tapping sleeve and valve or a tee and valve shall be installed at the service main.
6. Fire and domestic lines will terminate with flanged ends inside building.
7. All fittings outside building shall be M. J. Cast Iron.





All dimensions are in millimeters unless shown otherwise

FIGURE 5.11

middlesex centre
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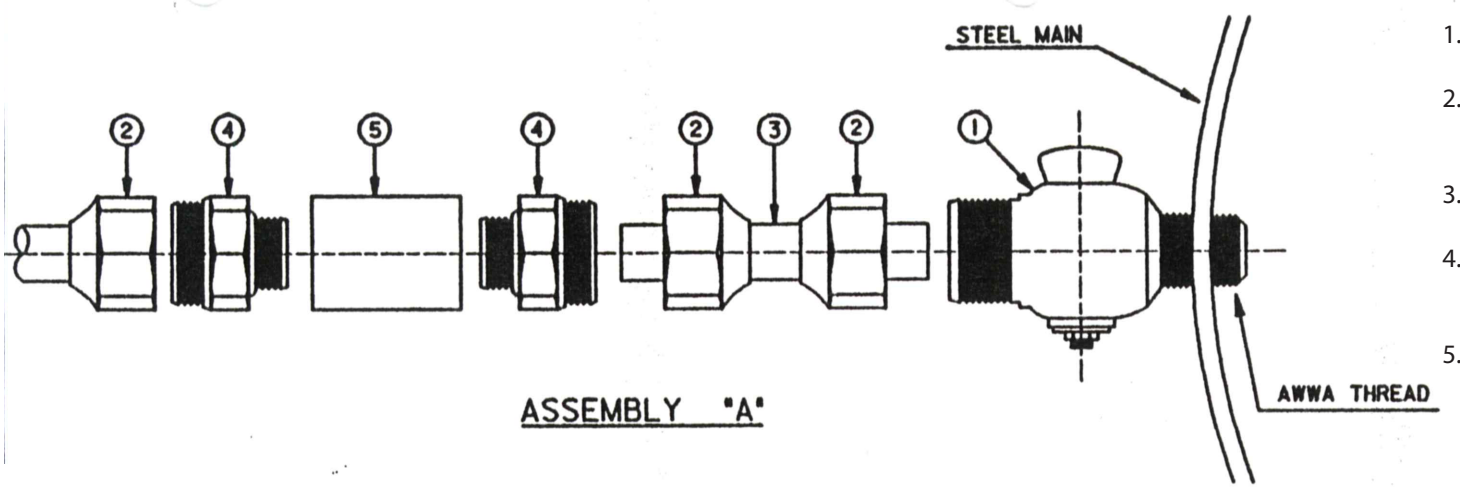
SCHEMATIC LAYOUT OF 100mm AND LARGER SERVICES

Typical Details of 100m and Larger Service / Typical Service Entrance Detail

DATE: 2017-04

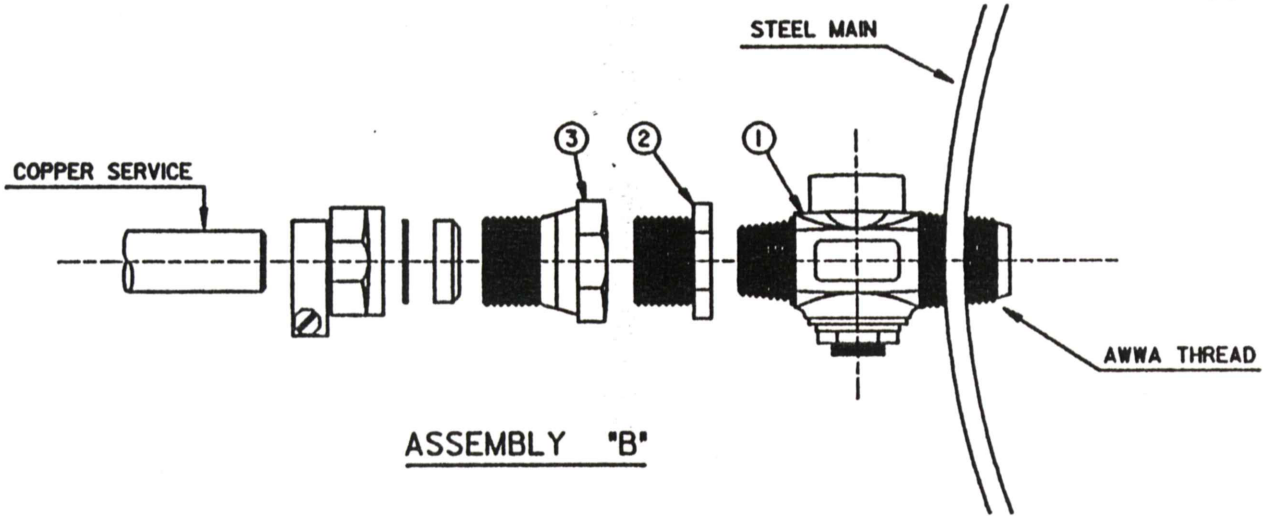
FIGURE 5.11



ASSEMBLY "A"

ASSEMBLY 'A'

1. Main stop (left open and burried)
2. Copper coupling nut (part of main stop or coupling)
3. Short piece of copper pipe
4. Copper to iron coupling (Mueller A-314 or equal)
5. Coupling - armour insulated



ASSEMBLY "B"

ASSEMBLY 'B'

1. Ford F400 or FB400 main stop - I.P. thread outlet (left open and barried
2. Nylon dielectric increasing bushing - F.I.P. threat inlet to MIP thread outlet
3. Ford C14 series decreasing coupling - F.I.P. thread inlet to compression outlet

NOTES:

1. Assembly 'A' or Assembly 'B' may be used as an alternative for 20mm and 25mm services, Cambridgt brass series 103 insulated main stop may be used.

FIGURE 5-12

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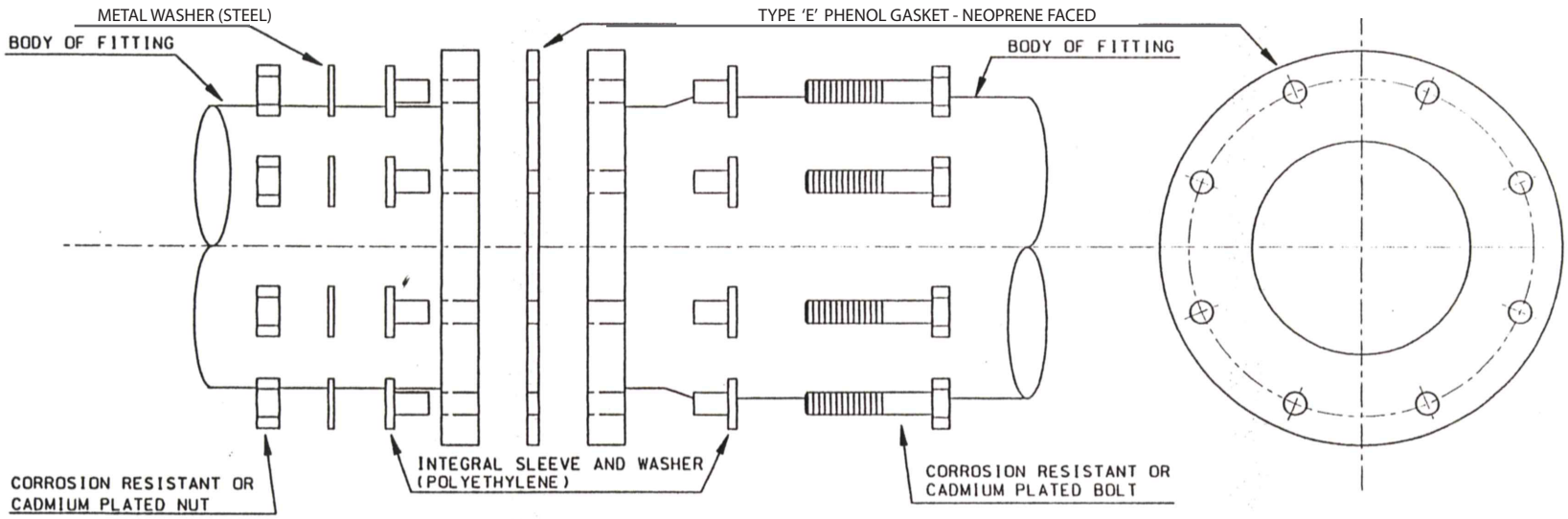
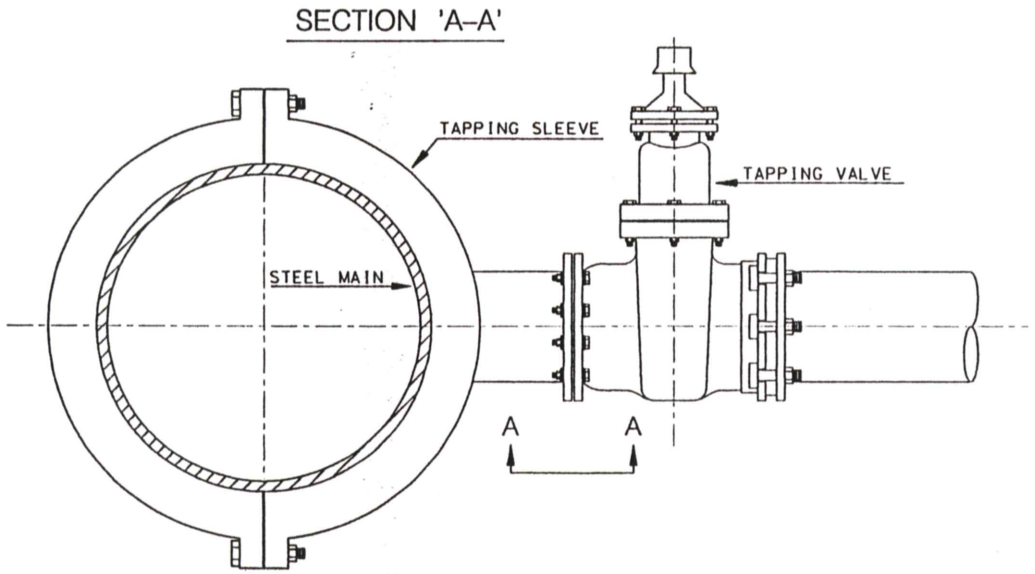
CATHODIC PROTECTION ASSEMBLIES FOR 20 mm TO 50 mm WATER SERVICES

DATE: 2017-04

FIGURE 5.12





NOTES:

1. To provide flange insulation for cathodic protection of steel mains maloney "Econoset" flange insulation must be installed as shown on all connections such as hydrants, lateral mains and services 100mm dia. and larger.
2. Bolt heads and nuts must not touch body of fitting.
3. Boss flanges not acceptable.
4. It may be necessary to use bolts of a smaller due to thickness of washers and sleeves.

FIGURE 5.13

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CATHODIC PROTECTION FOR 100 mm AND LARGER WATER SERVICES

DATE: 2017-04

FIGURE 5.13

FLOW RATES WILL VARY WITH PRESSURE. DESIGNERS ARE ASKED TO USE THE FOLLOWING FLOW RATES FOR AUTOMATIC FLUSHING DEVICES AS MINIMUM FLOW RATES WHEN DESIGNING WATER DISTRIBUTION SYSTEMS AND CARRYING OUT CALCULATIONS FOR HYDRAULIC MODELLING AND / OR FOR WATER QUALITY. THE WATER DISTRIBUTION SYSTEM PRESSURE WILL BE THE PRESSURE AS DETERMINED BY HYDRAULIC MODELLING DURING DESIGN.

TABLE 1: DISCHARGE RATES AT VARIOUS PRESSURES FOR AUTOMATIC DEVICES –50mm AUTOMATIC FLUSHING DEVICES

WATER DISTRIBUTION SYSTEM PRESSURE (PSI)	DISCHARGE RATE	
	USGPM	Lps
80psi	195.9	12.36
75psi	189.4	11.95
70psi	182.7	11.53
65psi	175.8	11.09
60psi	168.6	10.64
55psi	161.1	10.16
50psi	153.2	9.67
45psi	145.0	9.15
40psi	136.4	8.60

TABLE 2: DISCHARGE RATES AT VARIOUS PRESSURES FOR AUTOMATIC DEVICES –25mm AUTOMATIC FLUSHING DEVICES

WATER DISTRIBUTION SYSTEM PRESSURE (PSI)	DISCHARGE RATE	
	USGPM	Lps
80psi	36.6	2.31
75psi	35.3	2.23
70psi	34.1	2.15
65psi	32.8	2.07
60psi	31.4	1.98
55psi	30.0	1.89
50psi	28.5	1.80
45psi	27.0	1.70
40psi	25.3	1.60

FIGURE 5.14

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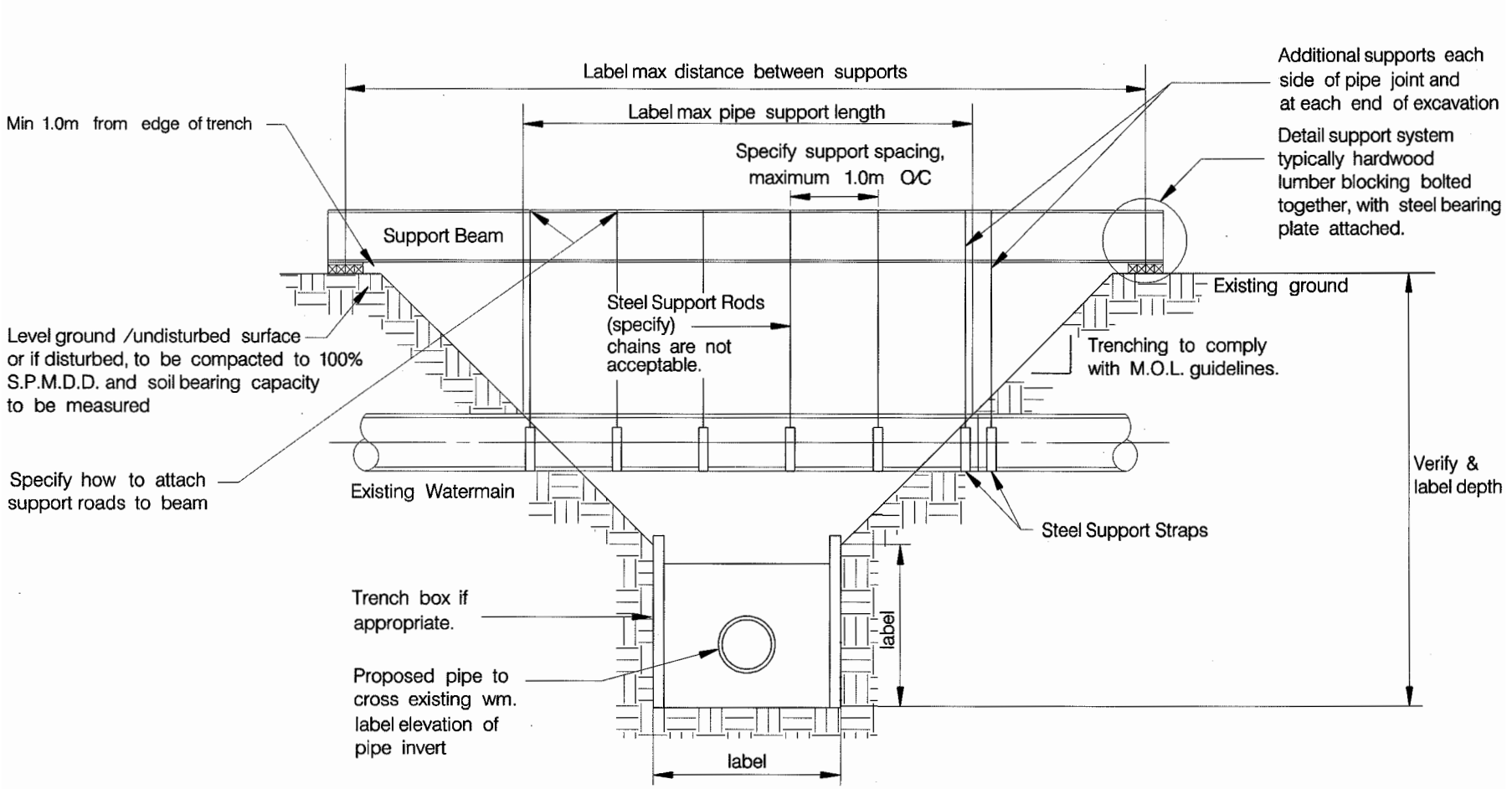
NOTE FOR DESIGNERS WITH REGARD TO AUTOMATIC FLUSHING DEVICES DISCHARGE RATES

DATE: 2017-04

FIGURE 5-14



TYPICAL SUPPORT CROSS SECTION

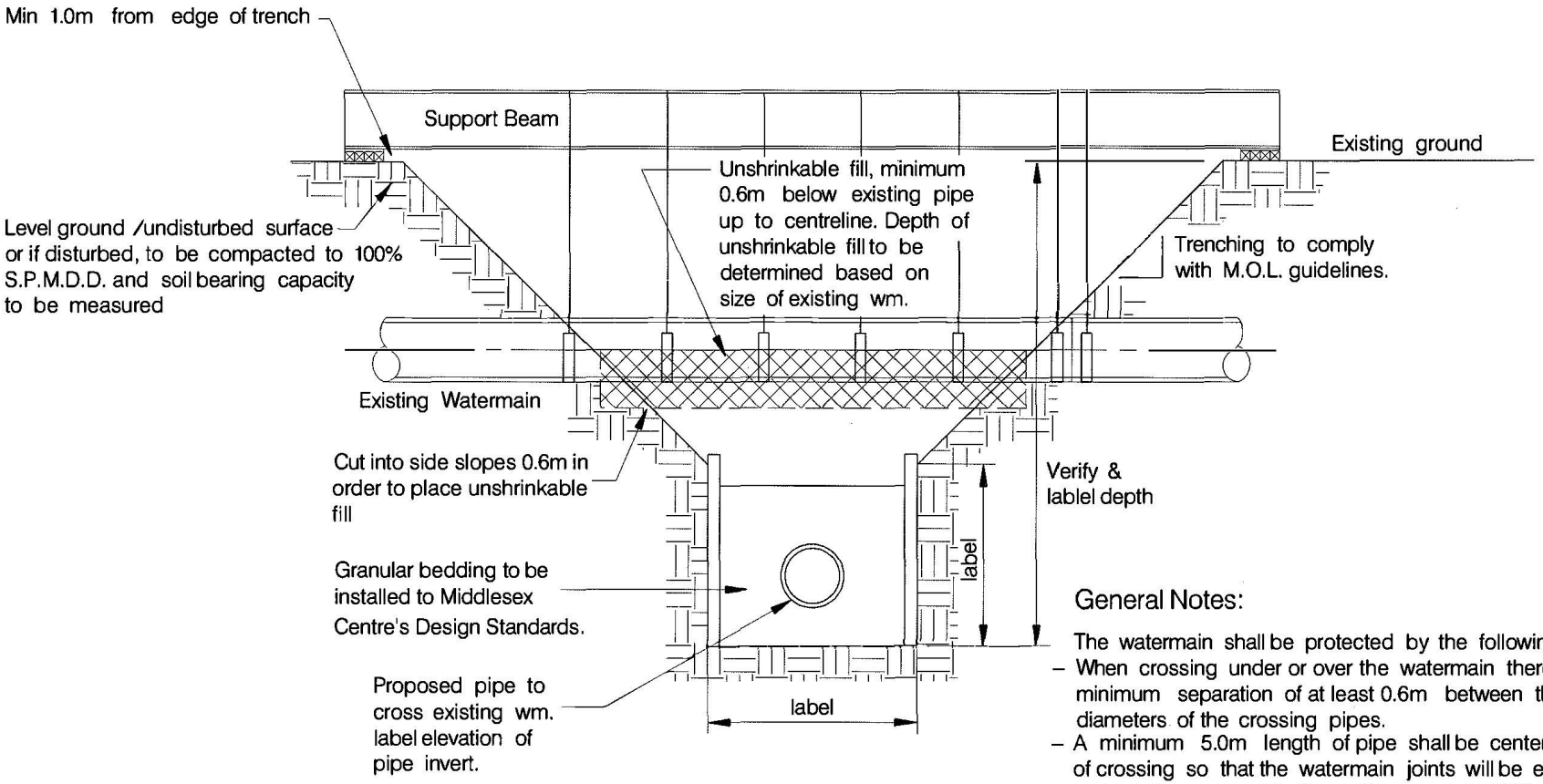
FIGURE 5.15

middlesex centre
in the centre of it all

450mm AND UP TYPICAL WATERMAIN SUPPORT DETAIL FOR UTILITY CROSSING USING OPEN CUT CONSTRUCTION

DATE: 2017-04

FIGURE 5.15



TYPICAL REINSTATEMENT /BEDDING DETAIL CROSS SECTION

General Notes:

The watermain shall be protected by the following:

- When crossing under or over the watermain there must be a minimum separation of at least 0.6m between the outside diameters of the crossing pipes.
- A minimum 5.0m length of pipe shall be centered at the point of crossing so that the watermain joints will be equidistance and as far as possible from the sewer or PDC. Crossing must be absolute minimum 2.0m from watermain joint.
- All construction methods including excavation and backfill compaction within 0.6m of existing watermain shall be done by hand.

It should be noted that the support structure is to remain in place until the watermain is fully supported by the reinstated bedding (i.e. until 5MPa unshrinkable fill is cured, provide bond break).

FIGURE 5.16

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TYPICAL REINSTATEMENT /BEDDING DETAIL FOR 450mm AND UP WATERMAIN SUPPORT

DATE: 2017-04

FIGURE 5.16

SUPPORT DETAIL REQUIREMENTS

Submission and Design Requirements

When crossing below an existing watermain (450mm Dia. and greater) using open cut construction, the following must be provided to the Municipality of Middlesex Centre's Public Works and Engineering Department for review/approval a minimum of two (2) weeks prior to the proposed work taking place:

A) A utility support system drawing stamped by a Professional Engineer, including the following: (See Figure 5.15)

- (i) Complete plan and cross-section drawings indicating support system including all appropriate dimensions and details.
- (ii) Provide all structural calculations for support systems including load and deflection information for proposed beam. Provide details to confirm adequacy of support mechanism proposed to transfer loading of supported utility to support beam.
- (iii) Provide calculations for loading transferred to the end support of the beam structure and confirm adequate soil bearing capacity for the system designed for beam supports.
- (iv) Identify procedure for transferring load of structure to be supported to support beam.

B) Contractor's work plan. The work plan shall include the following:

- (i) Identification of major activities to be carried out in association with the utility crossing.
- (ii) A schedule of these works.
- (iii) Monitoring of support system for deflection.

Under no circumstances will the work be allowed to proceed under adverse weather conditions.

The work may not proceed until all of the above are received and approved. Please note that traffic control plans affecting Middlesex Centre's Right-of-Way, if required, are to be submitted for approval separately to the Public Works and Engineering Department. At all times, all requirements of the Occupational Health & Safety Act must be met.

BEDDING/REINSTATEMENT DETAIL REQUIREMENTS

Submission and Design Requirements

When crossing below an existing watermain (450mm Dia. and greater) using open cut construction, the following must be provided to the Municipality of Middlesex Centre's Public Works and Engineering Department for review/approval a minimum of two (2) weeks prior to the proposed work taking place:

1) When crossing watermains 450mm and greater a drawing(s) must be submitted indicating reinstatement and bedding is required. The drawings shall include the following: (See Figure 5.16)

- (A) Cross – section drawing(s) including all appropriate dimensions and details.
- (B) If appropriate, identify insulation to be installed.
- (C) To prevent settlement of watermain, install 0.7MPa unshrinkable fill with bond breaker (ie 6mil poly) to a minimum 600mm below watermain up to the centreline OR obtain recommendations regarding watermain bedding from the watermain pipe manufacture, if any of the following apply:
  - (i) There is less than 600mm separation between the utilities crossing each other, OR
  - (ii) Either structure is greater than 1000mm in diameter, OR
  - (iii) Insulation is being placed between the utilities.

2) Contractor's work plan. The work plan shall include the following:

- (A) Identification of major activities to be carried out in association with the utility crossing.
- (B) A schedule of these works.

Under no circumstances will the work be allowed to proceed under adverse weather conditions.

The work may not proceed until all of the above are received and approved. Please note that traffic control plans affecting Middlesex Centre's Right-of-Way, if required, are to be submitted for approval separately to the Public Works and Engineering Department. At all times, all requirements of the Occupational Health & Safety Act must be met.

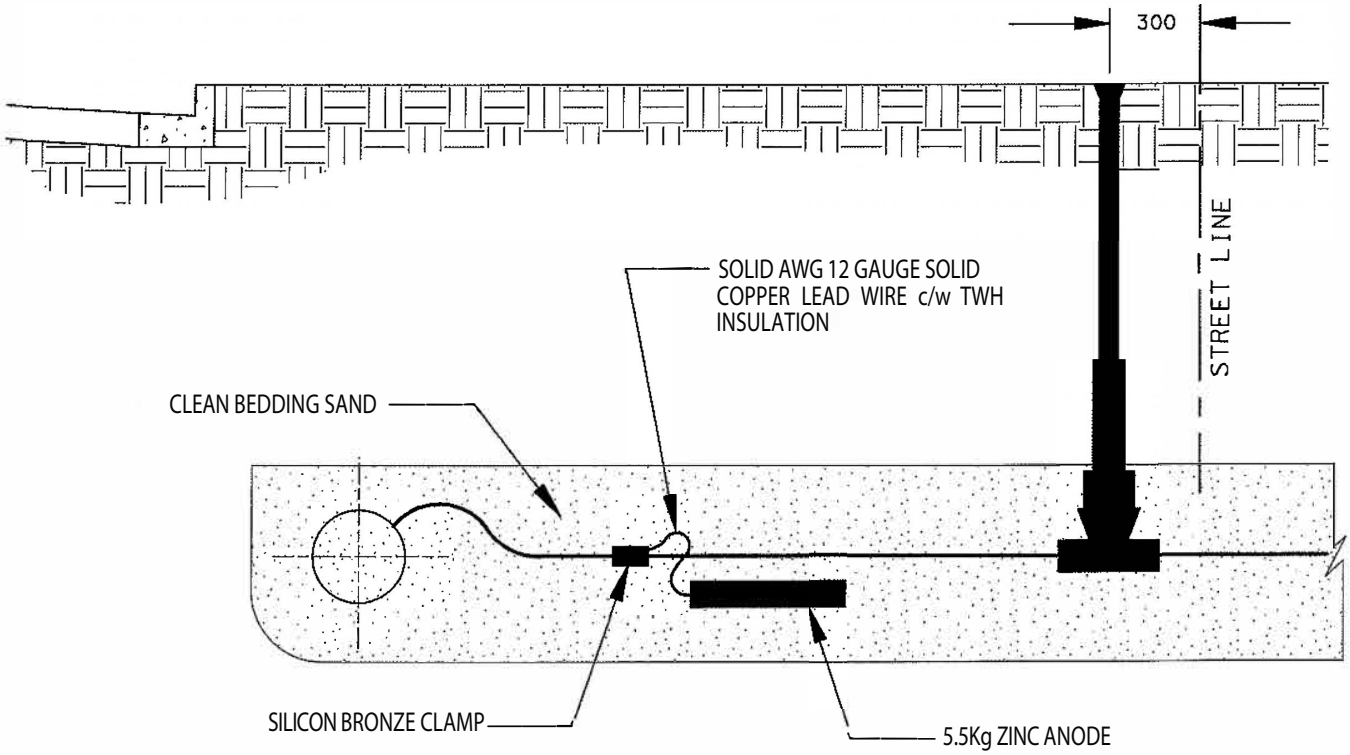
FIGURE 5.17

middlesex centre
in the centre of it all

GENERAL SUBMISSION AND DESIGN REQUIREMENTS FOR WATERMAIN SUPPORT AND BEDDING /REINSTATEMENT

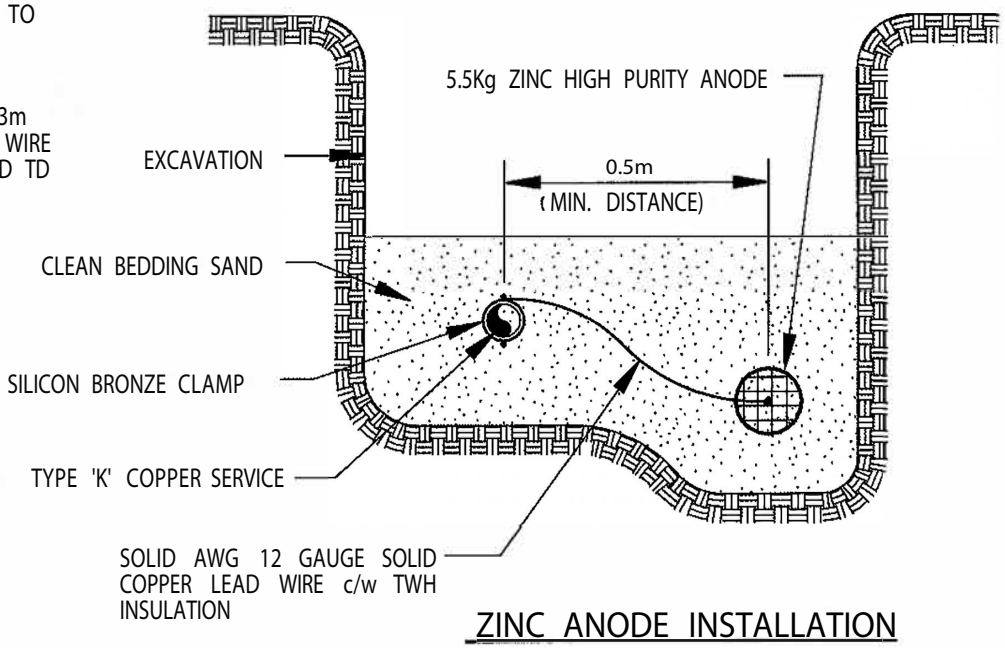
DATE: 2017-04

FIGURE 5.17



NOTES:

1. ALL COPPER TUBING MUST BE INSTALLED WITH A 5.5Kg ZINC ANODE.
2. 5.5Kg ZINC ANODE MUST CONFORM TO ASTM B418-73 TYPE JI.
3. ANODE MUST BE SUPPLIED WITH A 3m AWG 12 GAUGE SOLID COPPER LEAD WIRE WITH TWH INSULATION AND ATTACHED TD THE COPPER SERVICE WITH A SILICON BRONZE CLAMP.



ZINC ANODE INSTALLATION

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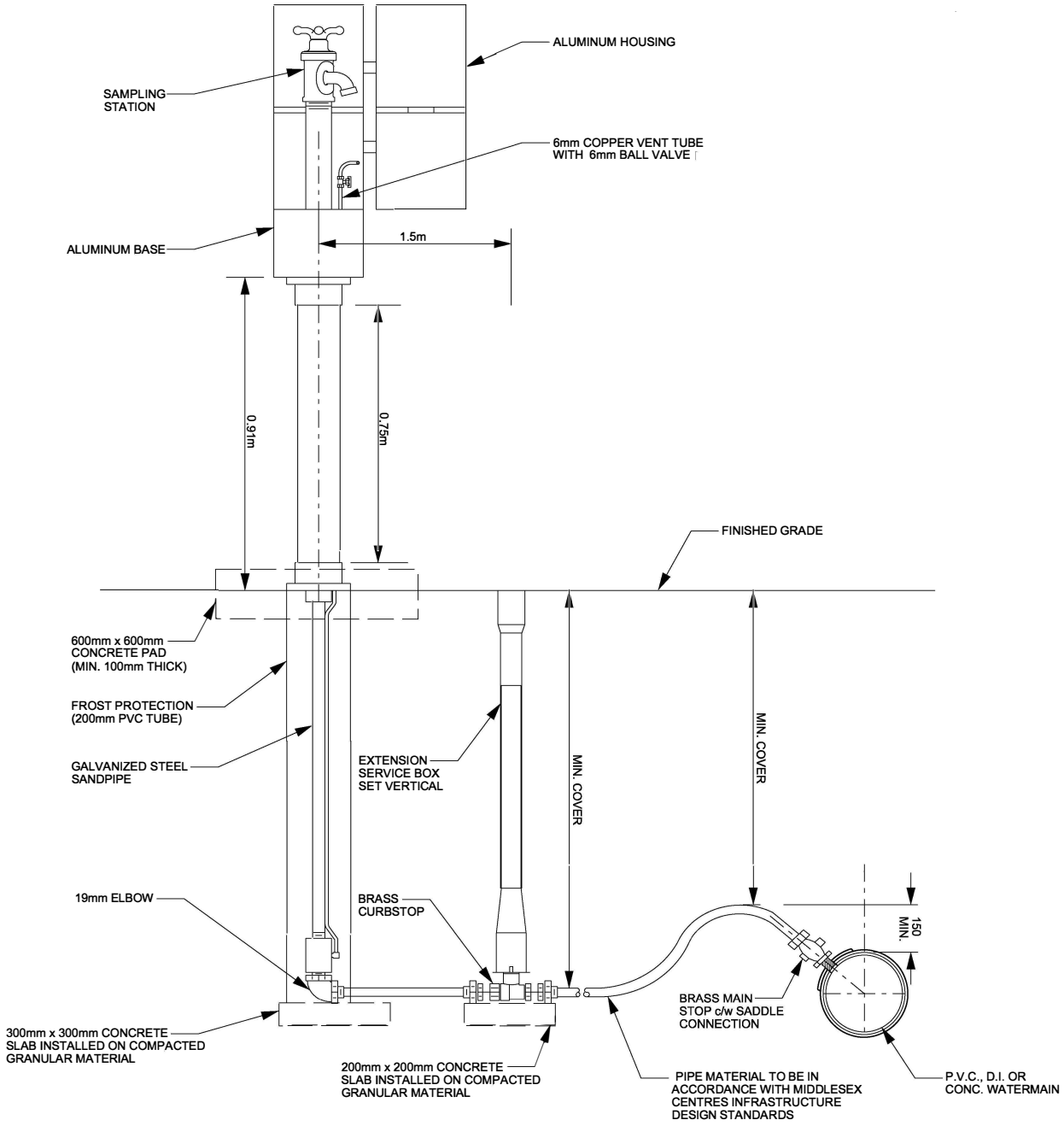
in the centre of it all

ZINC ANODE INSTALLATION ON ALL COPPER WATER SERVICE TUBING

DATE: 2017-04

FIGURE 5.18



NOTE

1. SAMPLING STATIONS SHALL BE FURNISHED WITH A 19mm FIP INLET, AND A (19mm HOSE OR UNTHREADED) NOZZLE.
2. ALL STATIONS SHALL BE ENCLOSED IN A LOCKABLE, NONREMOVEABLE, ALUMINUM-CAST HOUSING
3. WHEN OPENED, THE STATION SHALL REQUIRE NO KEY FOR OPERATION, AND THE WATER WILL FLOW IN AN ALL BRASS WATERWAY
4. ALL WORKING PARTS WILL ALSO BE OF BRASS AND BE REMOVEABLE FROM ABOVE GROUND WITH NO DIGGING. EXTERIOR PIPING SHALL BE GALVANIZED STEEL (BRASS PIPE ALSO AVAILABLE)
5. A COPPER VENT TUBE WILL ENABLE EACH STATION TO BE PUMPED FREE OF STANDING WATER TO PREVENT FREEZING AND TO MINIMIZE BACTERIA GROWTH.

All dimensions are in millimetres unless otherwise shown.

middlesex centre
in the centre of it all

TYPICAL SAMPLING STATION

DATE: 2018-01

FIGURE 5.19