

Standard Drawings for Sewer and Water

Volume 3 of the Ontario Provincial Standard Drawings (OPSD), and the current City of London Standard Drawings, are amended as follows:

Title of Drawing	Date of Drawing	City of London Drawing Classification	Ontario Provincial Standard Drawings	Date Drawing Superseded or Deleted	Old Drawing Title (if applicable)
Bedding Standard For Gravity And Pressure Pipe	8/15/2013	SW-1.0	-	2/29/2000	Bedding Standard For Gravity And Pressure Pipe
Concrete Bedding For Rigid Pipe	3/15/1996	SW-1.1	-	-	-
-	-	-	1003.01	12/1/1988	Manhole Drop Structure - Tee
-	-	-	1003.02	12/1/1988	Manhole Drop Structure Wye
Maintenance Drop Structure Wye	09/09/2019	SW-2.0	-	11/1/2004	Manhole Drop Structure - Wye
Safety Platform Aluminium	1/30/1999	SW-2.5	-	-	-
600X840 Precast Concrete Curb Inlet Catch basin	11/12/2012	SW-3.0	-	2/29/2000	600X840 Precast Concrete Curb Inlet Catch Basin
Catch Basin Pipe Subdrain Detail	09/09/2019	SW-3.1	-	11/1/2013	Catch basin Pipe Subdrain Detail
Precast Concrete Catch Basin Maintenance Hole	3/20/2002	SW-4.0	-	3/1/1998	Precast Concrete Catch Basin in Manhole
Maintenance Hole Adjustment Unit Detail	8/15/2013	SW-5.0	-	3/1/1998	Manhole Adjustment Unit Detail
Precast Concrete Maintenance Hole Tee	1/17/2003	SW-5.1	707.01	9/15/1996	Precast Concrete Maintenance Hole Tee
Steps in Maintenance Hole Benching	2/29/2000	SW-5.2	-	-	-
Maintenance Hole Cast Iron Watertight Liner	2/29/2000	SW-5.3	-	-	-

Supplemental Standards for Sewer and Water (SW)

Title of Drawing	Date of Drawing	City of London Drawing Classification	Ontario Provincial Standard Drawings	Date Drawing Superseded or Deleted	Old Drawing Title (if applicable)
Sanitary Sewer Dog-House Maintenance Hole	9/14/2012	SW-5.4	-	-	-
Catch Basin Frame and Grate "Fish Grate"	11/12/2012	SW-5.5	-	-	-
-	-	-	1006.02	12/1/1988	Sewer Service Connections for Rigid Pipe
Private Drain Connection	11/1/2013	SW-6.0	-	10/28/2008	Private Drain Connection
PDC Riser Type I – Stable Banks	09/09/2019	SW-6.1	-	10/3/2014	PDC Riser Type I
PDC Riser Type 2 – Unstable Banks	09/09/2019	SW-6.2	-	10/26/2009	PDC Riser Type 2
PDC Vertical Riser Installation	09/09/2019	SW-6.3	-	10/3/2014	PDC Vertical Riser Installation
Private Drain Cleanout	8/15/2013	SW-6.4	-	11/12/2012	Private Drain Cleanout
Standard Servicing Locations for Single Family and Semi-Detached Lots	3/1/1998	SW-7.0	-	2/15/1997	Standard Servicing Locations for Single Family and Semi-Detached Lots
-	-	-	-	5/23/2002 Included in the UCC Manual	Standard Utility Locations For All Streets
Hydrant And Valve Installation	09/09/2019	W-CS-1 Sheet 1	-	9/12/2018	Hydrant and Valve Installation
Tracer Wire Installation	9/23/2014	W-CS-1 Sheet 2	-	-	-
Metered Automatic Flushing Device	8/31/2017	W-CS-2 Sheet 1	-	-	-

Supplemental Standards for Sewer and Water (SW)

Title of Drawing	Date of Drawing	City of London Drawing Classification	Ontario Provincial Standard Drawings	Date Drawing Superseded or Deleted	Old Drawing Title (if applicable)
9800 Automatic Flushing Device Detail	8/31/2017	WCS-2 Sheet 2	-	-	-
Note for Designers With Regard to Automatic Flushing Devices Discharge Rates	8/31/2017	W-CS-2 Sheet 3	-	-	-
Standard 50mm Blow Off Installation	11/6/2006	W-CS-5	-	1/31/1999	Standard 50mm Blow Off Installation
Standard Valve Rod Extension Piece For 40mm And Larger Valves	11/6/2006	W-CS-6	-	1/31/1999	Standard Valve Rod Extension for 40mm and Larger Valves
Standard Valve Rod Extension Piece and Valve Box for 40mm and 50mm Valves	10/31/2018	W-CS-6 Sheet 2	-	-	-
Standard Installation Of 16mm Water Meter	11/1/2004	W-CS-7	-	2/29/2000	Standard Installation of 16mm Water Meter
Standard Installation of 25mm Water Service (Sht 1)	09/12/2019	W-CS-8 Sheet 1	-	9/12/2019	Standard Installation Of 25mm Water Service (Sht 1)
Standard Installation Of 20mm & 25mm Water Service (Sht 2)	1/30/1999	W-CS-8 Sheet 2	-	-	-
Bottom Board For Standard Installation Of 20mm & 25mm Water Service (Sht 3)	1/30/1999	W-CS-8 Sheet 3	-	-	-
Zinc Anode Installation on all Copper Water Service Tubing (Sht. 4)	09/12/2019	W-CS-8 Sheet 4	-	10/28/2008	Zinc Anode Installation on all Copper Water Service Tubing (Sht. 4)

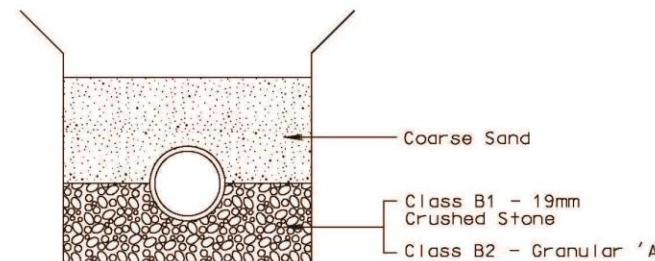
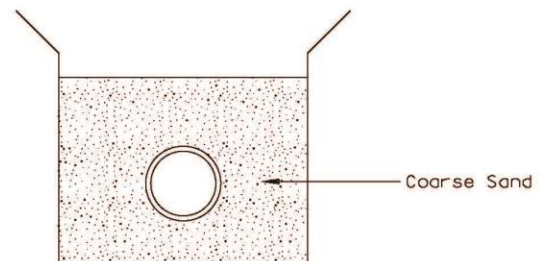
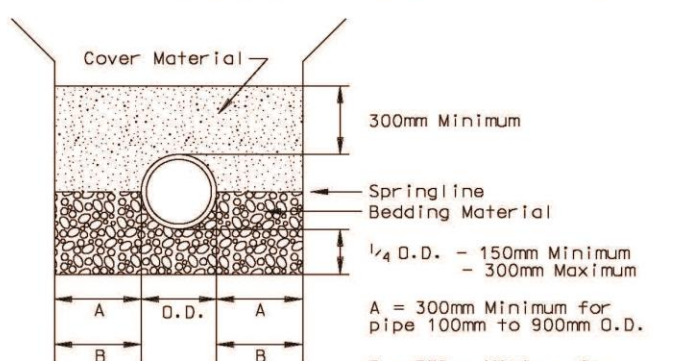
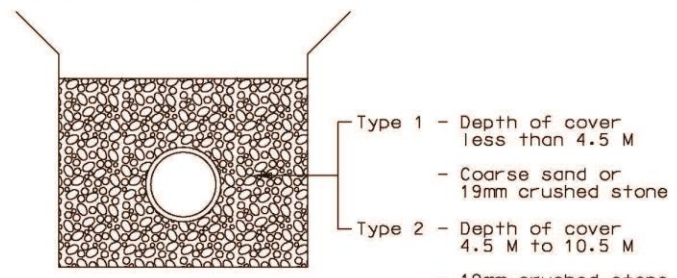
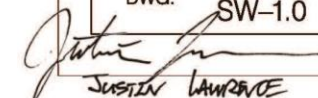
Title of Drawing	Date of Drawing	City of London Drawing Classification	Ontario Provincial Standard Drawings	Date Drawing Superseded or Deleted	Old Drawing Title (if applicable)
Standard Mechanical Joint Offset Installation Using Tiebolt Couplings	1/26/2012	W-CS-12	-	2/29/2000	Standard Mechanical Joint Offset Installation Using Tiebolt Couplings
Grip Ring Restrainer Assembly	2/29/2000	W-CS-12 Sheet 2	-	-	-
Typical Restraint Details	11/6/2006	W-CS-12 Sheet 3	-	-	-
Standard Installation of 40mm & 50mm Water Service	09/12/2019	W-CS-22	-	10/16/2007	Standard Installation of 40mm & 50mm Water Service
Cathodic Protection Assemblies for 20mm to 50mm Water Service	2/29/2000	W-CS-24	-	-	-
Cathodic Protection for 100mm and Larger Water Services	1/30/1999	W-CS-25	-	-	-
Typical Installation for 20mm, 40mm, and 50mm Disc Type Water Meter(Sheet 1)	1/30/1991	W-CS-30 Sheet 1	-	-	-
Typical Turbine Water Meter Installation for 75mm to 200mm	1/30/1999	W-CS-30 Sheet 2	-	-	-
Schematic Layout of 100mm and Larger Service	11/1/2004	W-CS-31 Sheet 1	-	-	-
Typical Thrust Blocks for Watermains Sheet 1	09/12/2019	W-CS-43 Sheet 1	-	10/31/2018	Typical Thrust Blocks for Watermains Sheet 1
-	-	-	-	11/1/2004	Typical Vertical Thrust Blocks For Watermains (sheet 2)

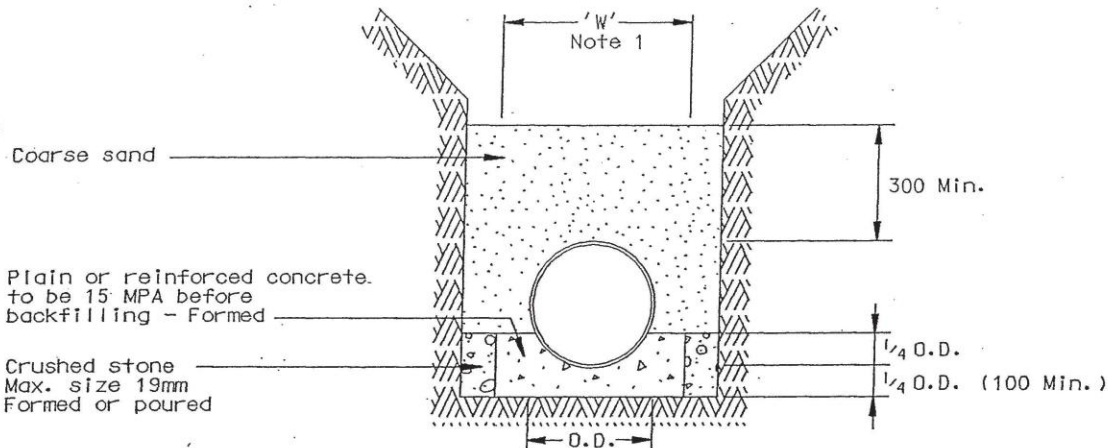
Supplemental Standards for Sewer and Water (SW)

Title of Drawing	Date of Drawing	City of London Drawing Classification	Ontario Provincial Standard Drawings	Date Drawing Superseded or Deleted	Old Drawing Title (if applicable)
Typical Thrust Blocks for Watermains (sheet 3)	09/12/2019	W-CS-43 Sheet 3	-	10/31/2018	Typical Thrust Blocks for Watermains (sheet 3)
Standard Location for Water Valves at Intersections With 9.0m and 10.5m Curb Radii	1/30/1999	W-CS-45	-	-	-
Standard City of London 737mm Frame and Cover	1/30/1999	W-CS-51	-	-	-
Disinfection	09/12/2019	W-CS-60	-	1/30/1999	Sterilizing Mains
Typical Service Entrances 100mm to 200mm	11/1/2004	W-CS-66	-	-	-
Remote Water Meter Register Installation	1/30/1999	W-CS-67	-	3/7/1985	Remote Water Meter Register Installation
Insulation of Watermain and Offsets (Protection from Freezing)	11/3/2015	W-CS-68	-	1/26/2012	Insulation of Shallow Mains and Offsets
450mm and Up Typical Watermain Support Detail for Utility Crossings Using Open Cut Construction	10/1/2012	W-CS-69 Sheet 1	-	9/16/2003	450mm and Up Typical Watermain Support Detail for Utility Crossings Using Open Cut Construction
Typical Reinstatement / Bedding Details for 450mm and Up Watermain Support	08/26/2019	W-CS-69 Sheet 2	-	10/1/2012	Typical Reinstatement / Bedding Details for 450mm and Up Watermain Support

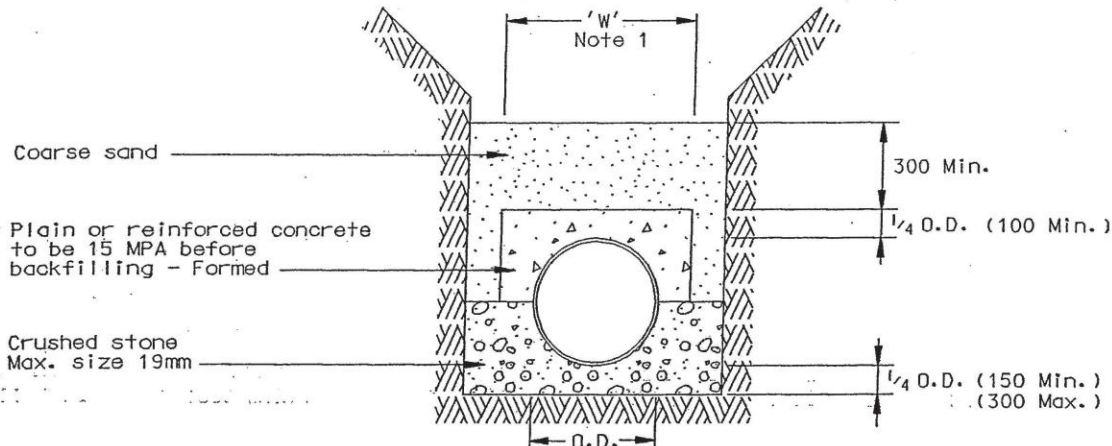
Supplemental Standards for Sewer and Water (SW)

Title of Drawing	Date of Drawing	City of London Drawing Classification	Ontario Provincial Standard Drawings	Date Drawing Superseded or Deleted	Old Drawing Title (if applicable)
General Submission and Design Requirements for Watermain Support and Bedding / Reinstatement	08/26/2019	W-CS-69 Sheet 3	-	10/1/2010	General Submission and Design Requirements for Watermain Support and Bedding / Reinstatement
Valve Box on Chambers	11/20/2009	W-CS-70	-	-	-
Metered Irrigation System and Backflow Prevention Assembly	9/24/2014	W-CS-71	-	1/26/2012	Metered Irrigation System and Backflow Prevention Assembly
Casing Detail	08/26/2019	W-CS-72	-	9/12/2018	Casing Detail
Typical Air Valve Chamber	9/24/2014	W-CS-74	-	-	-
Check Valve Chamber (Plan View)	09/09/2019	W-CS-75 Sheet 1	-	9/26/2017	Check Valve Chamber (Plan View)
Check Valve Chamber (Section View)	09/09/2019	W-CS-75 Sheet 2	-	9/26/2017	Check Valve Chamber (Section View)

RIGID PIPE – CLASS B  NOTE: PROPERLY CONSOLIDATED AND COMPACTED CLASS B1 BEDDING TO BE EXCLUSIVELY UTILIZED AS BEDDING MATERIAL WITHIN 5.0m OF ALL MANHOLES IN ALL SITUATIONS WHERE RIGID PIPE IS SPECIFIED.	RIGID PIPE – CLASS C  NOTE: PROPERLY CONSOLIDATED AND COMPACTED CLASS B1 BEDDING TO BE EXCLUSIVELY UTILIZED AS BEDDING MATERIAL WITHIN 5.0m OF ALL MANHOLES IN ALL SITUATIONS WHERE RIGID PIPE IS SPECIFIED.	
TRENCH DIMENSIONS FOR ALL PIPE SEWERS  A = 300mm Minimum for pipe 100mm to 900mm O.D. B = 375mm Minimum for pipe greater than 900mm O.D.	FLEXIBLE PIPE  NOTE: PROPERLY CONSOLIDATED 19mm CRUSHED STONE BEDDING TO BE EXCLUSIVELY UTILIZED AS BEDDING AND COVER MATERIAL WITHIN 5.0m OF ALL MANHOLES IN ALL SITUATIONS WHERE FLEXIBLE PIPE IS SPECIFIED.	
CITY OF LONDON STANDARD DRAWING		
BEDDING STANDARD FOR GRAVITY AND PRESSURE PIPE		
DWG: SW-1.0	DATE 2013 08 15	APPROVED BY CITY ENGINEER:
 JUSTIN LAWRENCE		NTS



**CLASS A-1
CONCRETE CRADLE BEDDING**



**CLASS A-2
CONCRETE ARCH BEDDING**

NOTES:

1. 'W' = O.D. + 200mm for pipe sizes up to and including 600mm in dia. and 1-1/4 O.D. for pipe sizes greater than 600mm.
2. 'P' is the ratio of area of steel to the area of concrete at the crown for concrete arch, and at the invert for concrete cradle.
3. All bedding materials to be mechanically compacted in accordance with City of London Standard Contract Documents
4. When reinforcing steel is required to obtain a specific load factor, design detail shall be submitted to the Contract Administrator for approval.

A. ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE SHOWN

Load Factors:

- = 2.8 for plain concrete
- = 3.4 for reinforced concrete with $p = 0.4\%$
- = 4.8 for reinforced concrete with $p = 1.0\%$

CITY OF LONDON STANDARD DRAWING

**CLASS A-1 CONCRETE CRADLE BEDDING AND CLASS A-2
CONCRETE ARCH BEDDING FOR RIGID PIPE**

DWG

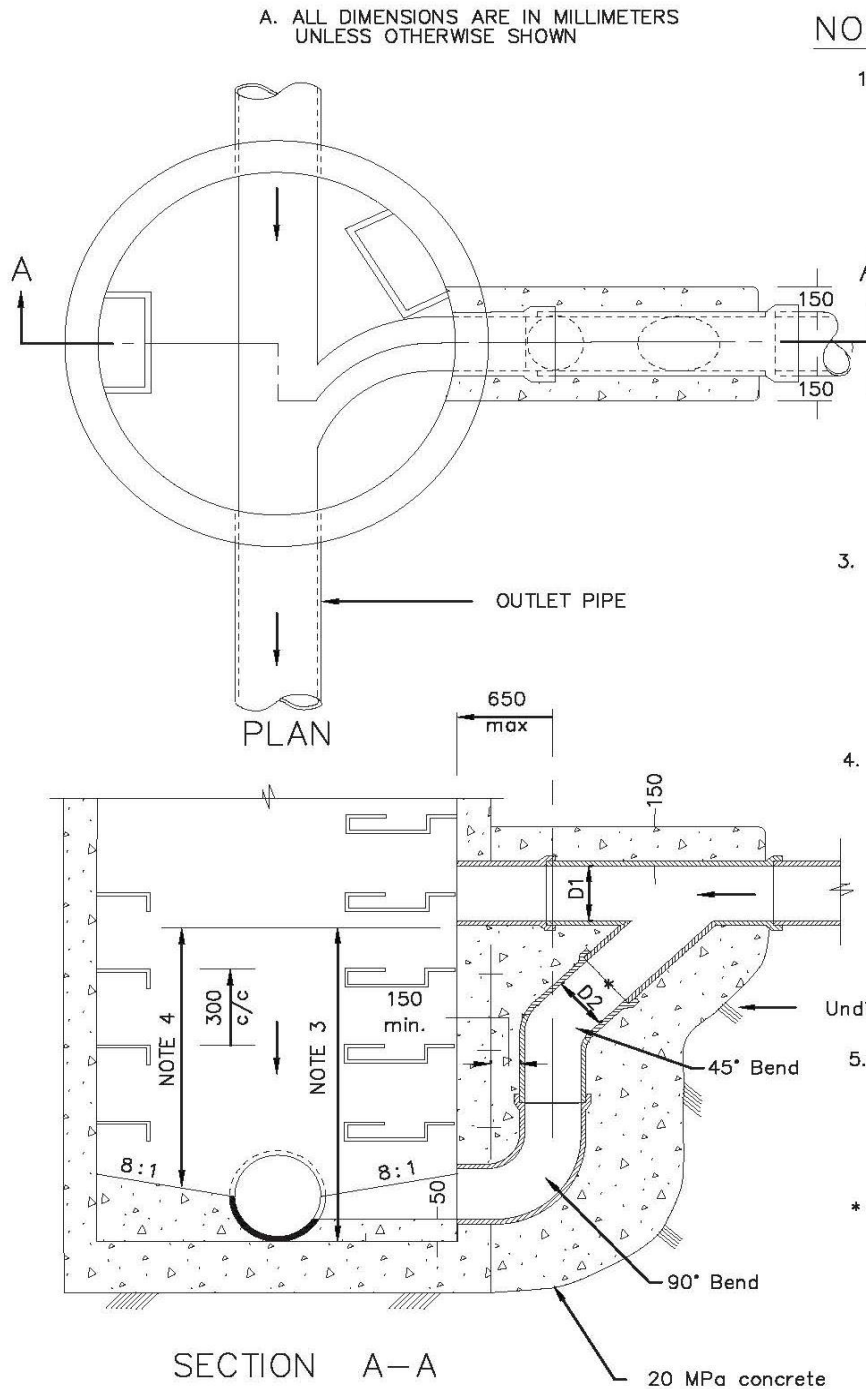
SW-1.1

DATE

1996 03 15

APPROVED BY
CITY ENGINEER

John W. J. J. J.



NOTES:

1. Drop structure to be completely encased in a minimum 150mm of 20 MPa concrete and secured to the maintenance hole with 450mm long, 13mm dia threaded rods and drilled expansion anchors down both sides of the drop pipe at 300mm c/c.
 2. For pipe sewer sizes 200mm to 450mm (inside pipe diameter) $D1 = D2^*$. For pipe sewer sizes equal to or greater than 525mm Dia. $D2 = 450\text{mm Dia}^*$.
 3. Drop structures shall be constructed when the difference in invert elevations between the upstream and outlet sewers in the maintenance hole is equal or greater than 600mm for sanitary sewers and 900mm for storm sewers.
 4. When the difference in elevation between the upstream invert and the top of the benching exceeds 1.50m, an additional set of steps are required adjacent to the overflow pipe for maintenance operations.
 5. Maintenance hole steps shall be located to avoid conflict with an inletting or outletting sewer pipe. Access to maintenance hole must be above the benching platform.
- * Due to fitting sizes, when the difference in the drop structure invert elevations is less than 1.2m, and the 450mm drop cannot physically be constructed, then $D2$ could be reduced to 375mm, or as approved by the Contract Administrator.

CITY OF LONDON STANDARD DRAWING

MAINTENANCE DROP STRUCTURE
WYE

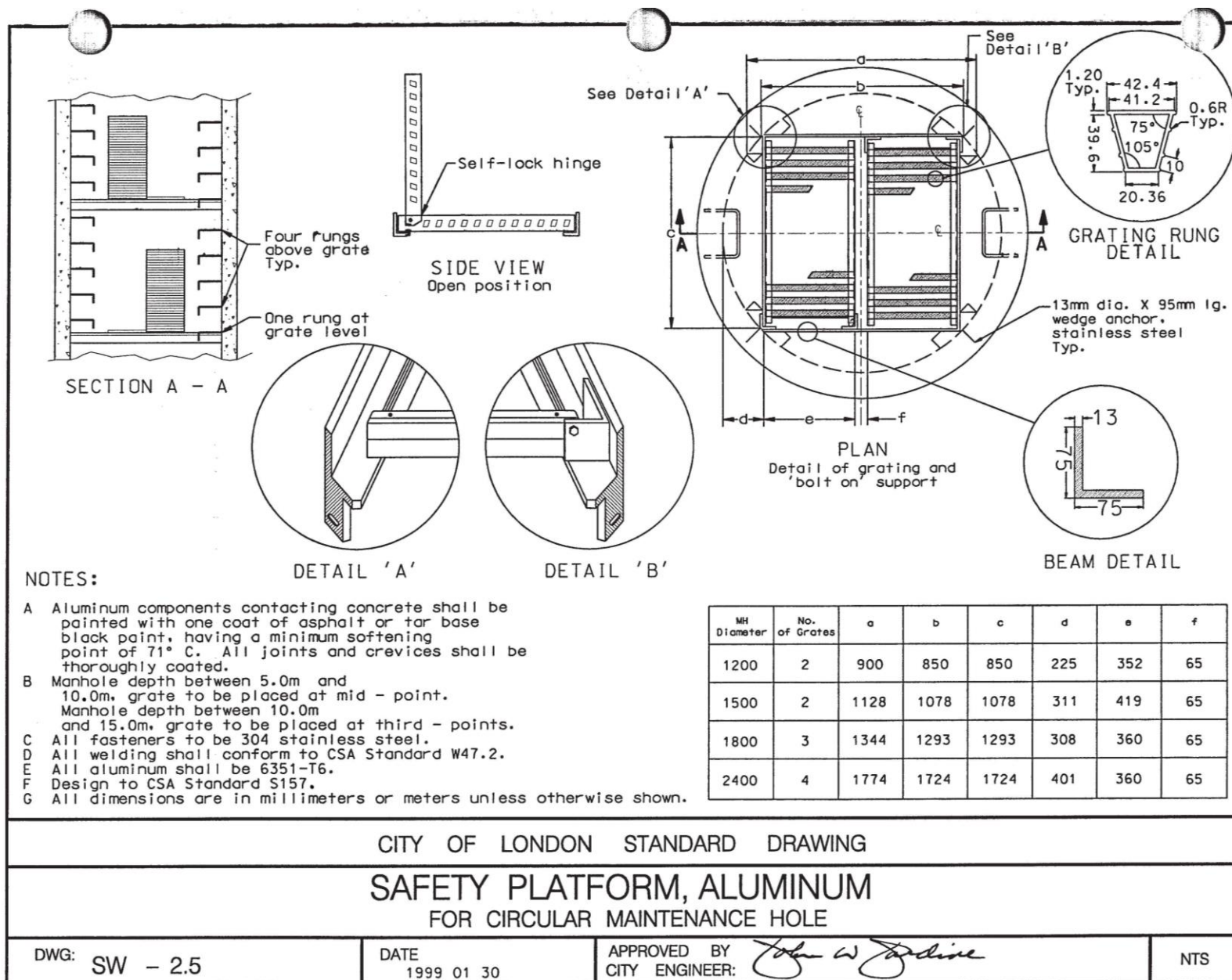
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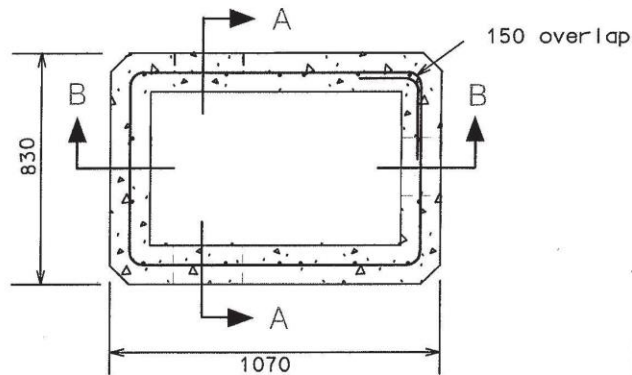
SW-2.0

DATE

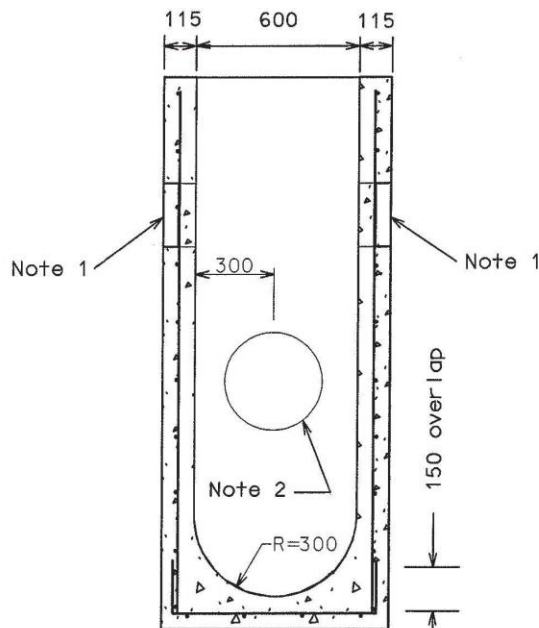
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CITY ENGINEER





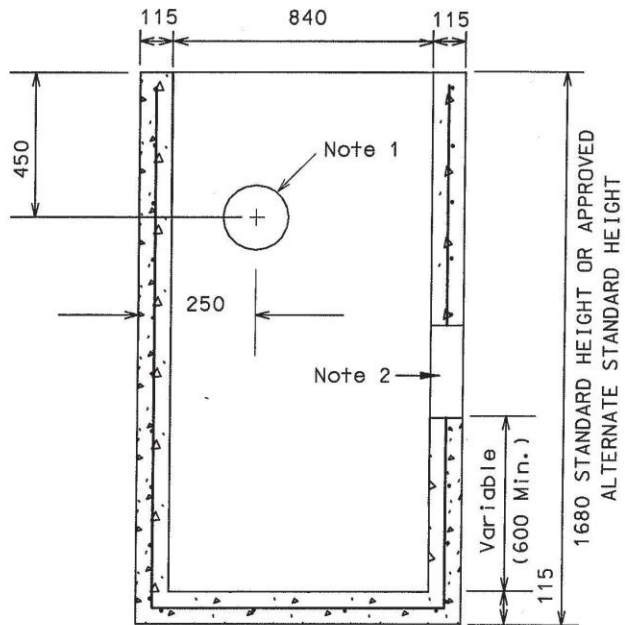
PLAN



SECTION A-A

NOTES:

1. 200mm dia. knockout to accommodate subdrain. Knockout to be half wall thickness from the outside.
2. Outlet hole size 400mm dia, location as required.
3. All reinforcing steel bars to be 15. Reinforcing steel shall have 50mm cover



SECTION B-B

A. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

4. Granular backfill to be placed and compacted to a min. thickness of 300mm all around
5. Adjustment units shall be installed as per OPSD-704.010. Minimum of 1 unit and a maximum of 300mm.
6. Class of concrete: 30 MPa at 28 days
7. Refer to OPSD-400.09 for catch basin cast iron curb inlet overflow plate details.

CITY OF LONDON STANDARD DRAWING

600 X 840

PRECAST CONCRETE CURB INLET CATCHBASIN

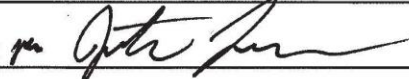
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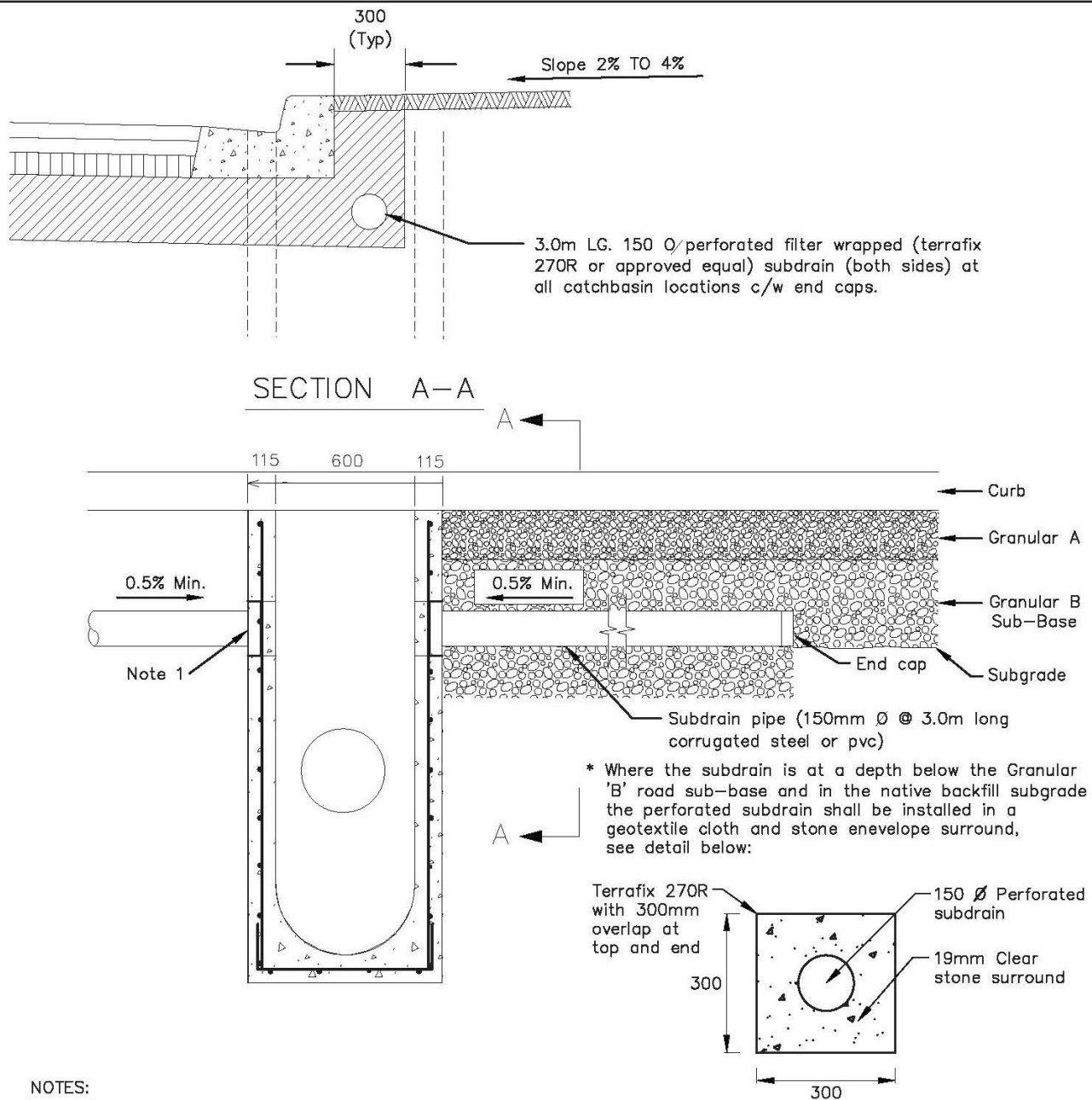
SW-3.0

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2012 11 12

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CITY ENGINEER





NOTES:

1. Subdrains to be installed on both sides of the catch basin at a 0.5% minimum grade into the catch basin. Subdrains to be installed into the 200mm knockout provided in the catch basin pot.
2. Subdrains – pipe subdrains shall consist of 6mm holes in four rows positioned at 4,5,7, and 8 o'clock and 75mm apart longitudinally in both materials or approved equivalent.

CITY OF LONDON STANDARD DRAWING

CATCH BASIN PIPE SUBDRAIN DETAIL

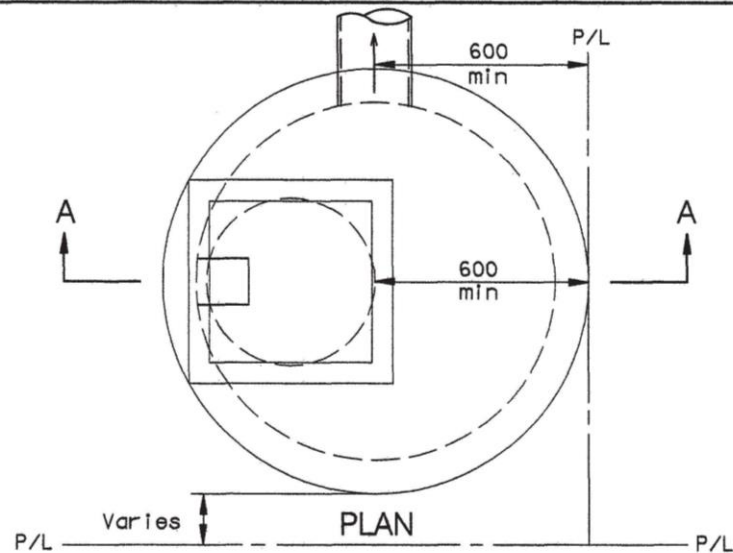
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SW-3.1

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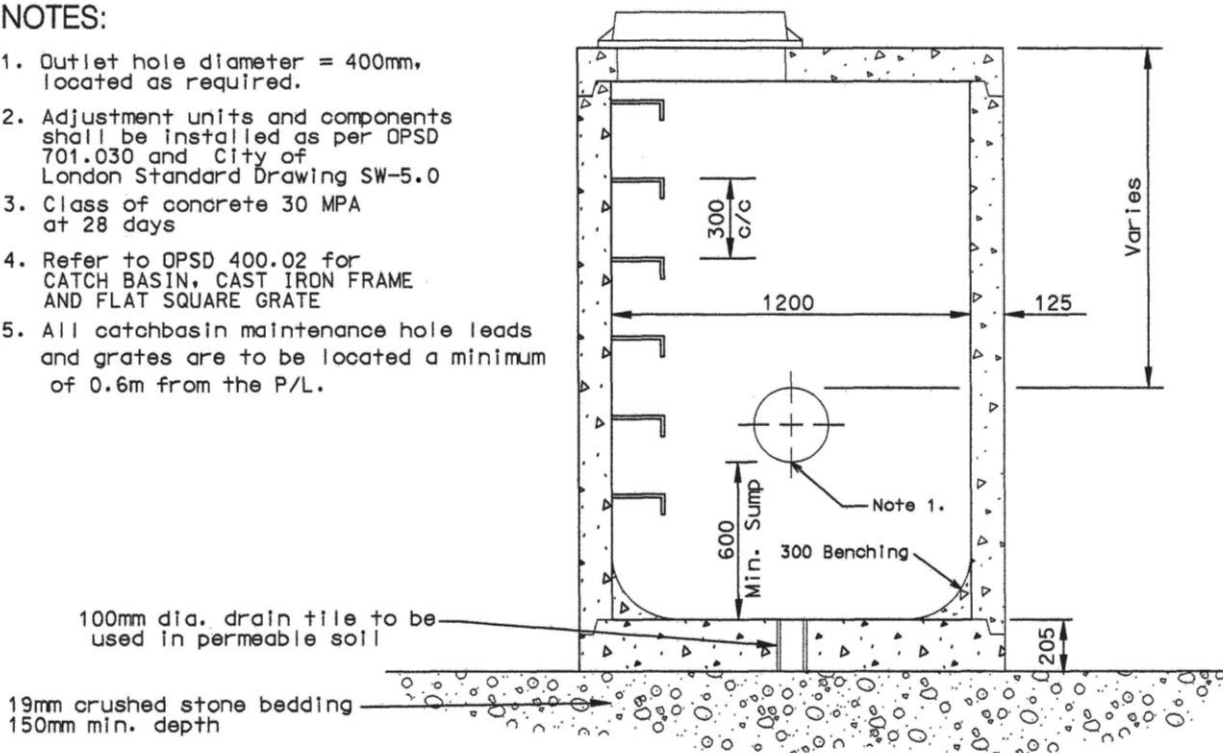
2019 09 09

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CITY ENGINEER



NOTES:

1. Outlet hole diameter = 400mm, located as required.
2. Adjustment units and components shall be installed as per OPSD 701.030 and City of London Standard Drawing SW-5.0
3. Class of concrete 30 MPA at 28 days
4. Refer to OPSD 400.02 for CATCH BASIN, CAST IRON FRAME AND FLAT SQUARE GRATE
5. All catchbasin maintenance hole leads and grates are to be located a minimum of 0.6m from the P/L.



A. ALL DIMENSIONS ARE IN MILLIMETRES
UNLESS OTHERWISE SHOWN.

SECTION A-A

CITY OF LONDON STANDARD DRAWING

PRECAST CONCRETE
CATCH BASIN – MAINTENANCE HOLE

DWG

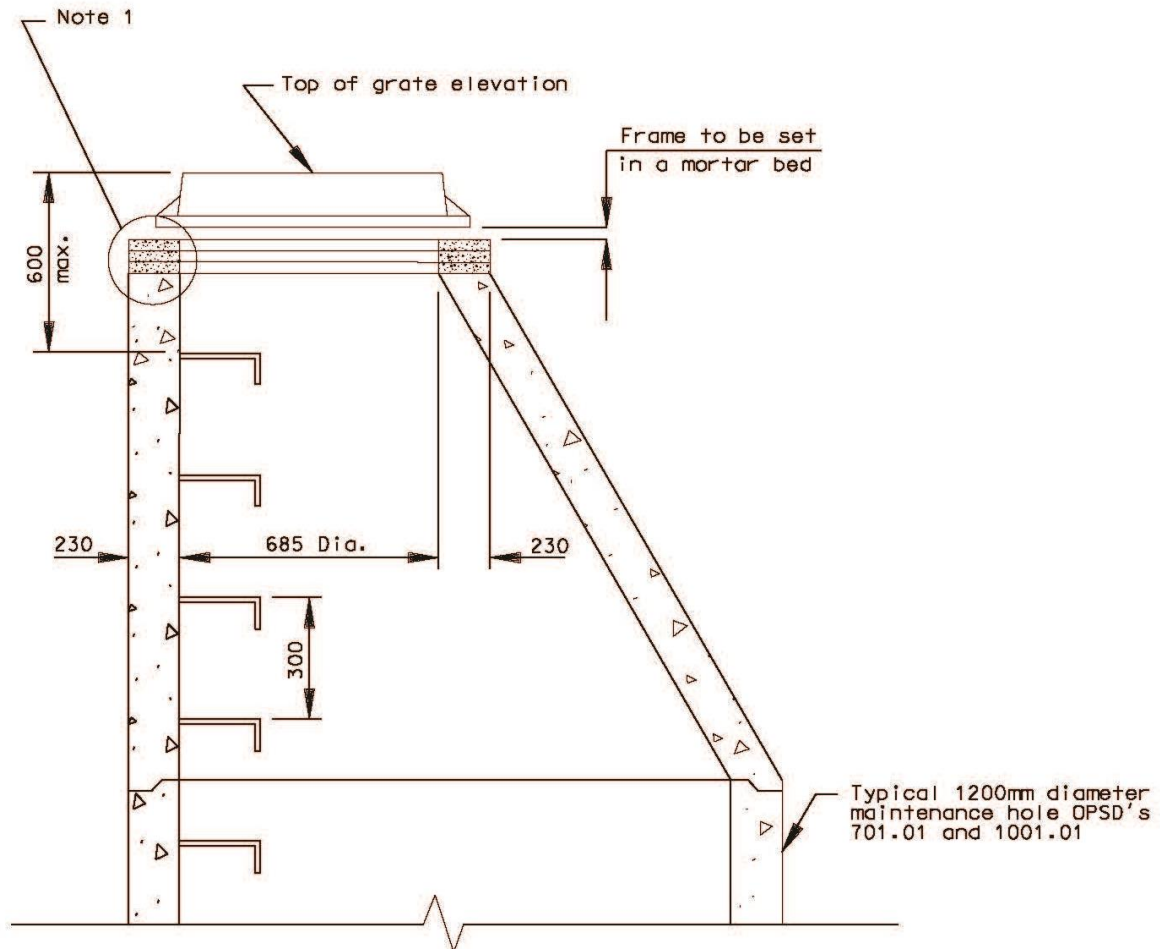
SW-4.0

DATE

2002 03 20

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CITY ENGINEER

Al Leckie



NOTES:

1. Adjustment units : Minimum of one (1) unit
Maximum height 300mm
2. Steps are **NOT** permitted in the adjustment units

A. ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE SHOWN.

CITY OF LONDON STANDARD DRAWING

MAINTENANCE HOLE ADJUSTMENT UNIT
DETAIL

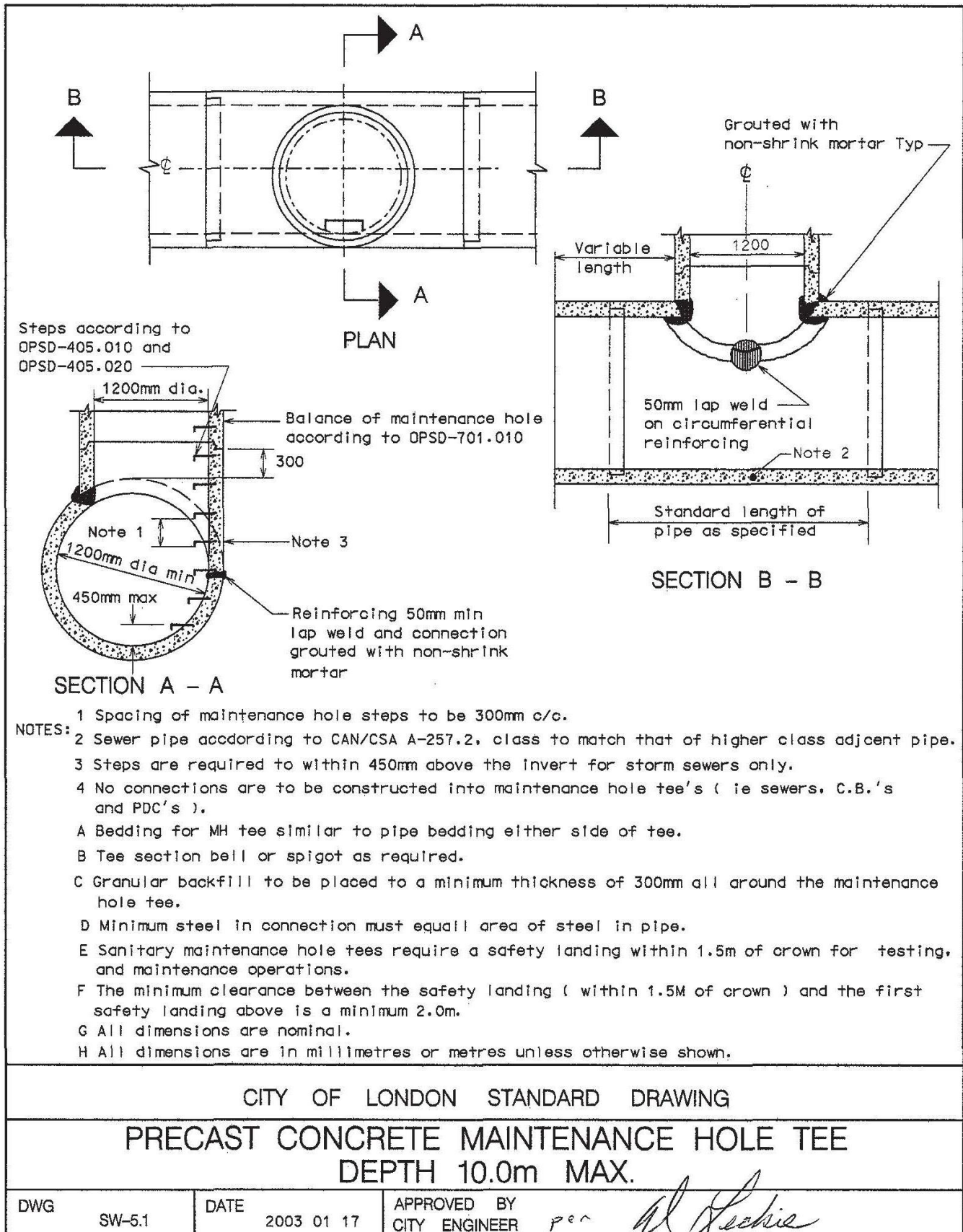
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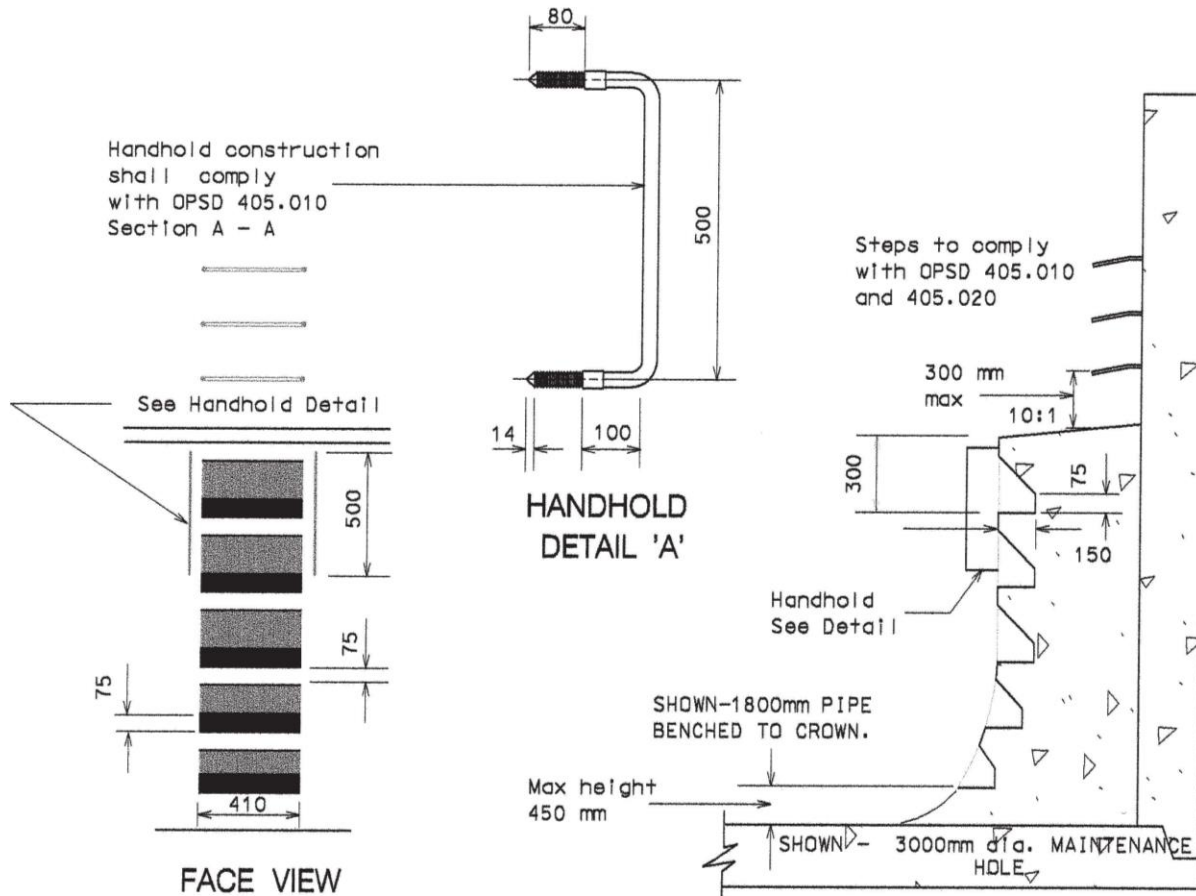
SW-5.0

DATE

2013 08 15

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1. Steps are required in benching for pipe diameters
 - a) Greater than 900mm - benching to springline.
 - b) Greater than or equal to 450mm - benching to crown.
2. Handholds shall be constructed in accordance with DETAIL 'A'.
3. Handholds are required for pipe diameters greater than or equal to 1500mm dia when benching to crown.
4. Additional handholds may be required for pipe diameters greater than 1950mm - benching to crown.
5. Step dimensions are typical
6. Maintenance hole steps shall be located to avoid conflict with an inletting or outletting sewer pipe. Access to maintenance hole must be above benching platform.

A. All dimensions are in millimetres unless otherwise shown.

CITY OF LONDON STANDARD DRAWING

STEPS IN MAINTENANCE HOLE BENCHING

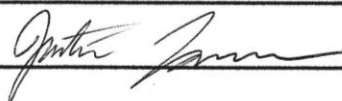
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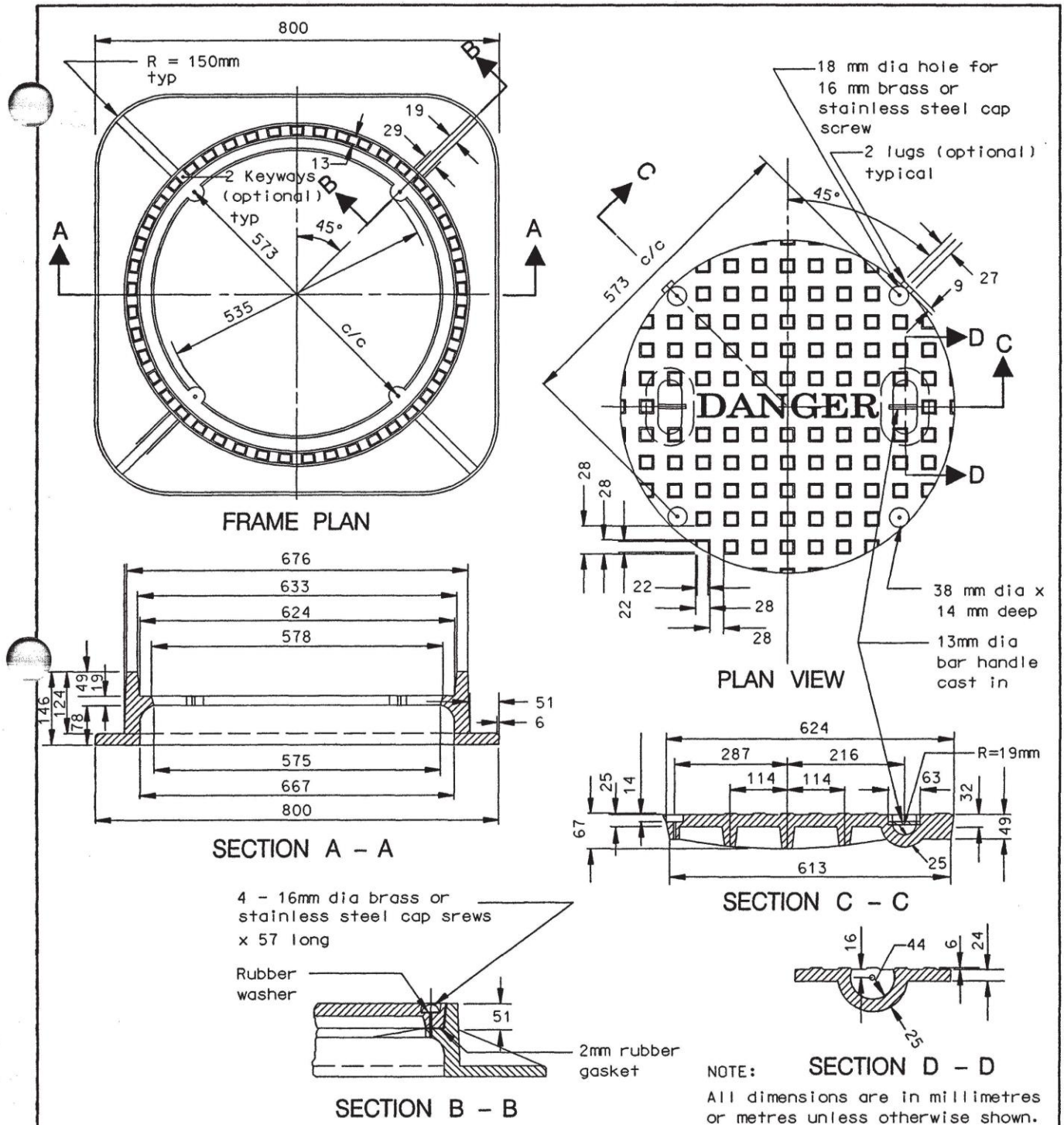
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CITY OF LONDON STANDARD DRAWING

**MAINTENANCE HOLE
CAST IRON, WATERTIGHT COVER AND SQUARE FRAME.**

DWG

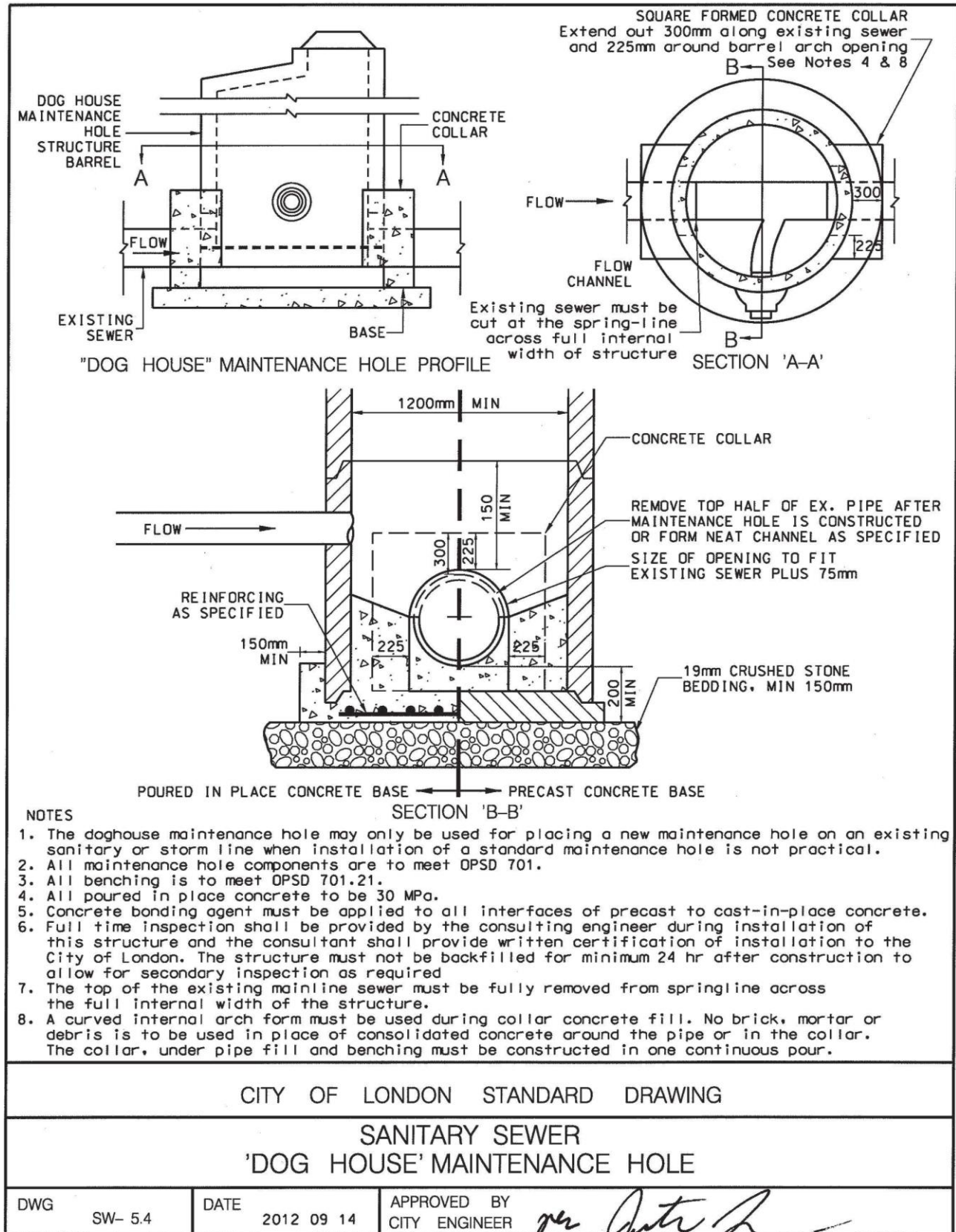
SW- 5.3

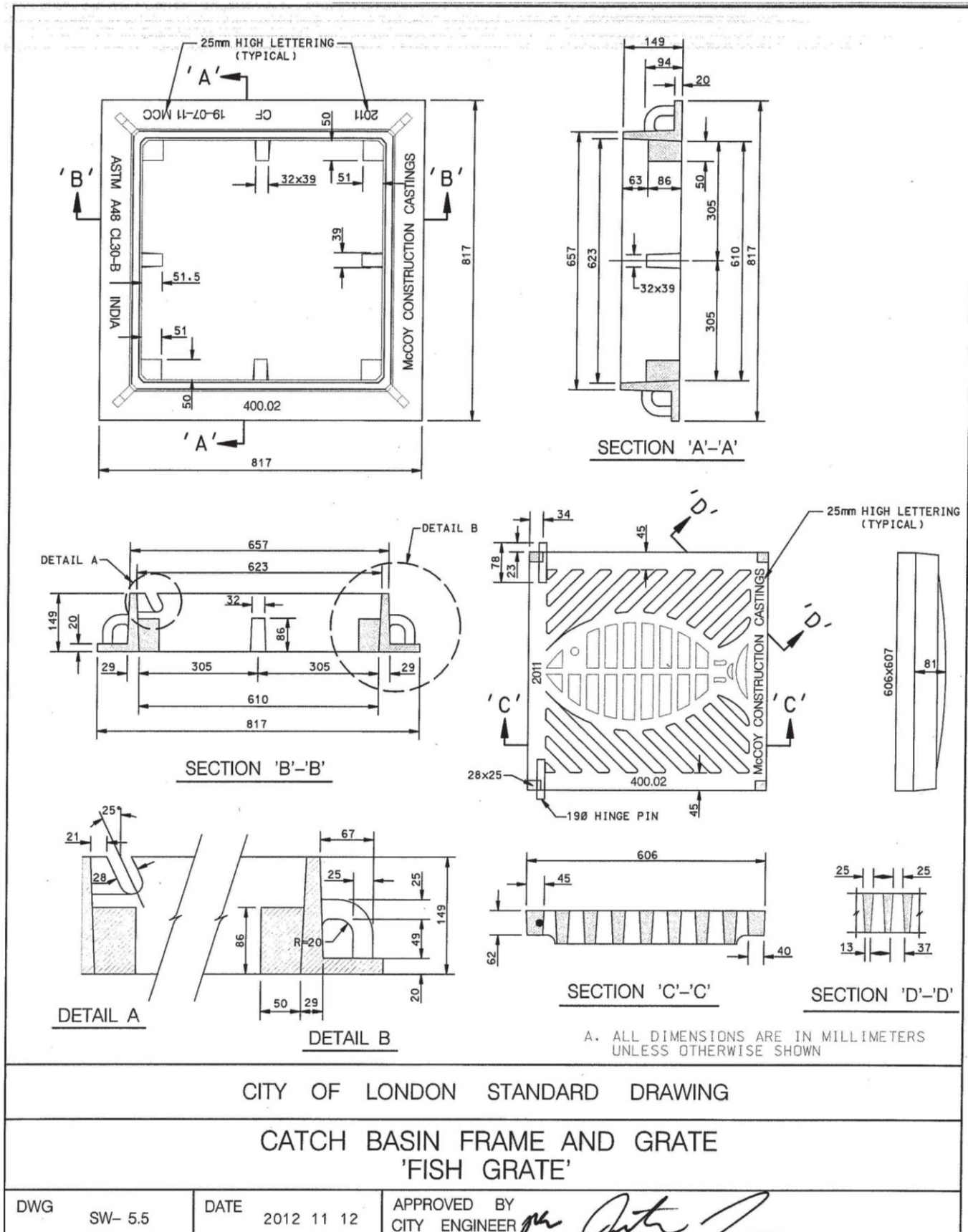
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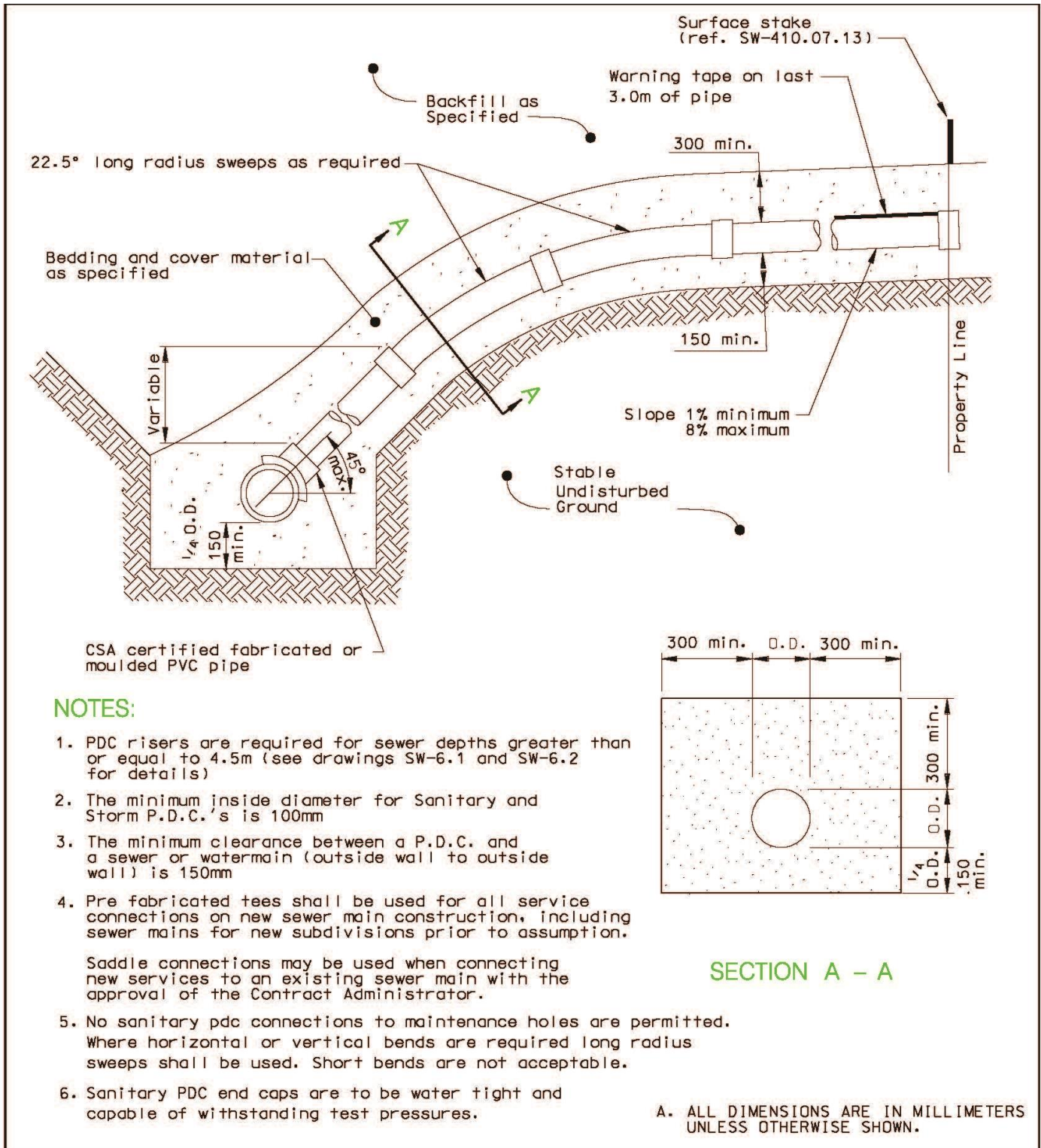
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John W. Adine







CITY OF LONDON STANDARD DRAWING

PRIVATE DRAIN CONNECTION

DWG

SW-6.0

DATE

2013 11 01

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Backfill as Specified

22.5° Radius long radius sweeps as required

19mm Crushed stone

Variable

150 min.

? O.D.

67.5° max—concrete mainline pipe
45° max—P.V.C. mainline pipe

CSA certified fabricated or moulded PVC pipe

Slope 1% minimum
8% maximum

Warning tape on last 3.0m of pipe

Surface stake (ref. SW-410.07.01.13)

Terminate crushed stone bedding at pipe joint

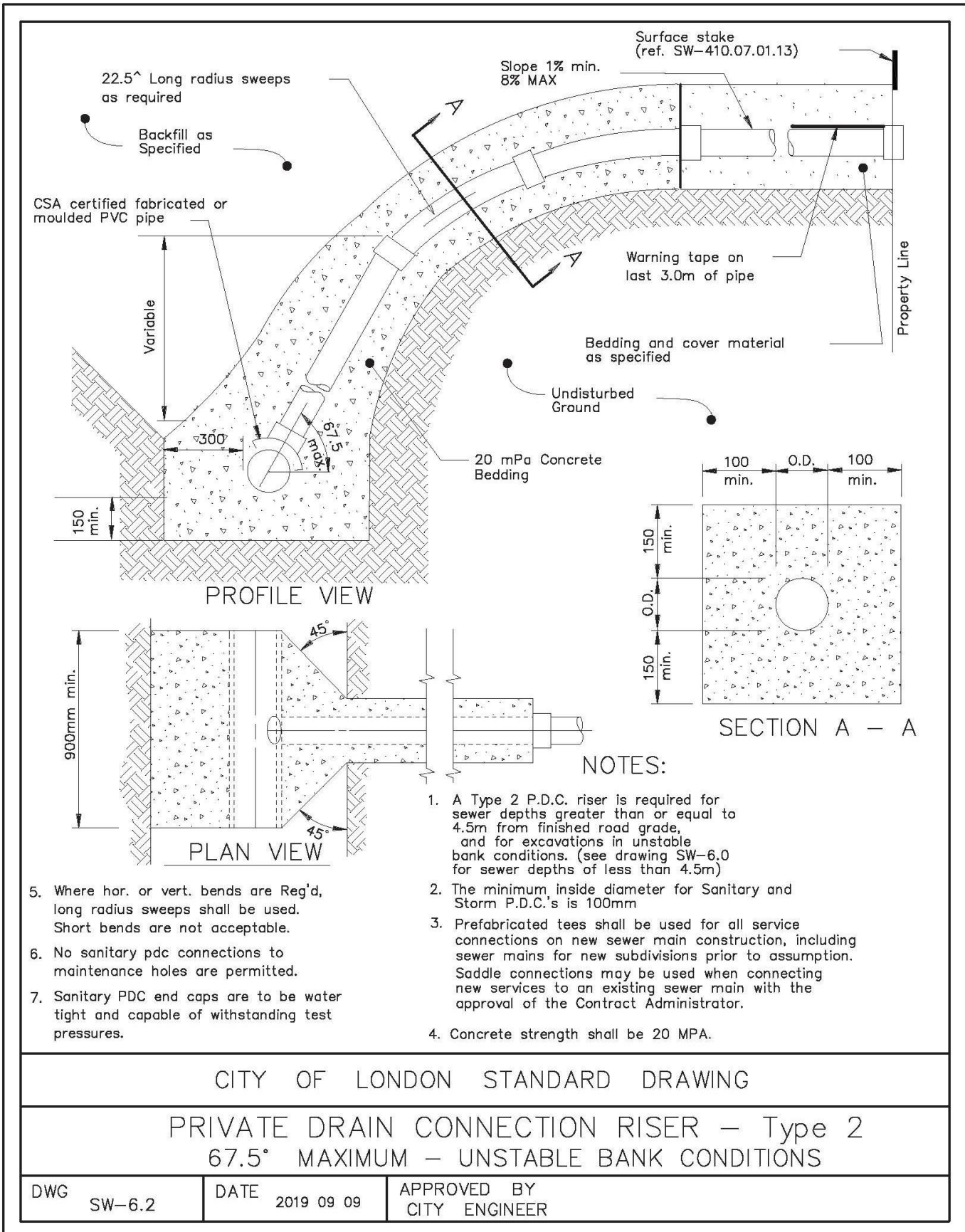
Bedding and cover material as specified

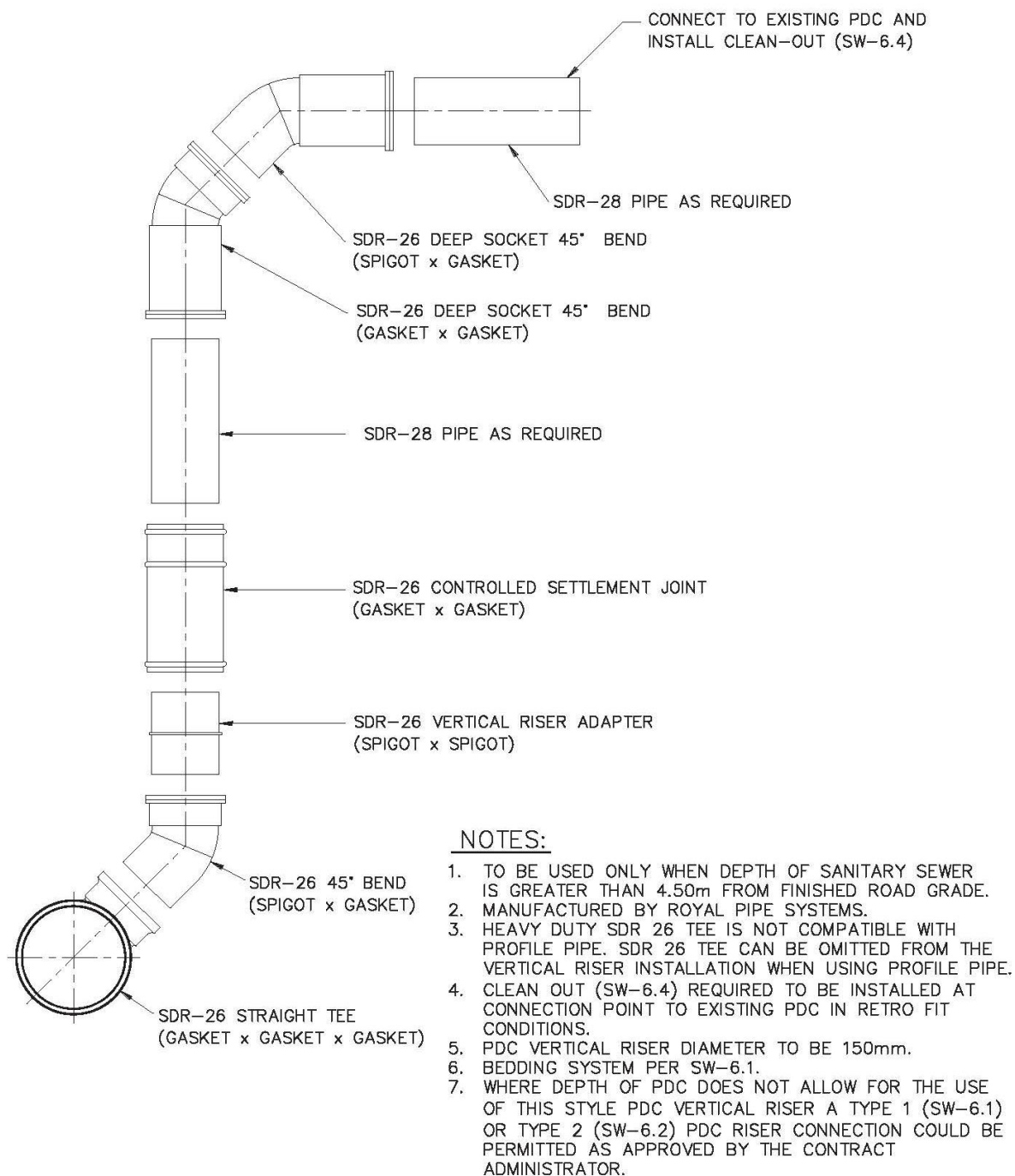
Property Line

Stable Undisturbed Ground

A. ALL DIMENSIONS ARE IN MILLIMETRES
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CITY OF LONDON STANDARD DRAWING

PDC VERTICAL RISER INSTALLATION

DWG

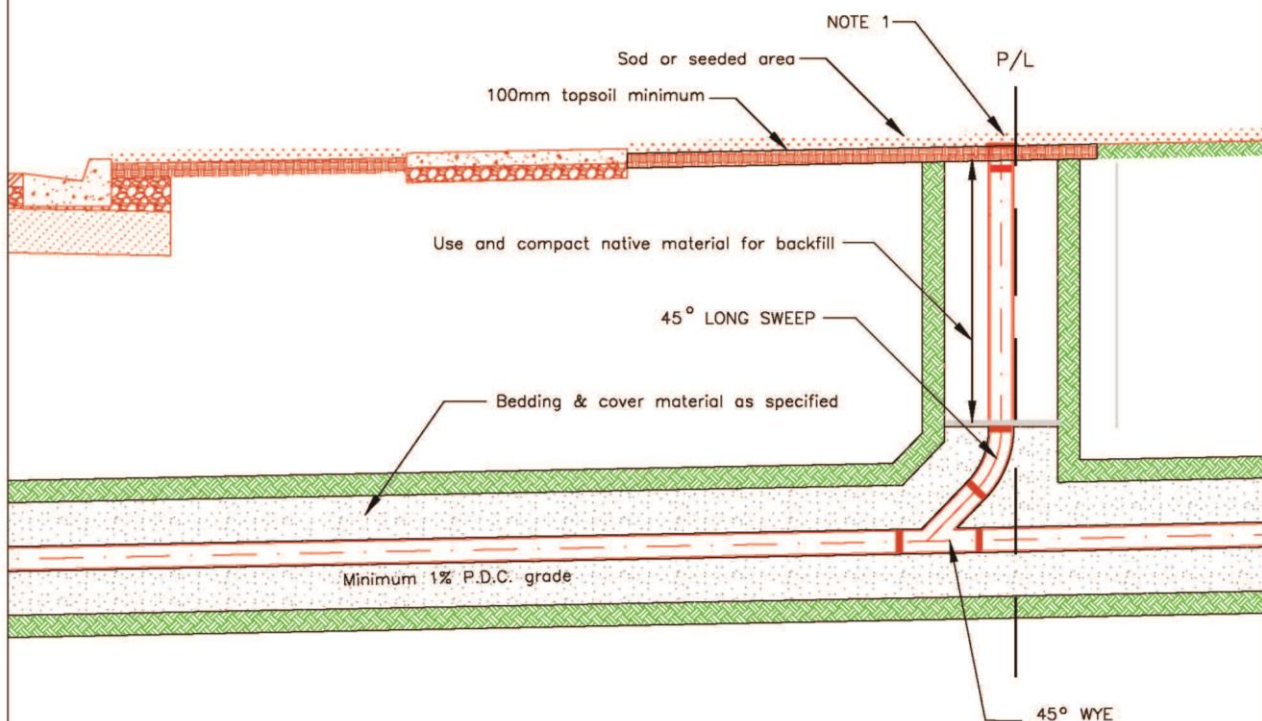
SW-6.3

DATE

2019 09 09

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1. The pipe diameter of the cleanout pipe shall equal the pipe diameter of the P.D.C.
2. The minimum inside diameter for sanitary P.D.C. cleanout is 100mm.
3. Approved prefabricated wyes and long radius sweeps shall be used for all P.D.C. cleanout connections.
4. Where applicable, approved end caps are required at property line to complete the P.D.C. installation. They shall be braced to withstand pressure testing when required.



Note 1

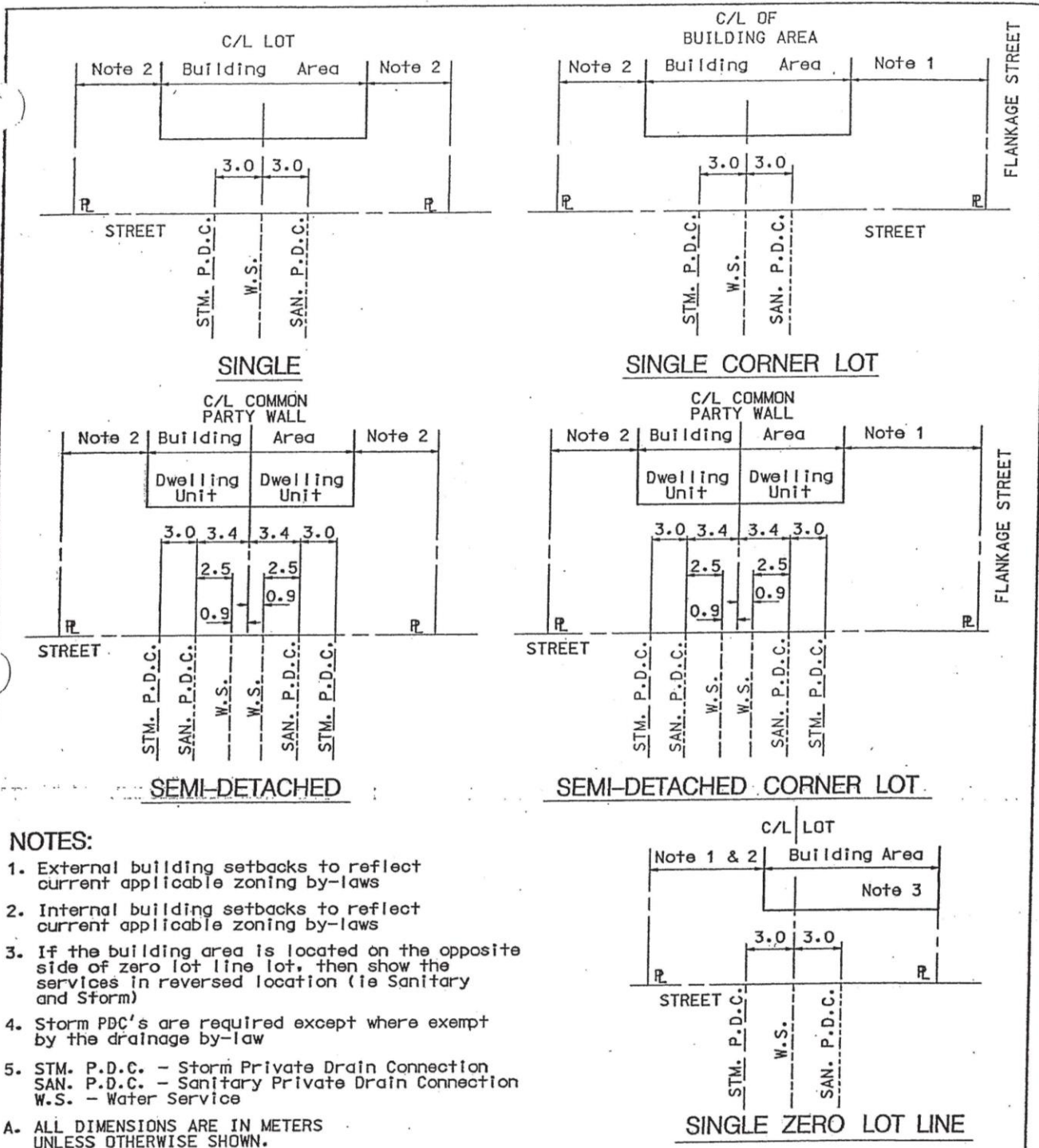
- a) Cleanout Hard (Rigid) Surface Installation: Use cast iron cap and install flush with surface.
Cleanout 4" - EMCO#DF44 - SKU 6463049
Cleanout 6" - EMCO#DF66 - SKU 6463052
- b) Cleanout Gravel Surface Installation: Use cast iron cap per a), install 75mm below finished grade.
- c) Cleanout Soft Surface (Grass) Installation: Use standard plastic cap, with peak flush with grass surface.
4" bds threaded adapter EMCO#SKU 6012213
4" bds threaded plug EMCO#SKU 6015263
6" bds threaded adapter EMCO#SKU 6010059
6" bds threaded plug EMCO#SKU 6010084

CITY OF LONDON STANDARD DRAWING

PRIVATE DRAIN CONNECTION CLEANOUTS

DWG NO. SW-6.4	DATE 2013 08 15	APPROVED BY CITY ENGINEER
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SUSTIN LAWRENCE



CITY OF LONDON STANDARD DRAWING

STANDARD SERVICING LOCATIONS FOR SINGLE FAMILY AND SEMI-DETACHED LOTS

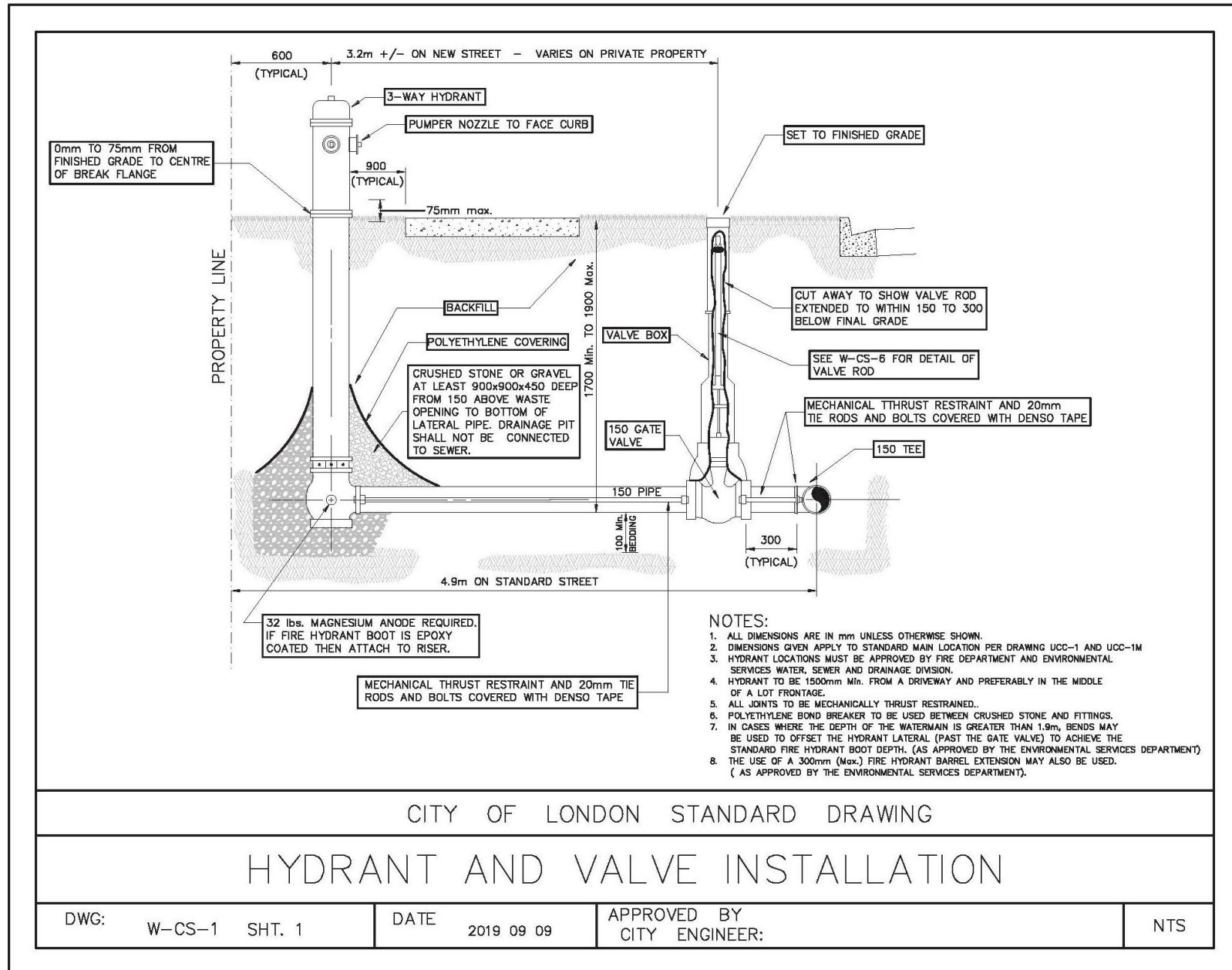
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SW-7.0

DATE

1998 03 01

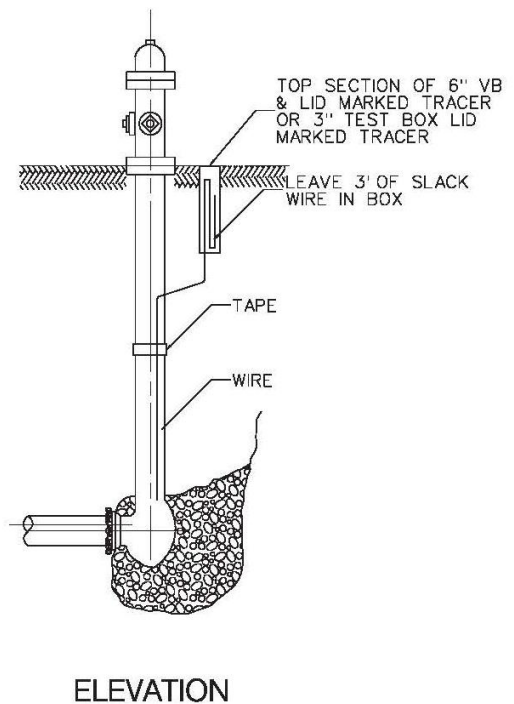
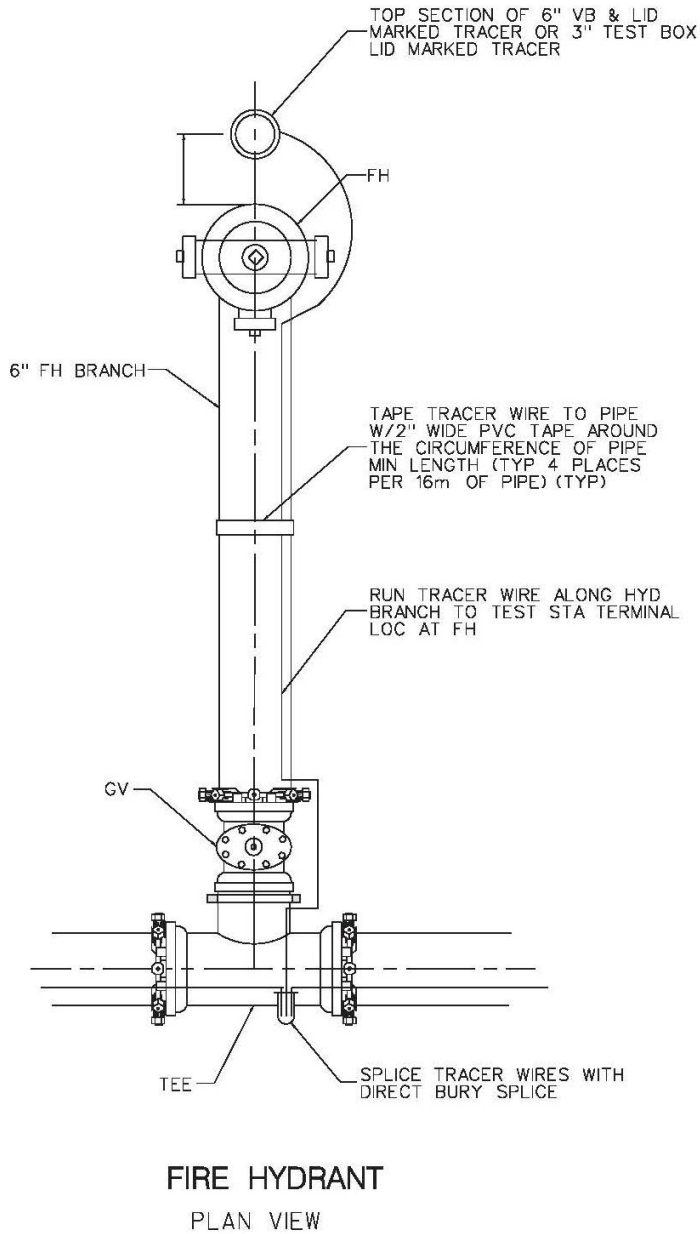
APPROVED BY
CITY ENGINEER





London
CANADA

Supplemental Standards for Sewer and Water (SW)



CITY OF LONDON STANDARD DRAWING

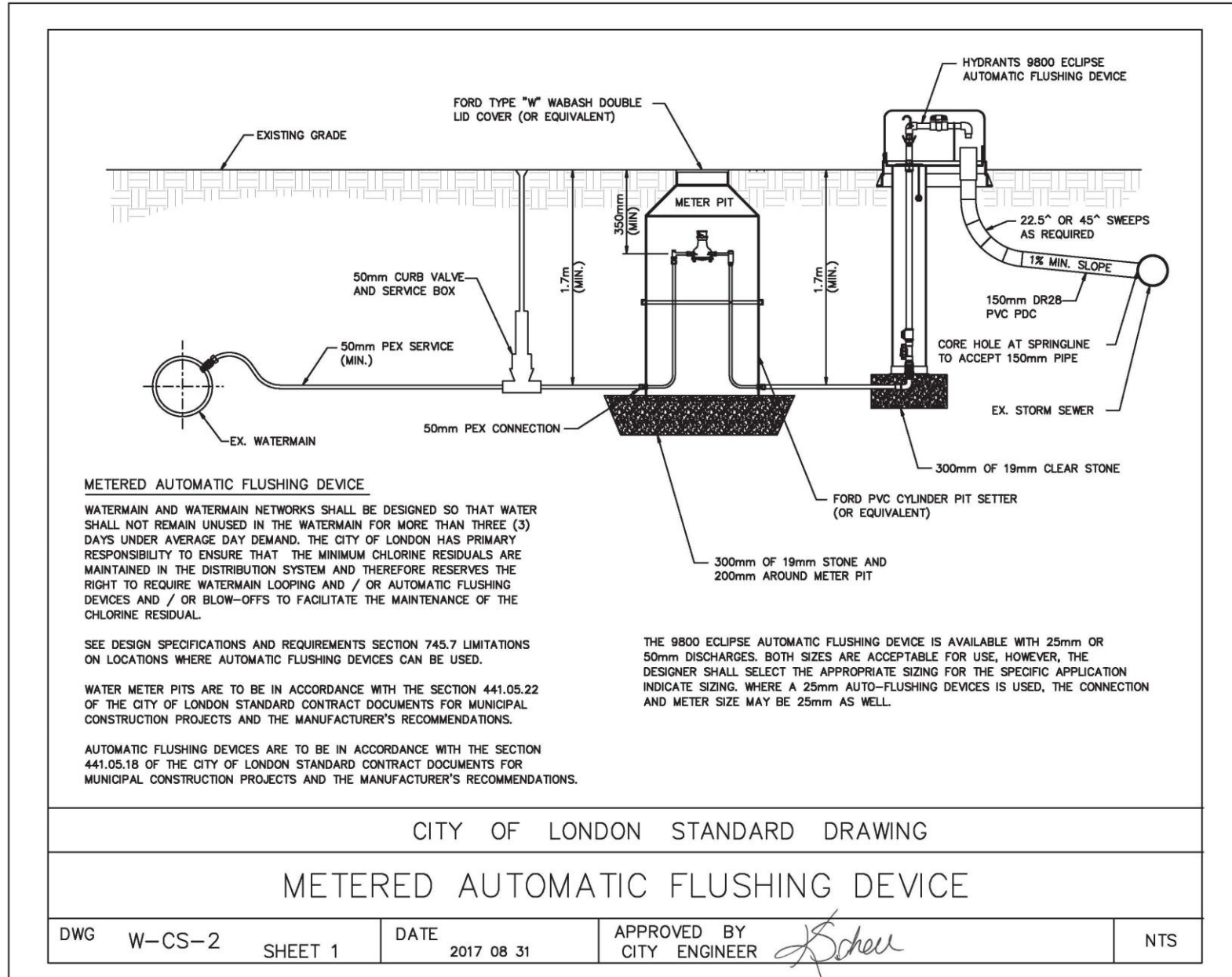
TRACER WIRE INSTALLATION

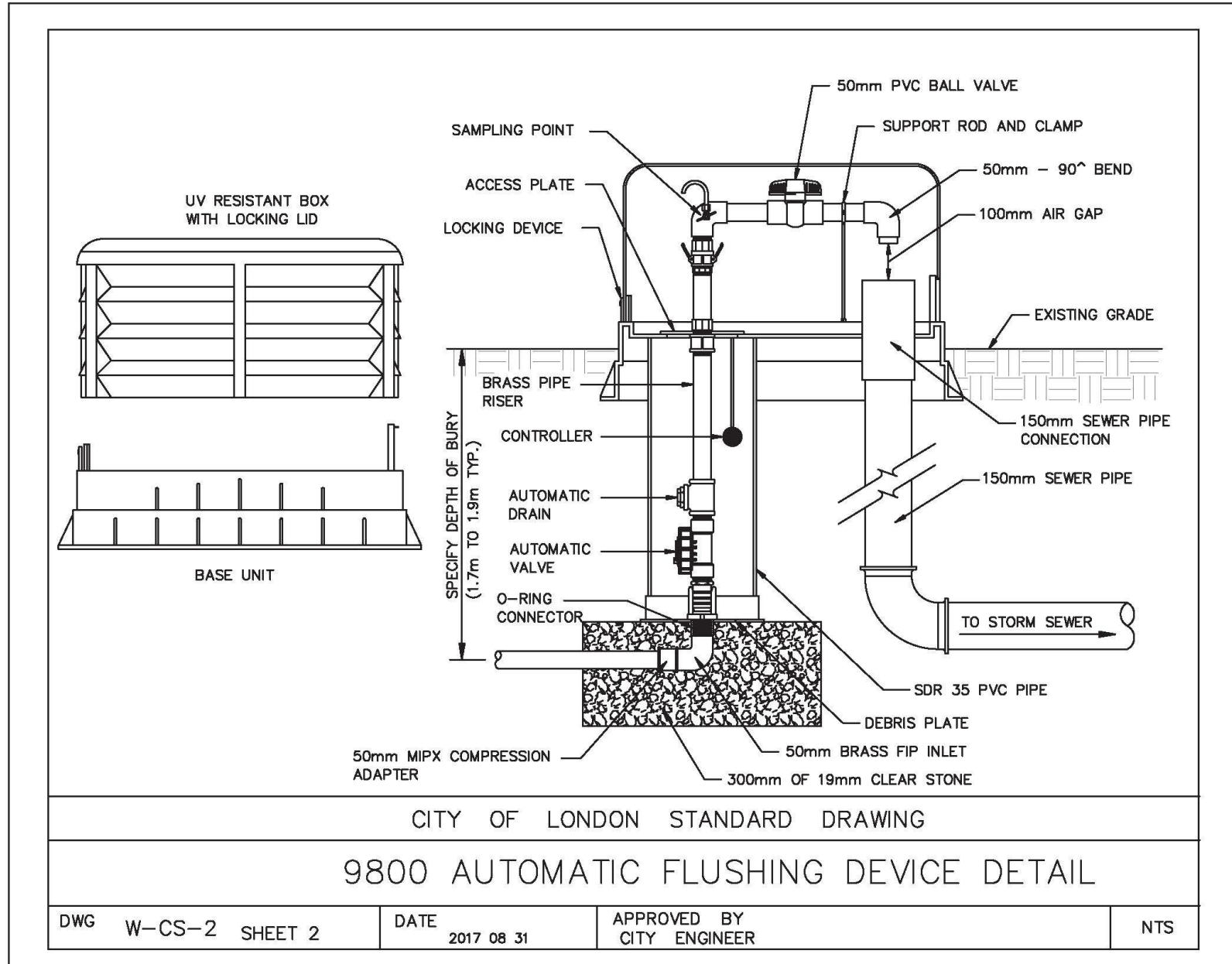
DWG: W-CS-1 SHT. 2

DATE
2014 09 24

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CITY ENGINEER:

NTS





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

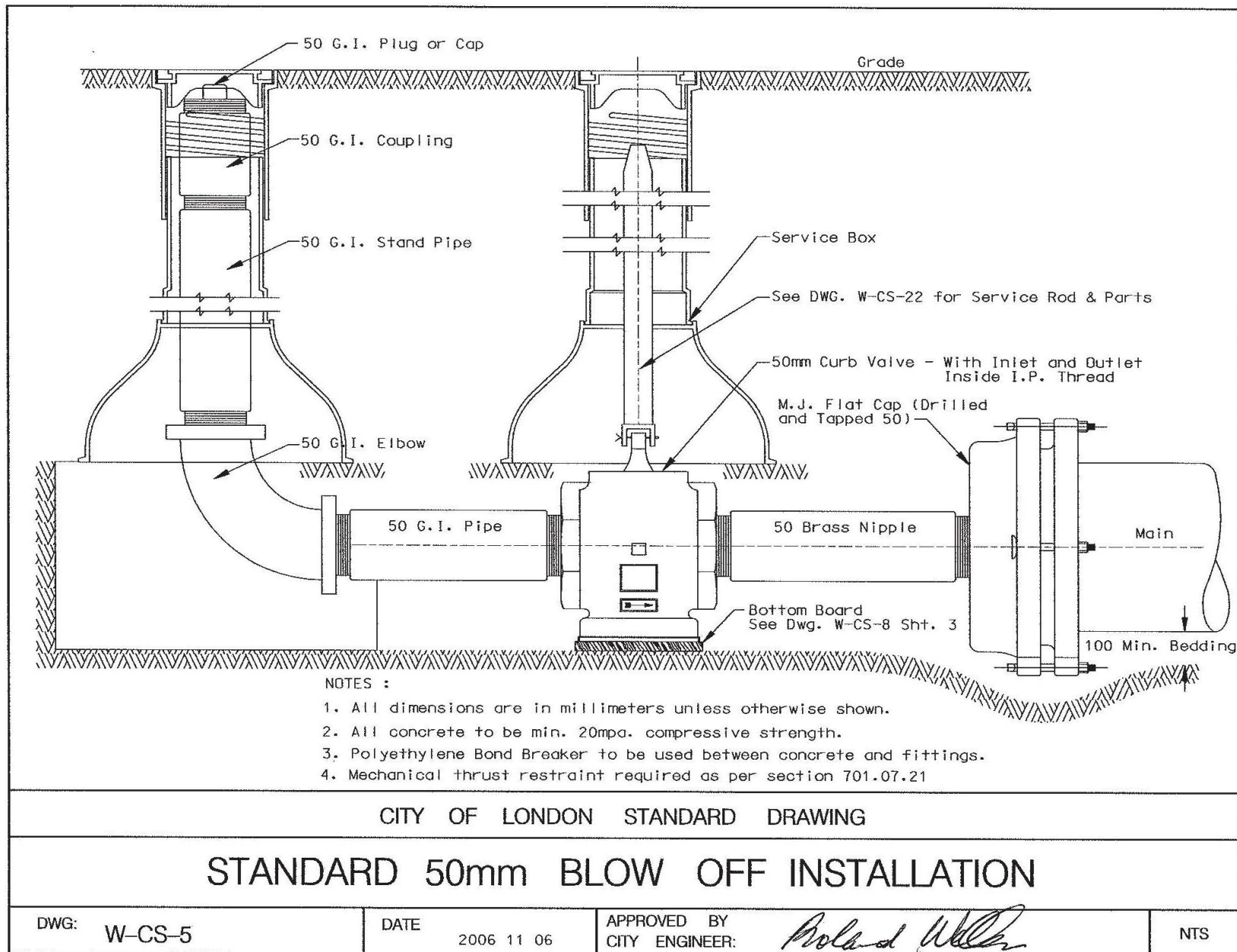
TABLE 2: DISCHARGE RATES AT VARIOUS PRESSURES FOR AUTOMATIC DEVICES
—25mm AUTOMATIC FLUSHING DEVICES

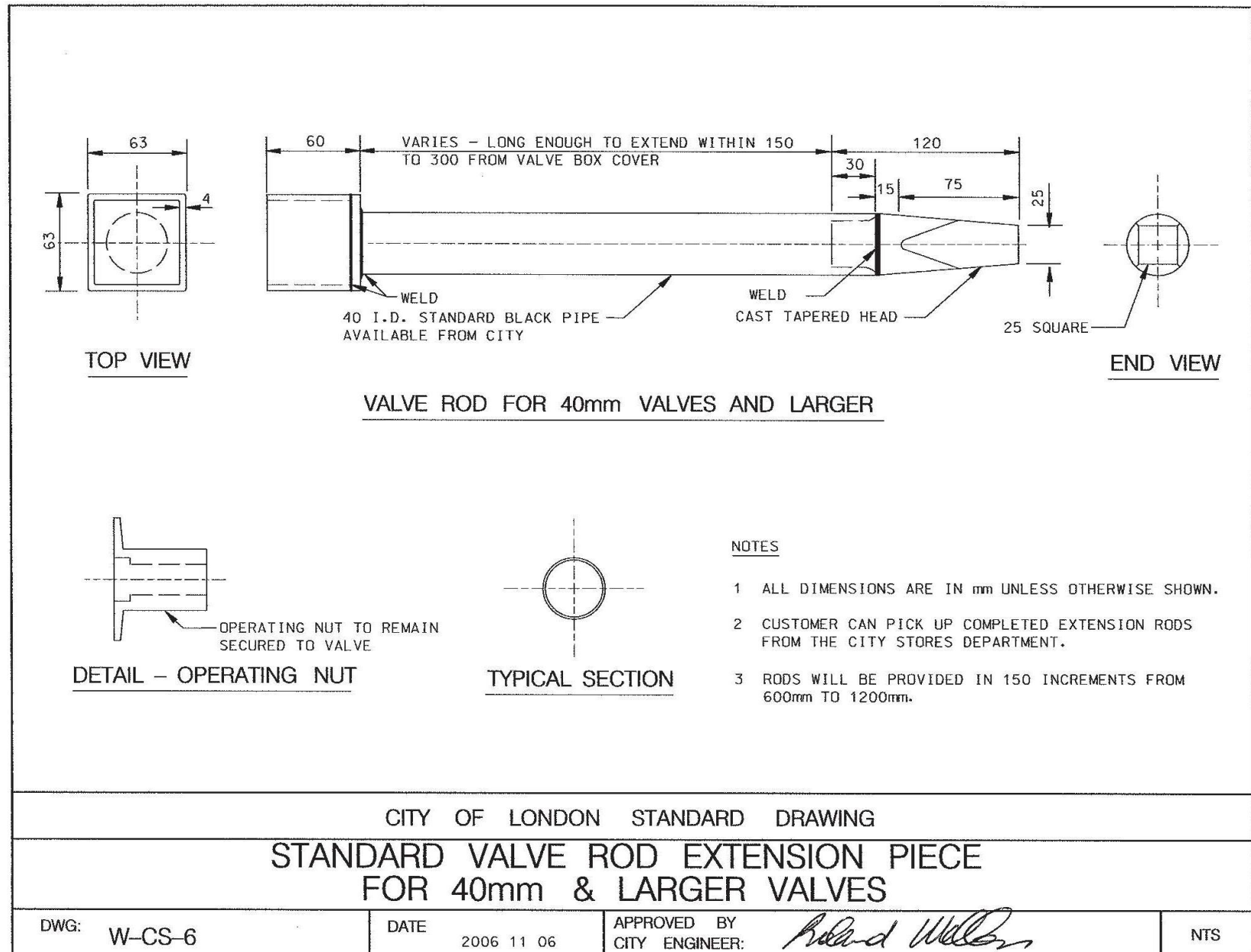
WATER DISTRIBUTION SYSTEM PRESSURE (PSI)	DISCHARGE RATE	
	USGPM	Lps
80psi	36.6	2.31
75psi	35.3	2.23
70psi	34.1	2.15
65psi	32.8	2.07
60psi	31.4	1.98
55psi	30.0	1.89
50psi	28.5	1.80
45psi	27.0	1.70
40psi	25.3	1.60

CITY OF LONDON STANDARD DRAWING

NOTE FOR DESIGNERS WITH REGARD TO AUTOMATIC FLUSHING DEVICES DISCHARGE RATES

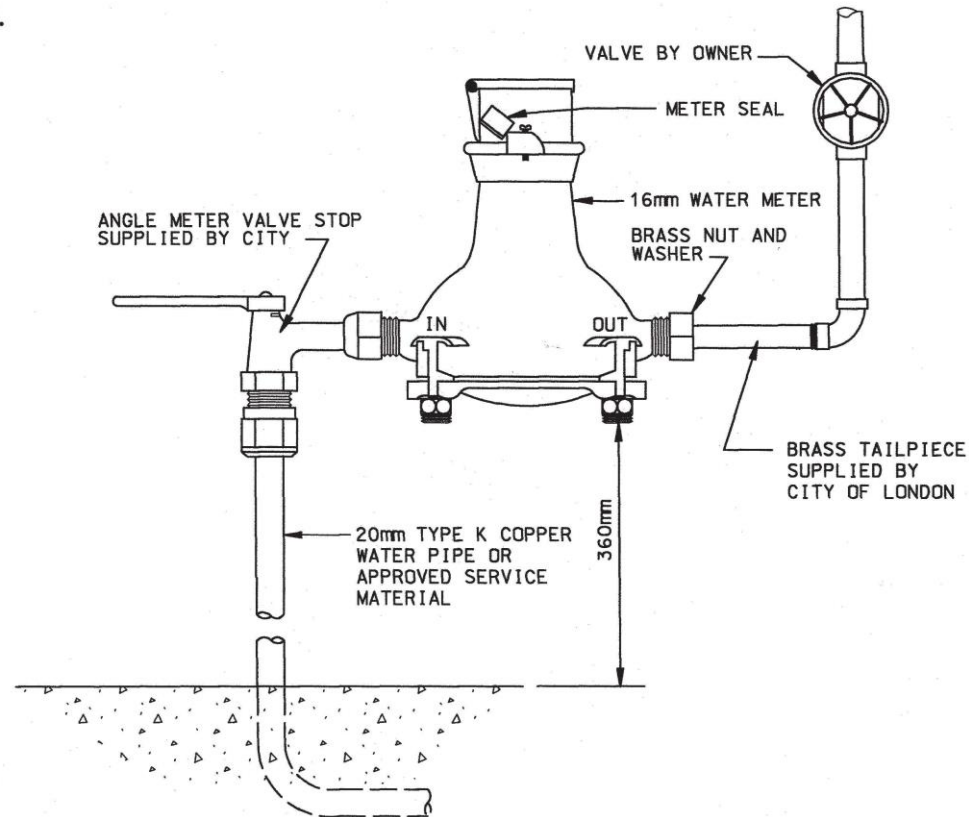
DWG	W-CS-2	SHEET 3	DATE	2017 08 31	APPROVED BY	CITY ENGINEER	NTS
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NOTE:

1. REFER TO W-CS-67 FOR DETAILS OF REMOTE WATER METER REGISTER INSTALLATION.
2. NO GROUNDING ALLOWED ON WATER METER



CITY OF LONDON STANDARD DRAWING

STANDARD INSTALLATION OF 16mm WATER METER

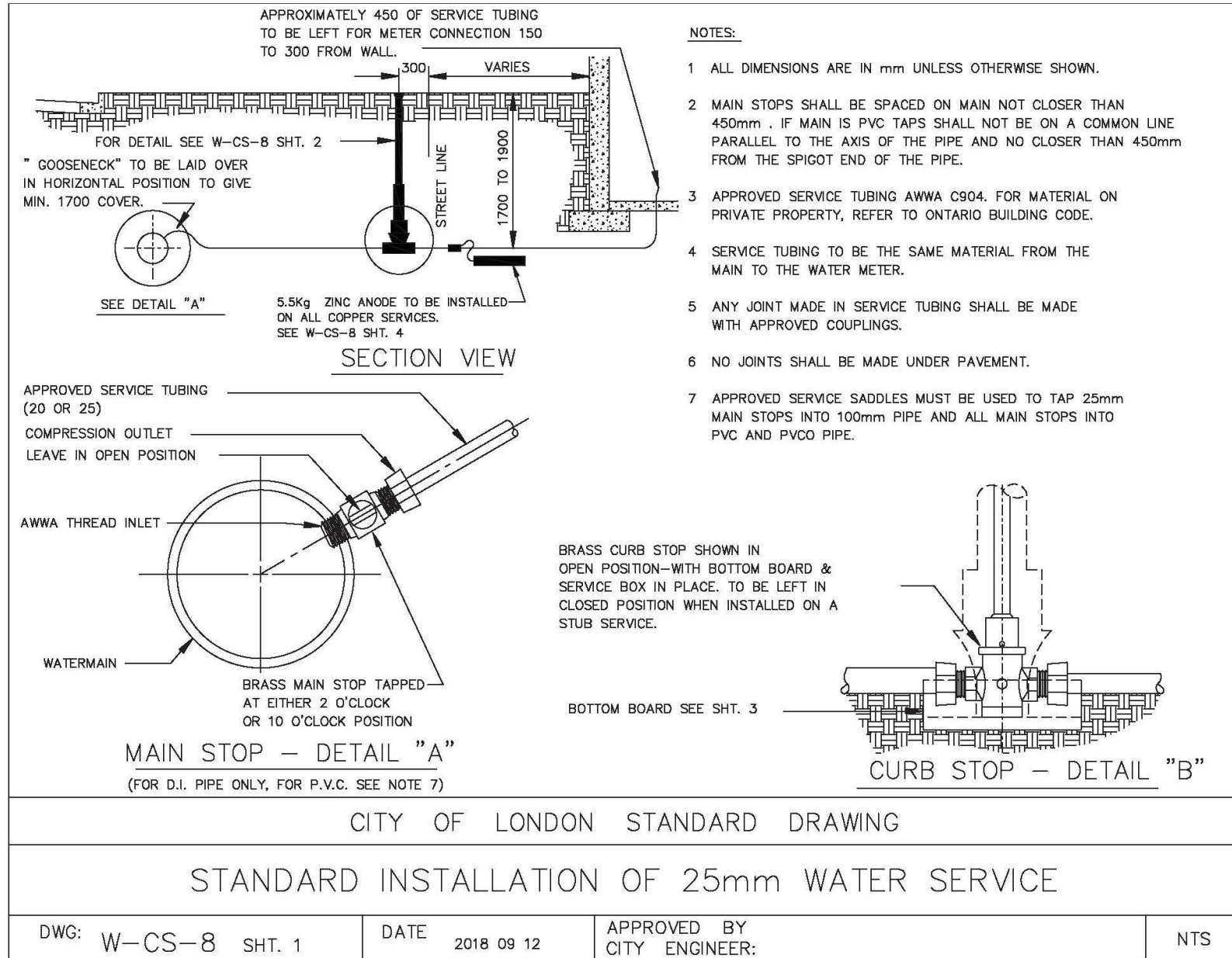
DWG: W-CS-7

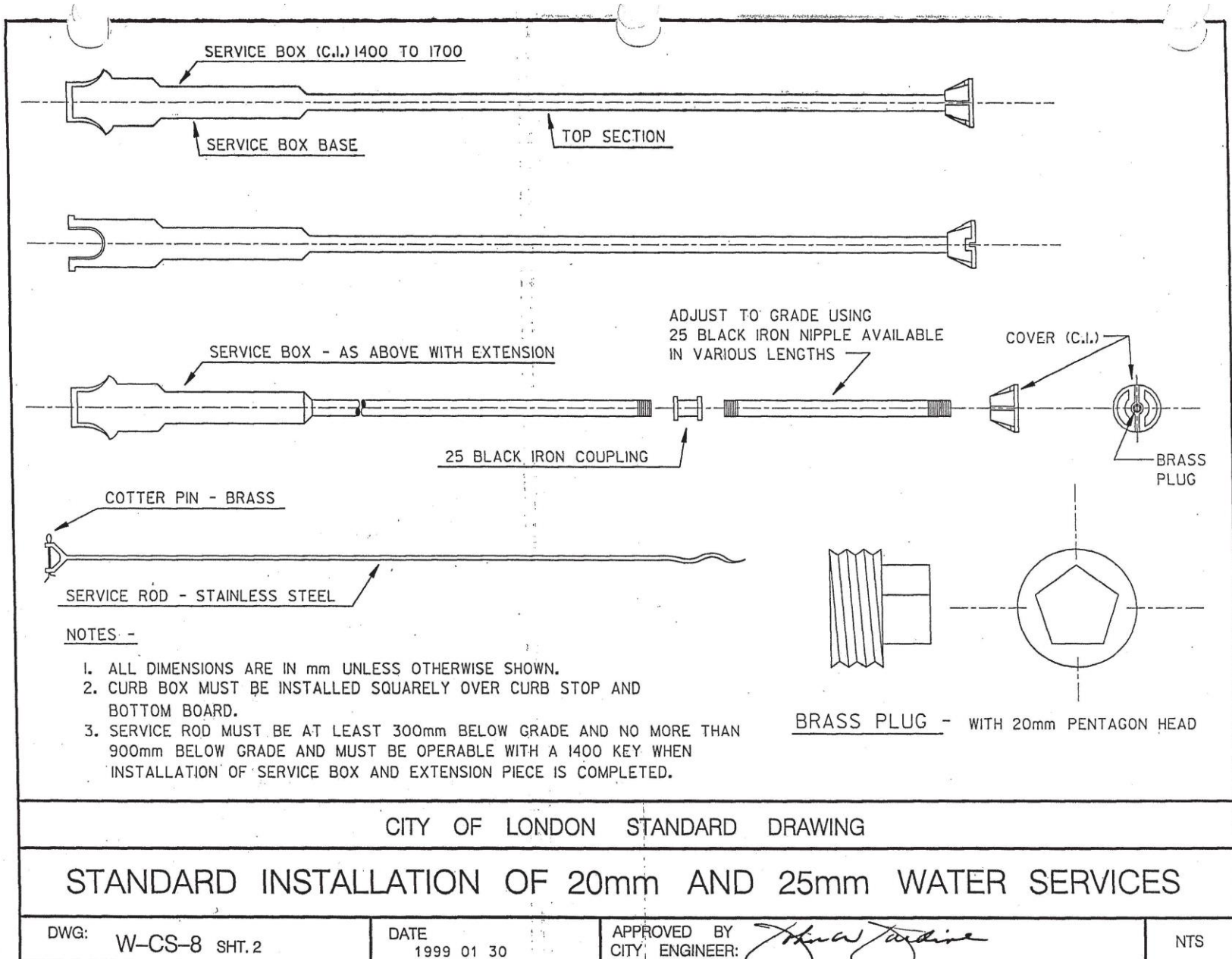
DATE 2004 11 01

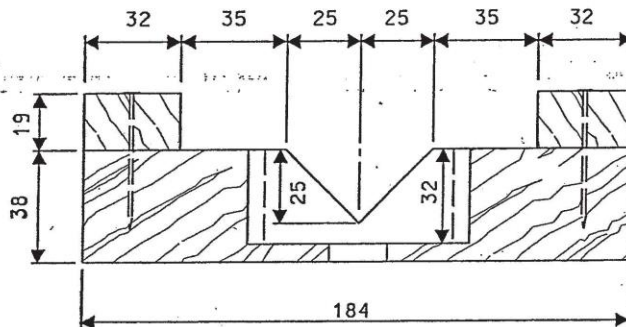
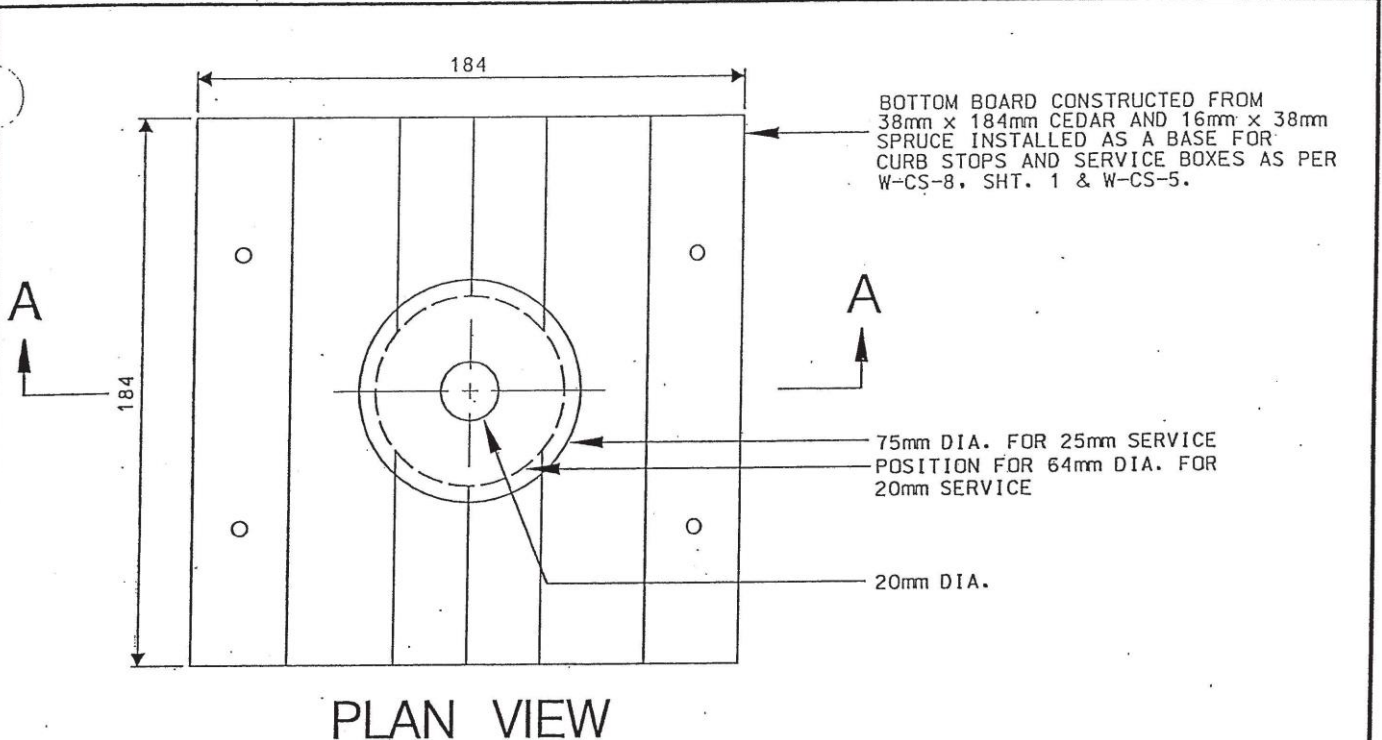
APPROVED BY
CITY ENGINEER:

NTS

REV 2004 02 25







NOTE: ALL DIMENSIONS ARE IN mm
UNLESS OTHERWISE NOTED.

CITY OF LONDON STANDARD DRAWING

BOTTOM BOARD FOR STANDARD INSTALLATION
OF 20mm & 25mm WATER SERVICES

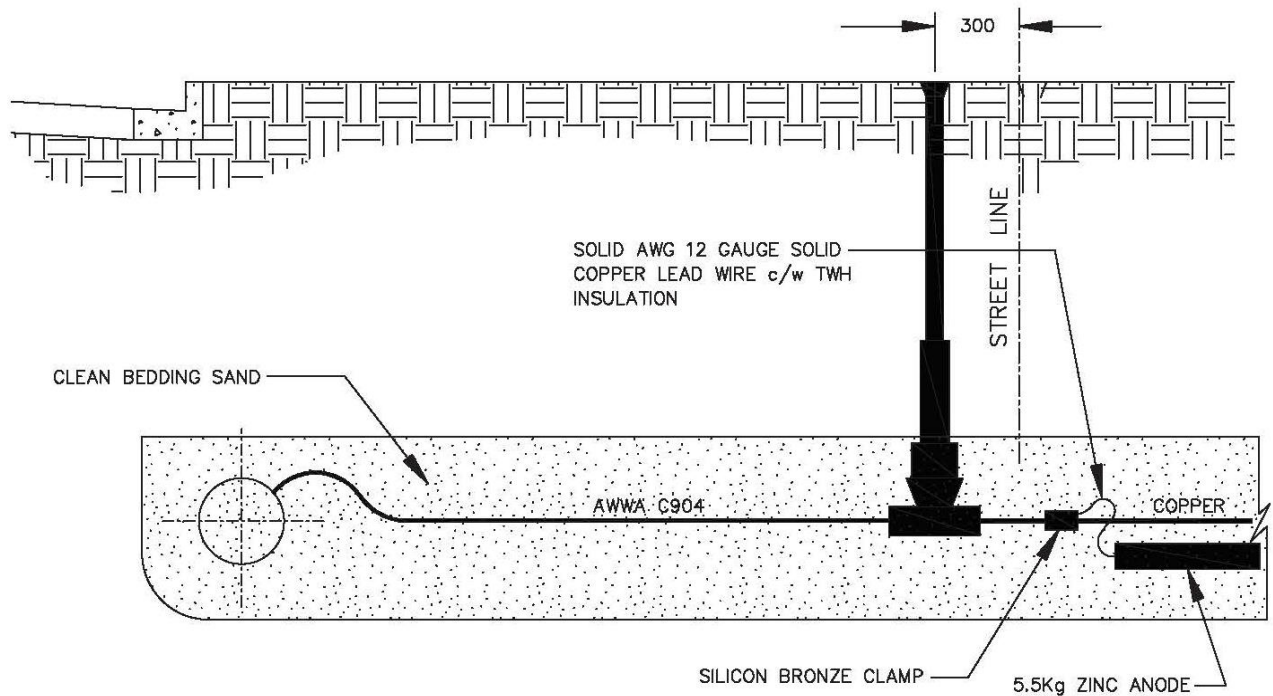
DWG: W-CS-8 SHT. 3

DATE
1999 01 30

APPROVED BY
CITY ENGINEER:

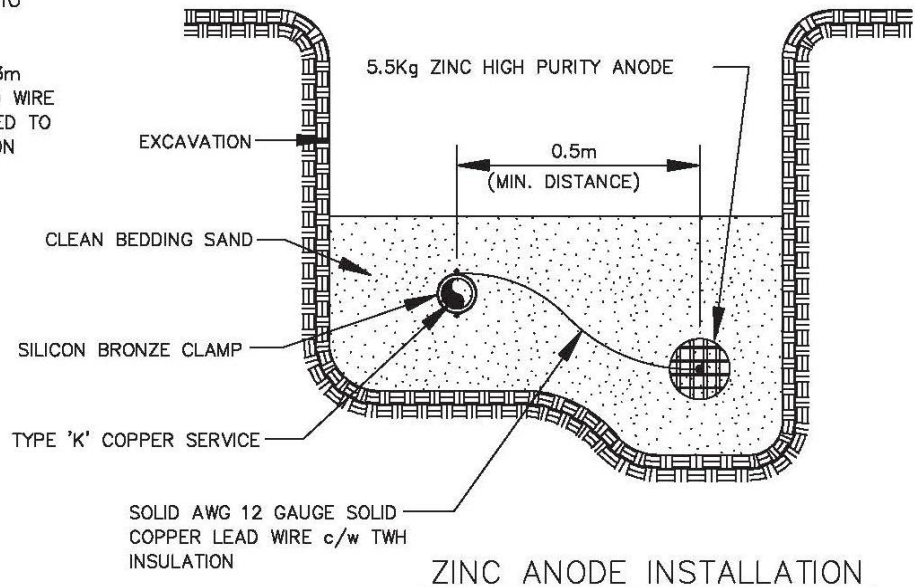
John W. [Signature]

NTS



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 II.
3. 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.



CITY OF LONDON STANDARD DRAWING

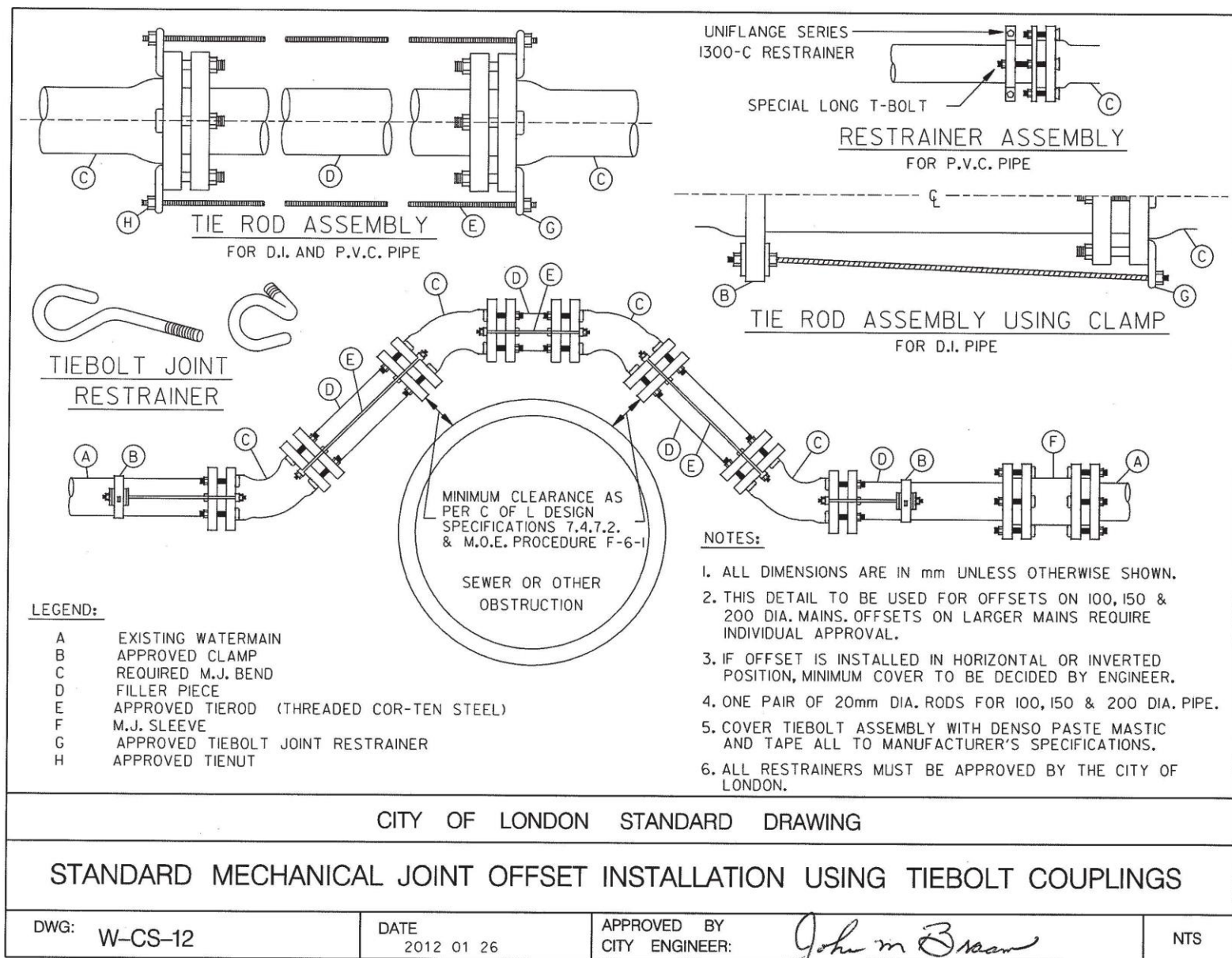
ZINC ANODE INSTALLATION
ON ALL COPPER WATER SERVICE TUBING

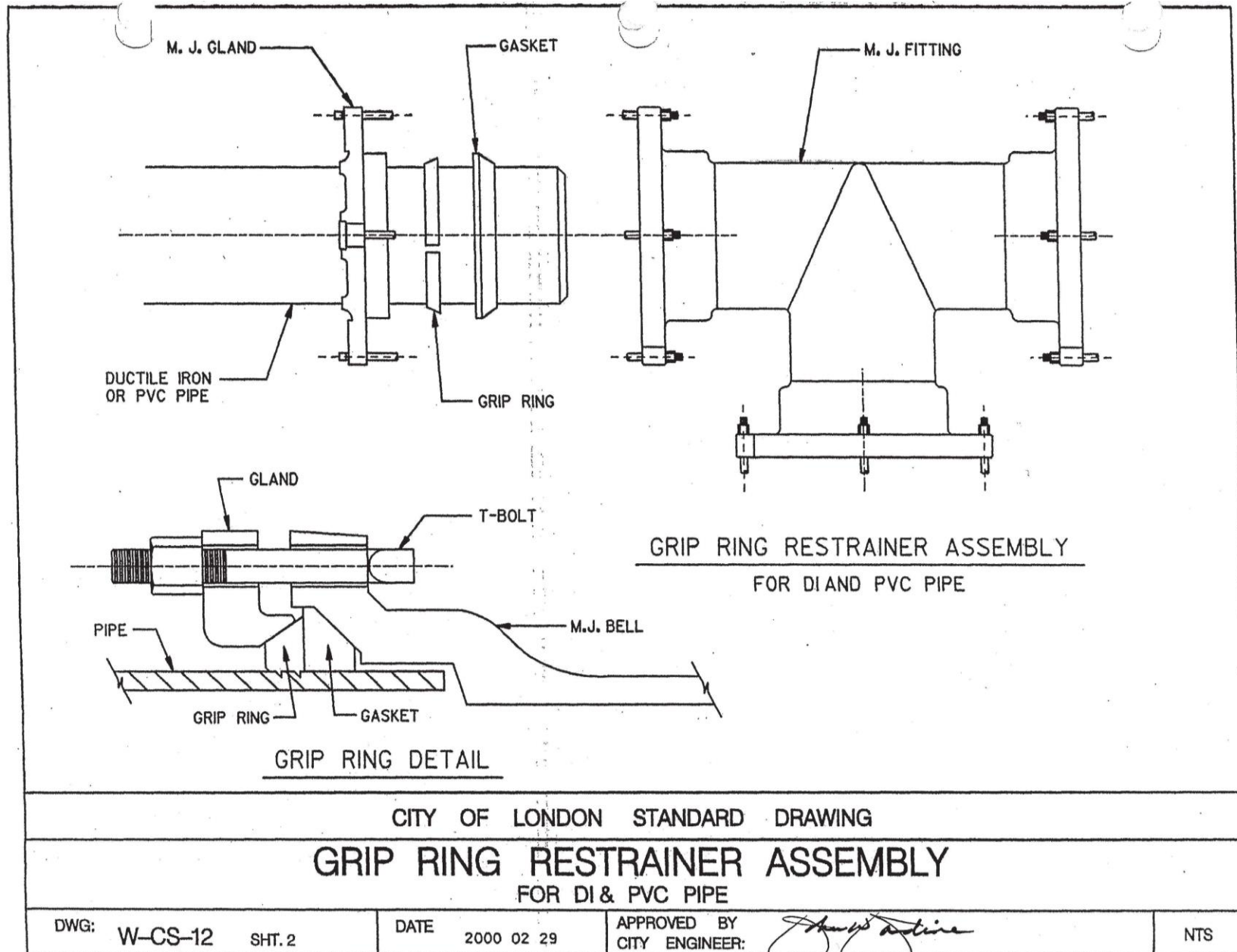
DWG W-CS-8 SHT. 4

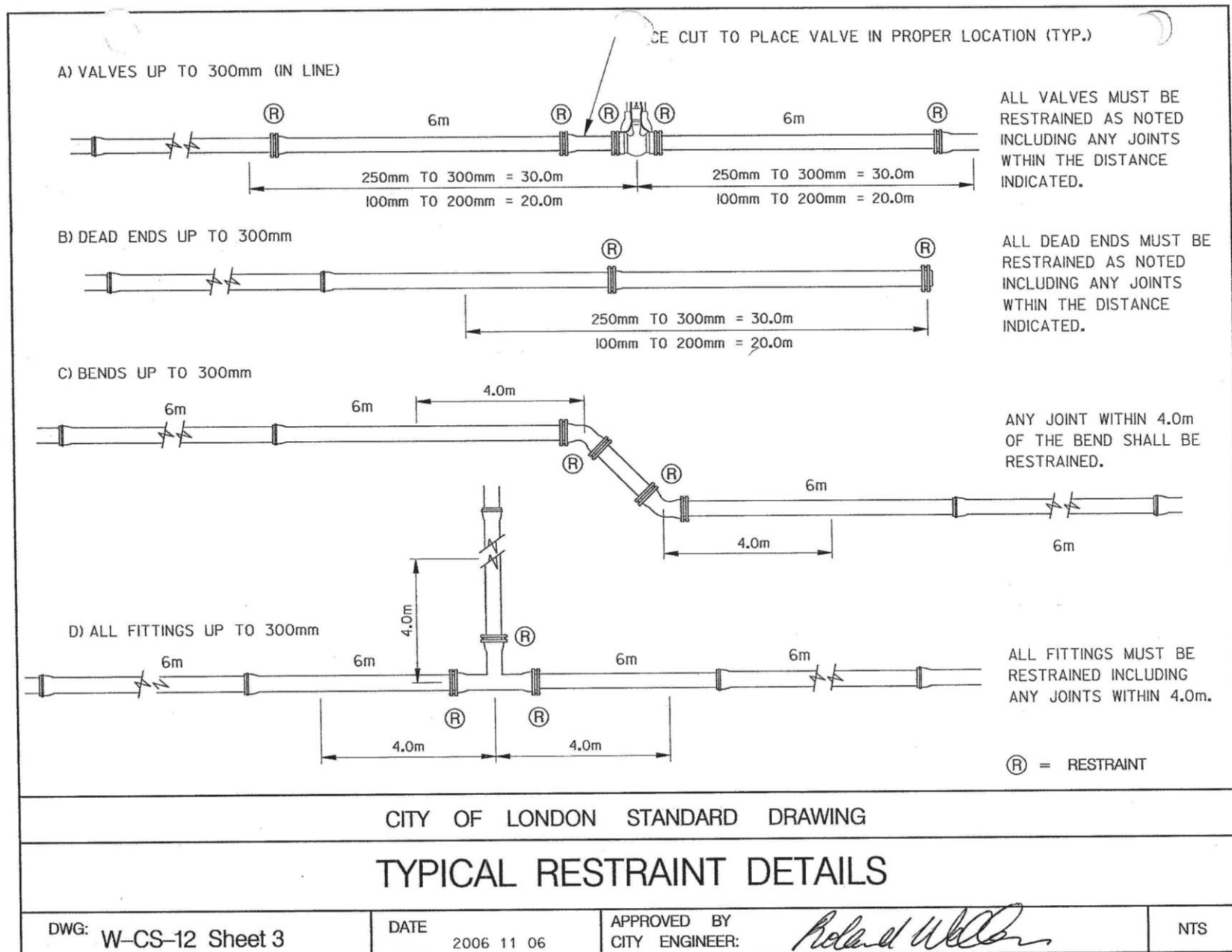
DATE 2018 09 12

APPROVED BY
CITY ENGINEER:

NTS



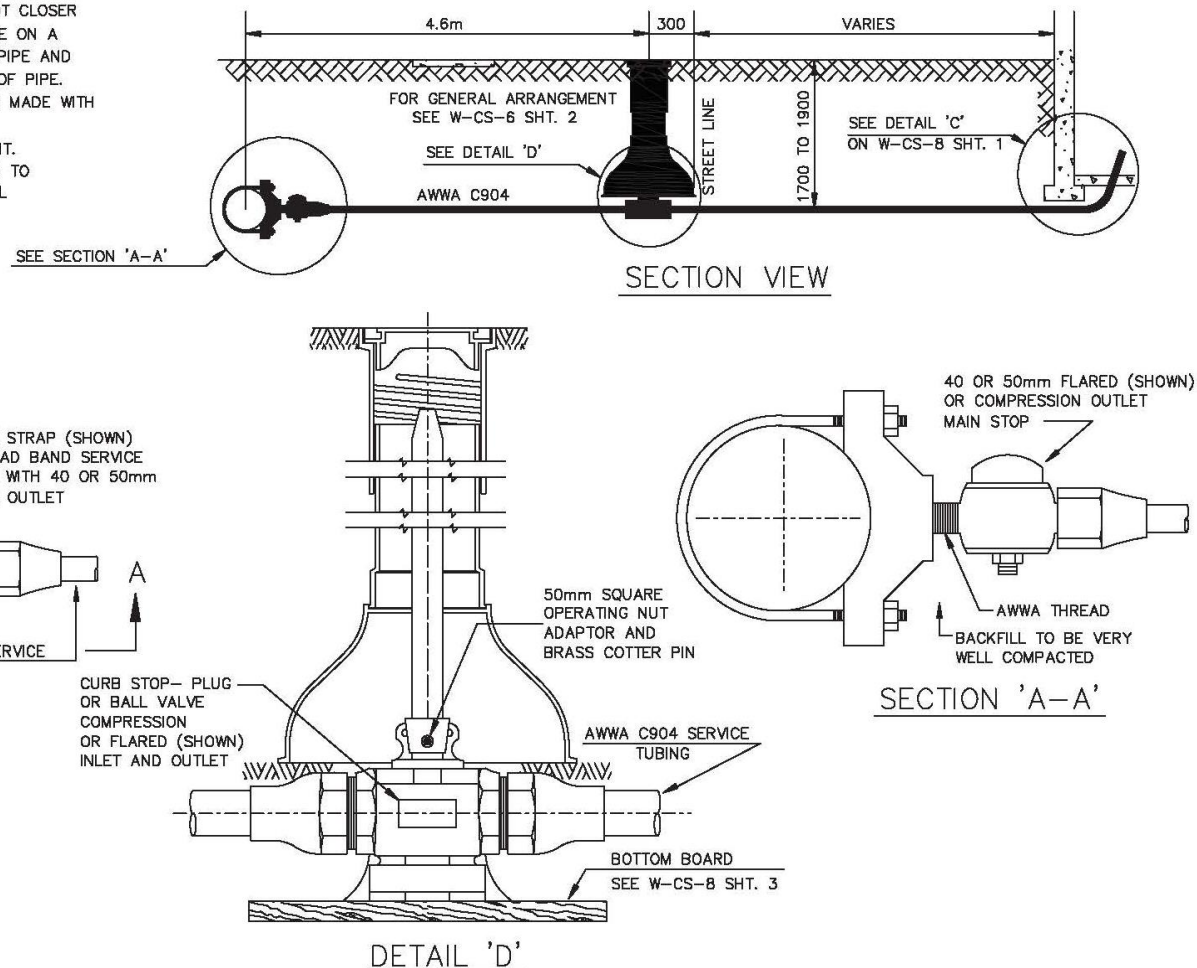




NOTES:

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SHOWN.
2. MAIN STOPS SHALL BE SPACED ON MAIN NOT CLOSER THAN 450. IF MAIN IS PVC TAPS SHALL NOT BE ON A COMMON LINE PARALLEL TO THE AXIS OF THE PIPE AND NO CLOSER THAN 450 FROM THE SPIGOT END OF PIPE.
3. ANY JOINT MADE IN SERVICE PIPE SHALL BE MADE WITH APPROVED COUPLINGS.
4. NO JOINTS SHALL BE MADE UNDER PAVEMENT.
5. APPROVED SERVICE SADDLES MUST BE USED TO TAP ALL 40mm & 50mm MAIN STOPS INTO ALL TYPES OF PIPE.

NOTE: SERVICE PLATE TO BE INSTALLED ON BLDG. SHOWING MEASUREMENT TO VALVE



CITY OF LONDON STANDARD DRAWING

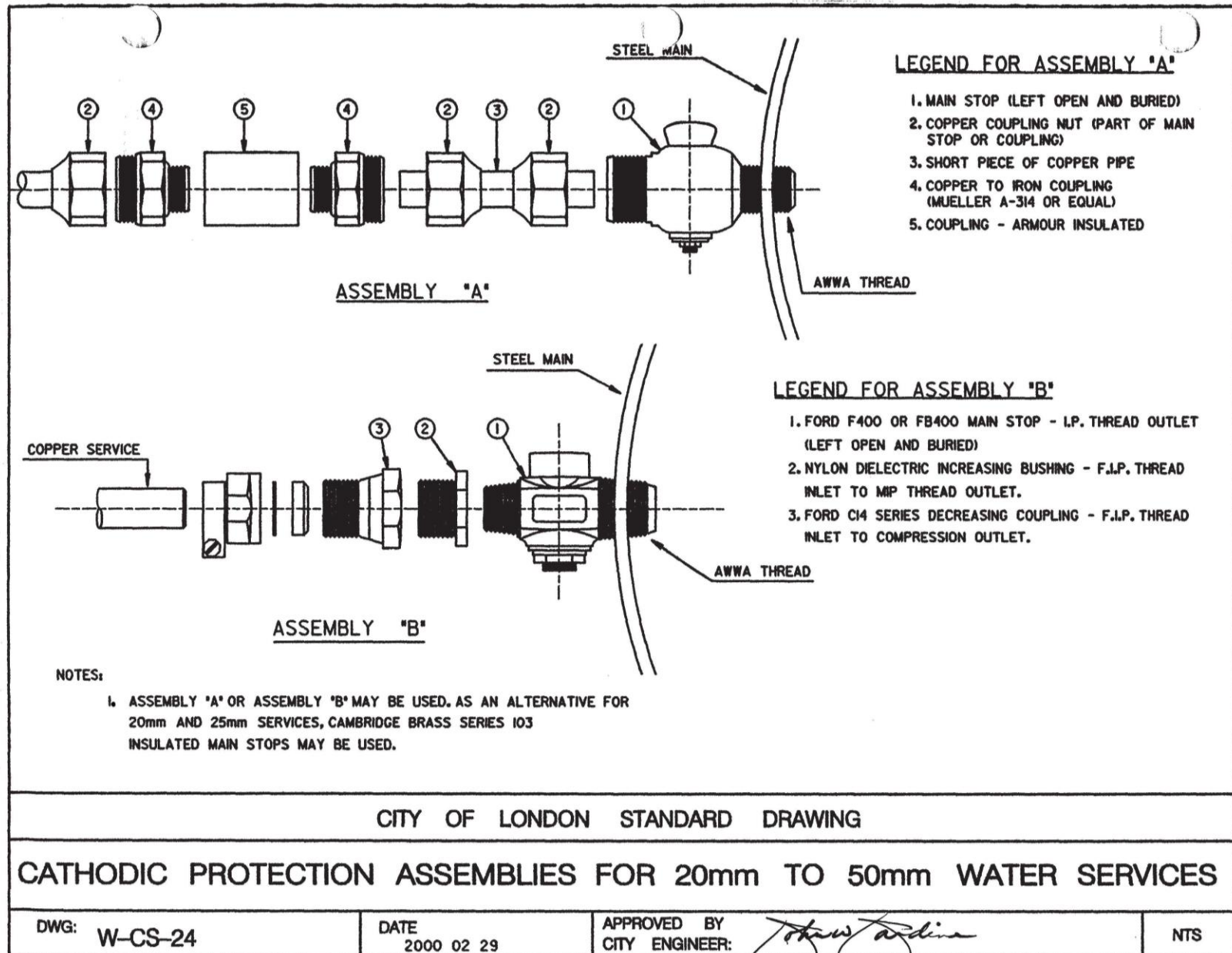
STANDARD INSTALLATION OF 40mm AND 50mm WATER SERVICES

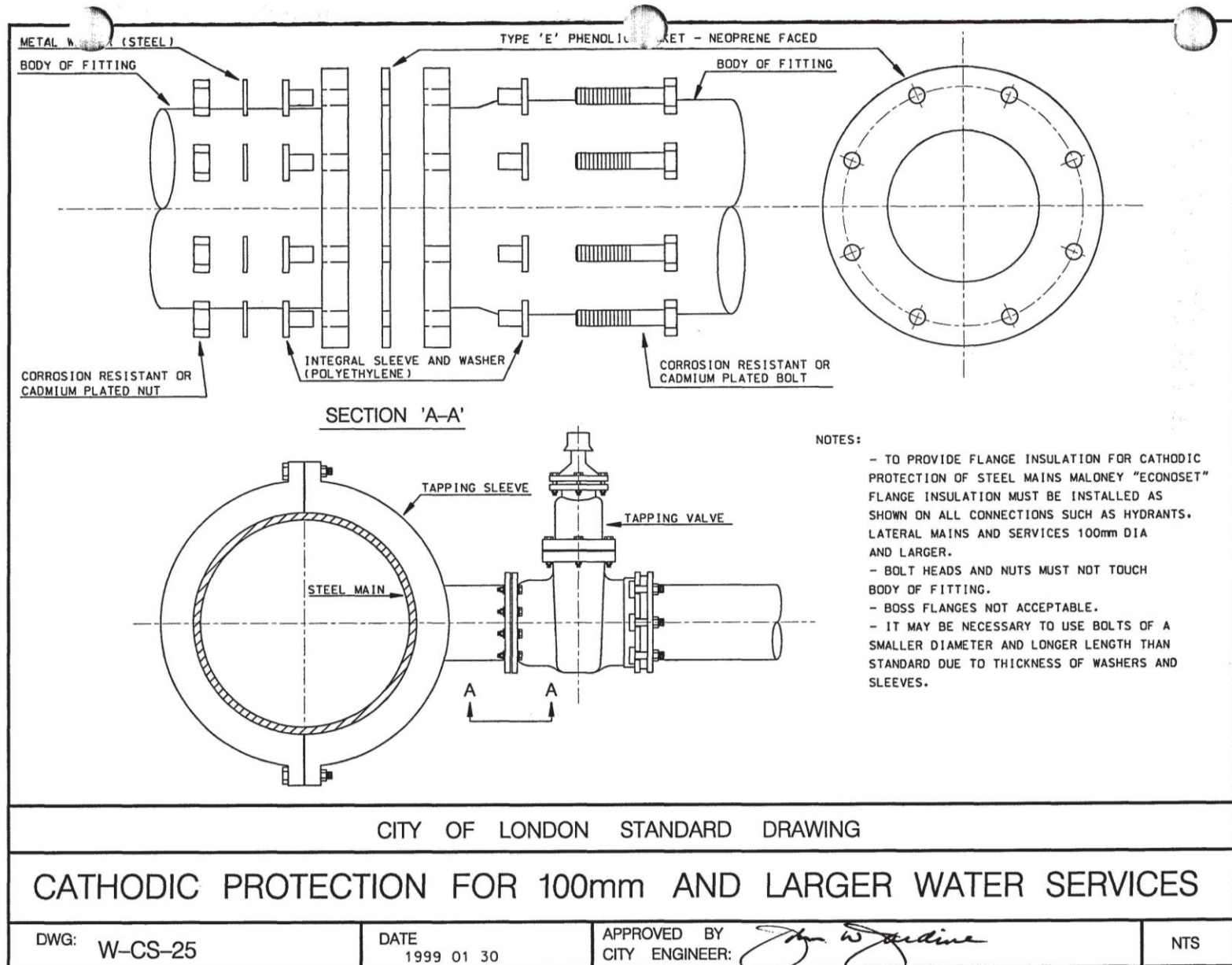
DWG: W-CS-22

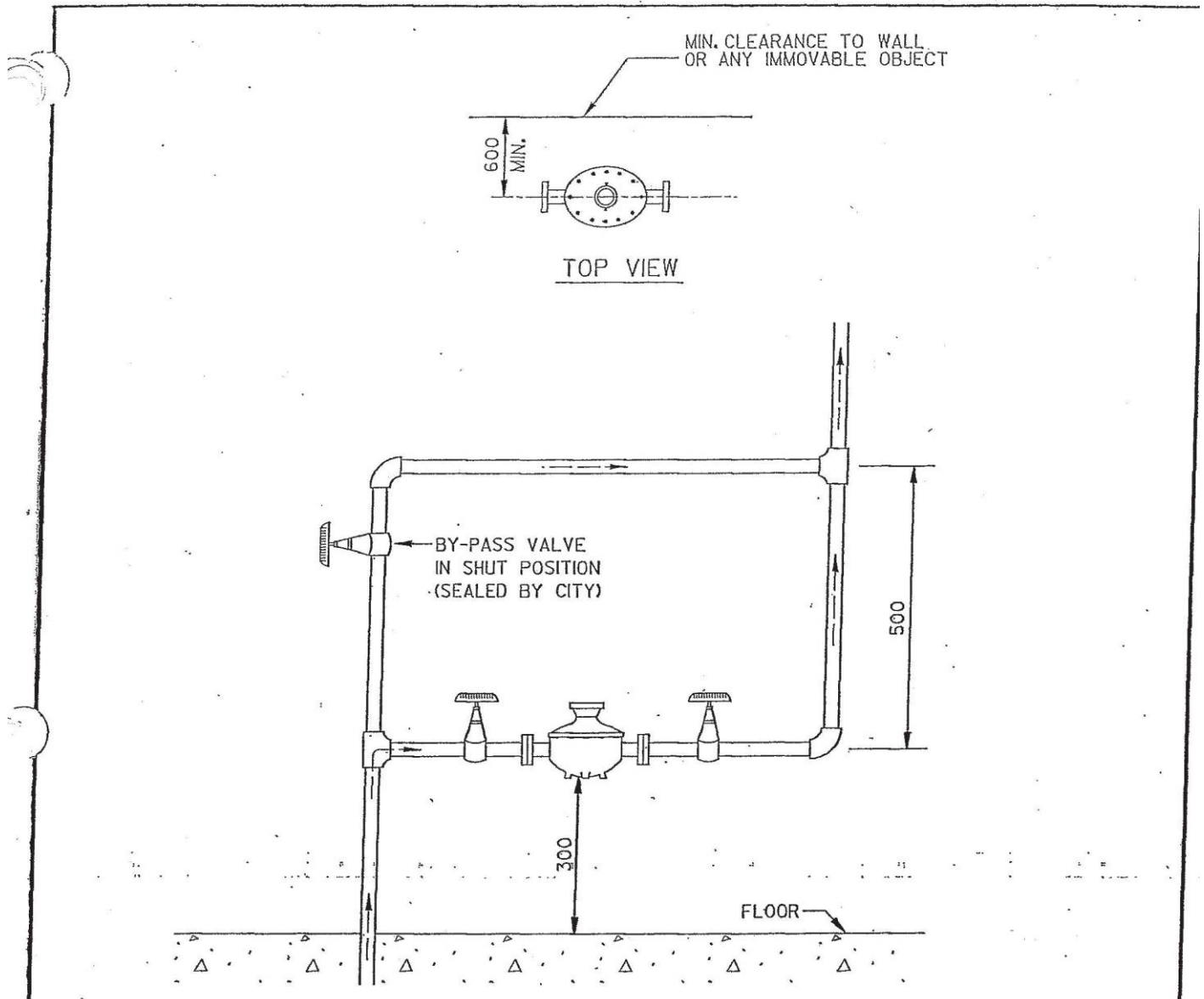
DATE
2018 09 12

APPROVED BY
CITY ENGINEER:

NTS







NOTES:

1. ALL 40mm METERS AND LARGER AND ANY METERS SUPPLYING MORE THAN ONE CUSTOMER REQUIRE A BY-PASS UNLESS OTHERWISE APPROVED BY ENGINEERING. UNLESS THE CONDITIONS OUTLINED IN 4.6.1 EXIST, A 25mm METER INSTALLATION DOES NOT REQUIRE A BY-PASS.
2. METER AND BY-PASS PIPING TO BE EQUAL SIZE.
3. ALL DIMENSIONS ARE EXPRESSED IN mm UNLESS OTHERWISE NOTED.
4. SOLDERED COPPER PIPE AND FITTINGS MAY BE USED.

CITY OF LONDON STANDARD DRAWING

TYPICAL INSTALLATION FOR 25mm, 40mm, & 50mm DISC TYPE WATER METER

DWG: W-CS-30 SHT. 1

DATE 1999 01 30

APPROVED BY
CITY ENGINEER:

John W. Fiedler

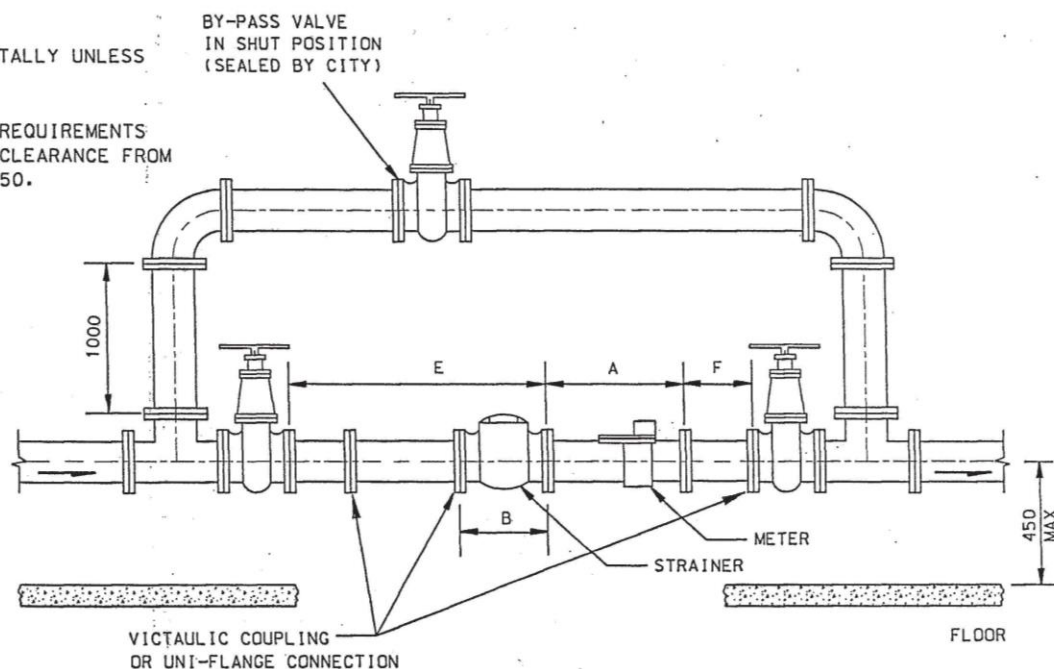
NTS

Supplemental Standards for Sewer and Water (SW)

NOT

- 1 ALL DIMENSIONS ARE IN mm UNLESS SHOWN OTHERWISE.
- 2 FLANGED FITTINGS ARE REQUIRED FOR ALL METERS.
- 3 MINIMUM SIZE OF VALVING & BYPASS PIPING TO BE EQUAL TO METER SIZE. ALL VALVES, PIPING, FITTINGS & SUPPORTS TO BE SUPPLIED & AND INSTALLED BY OWNER
- 4 ALL CHECK VALVES, BACKFLOW PREVENTION, PRESSURE REDUCING VALVES, ETC. MUST BE INSTALLED AFTER THE BY-PASS WHEN FIRE FLOWS ARE METERED.
- 5 ALL METERS ARE TO BE INSTALLED HORIZONTALLY UNLESS APPROVED OTHERWISE BY ENGINEERING.
- 6 INSTALLATION INDICATES THE MIN. SPACE REQUIREMENTS IN A MECHANICAL OR METERED ROOM. MIN. CLEARANCE FROM FLOOR, WALL OR FIXED EQUIPMENT TO BE 450.

METER SIZE	A TURBINE	A COMPOUND	B STANDARD	B FIREFLOW	E	F			
75	305	431			750	150			
100	356	508			1000	200			
150	458	610	229	683	1500	300			
200	508	NA	254	796	2000	400			



CITY OF LONDON STANDARD DRAWING

TYPICAL TURBINE WATER METER INSTALLATION FOR 75mm TO 200mm

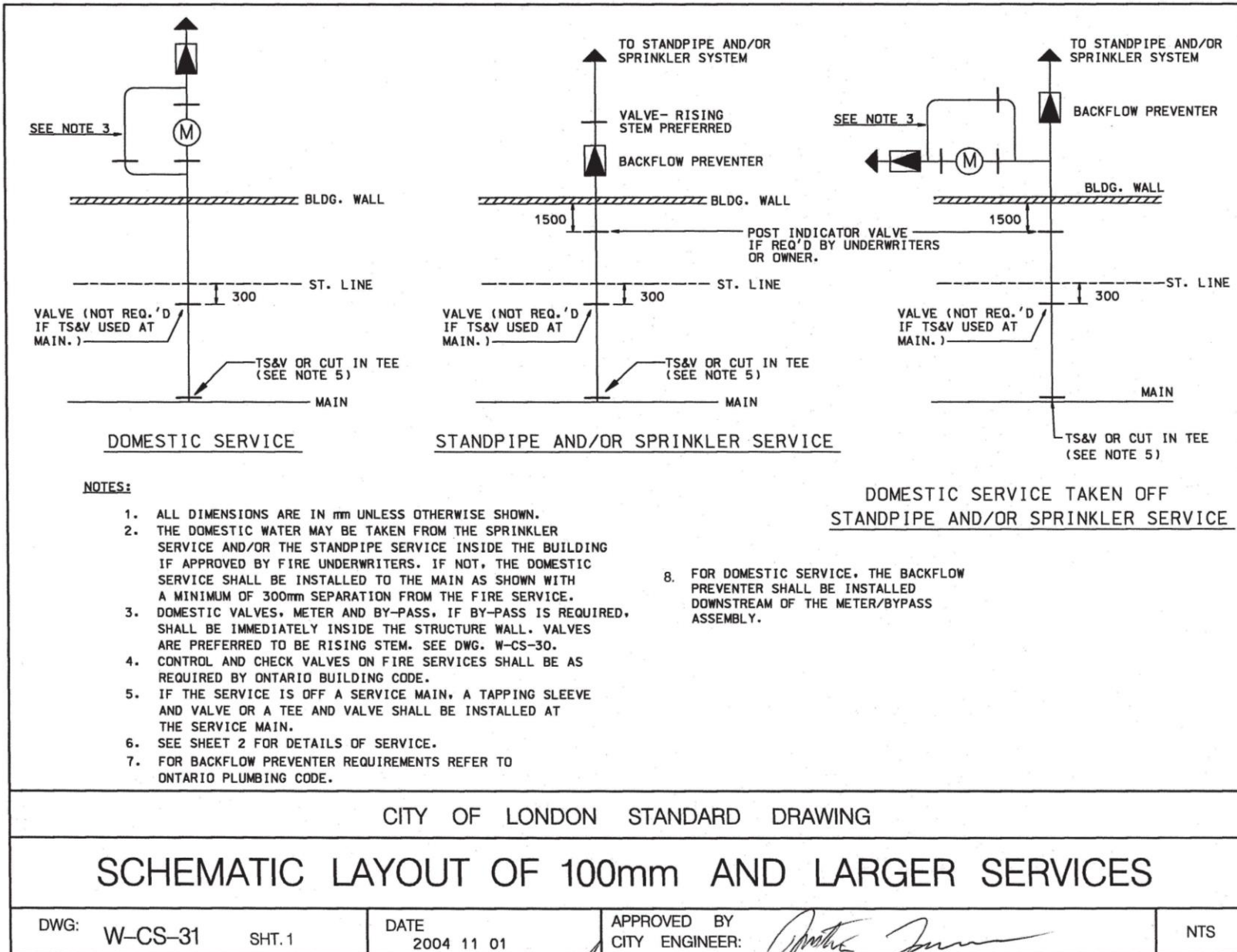
DWG: W-CS-30 SHT. 2

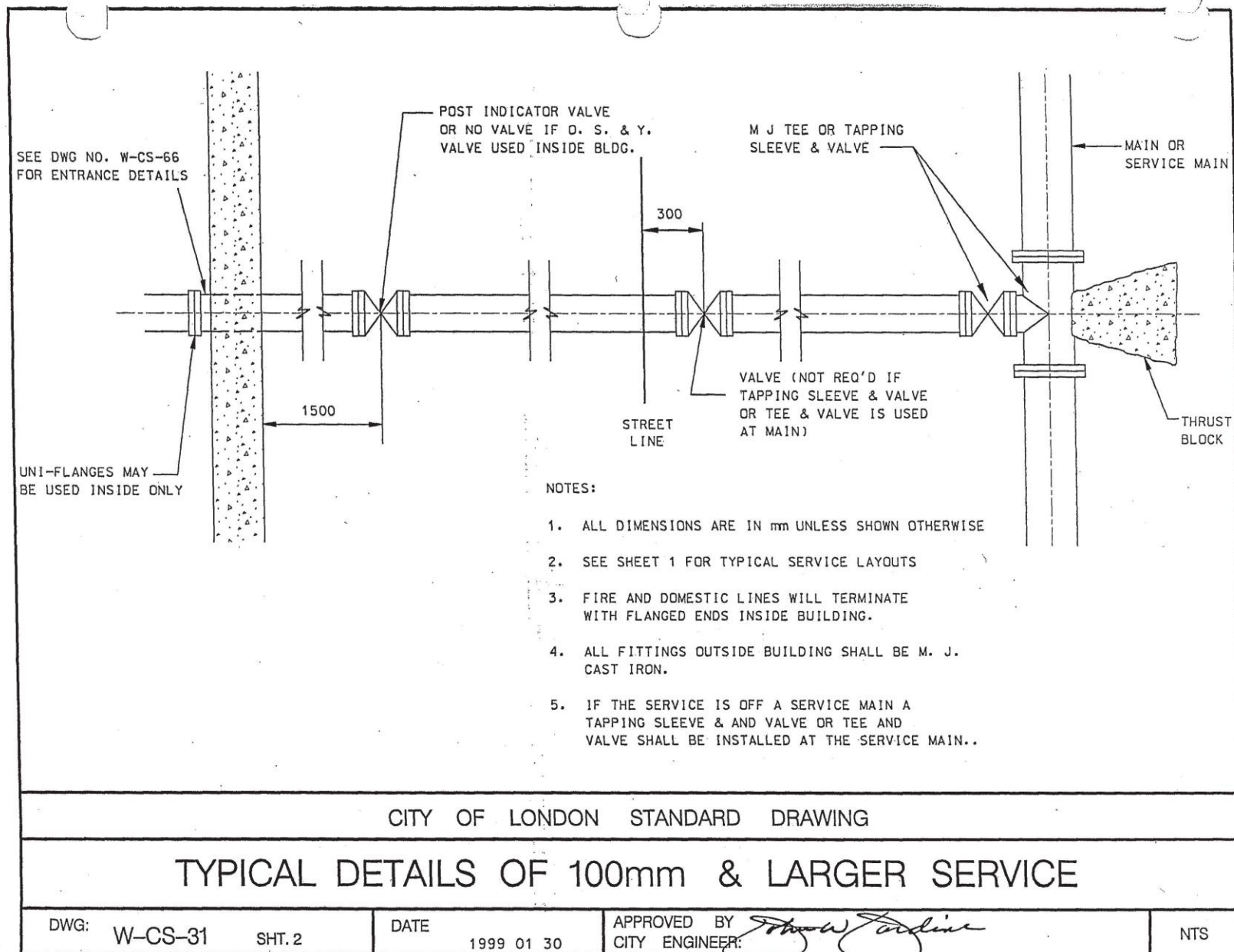
DATE 1999 01 30

APPROVED BY
CITY ENGINEER:

John W. [Signature]

NTS





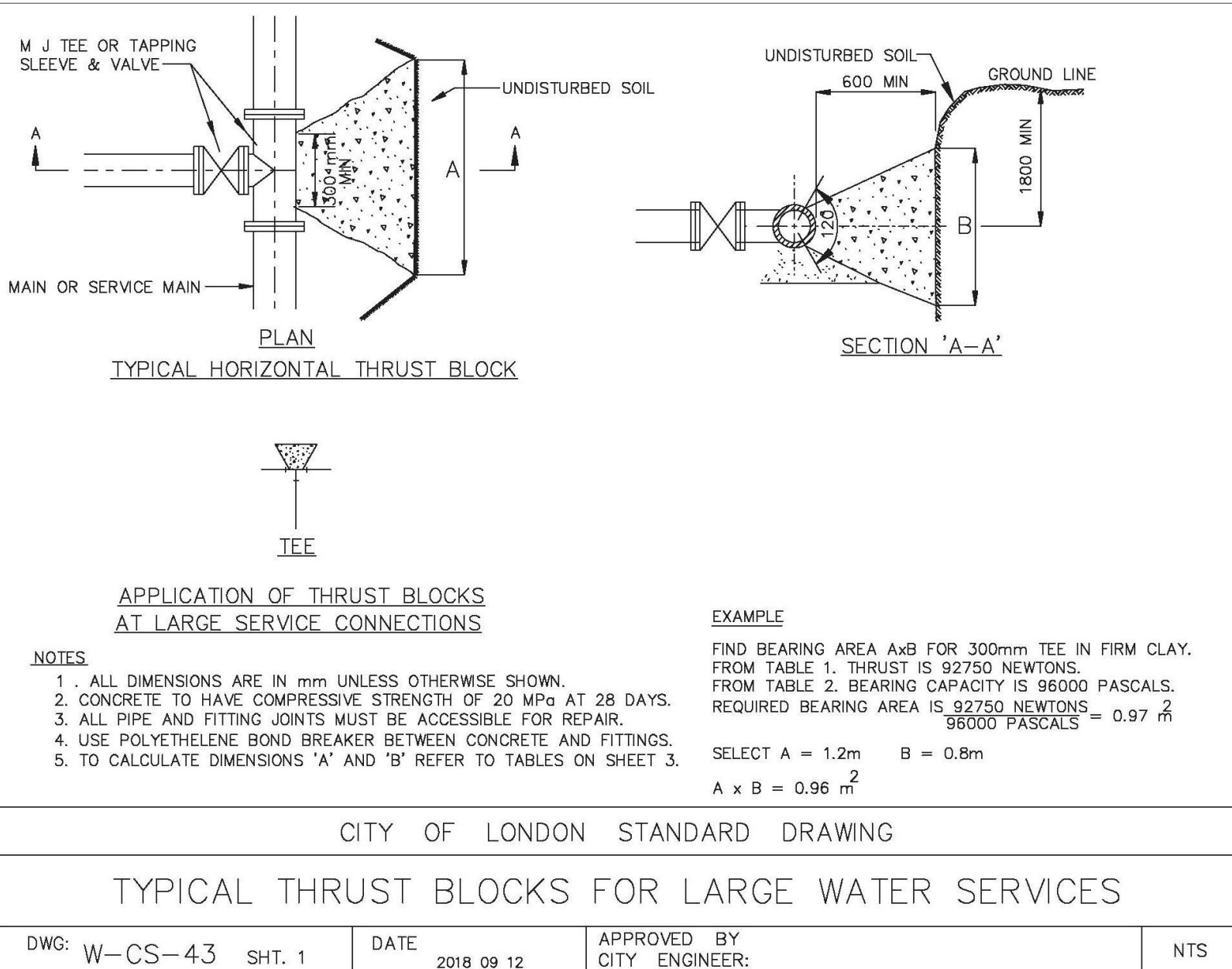


TABLE 1 – THRUST AT FITTINGS IN NEWTONS AT 1035KPa STATIC PRESSURE

PIPE DIA. (mm)	100	150	200	250	300
TEES	12350	25350	43400	72400	92750

TABLE 2 – BEARING CAPACITY OF VARIOUS SOILS IN Pascals (Pa)

SOIL	Pa
FIRM CLAY	96000
MEDIUM CLAY	72000
SOFT CLAY	48000
COARSE SAND OR GRAVEL	192000
SAND	96000

NOTES:

THE DESIGNER IS RESPONSIBLE FOR DETERMINING SAFE BEARING CAPACITIES. THOSE GIVEN, WHICH ARE OFTEN USED, ARE FOR HORIZONTAL THRUSTS WHEN DEPTH OF COVER EXCEEDS 0.6m.

CITY OF LONDON STANDARD DRAWING

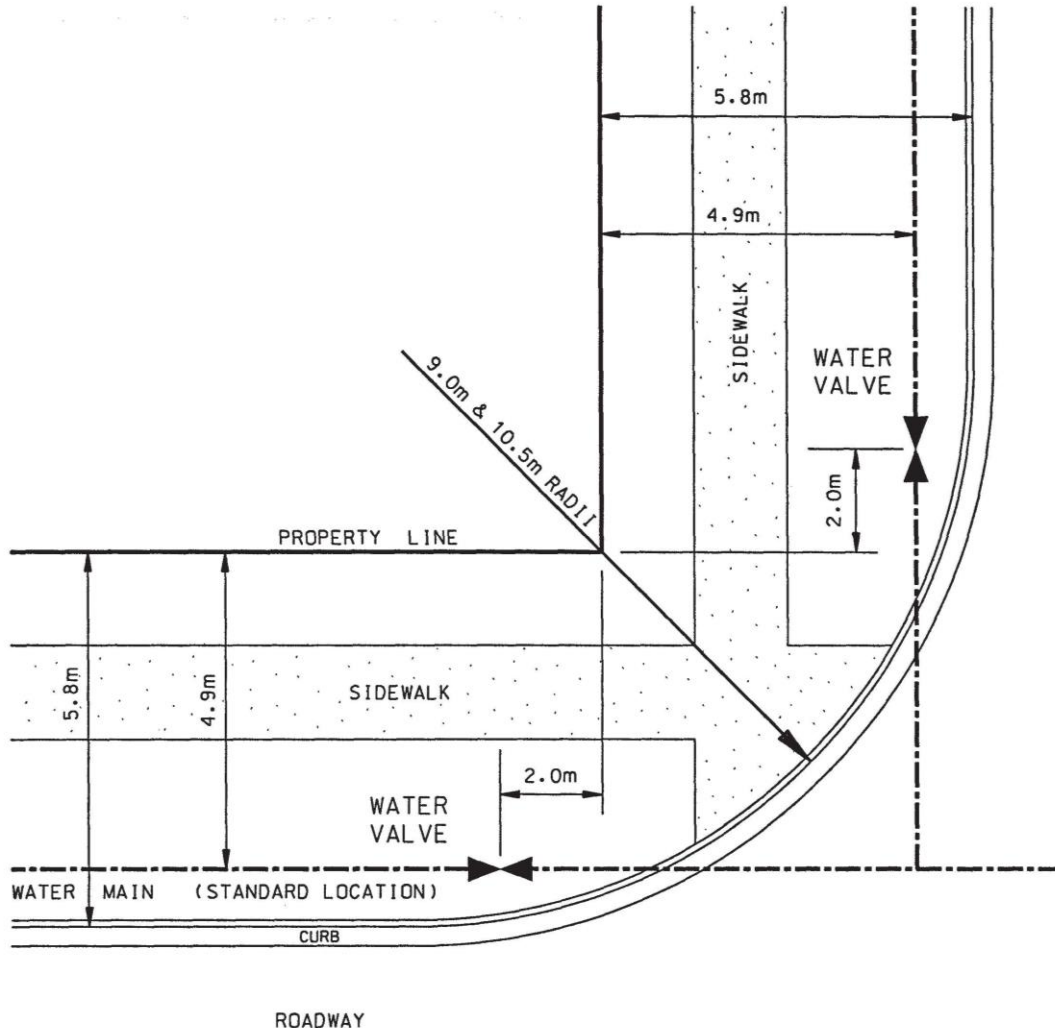
TYPICAL THRUST BLOCKS FOR LARGE WATER SERVICES

DWG: W-CS-43 SHT. 3

DATE 2018 09 12

APPROVED BY
CITY ENGINEER:

NTS



NOTES:

THIS STANDARD MAY NOT APPLY IF CURBS ARE MORE THAN 5.8m FROM PROPERTY LINE. THE OBJECTIVE IS TO PREVENT VALVES FROM BEING INSTALLED IN THE GUTTER.

CITY OF LONDON STANDARD DRAWING

STANDARD LOCATION FOR WATER VALVES AT INTERSECTIONS WITH 9.0m & 10.5m CURB RADII

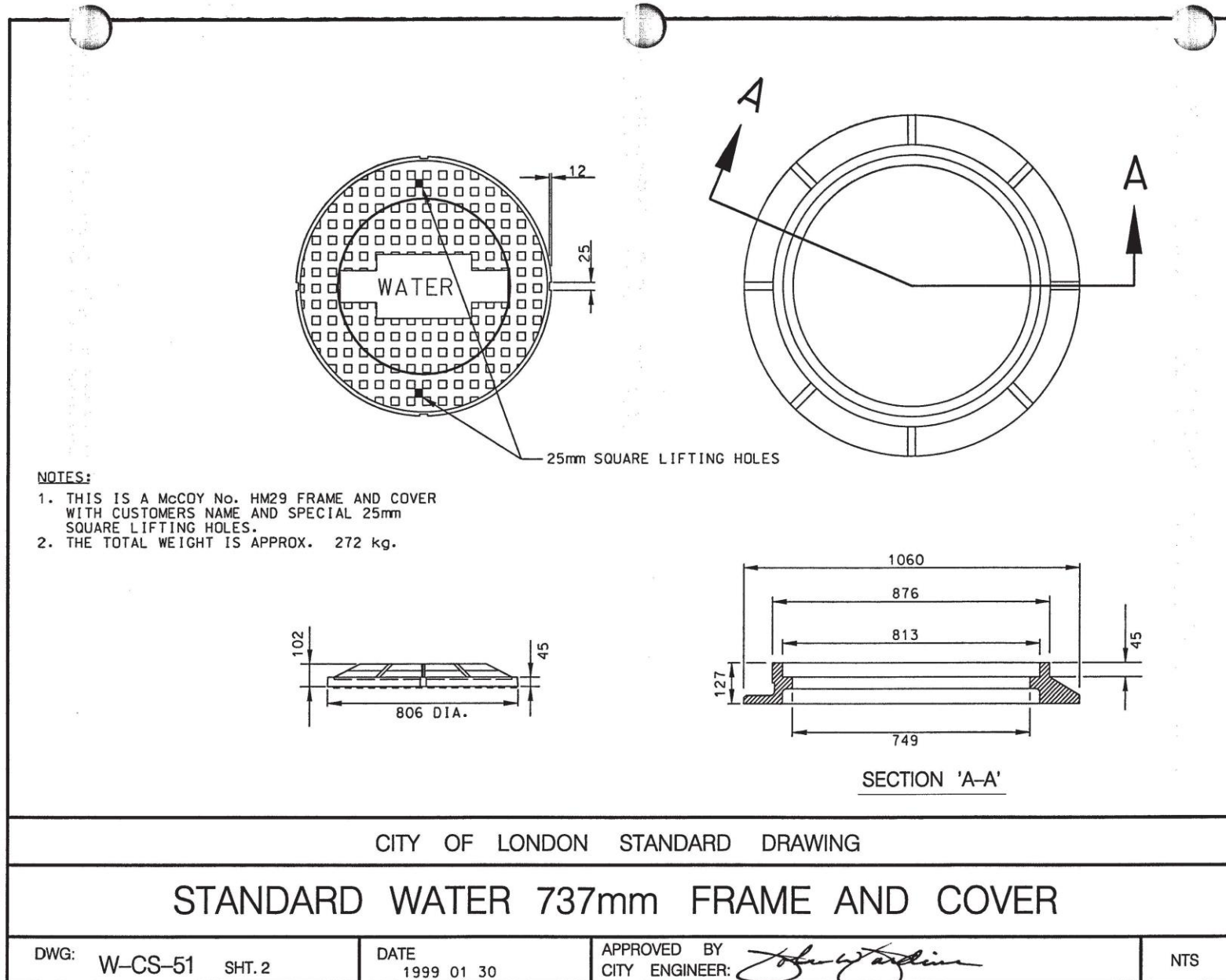
DWG W-CS-45

DATE 1999 01 30

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CITY ENGINEER:



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GRAMS OF HYPOCHLORITE PER 100 METRES OF MAIN

mg PER LITRE OR PARTS PER MILLION	MAIN DIAMETER — MILLIMETRES							
	100	150	200	250	300	350	400	450
12.5	14.5	32.5	57.5	90.5	130	177	231	292
25	29	65	115	181	260	354	462	584
50	58	130	230	362	520	708	924	1168
75	87	195	345	543	780	1068	1386	1742
100	116	260	460	724	1040	1416	1848	2336

NOTES:

1. THE CONTRACT ADMINISTRATOR WILL DETERMINE STRENGTH OF DOSAGE. ON NEW MAINS HYPOCHLORITE WILL BE INTRODUCED AS A SLURRY AT THE CHARGING END OF MAIN THROUGH A MUELLER, INSTALLED IF NECESSARY FOR THE PURPOSE.
2. MAIN WILL THEN BE LEFT CHARGED, BUT OUT OF SERVICE, FOR NOT LESS THAN 24 HOURS AND THEN BLOWN OFF. CHLORINATION PERSON WILL TEST FOR RESIDUAL AT TIME OF BLOW OFF. IF REQUIRED, MAIN WILL RECEIVE A SECOND DOSAGE FOR A FURTHER 24 HOURS.
3. ON REPAIR PROJECTS, CONDITIONS WILL DICTATE MEASURES TO BE USED.
4. DO NOT TAKE INTERNALLY. AVOID CONTACT WITH EYES AND PROLONGED CONTACT WITH SKIN. KEEP AWAY FROM HEAT AND COMBUSTIBLE MATERIALS.
5. KEEP MATERIALS IN ORIGINAL CONTAINER.
6. NOTE SAFETY PRECAUTIONS ON CONTAINER.
7. DOSAGE IS BASED ON 70 PERCENT AVAILABLE CHLORINE IN HYPOCHLORITE.

CITY OF LONDON STANDARD DRAWING

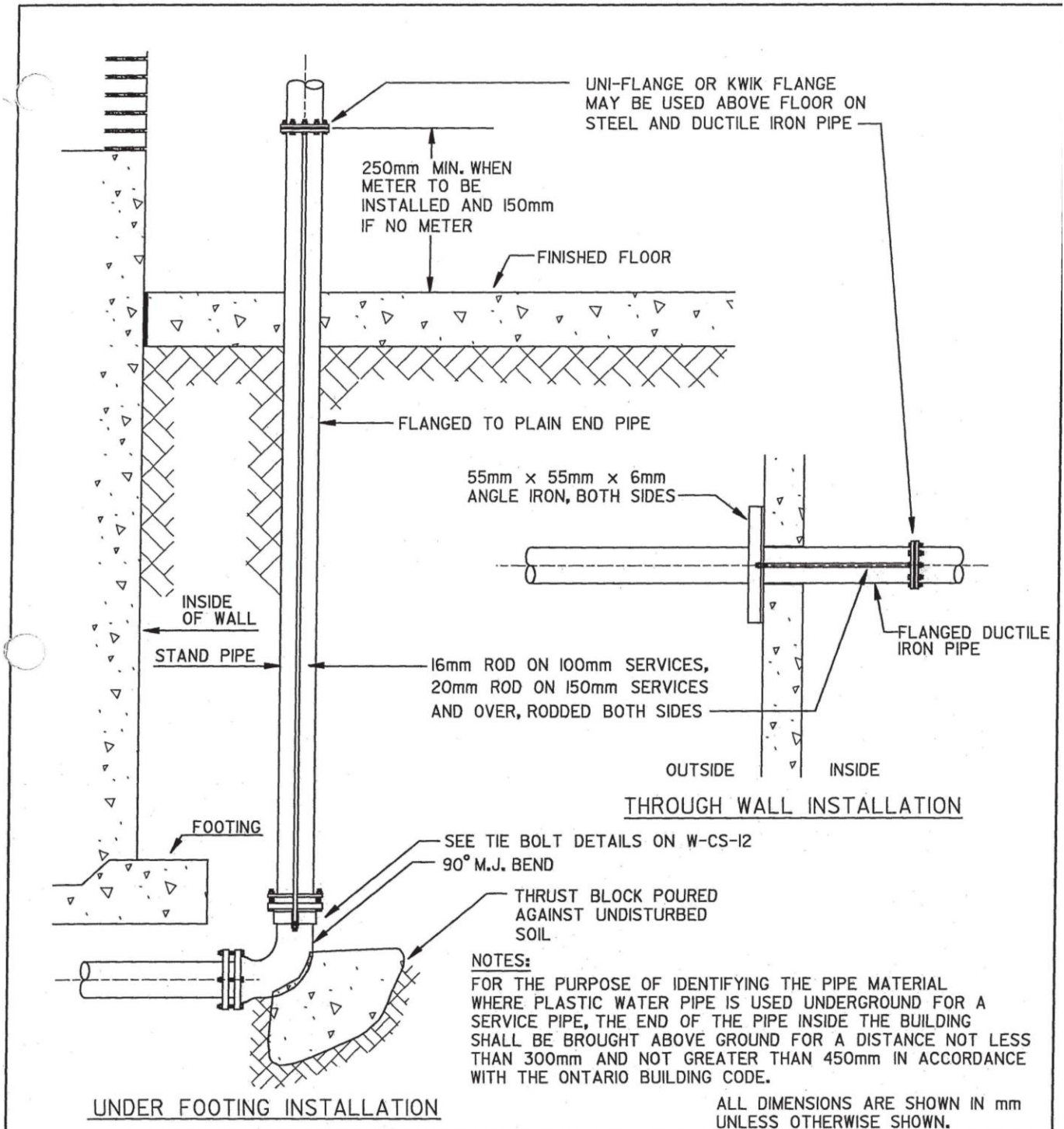
DISINFECTION

DWG: W-CS-60

DATE 2019 09 09

APPROVED BY
CITY ENGINEER:

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CITY OF LONDON STANDARD DRAWING

TYPICAL SERVICE ENTRANCES

100mm TO 200mm

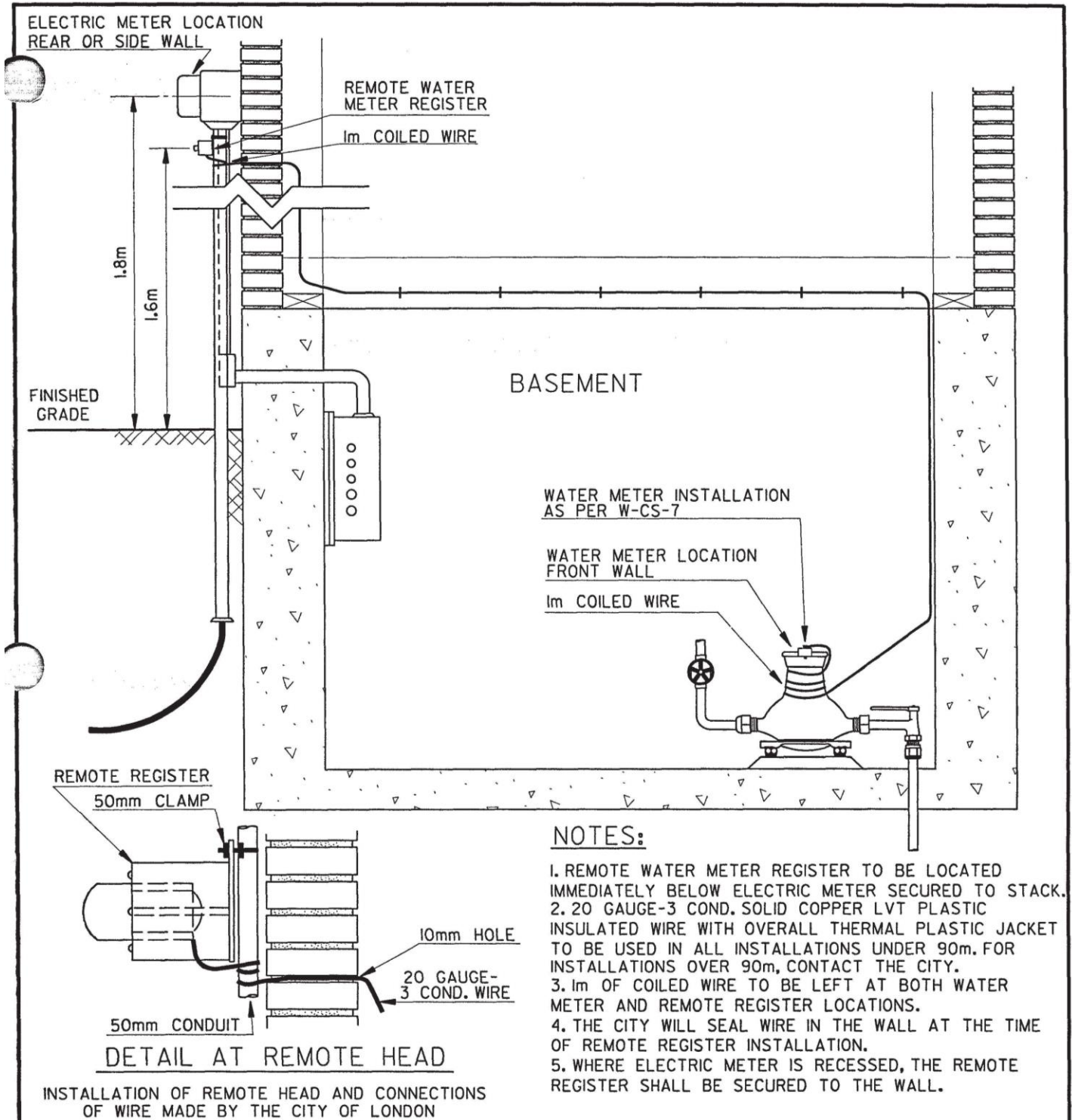
DWG: W-CS-66

DATE
2004 11 01

APPROVED BY
CITY ENGINEER: *[Signature]*

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REV 2004 02 25



CITY OF LONDON STANDARD DRAWING

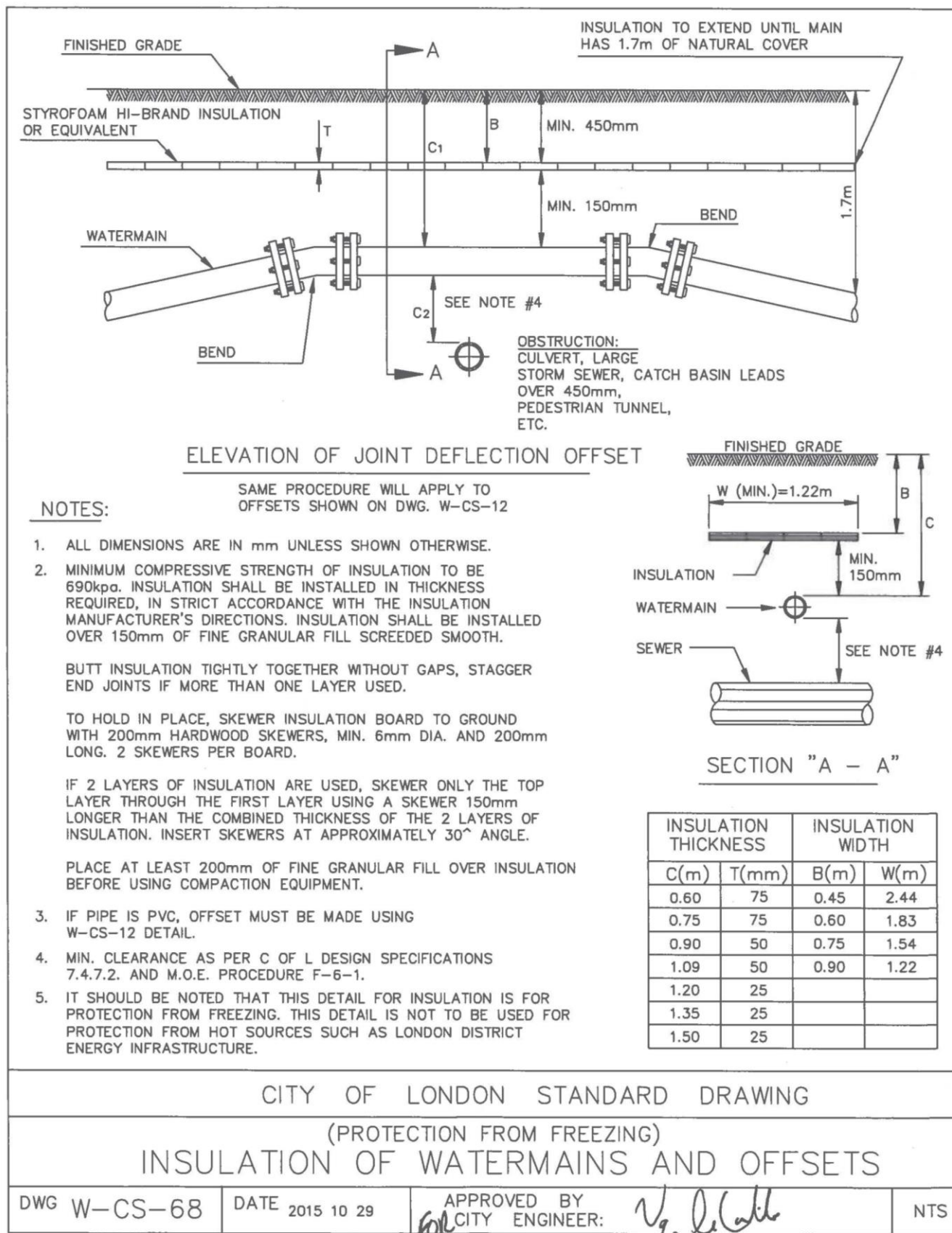
REMOTE WATER METER REGISTER INSTALLATION

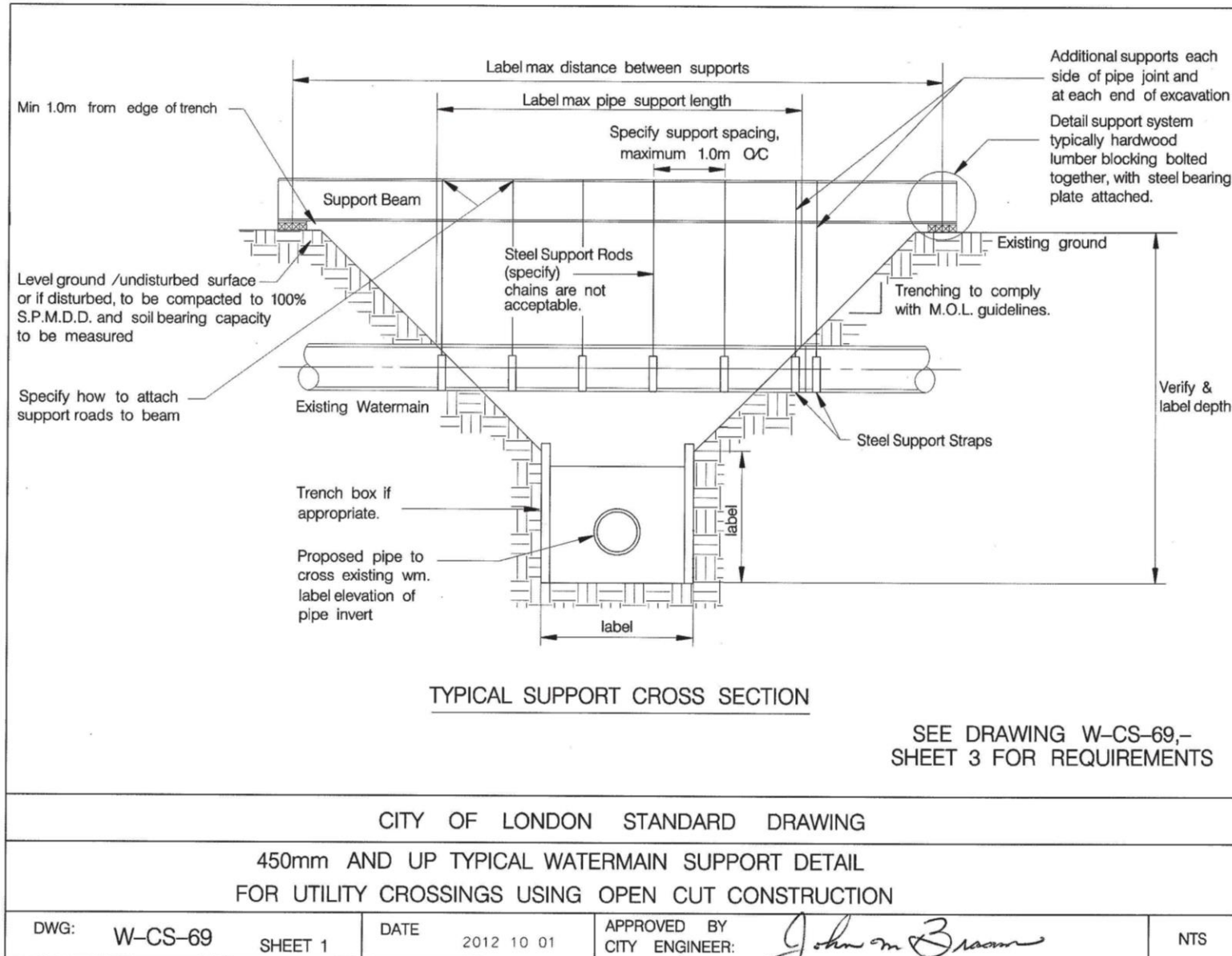
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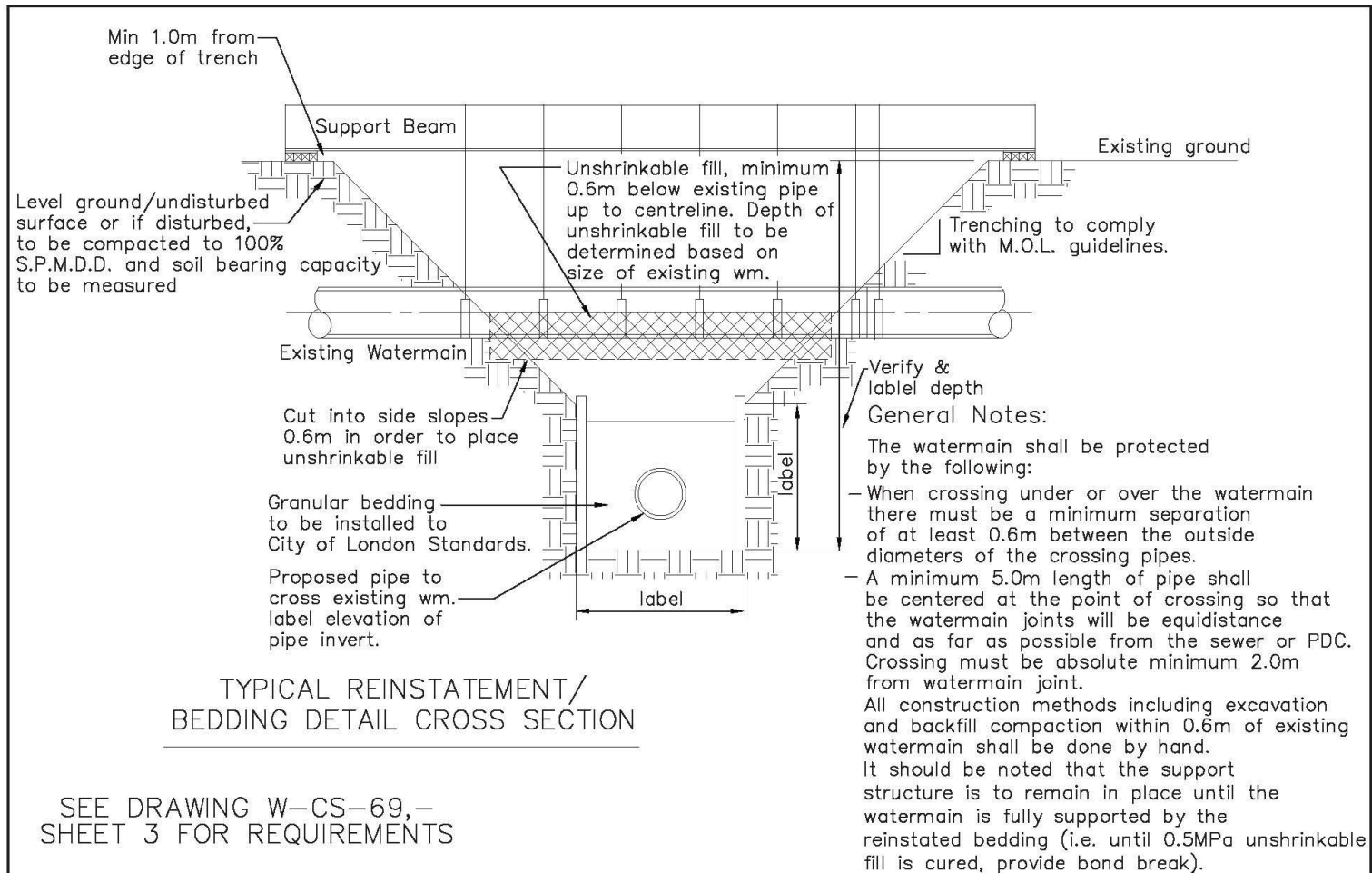
DATE 1999 01 30

APPROVED BY
CITY ENGINEER *John W. [Signature]*

NTS







TYPICAL REINSTATEMENT / BEDDING DETAIL CROSS SECTION

SEE DRAWING W-CS-69, - SHEET 3 FOR REQUIREMENTS

CITY OF LONDON STANDARD DRAWING

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

DWG: W-CS-69 SHEET 2

DATE 2019 08 26

APPROVED BY
CITY ENGINEER:

NTS

SUPPORT DETAIL REQUIREMENTS

Submission and Design Requirements

When crossing below on existing watermain (450mm or greater) using open cut construction, the following must be provided to the City of London Water Engineering Division 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 W-CS-69, Sheet #1 for Typical Drawing)
 - (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.
 - (v) Identify allowable deflections for watermain (considering size, material type and jointing system). Confirm deflections for proposed support system are less than the allowable deflection for the watermain.
- 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) Remove blackline and watermain 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 the City of London Right-of-Way, if required, are to be submitted for approval separately to the Transportation Engineering Division. 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 on existing watermain (450mm or greater) using open cut construction, the following must be provided to the City of London Water Engineering Division for review/approval a minimum of two (2) weeks prior to the proposed work taking place:

- 1) When crossing watermain 450mm and greater a drawing(s) must be submitted indicating reinstatement and bedding is required. The drawings shall include the following: (See W-CS-69, Sheet #2 for Typical Drawing)
 - (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 0.5MPa unshrinkable fill with bond breaker (i.e. 6mil poly) to a minimum 600mm below watermain up to the centreline OR obtain recommendations regarding watermain bedding from the watermain pipe manufacturer, if any of the following apply:
 - (i) there is less than 600mm separation between 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.

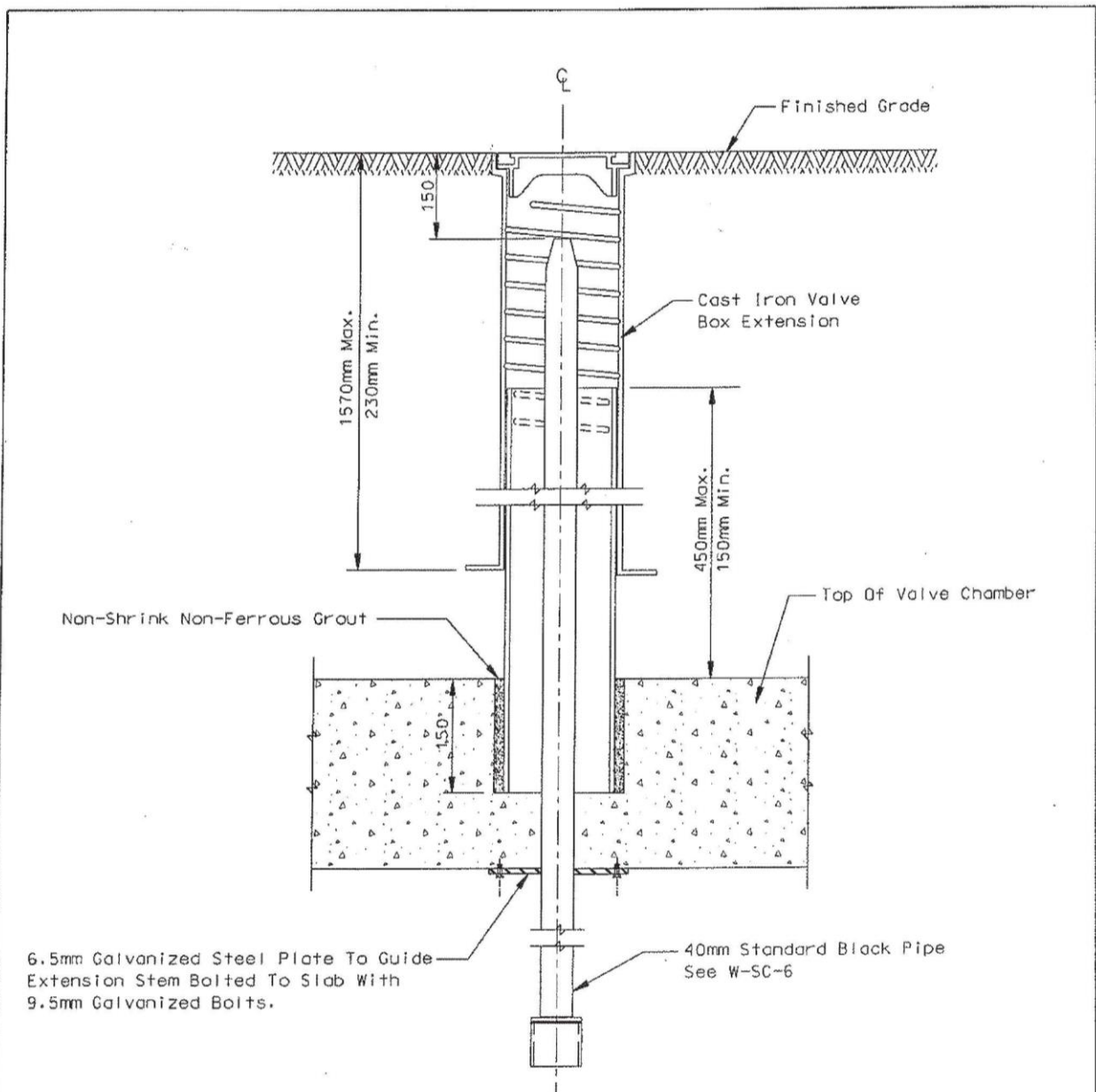
Under no circumstances will the work be allowed to proceed under adverse weather conditions.

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

CITY OF LONDON STANDARD DRAWING

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

DWG	W-CS-69 SHEET 3	DATE 2019 08 26	APPROVED BY CITY ENGINEER	NTS
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NOTES:

1. APPROVED 130mm SCREW VALVE BOXES ARE BIBBY CODE 7130 OR STAR PIPE PRODUCT VBDHD.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.

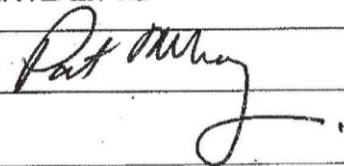
CITY OF LONDON STANDARD DRAWING

VALVE BOX ON CHAMBERS

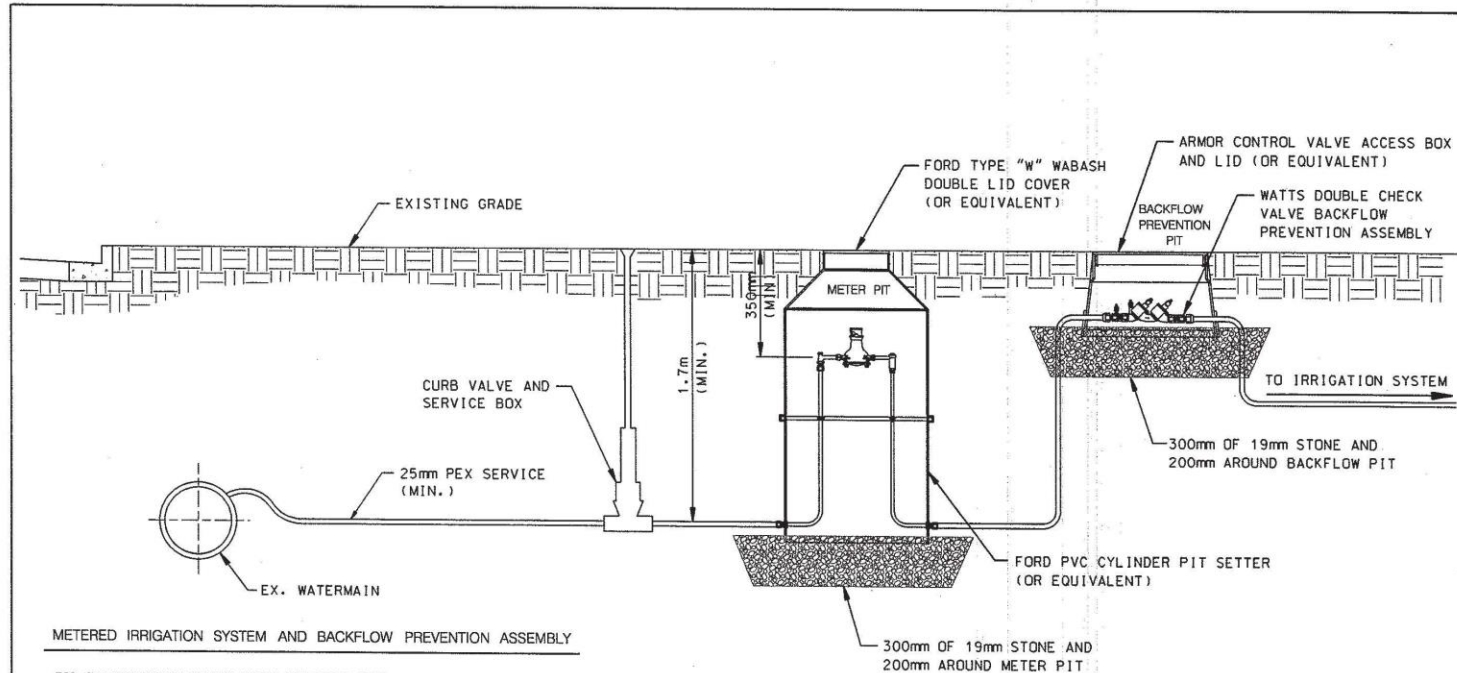
DWG W-CS-70

DATE 2009 11 20

APPROVED BY
CITY ENGINEER:



NTS



METERED IRRIGATION SYSTEM AND BACKFLOW PREVENTION ASSEMBLY

FOR THE PROTECTION OF THE WATER PURVEYOR'S DISTRIBUTION SYSTEM, ALL IRRIGATION SYSTEMS MUST BE METERED AND MUST HAVE AN APPROVED BACKFLOW PREVENTION ASSEMBLY THAT IS COMPATIBLE WITH THE DEGREE OF HAZARD.

BACKFLOW PREVENTION DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH THE ONTARIO BUILDING CODE AND CAN /CAS-B64 SELECTION AND INSTALLATION OF THE BACKFLOW PREVENTERS /MAINTENANCE AND FIELD TESTING OF BACKFLOW PREVENTERS AND CITY OF LONDON WATER BY-LAW W-3.

ALL BACKFLOW PREVENTION DEVICES SHALL BE INSPECTED AND TESTED AT THE EXPENSE OF THE OWNER, UPON INSTALLATION, AND THEREAFTER ANNUALLY, OR MORE OFTEN IF REQUIRED BY THE CITY, BY PERSONNEL APPROVED BY THE CITY TO CARRY OUT SUCH TESTS TO DEMONSTRATE THAT THE DEVICE IS IN GOOD WORKING ORDER.

WATER METER PITS ARE TO BE IN ACCORDANCE WITH THE SECTION 441.05.22 OF THE CITY OF LONDON STANDARD CONTRACT DOCUMENTS FOR MUNICIPAL CONSTRUCTION PROJECTS AND THE MANUFACTURER'S RECOMMENDATIONS.

CITY OF LONDON STANDARD DRAWING

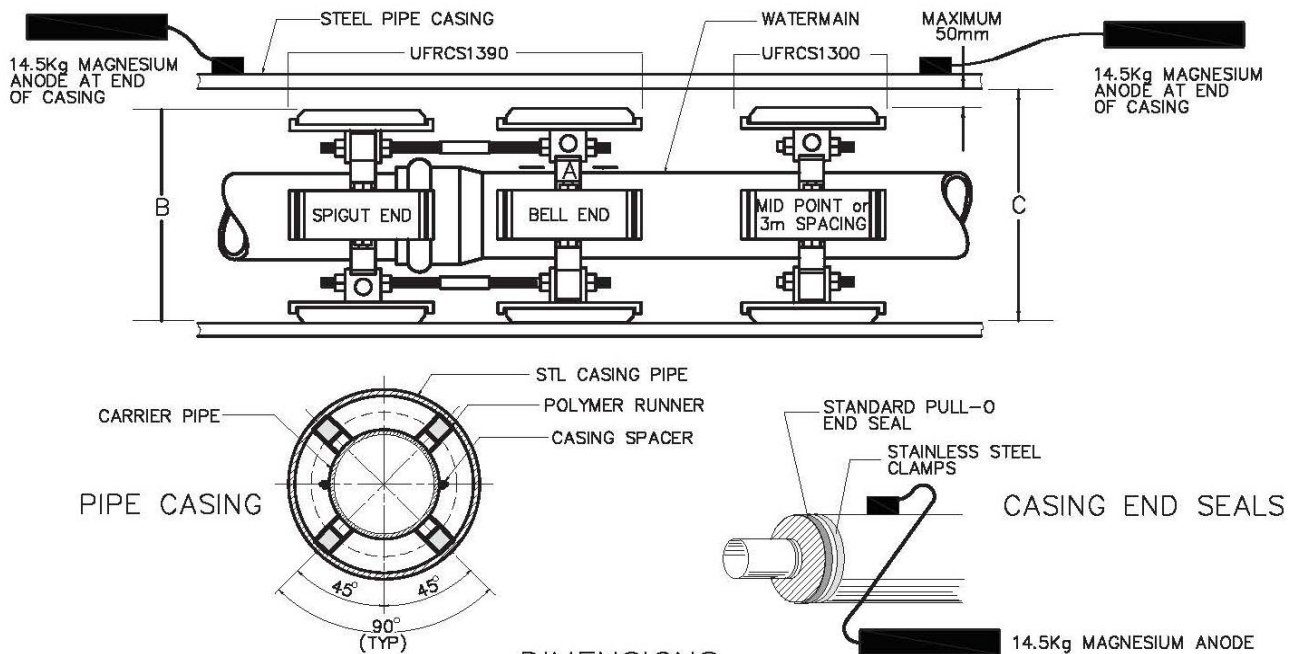
METERED IRRIGATION SYSTEM AND BACKFLOW PREVENTION ASSEMBLY

DWG W-CS-71

DATE 2012 01 26

APPROVED BY
CITY ENGINEER

NTS



DIMENSIONS

NOM. PIPE SIZE	ACTUAL PIPE OD (IN.)	A	B (APPROX)	1390 RESISTANT ROD		C REC. CASING SIZE (ID)	CASING MIN. WALL THICKNESS (ID)
				NO.	SIZE		
4"	4.80	1-1/8"	11-3/4"	2	3/4"X17"	12.4"	0.25
6"	6.90	1-1/8"	13-3/8"	2	3/4"X17"	14"	0.3125
8"	9.05	1-1/8"	17-1/8"	2	3/4"X17"	17.875"	0.3125
10"	11.10	1-3/8"	19-3/4"	4	3/4"X24"	21.5"	0.3125
12"	13.20	1-3/8"	21-7/8"	4	3/4"X24"	23"	0.375
14"	15.30	4"	26-3/8"	6	3/4"X30"	27"	0.375
16"	17.40	4"	28-3/8"	6	3/4"X30"	30"	0.500
18"	19.50	5"	30-1/2"	8	3/4"X30"	31"	0.500
20"	21.60	7"	32-1/4"	8	3/4"X36"	33"	0.500
24"	25.80	7"	38-1/4"	12	3/4"X36"	39"	0.500

*Working Pressure rating for the restrained carrier pipe, minimum 2:1 safety factor on all sizes

NOTES:

Carrier pipes to be installed inside casings shall be installed with self-restraining casing spacers. Casing spacers shall provide axial thrust restraint to prevent pipe joint separation during and after installation. They shall also provide dielectric insulation between the carrier pipe and the casing and facilitate installation of the carrier pipe into the casing.

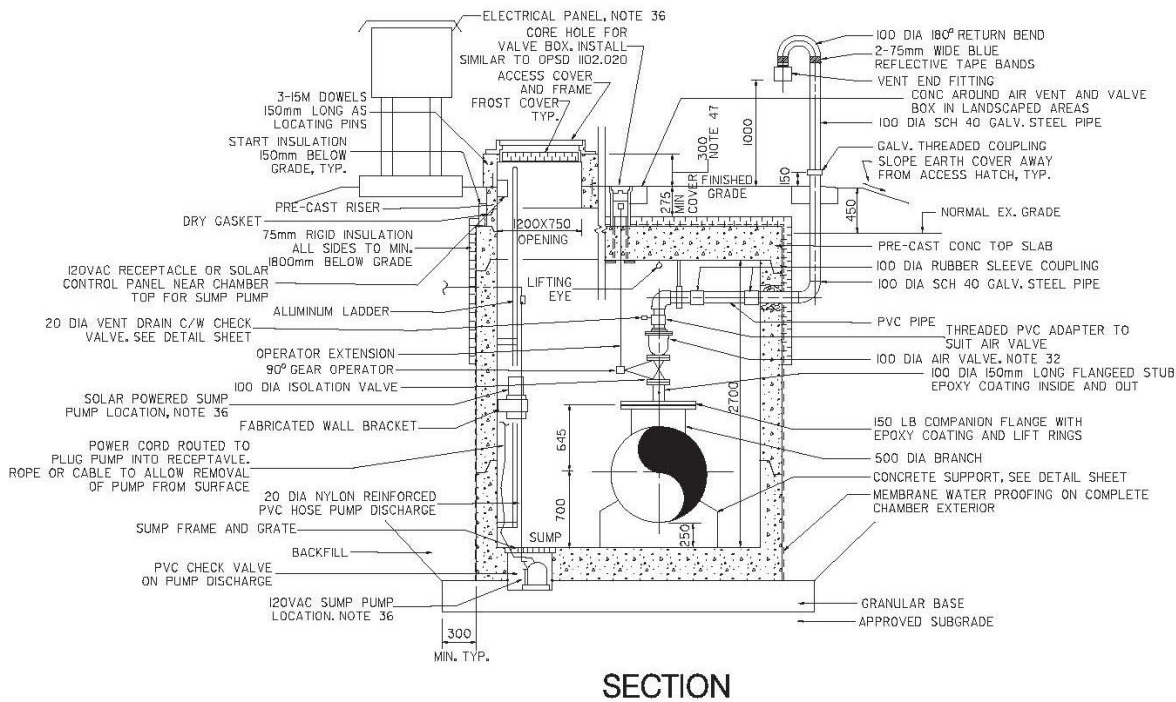
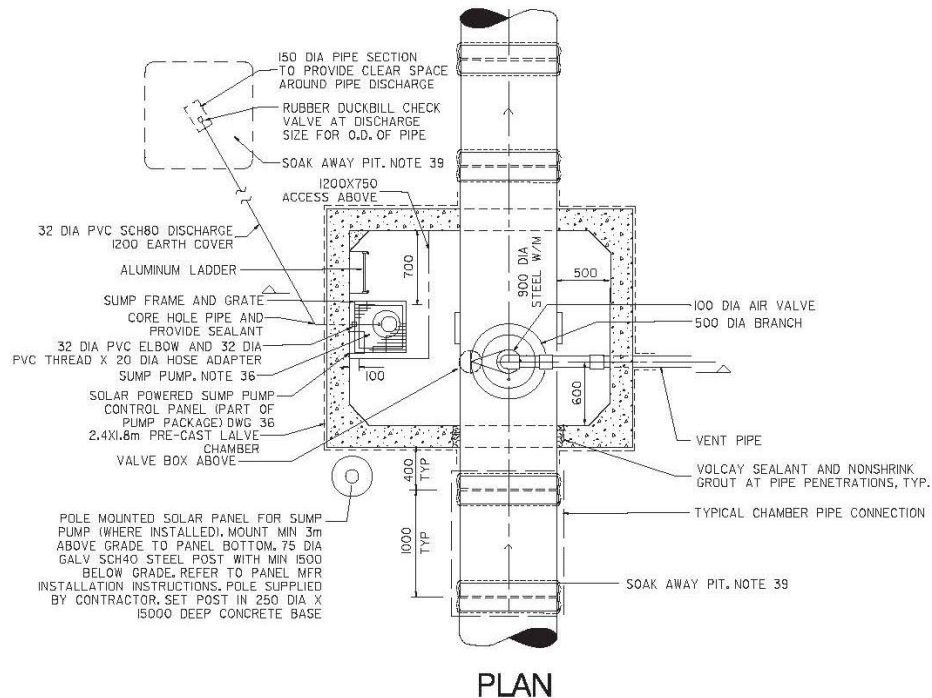
Restrained casing spacers shall be manufactured of high strength ductile iron, ASTM A536, Grade 65-45-12. Restraining rods shall be of high strength, low alloy material meeting the requirements of ANSI / AWWA C111 / A21.11. Casing spacer runners shall be of ultra high molecular weight polymer.

Restrained casing spacers shall be provided at all pipe bell joints. In addition, casing spacers shall be installed each 3 metres of the pipeline to support the pipe barrel and the weight of its contents. Restrained casing spacers shall be Uni-Flange Series UFRCS1300 (pipe barrel) or UFRCS1390 (for pipe bell joints) or approved equal.

CITY OF LONDON STANDARD DRAWING

CASING DETAIL

DWG: W-CS-72	DATE 2019 08 26	APPROVED BY CITY ENGINEER:	NTS
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CITY OF LONDON STANDARD DRAWING

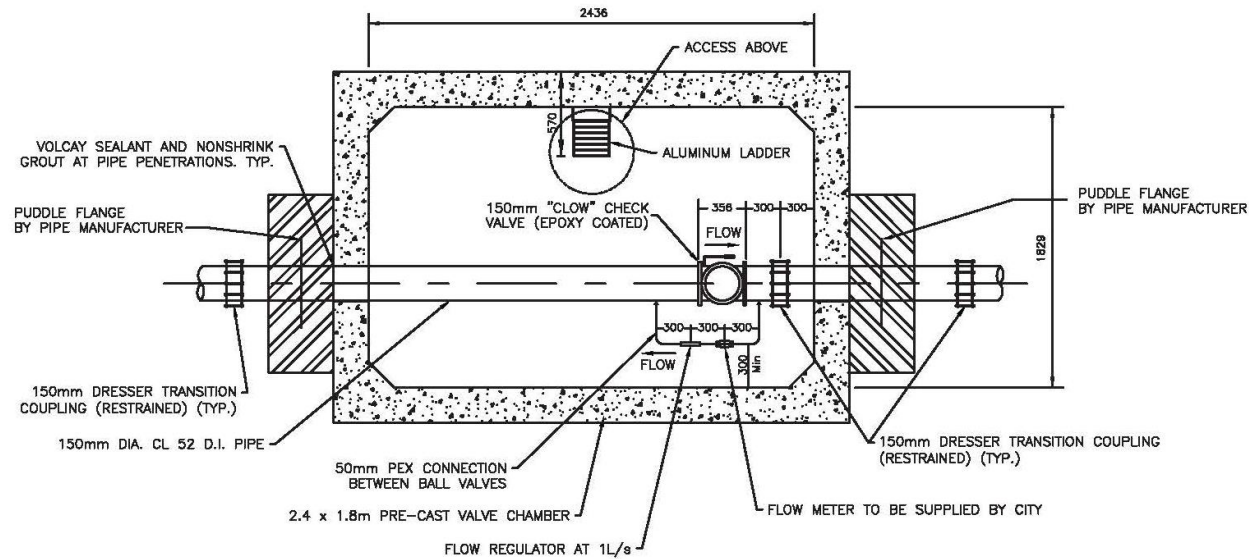
TYPICAL AIR VALVE CHAMBER

DWG: W-CS-74

DATE
2014 11 04

APPROVED BY
CITY ENGINEER:

NTS



MINIMUM SIZES OF PIPE AND FLOW REGULATOR SHOWN.
SIZES TO BE DETERMINED BASED ON EACH SPECIFIC APPLICATION

SEE SHEET 2 FOR SECTION VIEW

CITY OF LONDON STANDARD DRAWING

CHECK VALVE CHAMBER (PLAN VIEW)

DWG W-CS-75 SHEET 1

DATE
2019 09 09

APPROVED BY
CITY ENGINEER

NTS