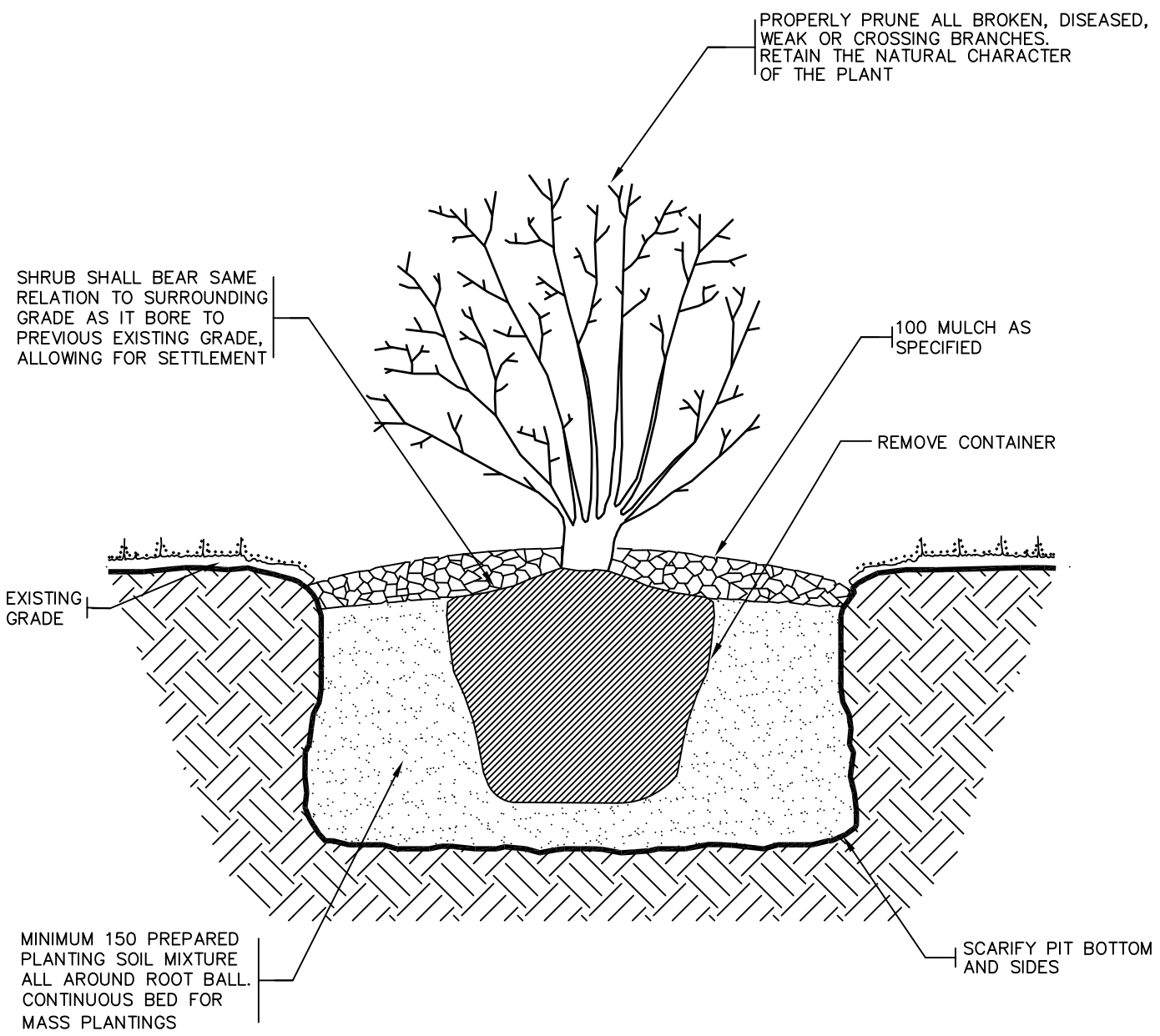


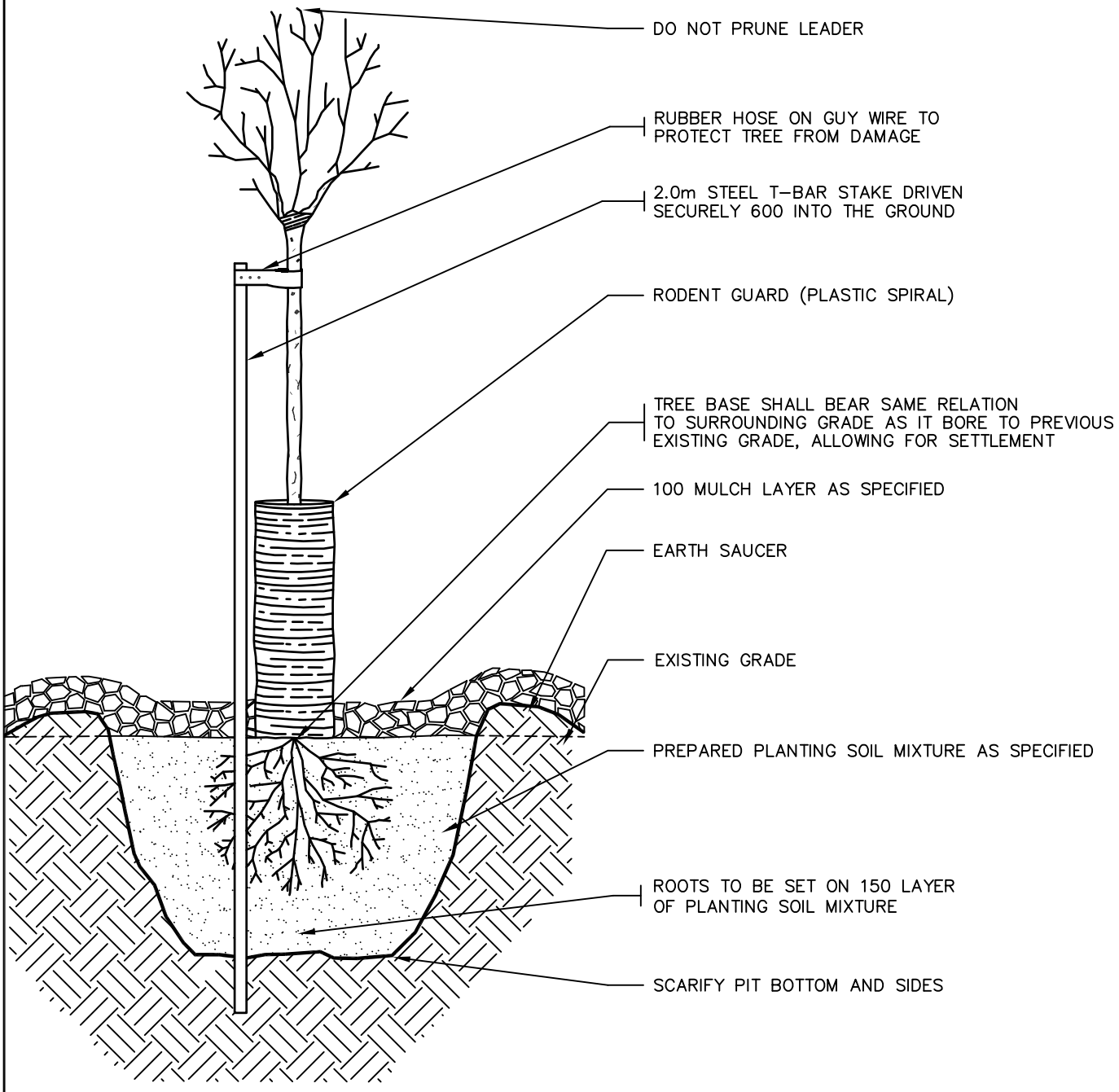
ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: January 2014	Rev. 1	NTS

SHRUB PLANTING POTTED

REGION STANDARD RH 100.01



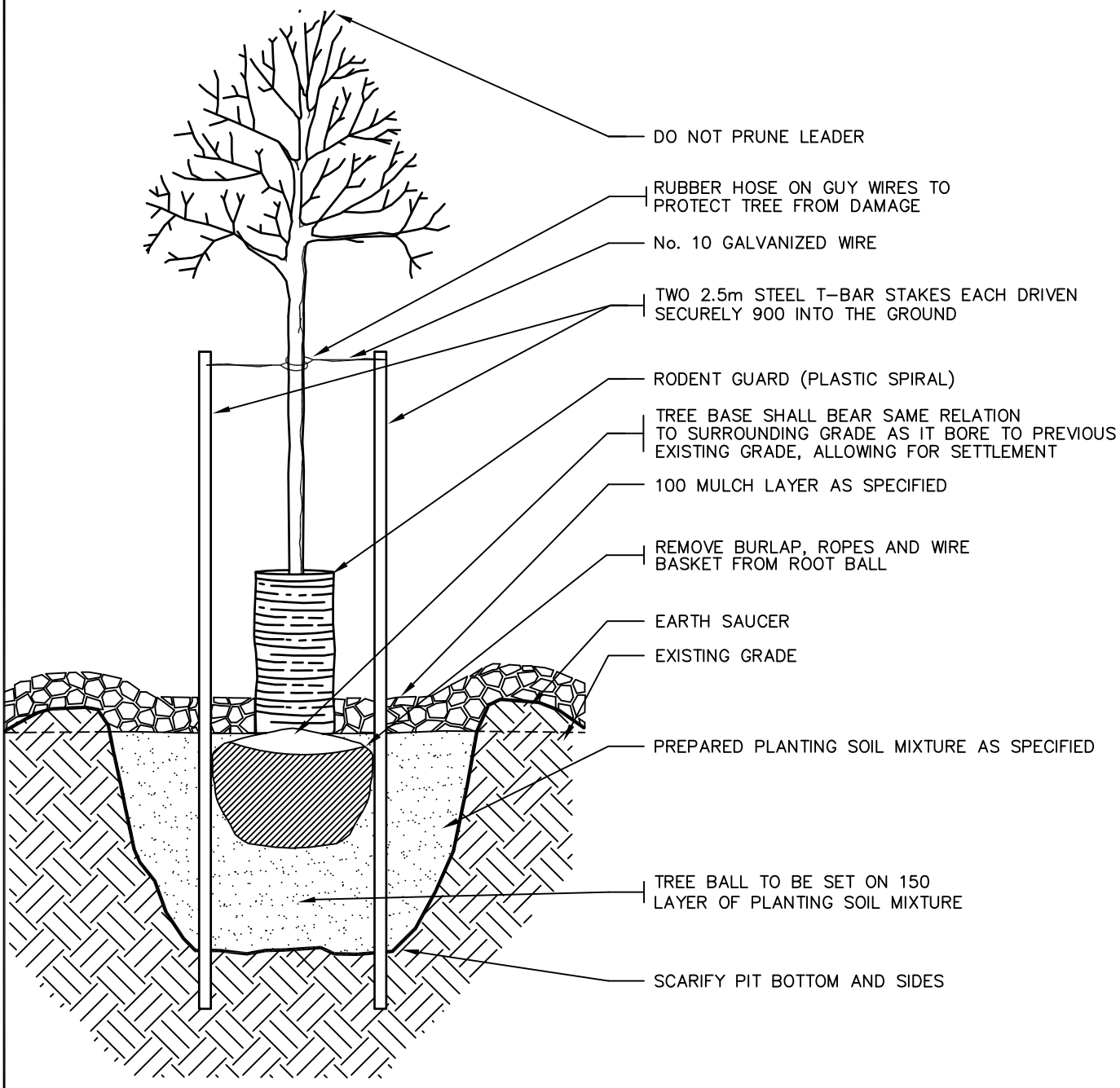
ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: January 2014	Rev. 1	NTS

DECIDUOUS TREE PLANTING BARE ROOT STOCK 2.0m, 2.5m & 3.0m HEIGHT

REGION STANDARD RH 100.02



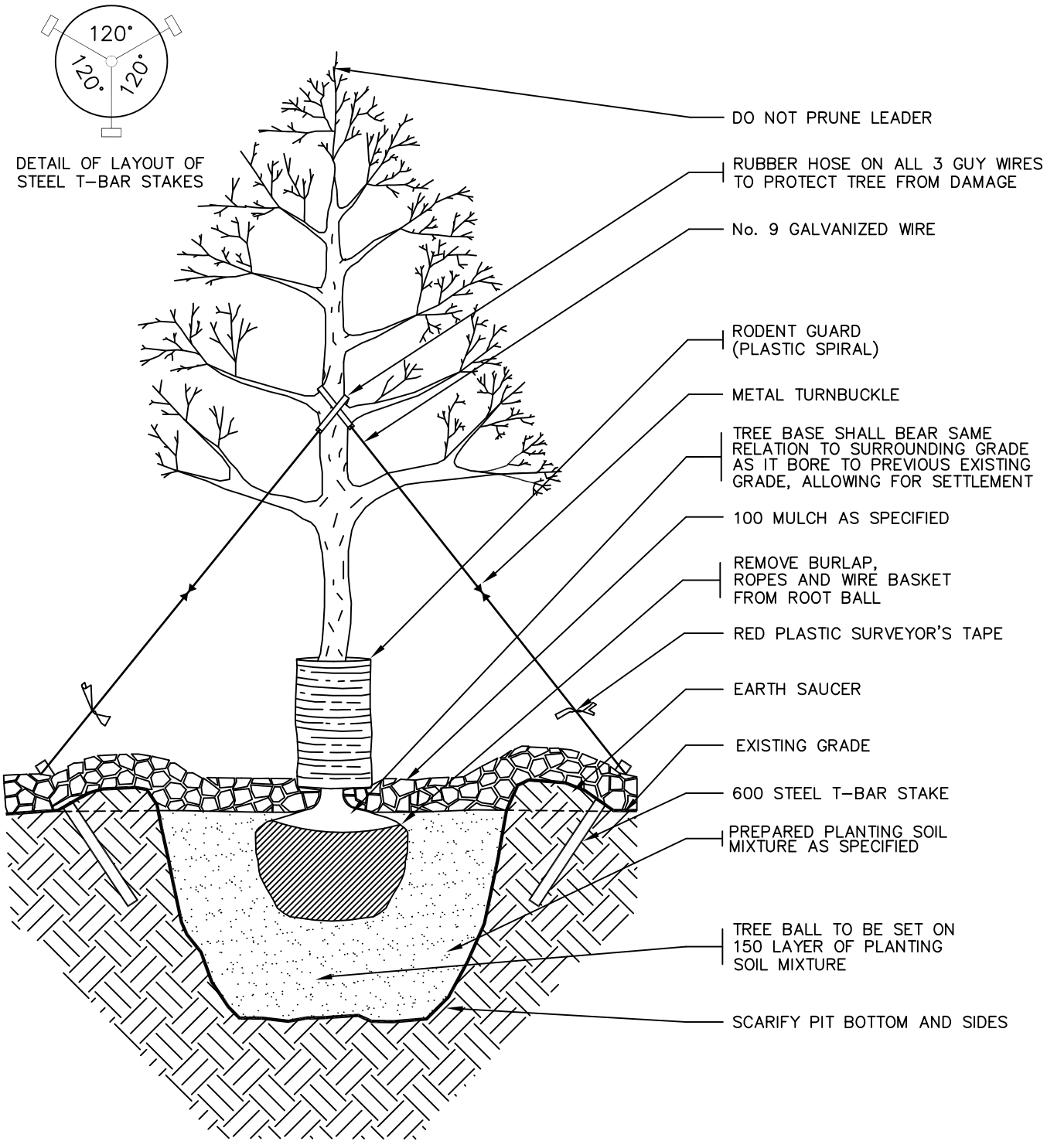
ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: January 2014	Rev. 1	NTS

DECIDUOUS TREE PLANTING 40mm, 50mm & 60mm CALLIPER

REGION STANDARD RH 100.03



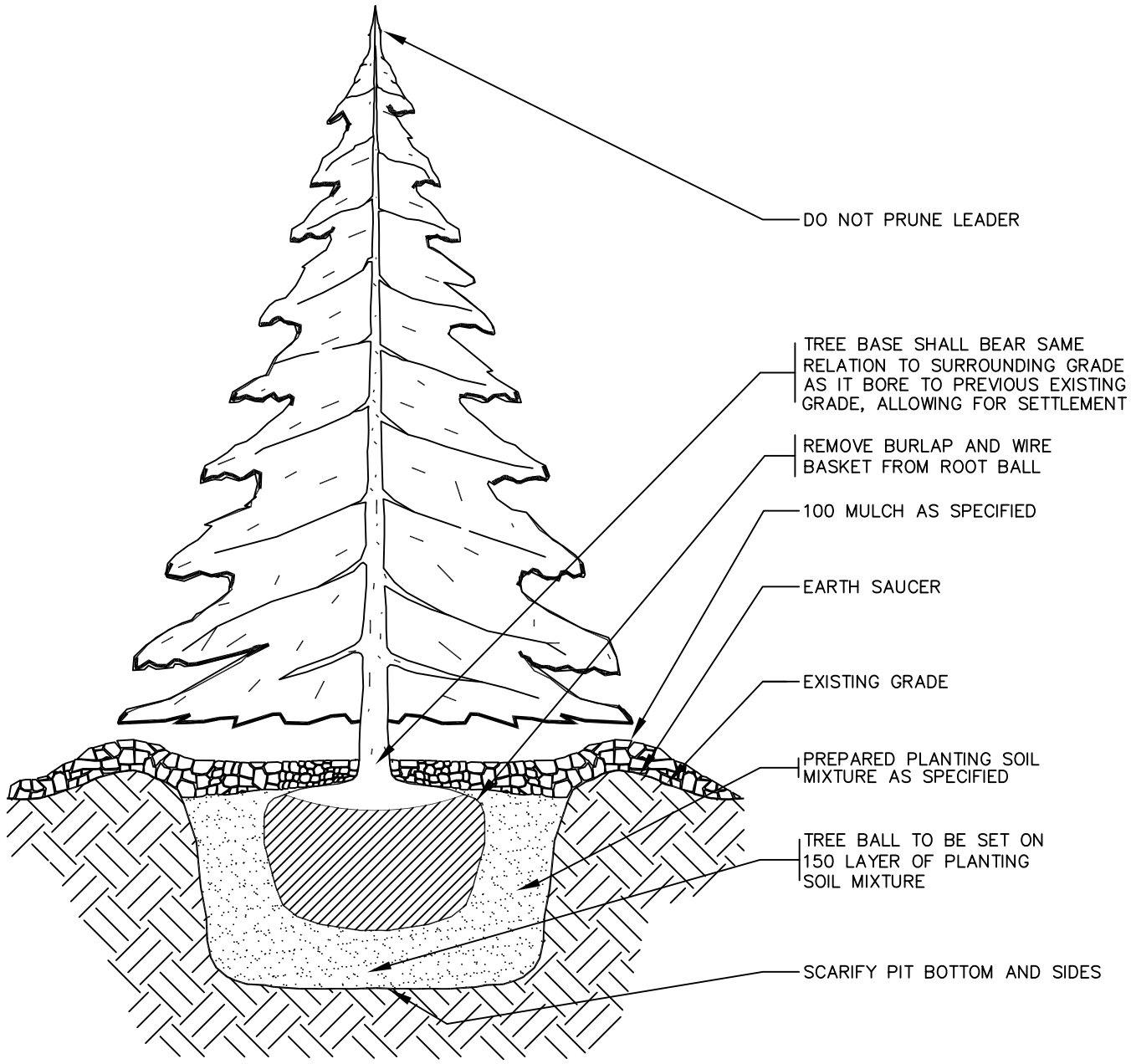
ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: January 2014	Rev. 1	NTS

DECIDUOUS TREE PLANTING 70mm & LARGER CALLIPER

REGION STANDARD RH 100.04



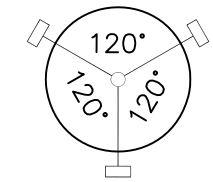
ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

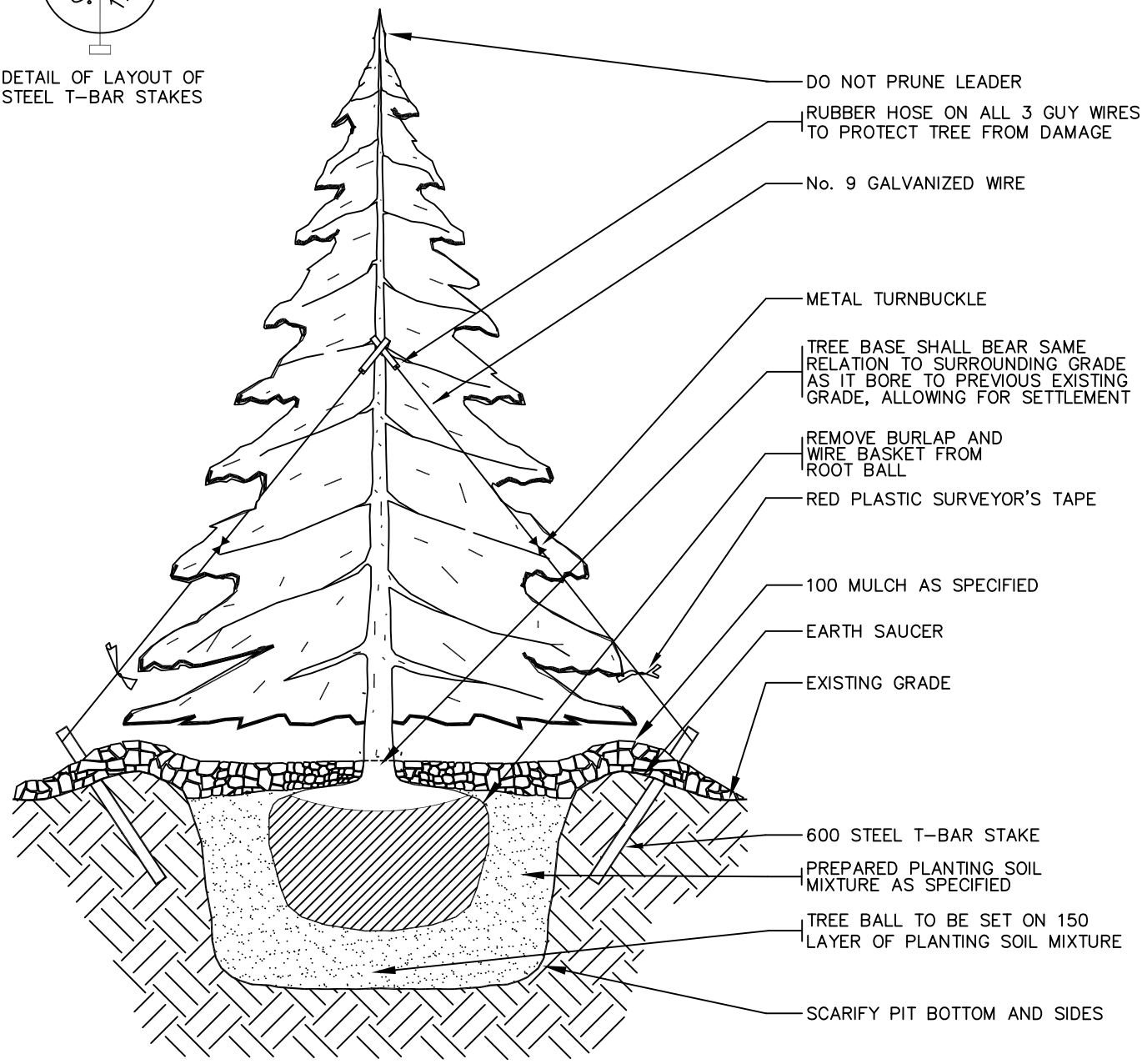
Date: January 2014	Rev. 1	NTS

CONIFEROUS TREE PLANTING 1.25m HEIGHT AND SMALLER

REGION STANDARD RH 100.05



DETAIL OF LAYOUT OF
STEEL T–BAR STAKES



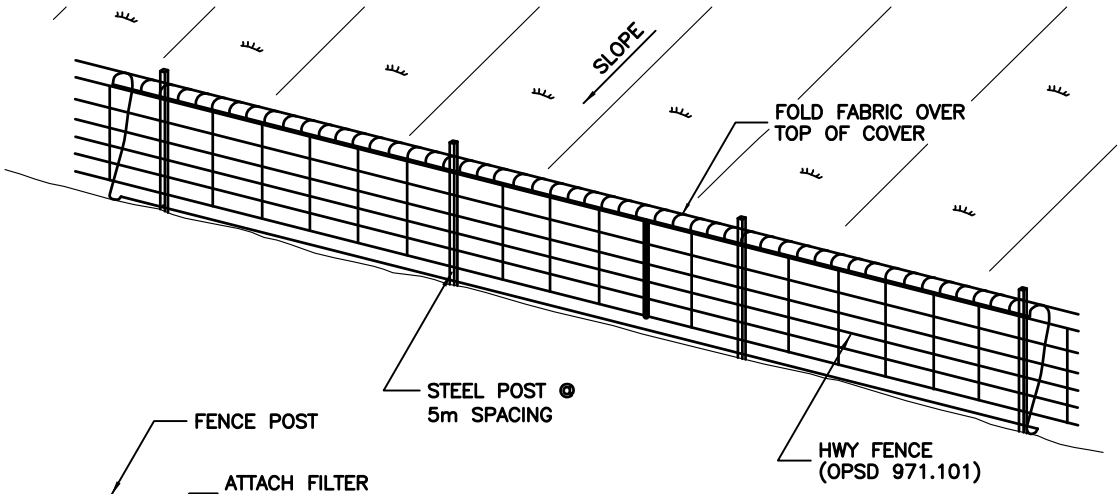
ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

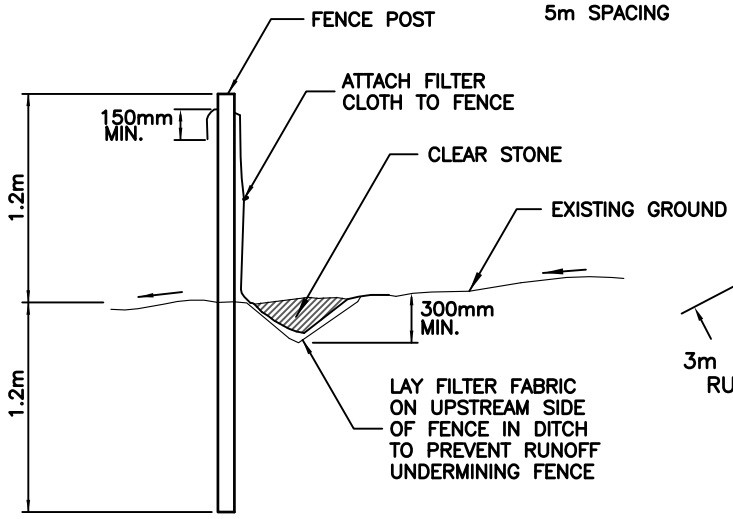
THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: January 2014	Rev. 1	NTS

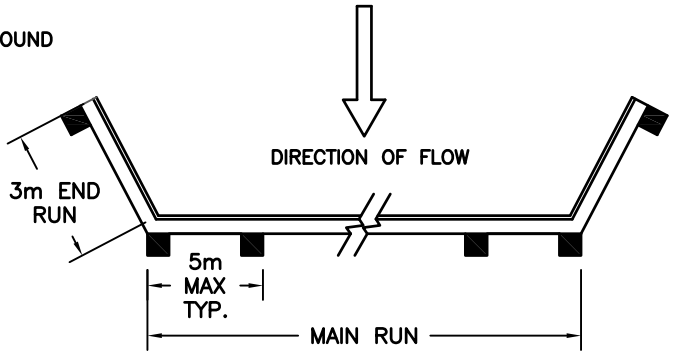
CONIFEROUS TREE PLANTING 1.50m HEIGHT AND LARGER

REGION STANDARD RH 100.06

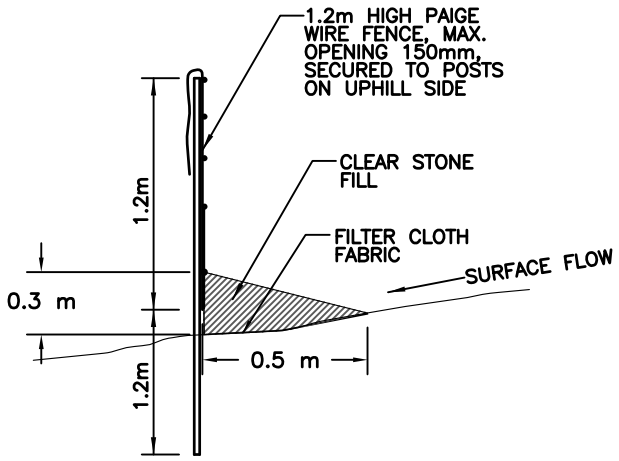




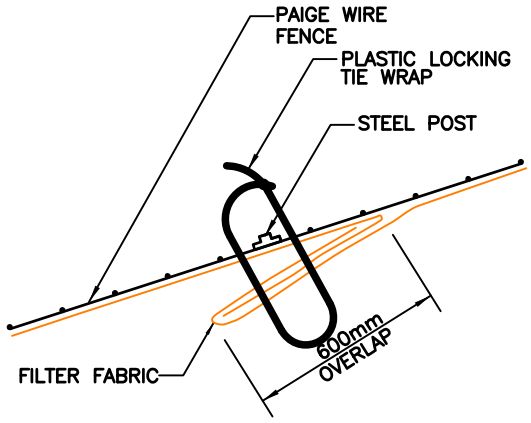
KEY–IN



PLAN VIEW



NON KEY–IN



CONNECTION @ STEEL POST

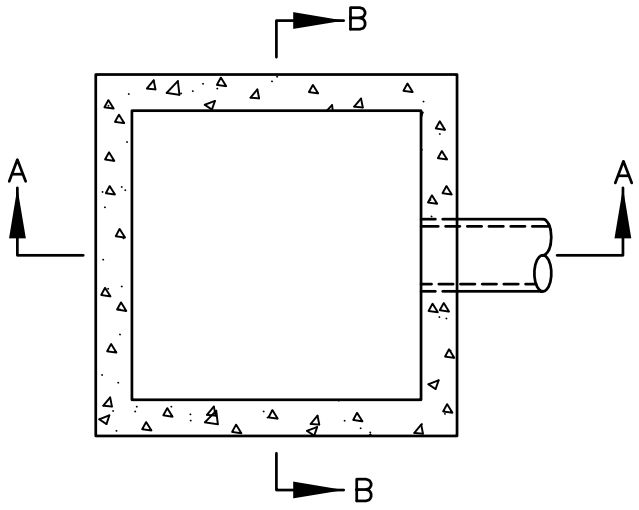
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

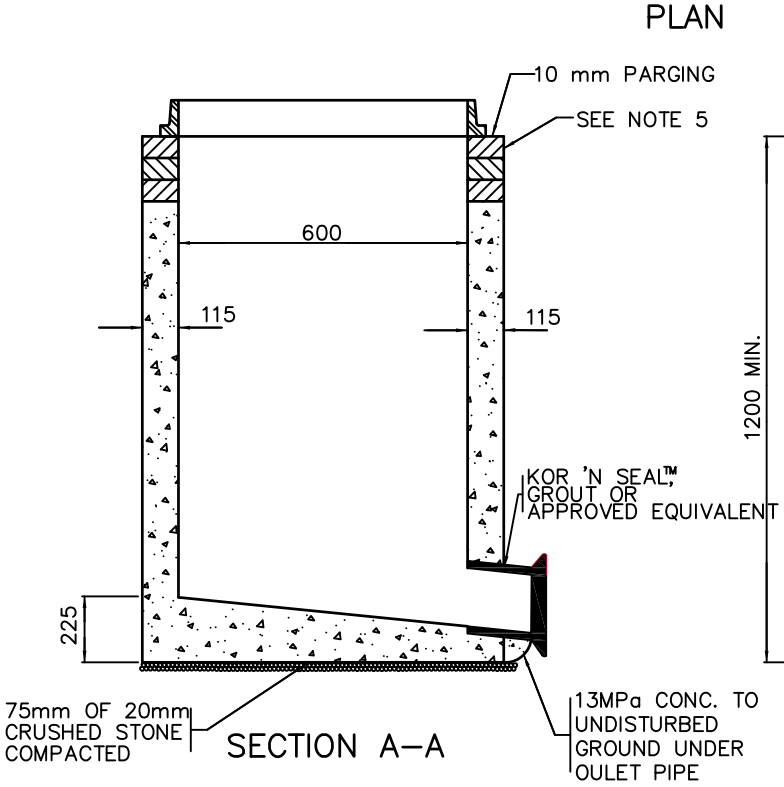
Date: January 2014 | Rev. 0 | NTS

HEAVY DUTY SILT FENCE BARRIER

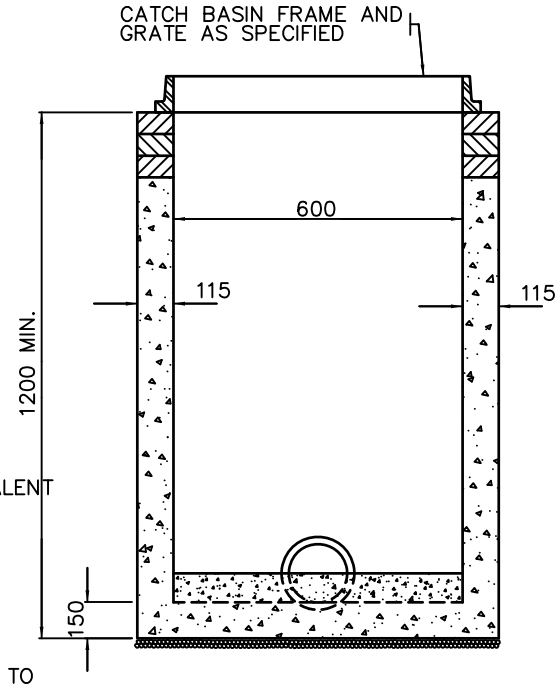
REGION STANDARD RH 200.040



PLAN



SECTION A–A



SECTION B–B

NOTES:

1. CONCRETE TO BE 27 MPa AT 28 DAYS.
2. PARGING MIX ON ANY BRICKWORK TO BE 1:3 MORTAR MIX AND APPLIED 10mm THICK, OUTSIDE ONLY.
3. ALL JOINTS AND LIFTING HOLES TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
4. FOR USE IN SPECIAL LOCATIONS ONLY WITH THE APPROVAL OF THE DESIGN ENGINEER.
5. ADJUSTMENT UNITS TO BE MIN. 150mm TO MAX. 300mm
6. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

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PUBLIC WORKS DEPARTMENT

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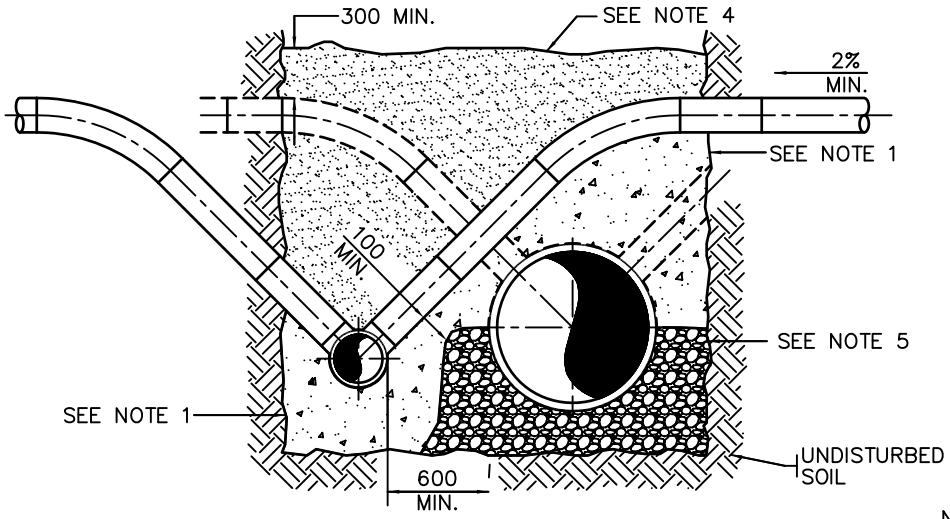
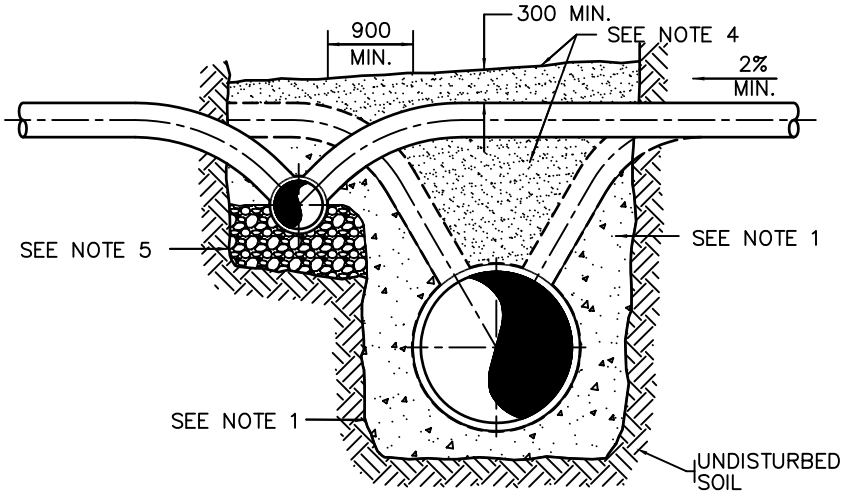
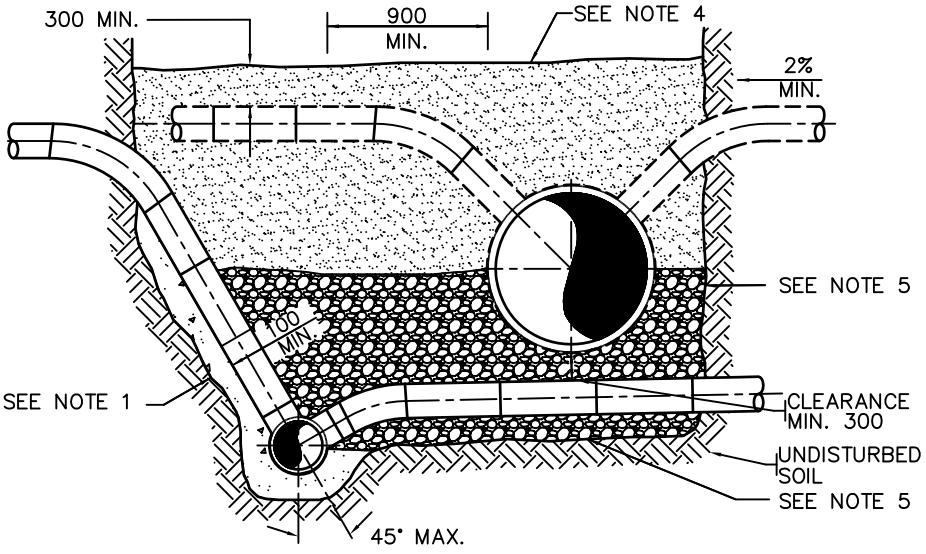
PRECAST CATCHBASIN WITHOUT SUMP

REGION STANDARD RH 301.01







NOTES:

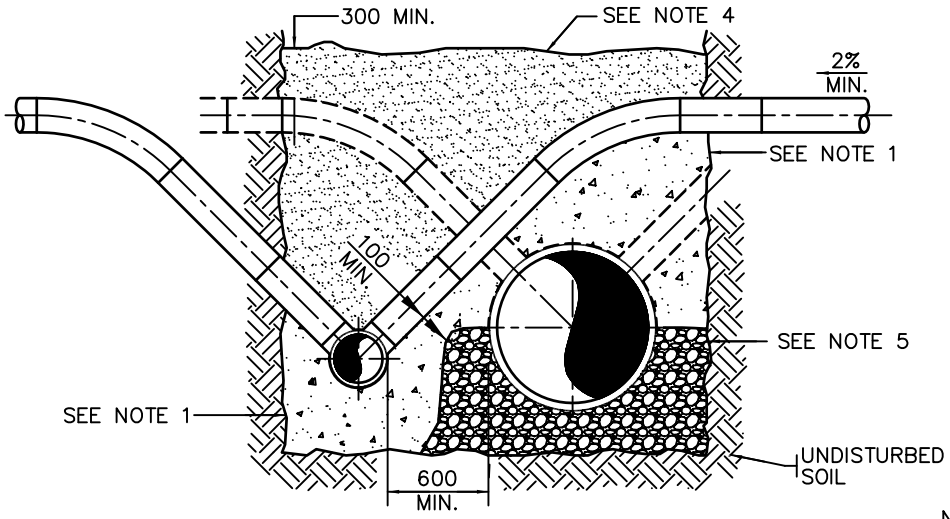
1. CONCRETE TO BE AT 20 MPa AT 28 DAYS.
2. USE FACTORY INSTALLED 'TEES' UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
3. THE USE AND LOCATION OF ELBOWS TO BE AS DIRECTED BY THE ENGINEER.
4. GRANULAR MATERIAL COMPACTED TO 95% STD. PROCTOR. STONE SIZE WITHIN 300mm OF SURFACE OF PIPE, SHALL NOT EXCEED 25 mm.
5. GRANULAR 'A' COMPACTED TO 95% STD. PROCTOR OR WITH THE ENGINEER'S APPROVAL. USE 16 mm CLEAR STONE AT LATERAL LOCATIONS. REFER TO RISER DETAIL OPSD–1006.010.
6. FOR BEDDING DETAILS SEE OPSD
7. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

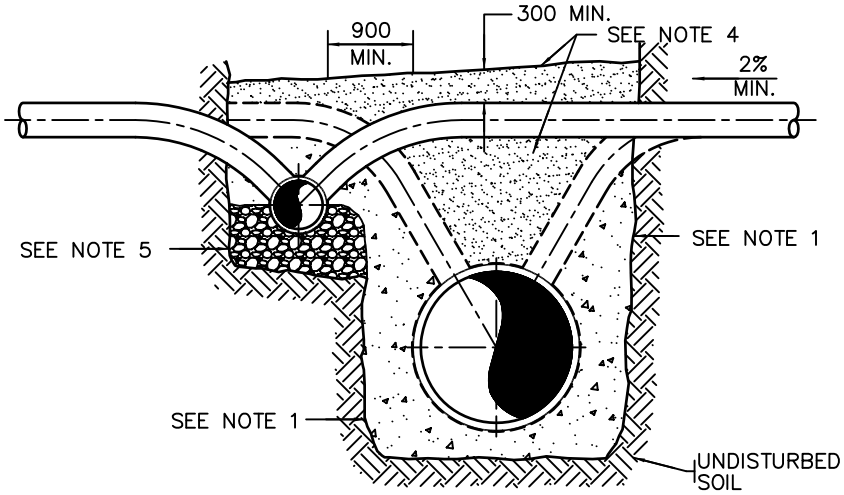
THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

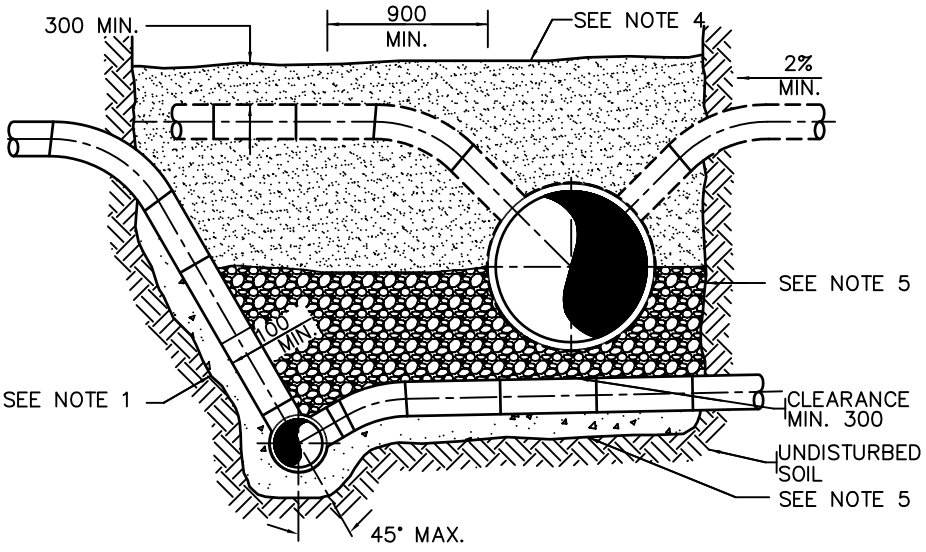
Date: January 2014 | Rev. 2 | NTS

COMMON TRENCH FOR SEWER SERVICE CONNECTIONS FOR RIGID PIPE

REGION STANDARD RH 302.01







NOTES:

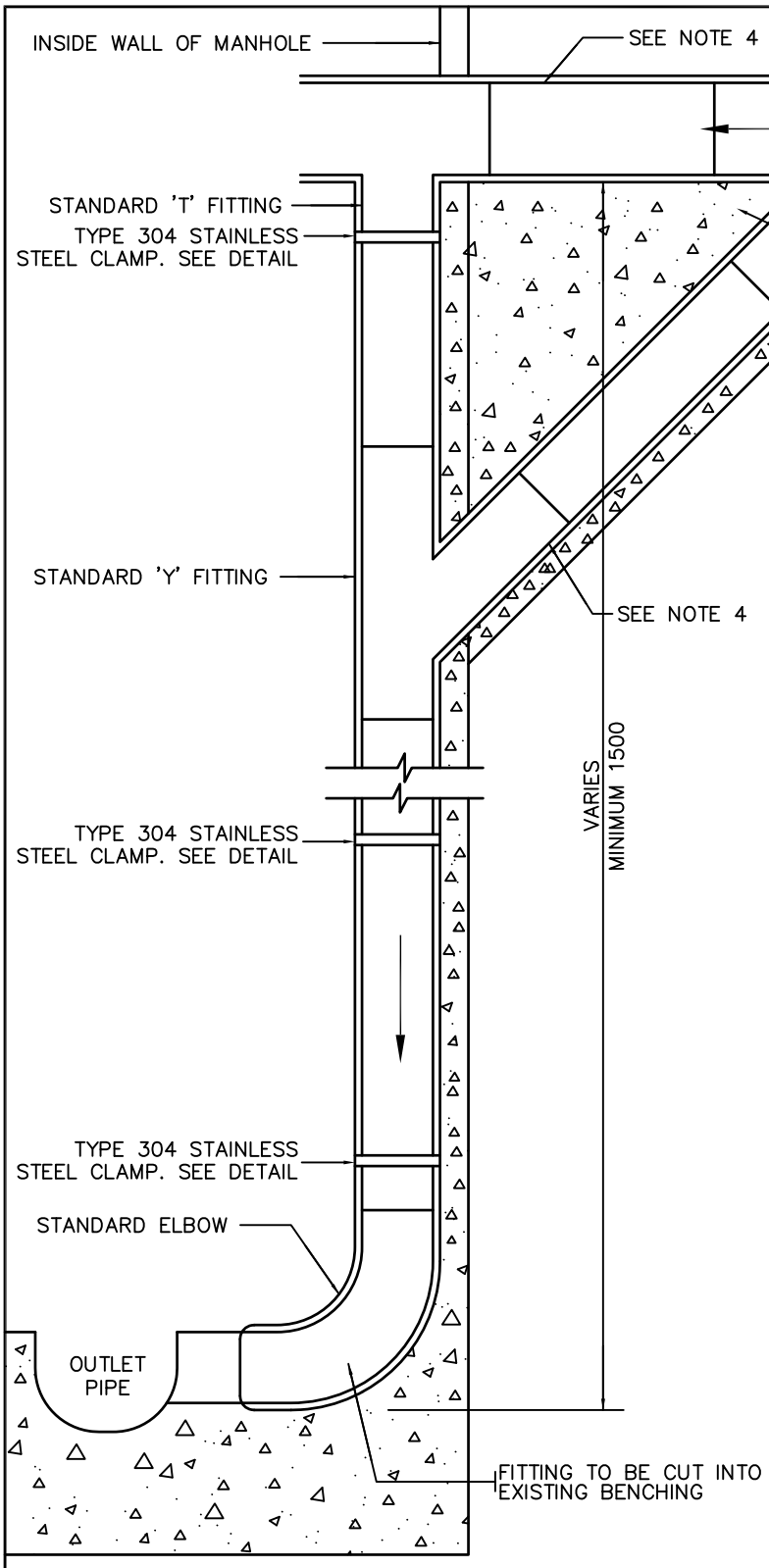
1. CONCRETE TO BE AT 20MPa AT 28 DAYS.
2. USE FACTORY INSTALLED 'TEES' UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
3. THE USE AND LOCATION OF ELBOWS TO BE AS DIRECTED BY THE ENGINEER.
4. GRANULAR MATERIAL COMPACTED TO 95% STD. PROCTOR. STONE SIZE WITHIN 300mm OF SURFACE OF PIPE, SHALL NOT EXCEED 25mm.
5. GRANULAR 'A' COMPACTED TO 95% STD. PROCTOR OR WITH THE ENGINEER'S APPROVAL. USE 16mm CLEAR STONE AT LATERAL LOCATIONS. REFER TO RISER DETAIL OPSD–1006.020.
6. FOR BEDDING DETAILS SEE OPSD
7. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

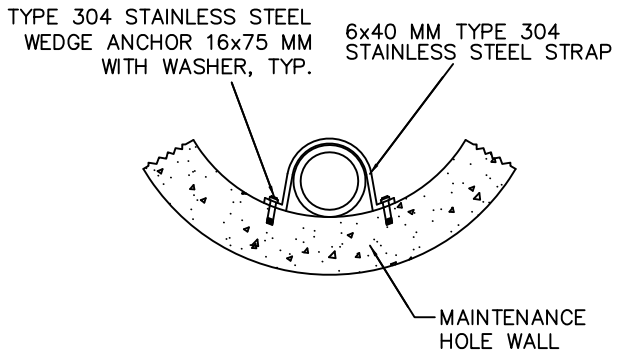
THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

COMMON TRENCH FOR SEWER SERVICE CONNECTIONS FOR FLEXIBLE PIPE

Date: January 2014	Rev. 1	NTS

REGION STANDARD RH 302.02





CLAMP DETAIL

NOTES:

1. PIPE MATERIAL TO BE P.V.C. SDR 35
2. DROP PIPE TO BE ONE SIZE SMALLER THAN INLET PIPE.
3. MINIMUM SIZE DROP PIPE TO BE 150mm.
4. DROP PIPE TO MATCH OBVERTS WITH OUTLET PIPE AND BENCHED TO OBVERT.
5. ADJUSTMENTS TO BE MADE WITH STRAIGHT PIPE LENGTHS TO PROVIDE 600mm MIN. BETWEEN BREAK-INS FOR PIPES.
6. DROP PIPE TO BLEND WITH FLOW.
7. ALL CONCRETE IN DROP STRUCTURE TO BE 20 MPa IN 28 DAYS.
8. MANHOLE STEPS TO BE RELOCATED IF NECESSARY.
9. TYPE 304 STAINLESS STEEL SUPPORT CLAMPS WITH GALVANIZED LAG SCREWS TO BE USED AT 1500mm MAX. CENTRES.
10. THIS STRUCTURE IS TO BE USED ONLY WITH THE CONSENT OF THE REGION OF HALTON FOR RETROFIT AT EXISTING MANHOLES.
11. MINIMUM REMAINING INTERNAL DIAMETER OF MANHOLE SHALL BE 1200mm.
12. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

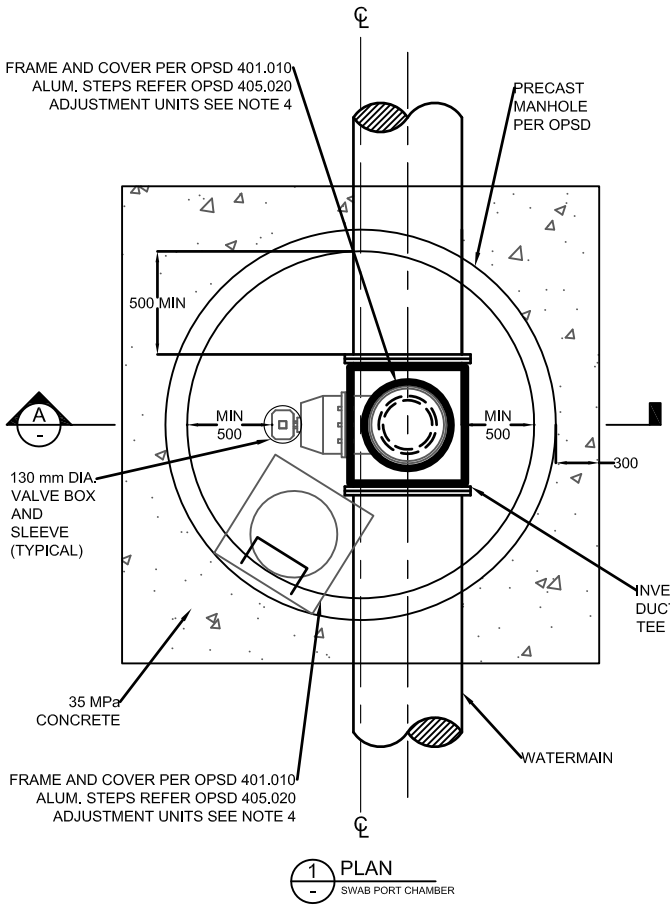
THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

INTERNAL DROP STRUCTURE FOR MANHOLES

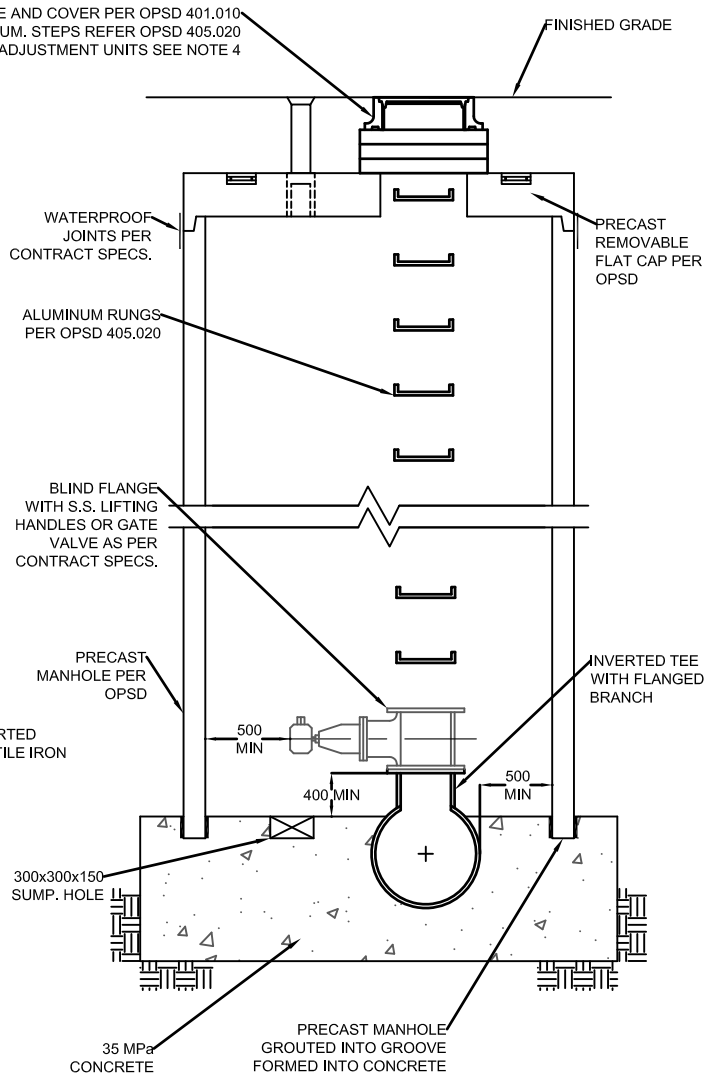
SPECIAL CONSIDERATION ONLY

Date: January 2014	Rev. 2	NTS

REGION STANDARD RH 303.01



1 - PLAN
SWAB PORT CHAMBER



A - SECTION

NOTES:

1. REINF. CONC. PRECAST CHAMBER TO MEET CURRENT OPSD.
2. LIFTING HANDLES TO BE COUNTERSUNK IN FLAT CAP.
3. STEPS: 1ST STEP TO BE 450 MM BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300 MM ABOVE BASE.
4. ADJUSTMENT UNITS TO BE MIN. 150 MM TO MAX. 300 MM.
5. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15 MM THICK.
6. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
7. PRESS SEAL OR EQUIVALENT RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
8. BOLTS AND RESTRAINING RODS HIGH STRENGTH, LOW ALLOY, ANSI/AWWA C111/A21.11.
9. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

PIPE SIZE	SWAB PORT	CHAMBER Ø
400-600	300 MIN.	2400
750	400 MIN.	2400
900	600 MIN.	3000
1200	600 MIN.	3600

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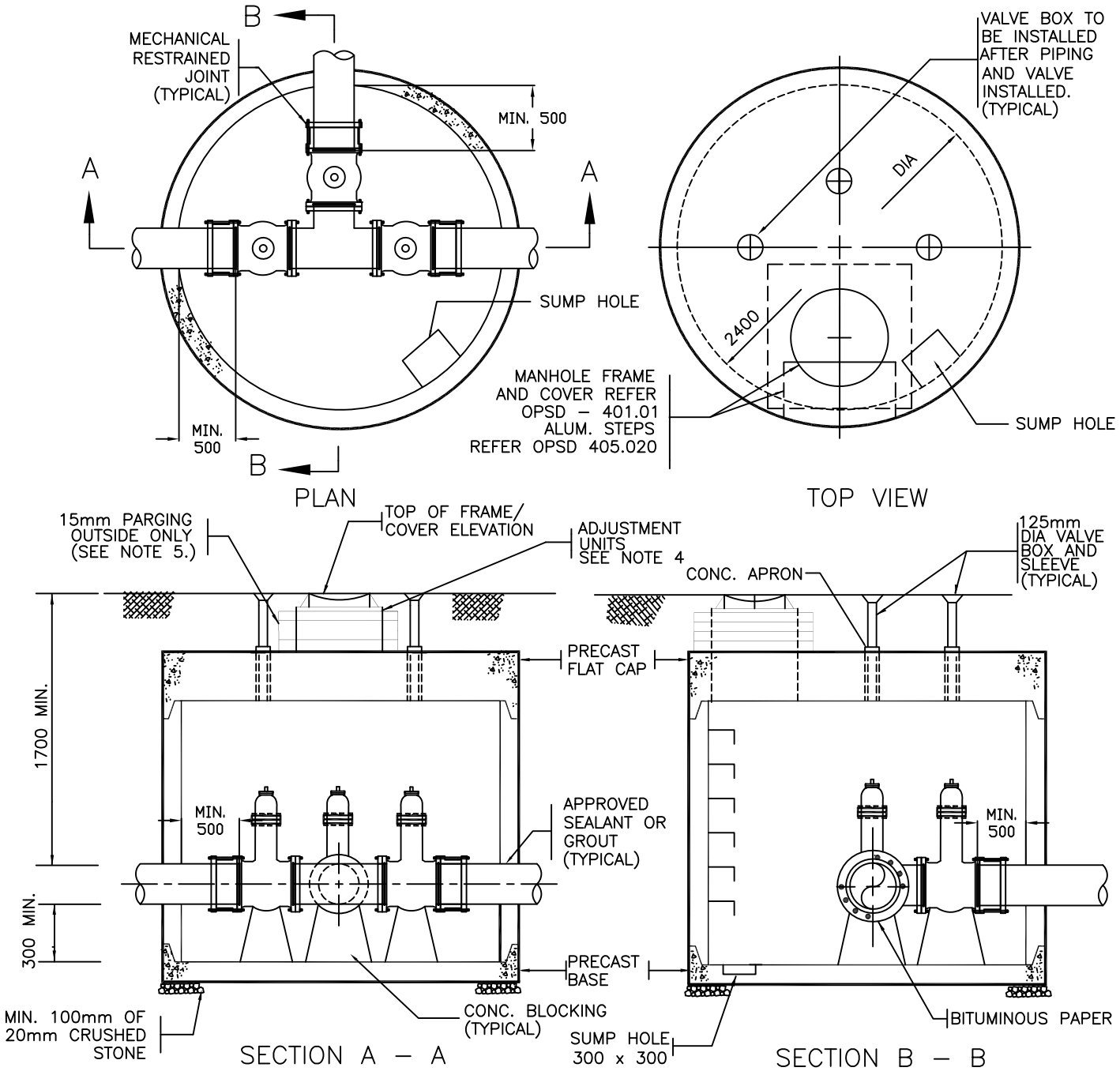
SWABBING PORT CHAMBER DETAIL

REGION STANDARD RH 401.010



NOTES

1. REINF. CONC. PRECAST CHAMBER TO MEET CURRENT OPSD.
2. STEPS: 1ST STEP TO BE 450M MM BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300 MM ABOVE BASE.
3. VALVES TO BE FLANGED.
4. ADJUSTMENTS UNITS TO BE MIN. 150 MM TO MAX. 300 MM.
5. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15 MM THICK.
6. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
7. PRESS SEAL OR EQUIVALENT RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
8. BOLTS AND RESTRAININGS RODS HIGH STRENGTH, LOW ALLOY, ANSI/AWWA C111/A21.11.
9. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON
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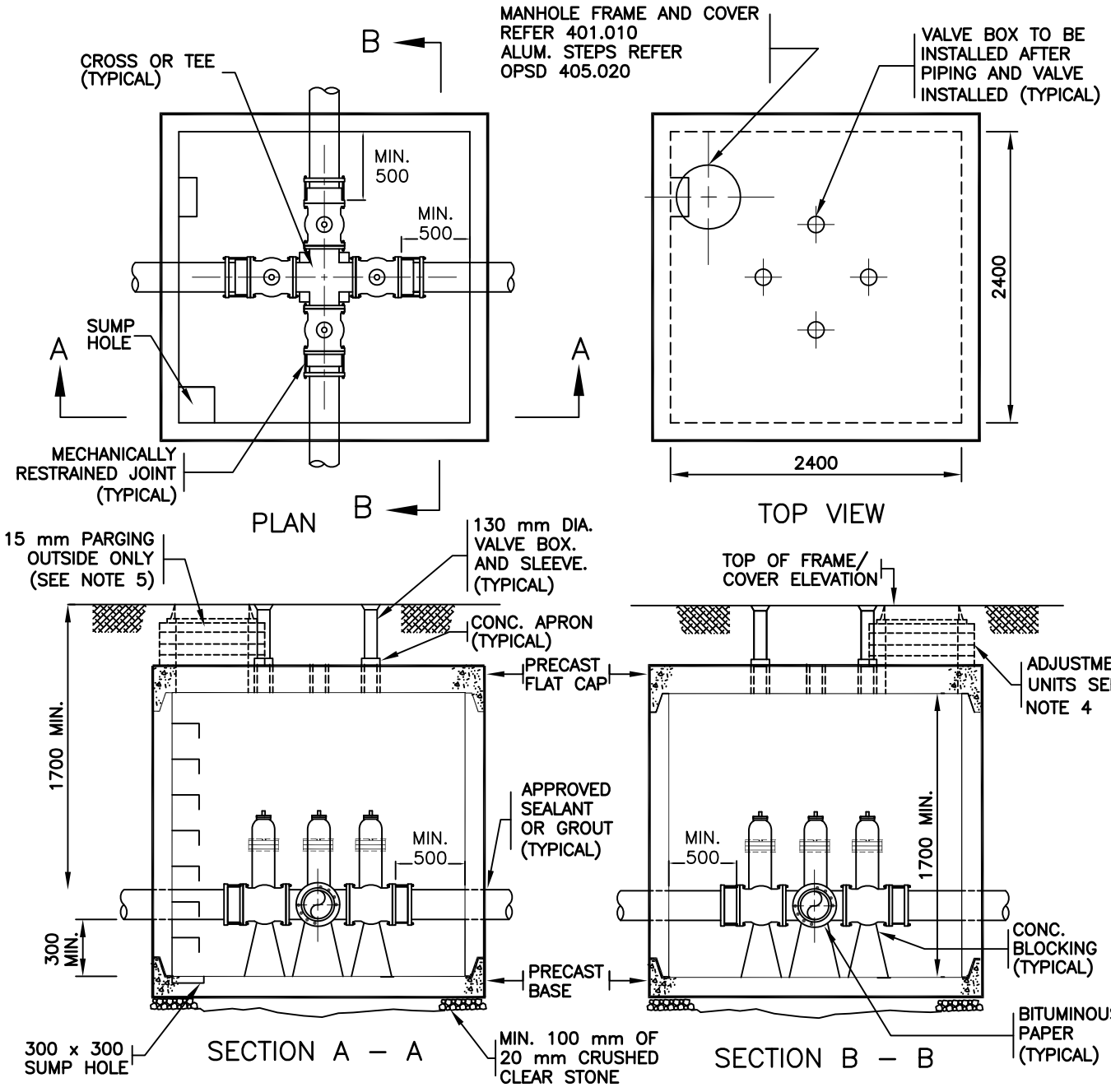
PRECAST VALVE CHAMBER FOR THREE VALVES 150 mm TO 200 mm

Date: January 2014	Rev. 0	NTS

REGION STANDARD RH 402.010



NOTES:

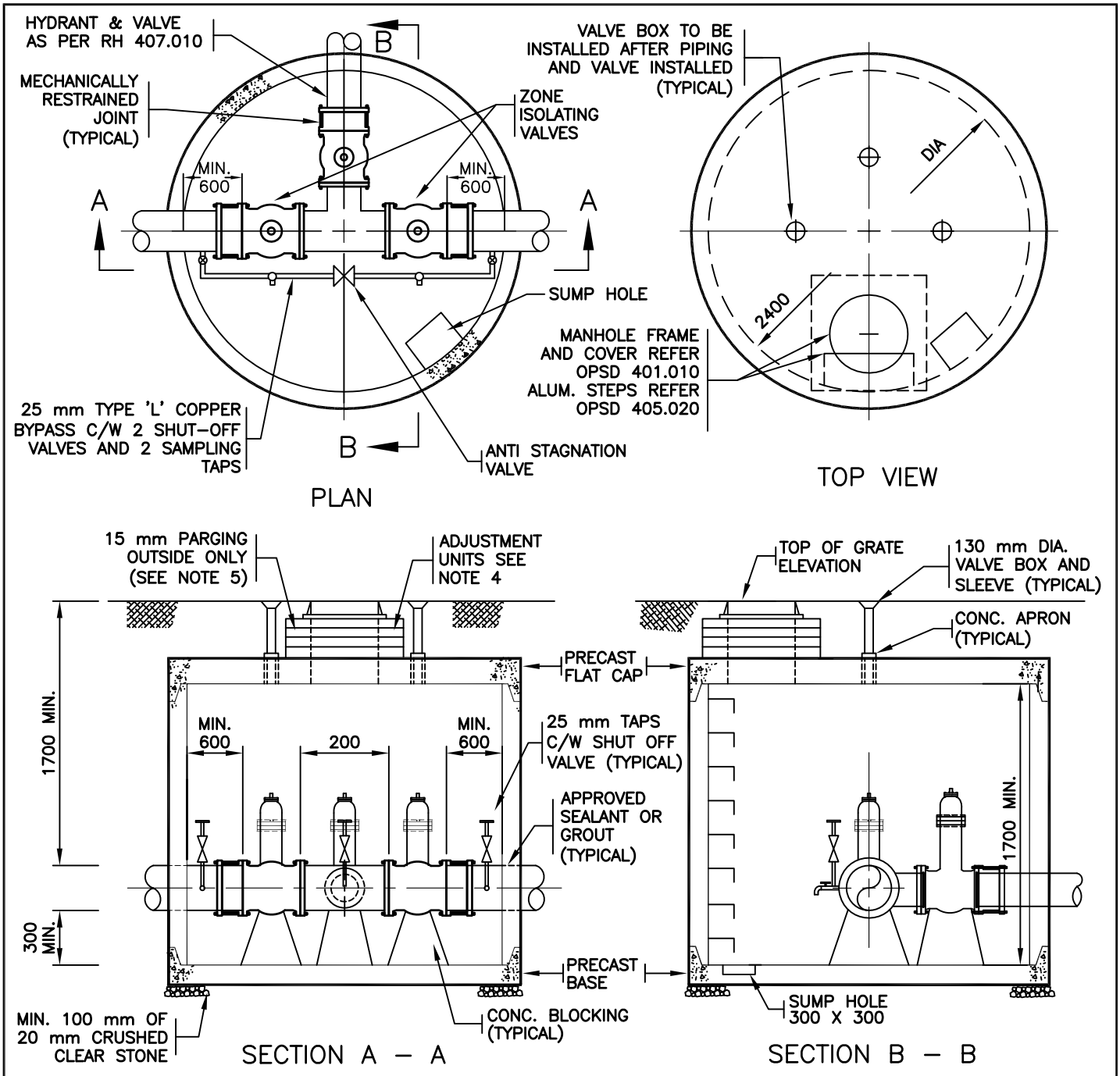
1. REINF. CONC. PRECAST CHAMBER TO MEET CURRENT OPSD.
2. STEPS: 1ST STEP TO BE 450 mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300 mm ABOVE BASE.
3. VALVES TO BE FLANGED.
4. ADJUSTMENT UNITS TO BE MIN. 150 mm TO MAX. 300 mm.
5. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15 mm THICK.
6. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
7. PRESS SEAL OR EQUIVALENT RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
8. BOLTS AND RESTRAINING RODS HIGH STRENGTH, LOW ALLOY, ANSI/AWWA C111/A21.11.
9. FOR 300 mm AND 400 mm TEES, THE MAIN LINE CAN BE OFFSET FROM THE CENTRELINE OF CHAMBER UP TO 200 mm AS NEEDED.
10. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: July 2017 | Rev. 2 | NTS

PRECAST VALVE CHAMBERS FOR MAXIMUM 4 VALVES 150 mm TO 300 mm

REGION STANDARD RH 402.020



NOTES:

1. REINF. CONC. PRECAST CHAMBER TO MEET CURRENT OPSD.
2. STEPS: 1ST STEP TO BE 450 mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300 mm ABOVE BASE.
3. VALVES TO BE FLANGED.
4. ADJUSTMENT UNITS TO BE MIN. 150 mm TO MAX. 300 mm.
5. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15 mm THICK.
6. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
7. PRESS SEAL OR EQUIVALENT RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
8. BOLTS AND RESTRAINING RODS HIGH STRENGTH, LOW ALLOY, ANSI/AWWA C111/A21.11.
9. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON
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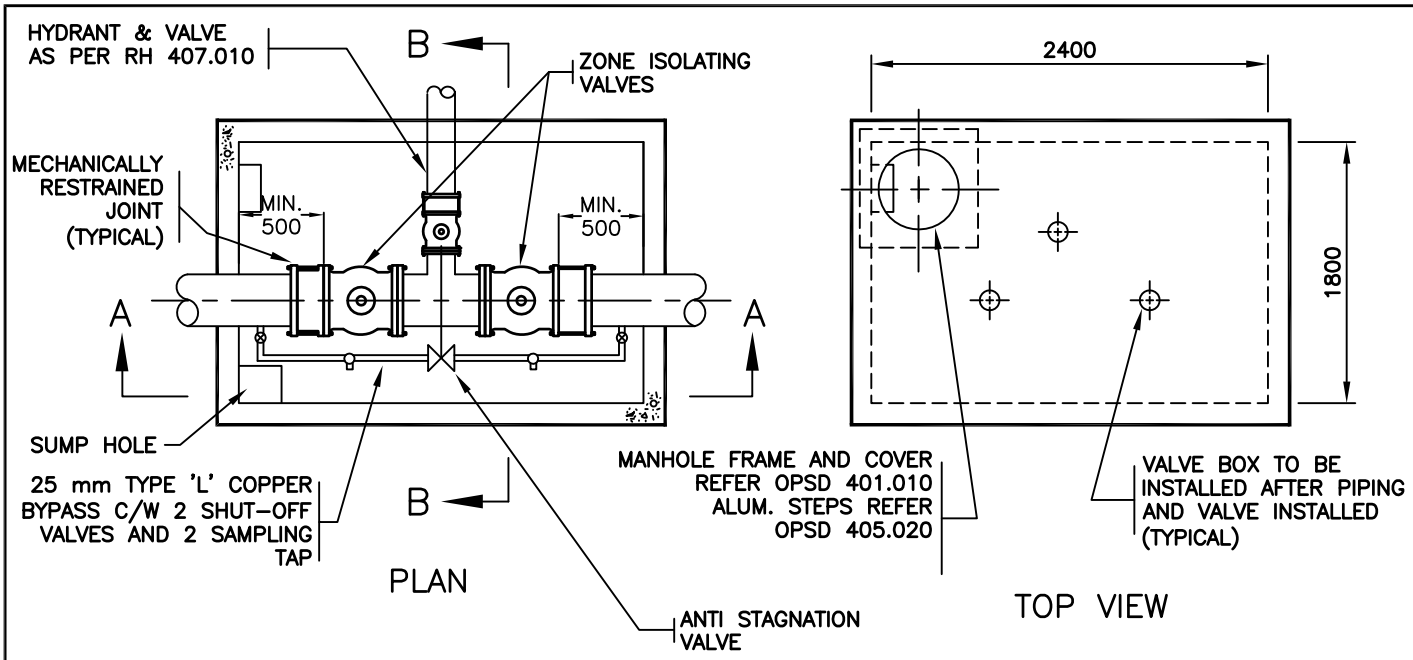
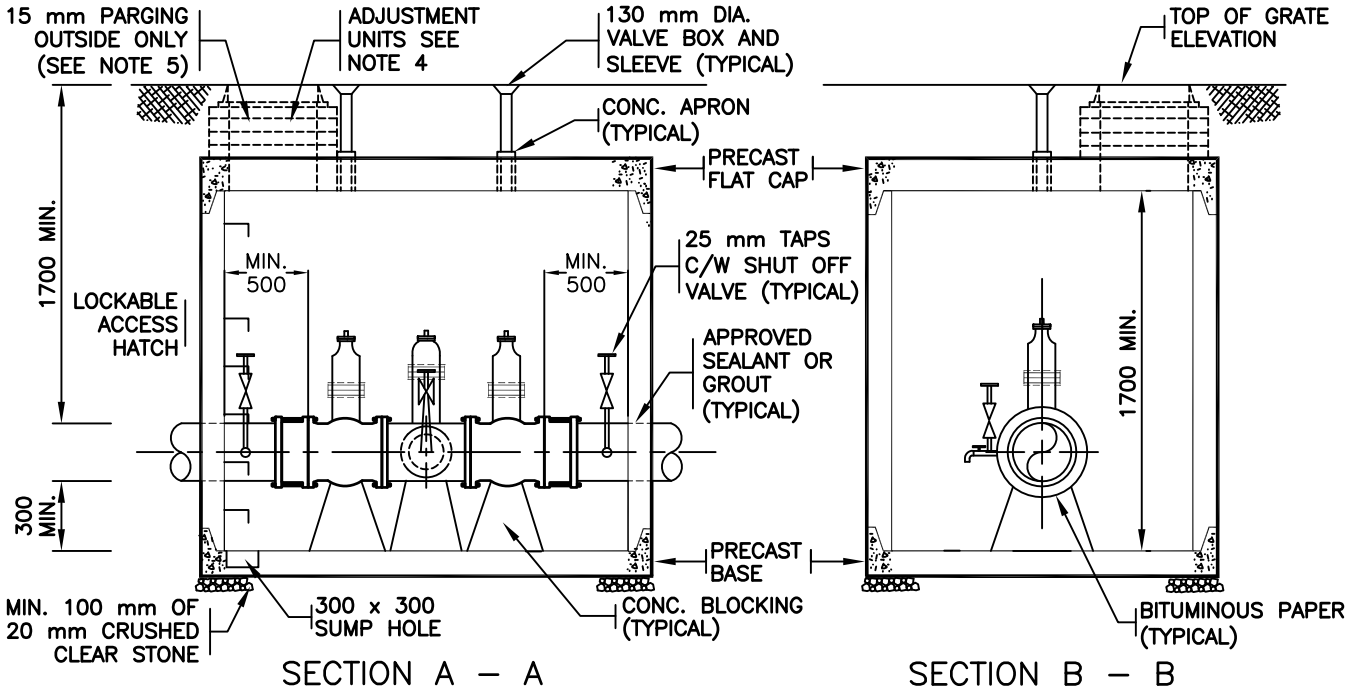
Date: January 2014 | Rev. 0 | NTS

ZONE ISOLATING VALVE CHAMBER 150 mm TO 200 mm

REGION STANDARD RH 402.030





NOTES:

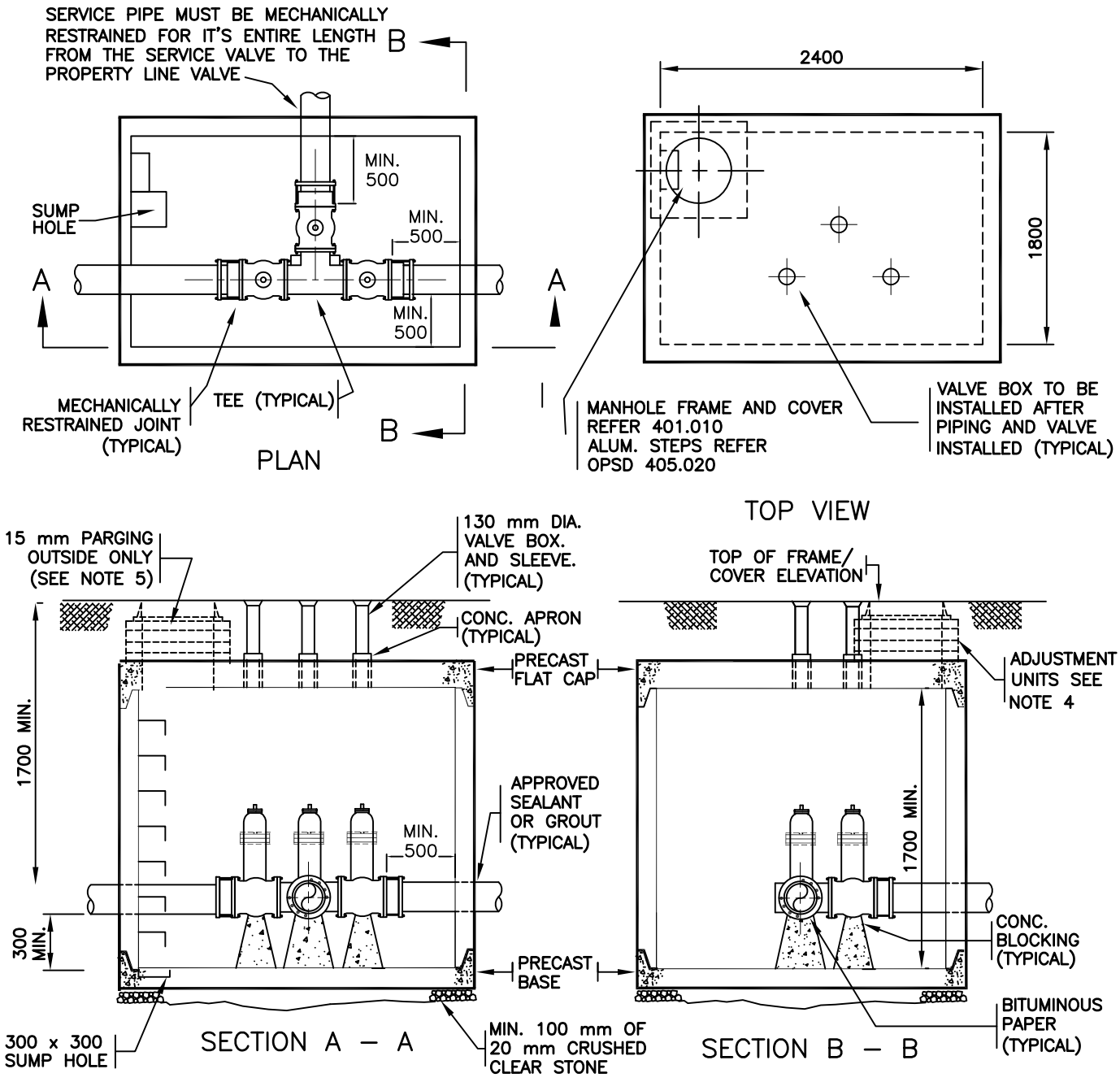
1. REINF. CONC. PRECAST CHAMBER TO MEET CURRENT OPSD.
2. STEPS: 1ST STEP TO BE 450 mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300 mm ABOVE BASE.
3. VALVES TO BE FLANGED.
4. ADJUSTMENT UNITS TO BE MIN. 150 mm TO MAX. 300 mm.
5. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15 mm THICK.
6. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
7. PRESS SEAL OR EQUIVALENT RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
8. BOLTS AND RESTRAINING RODS HIGH STRENGTH, LOW ALLOY, ANSI/AWWA C111/A21.11.
9. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: July 2017	Rev. 2	NTS

ZONE ISOLATING VALVE CHAMBER 300 mm & LARGER

REGION STANDARD RH 402.040

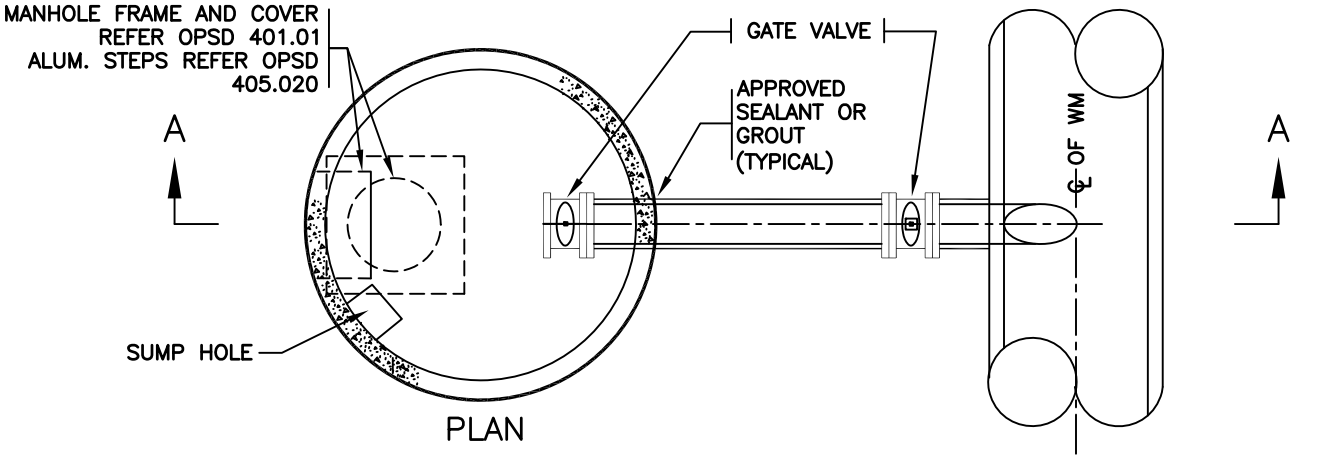


NOTES:

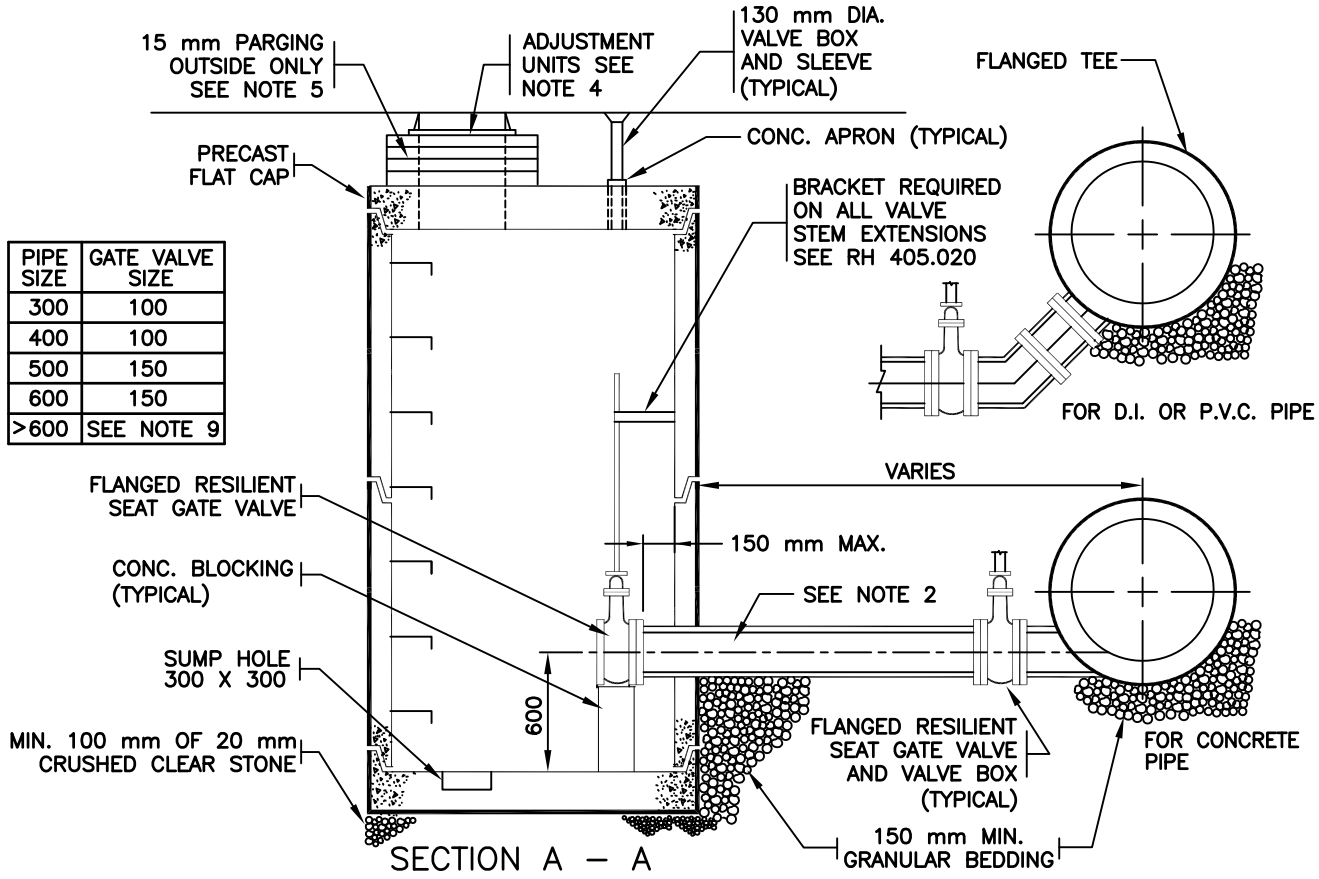
1. REINF. CONC. PRECAST CHAMBER TO MEET CURRENT OPSD.
2. STEPS: 1ST STEP TO BE 450 mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300 mm ABOVE BASE.
3. VALVES TO BE FLANGED.
4. ADJUSTMENT UNITS TO BE MIN. 150 mm TO MAX. 300 mm.
5. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15 mm THICK.
6. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
7. PRESS SEAL OR EQUIVALENT RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
8. BOLTS AND RESTRAINING RODS HIGH STRENGTH, LOW ALLOY, ANSI/AWWA C111/A21.11.
9. FOR 300 mm AND 400 mm TEES, THE MAIN LINE CAN BE OFFSET FROM THE CENTRELINE OF CHAMBER UP TO 200 mm AS NEEDED.
10. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

PRECAST VALVE CHAMBERS FOR MAXIMUM 3 VALVES 150mm TO 300mm AND MULTI UNIT SERVICE

Date: July 2017	Rev. 1	NTS
REGION STANDARD	RH	402.050



PLAN



PIPE SIZE	GATE VALVE SIZE
300	100
400	100
500	150
600	150
>600	SEE NOTE 9

SECTION A – A

NOTES:

1. REINF. CONC. PRECAST CHAMBER TO MEET CURRENT OPSD.
2. MECHANICALLY RESTRAINED JOINTS REQUIRED ON ALL JOINTS BETWEEN WATERMAIN AND CHAMBER VALVE.
3. VALVE OPERATOR TO BE OPPOSITE FRAME AND COVER OPENINGS.
4. ADJUSTMENT UNITS TO BE MIN. 150 mm TO MAX. 300 mm.
5. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15 mm THICK.
6. STEPS: 1ST STEP TO BE 450 mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300 mm ABOVE BASE.
7. VALVES TO BE FLANGED.
8. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
9. OUTLET PIPE/VALVE SIZING TO BE DETERMINED BY ENGINEER AND APPROVED BY REGION.
10. PRESS SEAL OR EQUIVALENT RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
11. BOLTS AND RESTRAINING RODS HIGH STRENGTH, LOW ALLOY, ANSI/AWWA C111/A21.11.
12. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON
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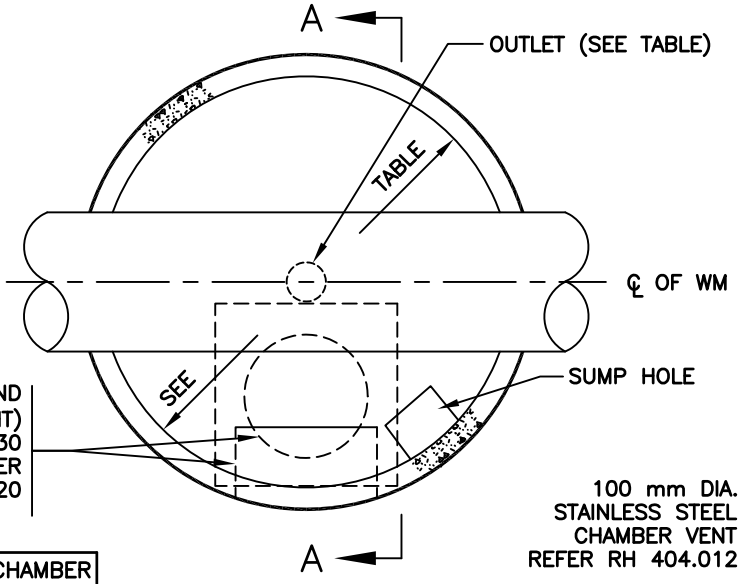
1200mm PRECAST DRAIN CHAMBER

REGION STANDARD RH 403.010

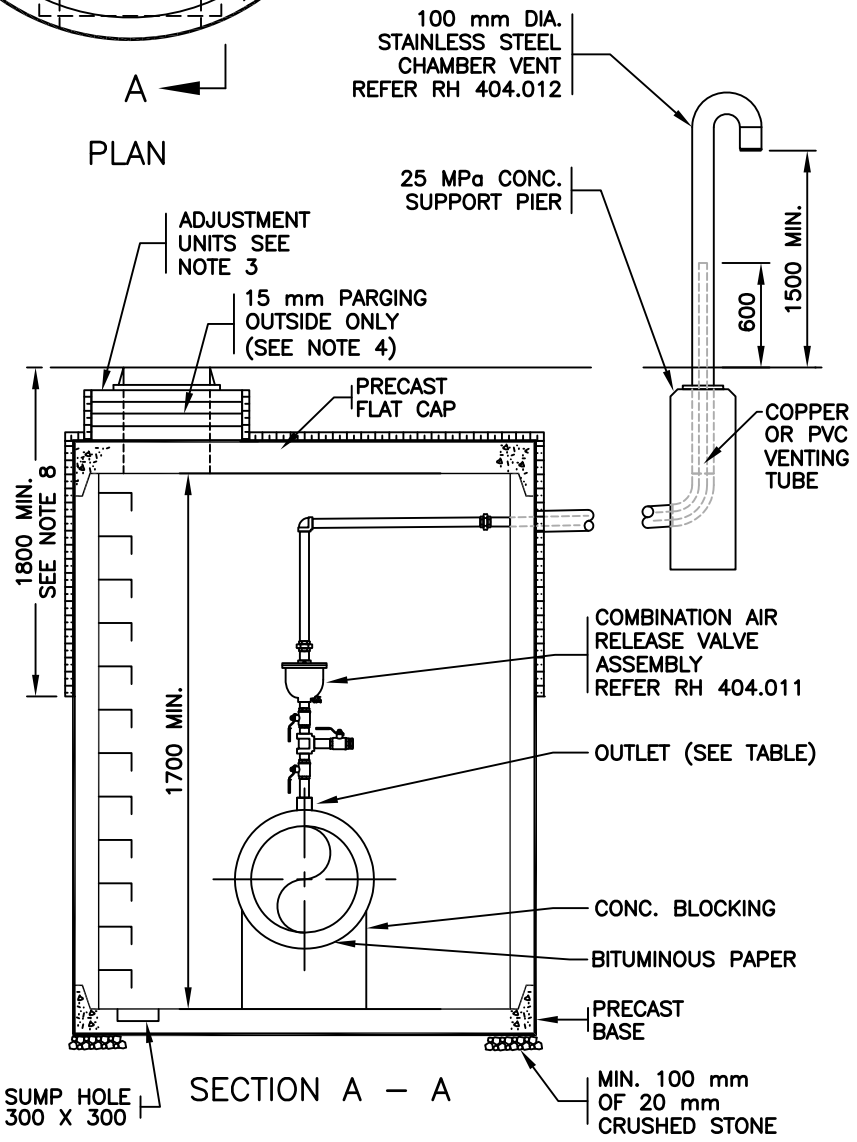


PLAN

DIAMETER	OUTLET		CHAMBER
WATERMAIN	SIZE	TYPE	SIZE
400mm	SEE NOTE 7	THREADED	1200
450mm		"	1200
500mm		"	1200
600mm		"	1200
750mm		FLANGED	1500
900mm		"	1800
>900mm	SEE NOTE 7		

NOTES:

1. REINFORCED CONCRETE PRECAST CHAMBER TO MEET CURRENT OPSD.
2. STEPS: 1ST STEP TO BE 450 mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300 mm ABOVE BASE.
3. ADJUSTMENT UNITS TO BE MIN. 150 mm TO MAX. 300 mm.
4. PARGING MIX ON ALL BRICKWORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15 mm THICK.
5. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
6. PRESS SEAL OR EQUIVALENT RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
7. PIPE OPENING AND VALVE OUTLET SIZE WILL BE DETERMINED BY THE DESIGNER AND APPROVED BY THE REGION.
8. 50 mm TH. EXPANDED STYRENE (DOW HI-100 INSULATION OR APPROVED EQUAL), WITH PROTECTION BOARD (CEMENT BOARD) AND WATERPROOFING.
9. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.



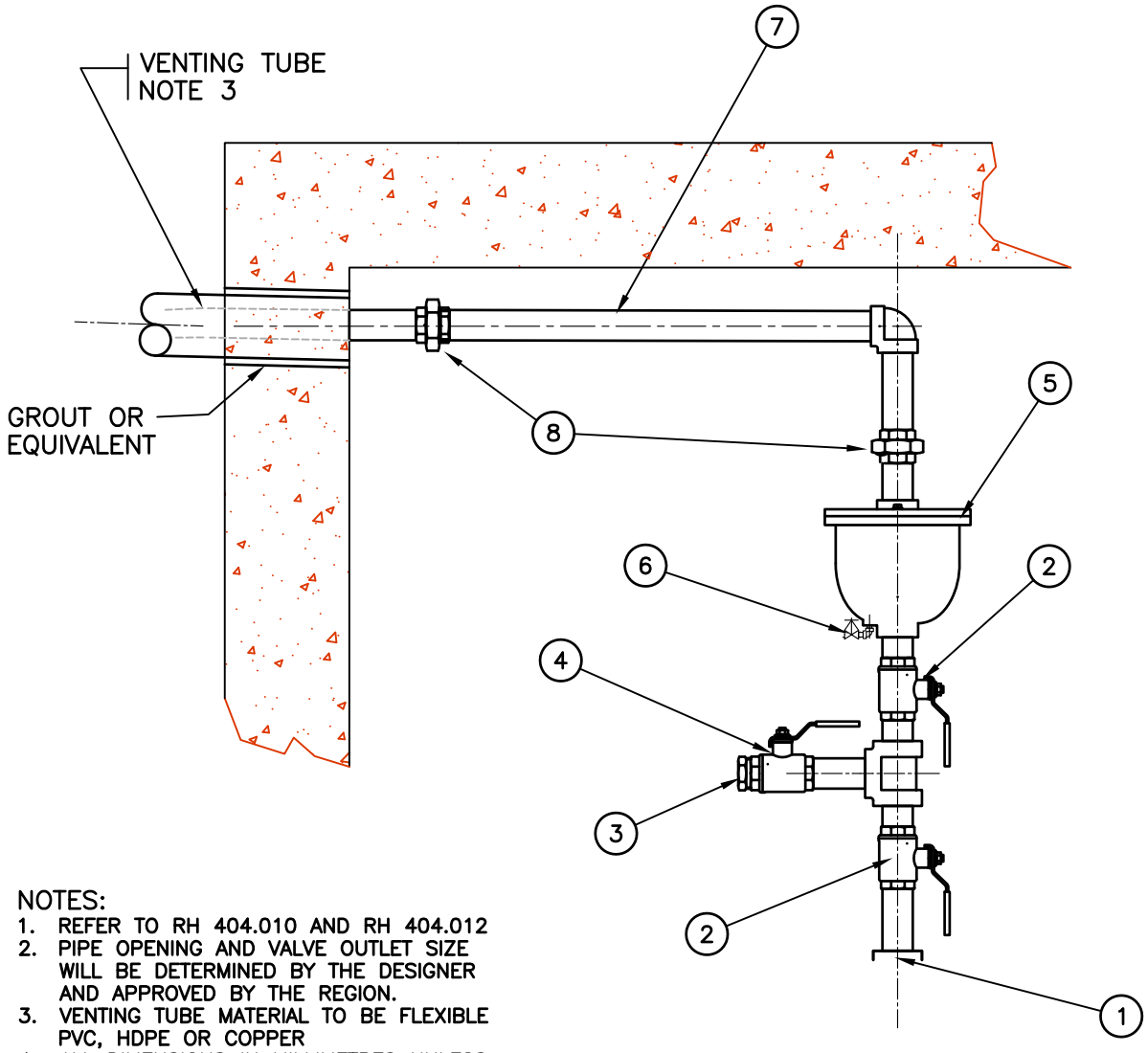
SECTION A – A

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: January 2014 | Rev. 0 | NTS

PRECAST CHAMBER FOR COMBINATION AIR RELEASE/ VACUUM BREAK VALVE

REGION STANDARD RH 404.010



NOTES:
1. REFER TO RH 404.010 AND RH 404.012
2. PIPE OPENING AND VALVE OUTLET SIZE WILL BE DETERMINED BY THE DESIGNER AND APPROVED BY THE REGION.
3. VENTING TUBE MATERIAL TO BE FLEXIBLE PVC, HDPE OR COPPER
4. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

ITEM	ITEM DESCRIPTION
1	LINE CONNECTION SPECIFIC TO SUIT INSTALLATION REQUIREMENTS
2	THREADED, STAINLESS STEEL, 1000 WAG BALL VALVE (OR APPROVED EQUAL) WITH PTFE SEALS AND SEATS
3	THREADED PLUG
4	THREADED, STAINLESS STEEL, SPRING RETURN, 1000 WAG BALL VALVE (OR APPROVED EQUAL) WITH PTFE SEALS AND SEATS (SAMPLE VALVE)
5	COMBINATION AIR RELEASE VALVE ASSEMBLY, VALMATIC MODEL VM-202C (OR APPROVED EQUAL) INTERIOR & EXTERIOR OF VALVE SHALL BE FUSION BONDED EPOXY COATED ANSI/NSF 61 APPROVED
6	THREADED, STAINLESS STEEL, 1000 WAG BALL VALVE (OR APPROVED EQUAL) WITH PTFE SEALS AND SEATS, SISE TO SUIT AIR VALVE DRAIN PORT
7	STAINLESS STEEL. VENT PIPE SUPPORT PIPE AS REQUIRED
8	UNION

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

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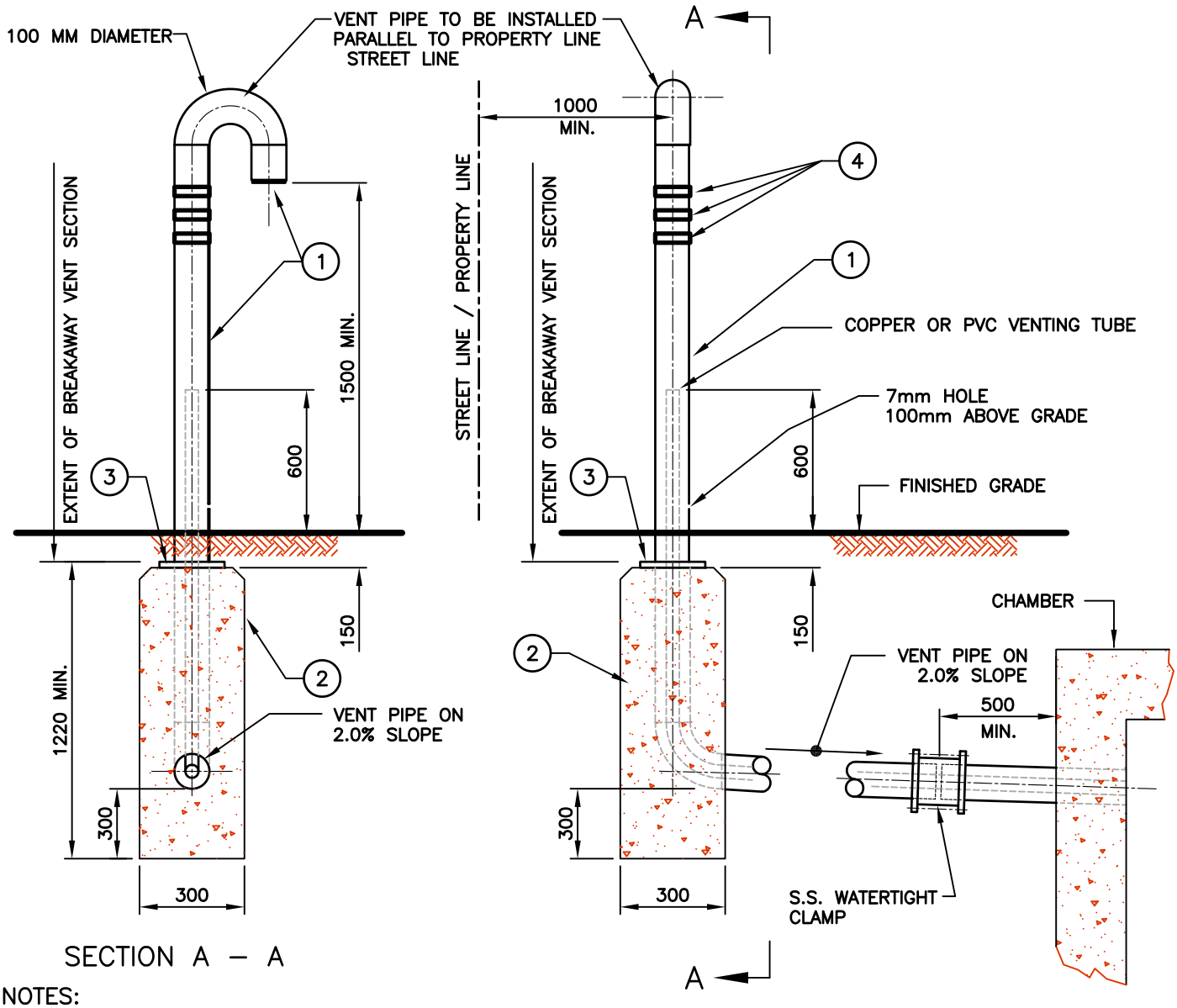
TYPICAL LAYOUT COMBINATION AIR RELEASE/ VACUUM BREAK VALVE

REGION STANDARD RH 404.011



SECTION A – A

NOTES:

1. REFER TO RH 404.010 AND RH 404.011
2. LOCATE VENT PIPE AS DIRECTED IN THE FIELD BY THE ENGINEER AND APPROVED BY REGION AND LOCAL AREA MUNICIPALITY.
3. PIPE OPENING AND VALVE OUTLET SIZE WILL BE DETERMINED BY THE DESIGNER AND APPROVED BY THE REGION.
4. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

ITEM	ITEM DESCRIPTION
1	100 mm ø 304 SS VENTILATION HOOK–UP, FLANGE & 180° RETURN BEND C/W REMOVABLE 304 S.S. INSECT SCREEN
2	CONCRETE SUPPORT PIER 25 MPa CONCRETE.
3	BREAK AWAY CONNECTION WITH CONCRETE WELDED FLANGE OR PLATE WITH 4–LIGHT MEDIUM DUTY CONCRETE ANCHORS WHICH WILL INSURE THAT THE PIPE WILL SHEER AT THE CONCRETE INTERFACE.
4	VENT PIPES FOR AIR VALVE CHAMBERS SHALL BE AFFIXED WITH THREE 100 mm WIDE REFLECTIVE TAPES (ASTM D4956) 100 mm APART.

THE REGIONAL MUNICIPALITY OF HALTON
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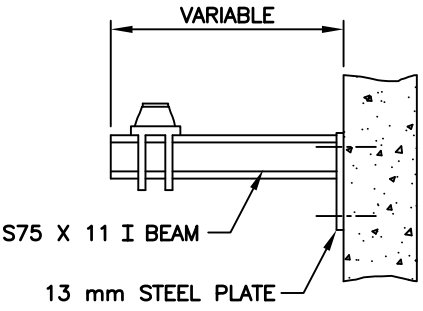
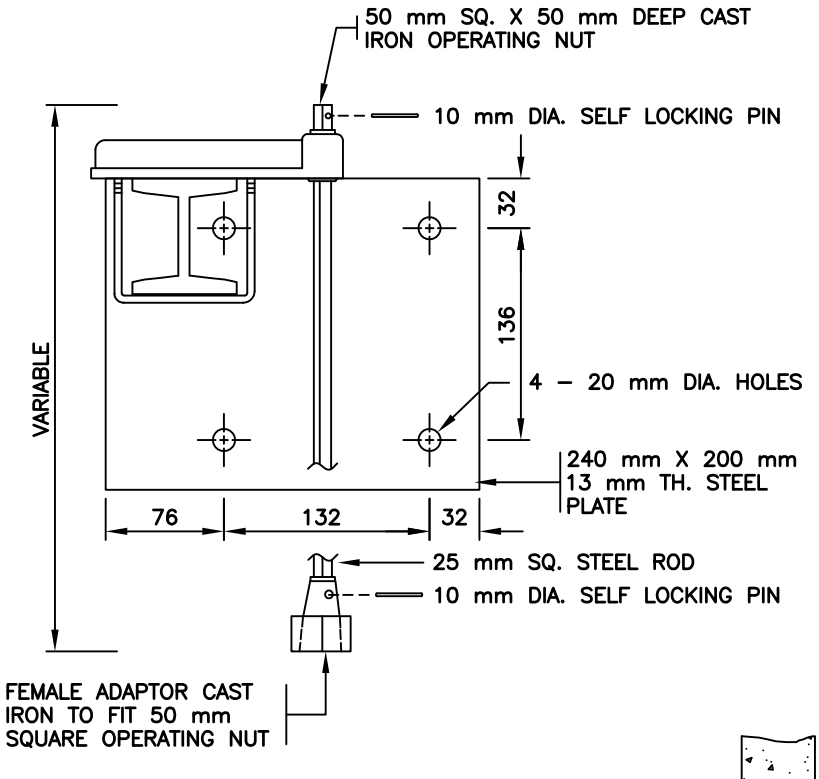
100 mm ø STAINLESS STEEL CHAMBER VENT

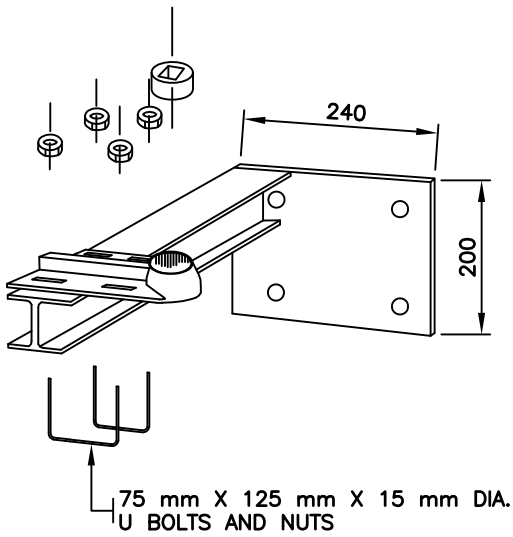
REGION STANDARD RH 404.012



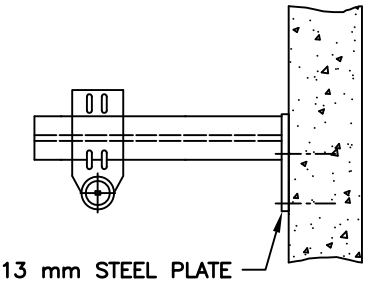
SIDE VIEW



END VIEW



ISOMETRIC VIEW



PLAN VIEW

NOTES:
1. ALL STEEL TO BE TYPE 304 STAINLESS STEEL.
2. ON EXISTING CHAMBERS FASTEN BRACKET TO WALL USING 15 mm DIA. X 75 mm LONG LAG SCREWS WITH 75 mm LONG EXPANSION SHIELDS.
3. ON PROPOSED CHAMBERS FASTEN BRACKET TO WALL USING 15 mm DIA. X 200 mm LONG BOLTS WITH WASHERS AND NUTS.
4. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

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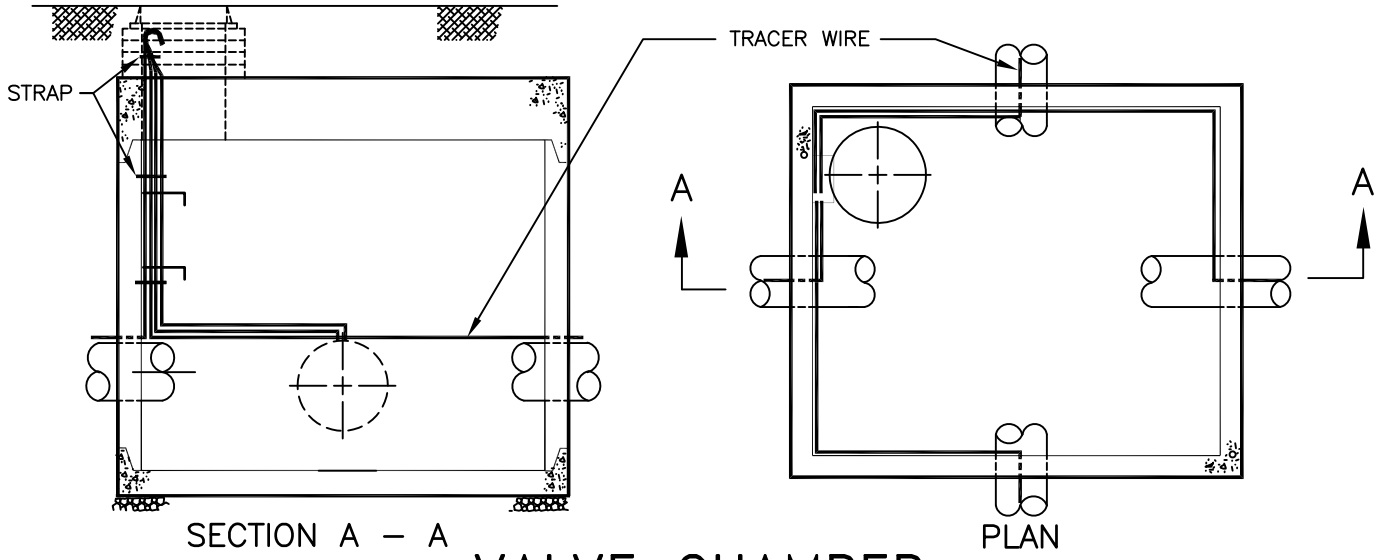
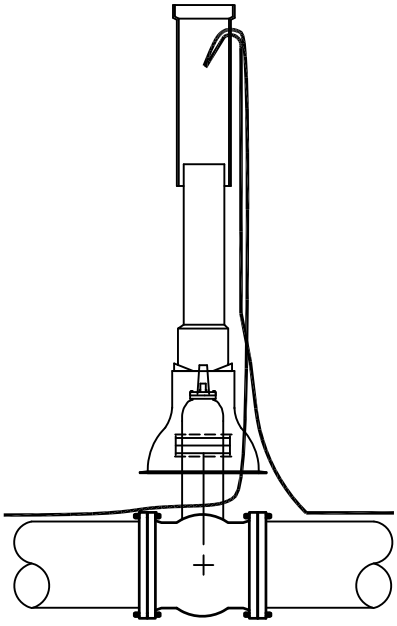
WALL BRACKET DETAIL FOR VALVE STEM EXTENSION

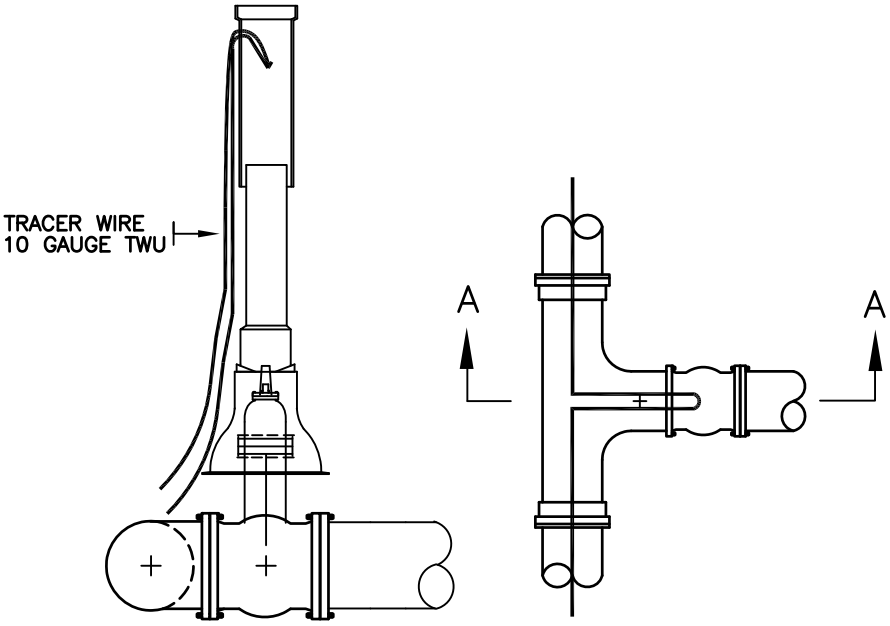
REGION STANDARD RH 405.020



VALVE CHAMBER



LINE VALVE



SECONDARY VALVE

NOTES:

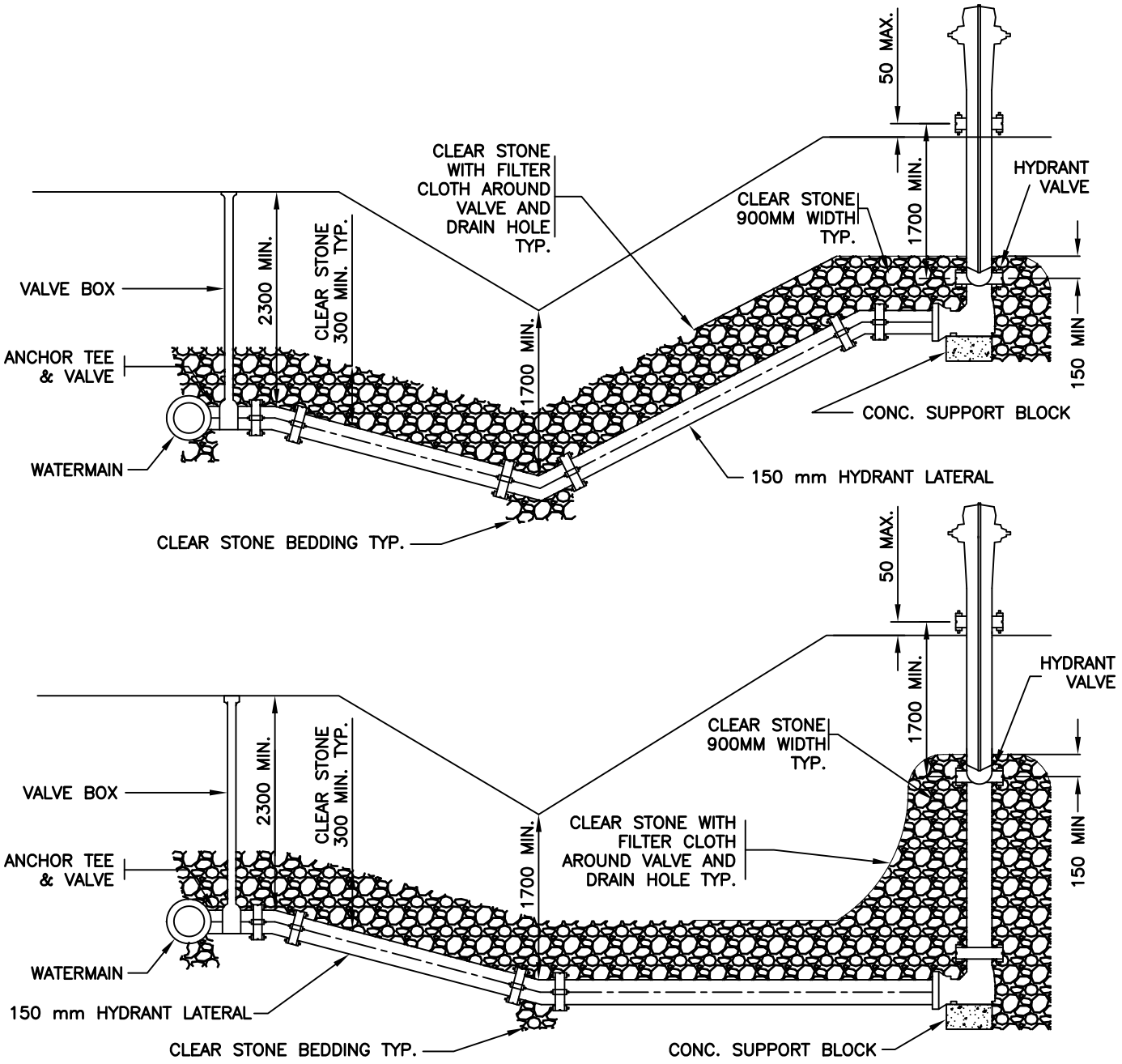
1. TRACER WIRE TO BE INSTALLED ON OUTSIDE OF VALVE BOX AND THROUGH HOLE.
2. MINIMUM OF 300 mm OF TRACER WIRE TO BE LEFT IN THE TOP OF VALVE BOX OR CHAMBER.
3. HOLE TO BE DRILLED IN THE TOP SECTION OF VALVE BOX 50 mm BELOW BOTTOM OF LID.
4. TRACER WIRE TO BE ATTACHED TO VALVE CHAMBER WALL AND ADJUSTMENT RINGS WITH STAINLESS STEEL STRAPS.
5. TRACER WIRE IN VALVE CHAMBER TO BE INSTALLED BESIDE CHAMBER STEPS.
6. ENDS OF EACH TRACER WIRE TO BE BROUGHT UP TO THE TOP OF THE VALVE BOX AND/OR WATER VALVE CHAMBER. IN CHAMBERS ENSURE CONNECTION CAN BE MADE TO EACH LINE WITHOUT ENTERING THE CONFINED SPACE.
7. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: January 2014 | Rev. 0 | NTS

TRACER WIRE INSTALLATION IN VALVE CHAMBER, VALVE BOX AND SECONDARY VALVE BOX

REGION STANDARD RH 406.010



NOTES:

1. HYDRANTS AND HYDRANT LATERALS ARE TO BE MECHANICALLY RESTRAINED AT ALL JOINTS OVER THE ENTIRE LENGTH.
2. 19MM CLEAR STONE BEDDING IS TO BE USED FOR THE ENTIRE LATERAL TRENCH.
3. LOWER ROD LENGTH SHALL NOT EXCEED 1.7 m MEASURED FROM THE BREAK–OFF FLANGE.
4. DRAIN HOLE TO BE IMMEDIATELY ABOVE HYDRANT VALVE.
5. MAXIMUM 45 DEGREE BENDS MAY BE USED ON HYDRANT LATERALS.
6. ALL HYDRANTS REQUIRE STORZ PUMPER CONNECTION, REFER TO SECTION 2.6.10. e. IN 'WATER AND WASTEWATER LINEAR DESIGN MANUAL'
7. ALL EXTENSIONS TO BE PLACED BETWEEN BOOT AND HYDRANT BARREL. BARRELS ARE NOT TO BE CUT.
8. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON
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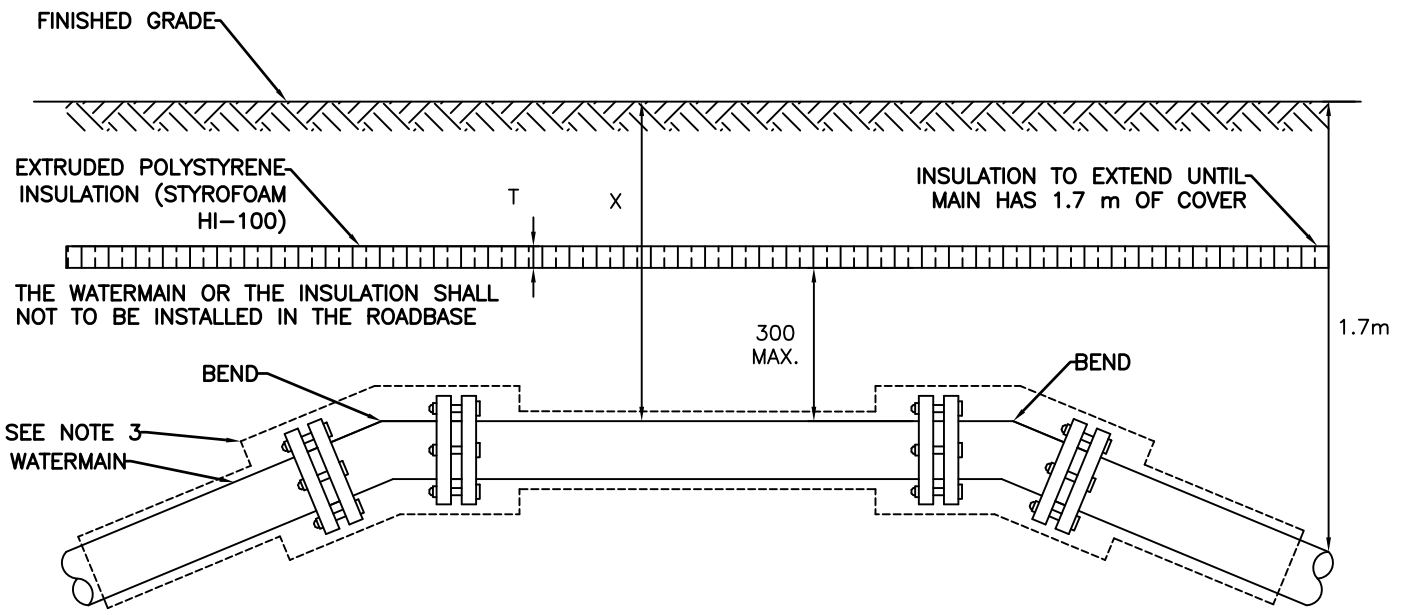
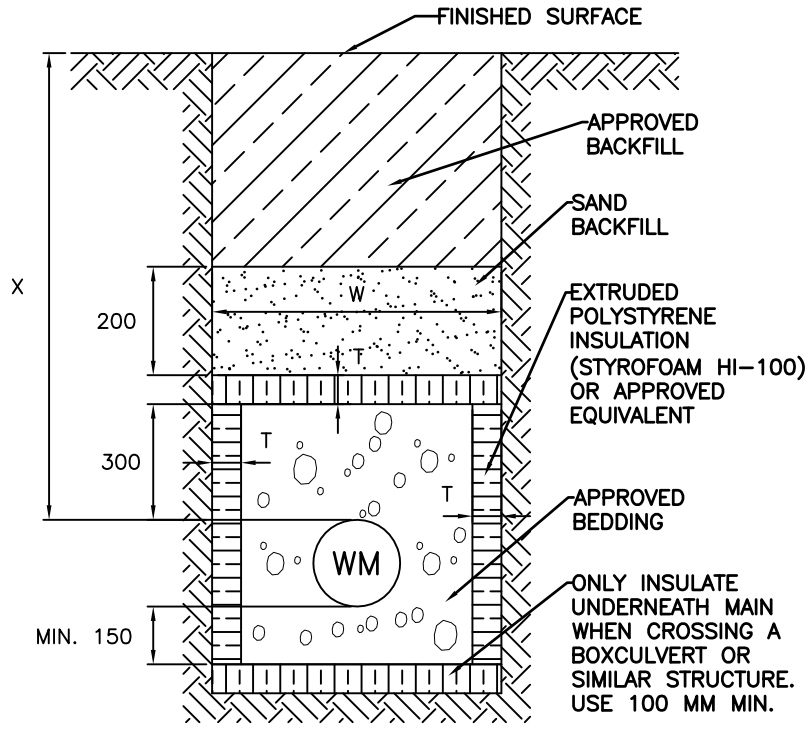
Date: January 2014	Rev. 0	NTS

HYDRANT INSTALLATION FOR RURAL ROAD SECTION

REGION STANDARD RH 407.010



INSULATION DETAIL FOR PIPE UNDER ROADWAY EXCAVATION



INSULATION DETAIL FOR PIPE IN AN EXCAVATION

WIDTH OF TRENCH INSULATION (W)			
X	1200	1500	1700
T	100	50	0

WIDTH (W) AND THICKNESS (T) BASED ON FROST PENETRATION OF 1200

NOTE:

1. INSULATION SHALL BE THE ENTIRE WIDTH OF TRENCH.
2. THE LENGTH OF AREA TO BE INSULATED SHALL BE FULL LENGTH OF WATERMAIN UNTIL PIPE COVER IS 1.7m MIN.
3. USE OF PRE INSULATED PIPE WILL BE CONSIDERED AN EQUIVALENT FOR WATERMAIN SIZES UP TO 300 MM
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

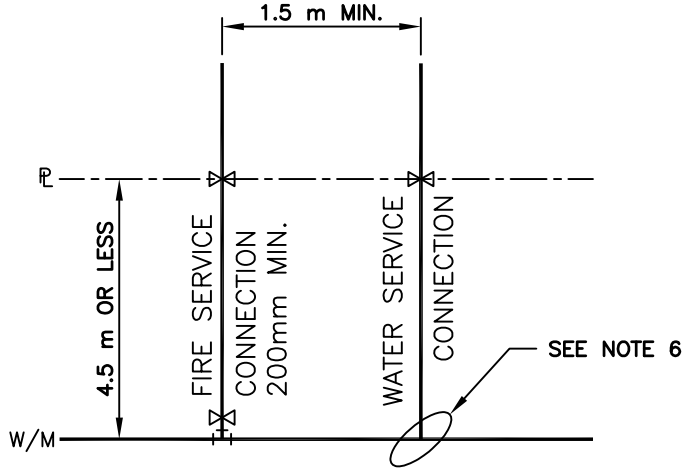
THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

WATERMAIN AND WATER SERVICE INSULATION DETIAL

SITE SPECIFIC – APPROVED BY OWNERS REPRESENTATIVE (FORM 1)

Date: January 2014	Rev. 0	NTS

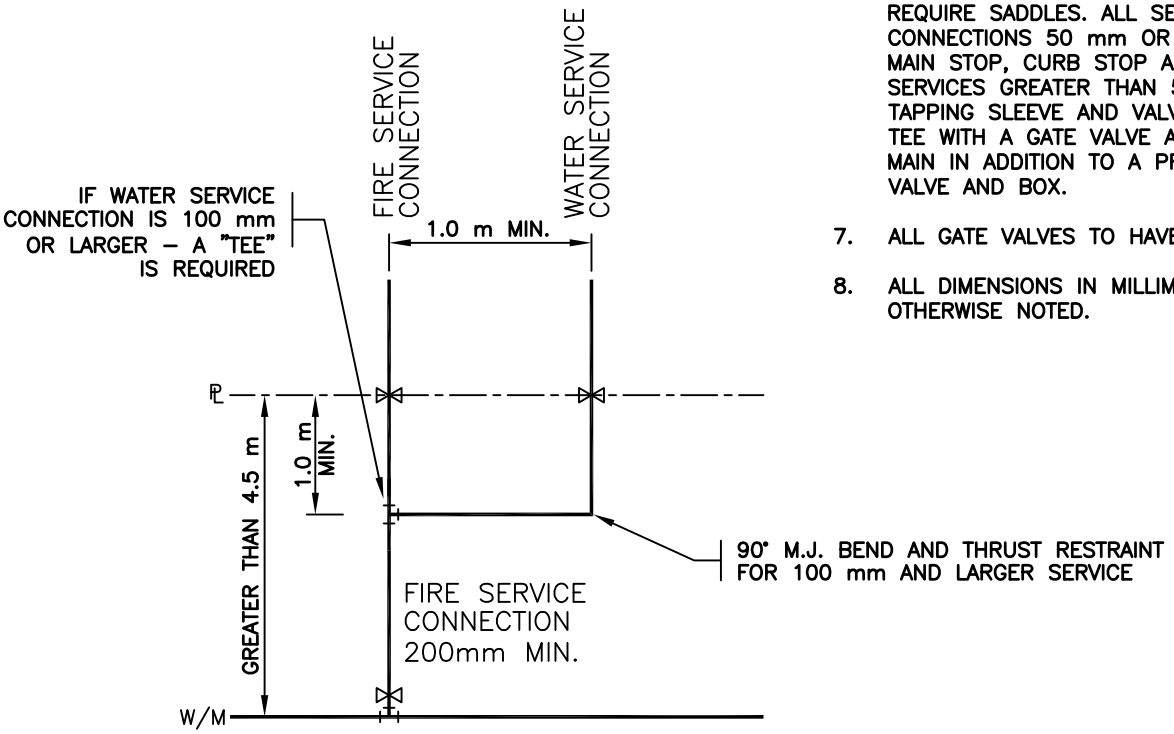
REGION STANDARD RH 408.010



4.5 m OR SHORTER SERVICE

NOTES

1. COMPRESSION TYPE FITTINGS ONLY. NO SOLDERED JOINTS ARE PERMITTED BEFORE THE WATER METER.
2. WATER SERVICE CONNECTION 25, 38, 50 TO BE TYPE 'K' SOFT COPPER, 100 AND LARGER TO BE PVC OR DI.
3. FIRE SERVICE CONNECTION TO BE MIN. 200 MM.
4. IF THE WATERMAIN IS 4.5 m OR LESS FROM THE PROPERTY LINE, THEN 2 SEPARATE CONNECTIONS ARE REQUIRED.
5. TAPPING SLEEVE TO BE PRESSURE TESTED BY CONTRACTOR BEFORE MAIN IS TAPPED.
6. ALL SERVICE CONNECTIONS TO PVC PIPE REQUIRE SADDLES. ALL SERVICE CONNECTIONS 50 mm OR LESS TO HAVE A MAIN STOP, CURB STOP AND BOX. ALL SERVICES GREATER THAN 50 mm REQUIRE A TAPPING SLEEVE AND VALVE OR AN ANCHOR TEE WITH A GATE VALVE AND BOX AT THE MAIN IN ADDITION TO A PROPERTY LINE GATE VALVE AND BOX.
7. ALL GATE VALVES TO HAVE VALVE BOXES.
8. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.



LONGER THAN 4.5 m

THE REGIONAL MUNICIPALITY OF HALTON PUBLIC WORKS DEPARTMENT	Date: January 2014	Rev. 1	NTS
WATER SERVICE AND FIRE SERVICE CONNECTION INSTALLATIONS			
	REGION STANDARD	RH	409.01

FOR PIPES FLOWING FULL

GRADE	200 mm		250 mm		300 mm		375 mm	
%	V	Q	V	Q	V	Q	V	Q
6.00	2.585	.084	2.999	.152	3.387	.247	3.930	.448
5.00	2.359	.077	2.738	.139	3.092	.226	3.587	.409
4.00	2.110	.068	2.449	.124	2.765	.202	3.209	.366
3.50	1.974	.064	2.291	.116	2.587	.189	3.002	.342
3.00	1.828	.059	2.121	.108	2.395	.175	2.779	.317
2.50	1.668	.054	1.936	.098	2.186	.160	2.537	.289
2.00	1.492	.048	1.732	.088	1.955	.143	2.269	.259
1.80	1.416	.046	1.643	.083	1.855	.136	2.153	.246
1.60	1.335	.043	1.549	.079	1.749	.128	2.029	.231
1.50	1.292	.042	1.500	.076	1.693	.124	1.965	.224
1.40	1.248	.041	1.449	.073	1.636	.119	1.898	.216
1.30	1.203	.039	1.396	.071	1.576	.115	1.829	.209
1.20	1.156	.038	1.341	.068	1.515	.111	1.758	.200
1.10	1.107	.036	1.284	.065	1.450	.106	1.683	.192
1.00	1.056	.034	1.224	.062	1.383	.101	1.604	.183
0.98	1.045	.034	1.212	.061	1.369	.100	1.588	.181
0.96	1.034	.034	1.200	.061	1.355	.099	1.572	.179
0.94	1.023	.033	1.187	.060	1.341	.098	1.556	.177
0.92	1.012	.033	1.174	.060	1.326	.097	1.539	.176
0.90	1.001	.033	1.162	.059	1.312	.096	1.522	.174
0.88	0.990	.032	1.149	.058	1.297	.095	1.505	.172
0.86	0.979	.032	1.135	.058	1.282	.094	1.488	.170
0.84	0.967	.031	1.122	.057	1.267	.093	1.470	.168
0.82	0.956	.031	1.109	.056	1.252	.091	1.453	.166

Diameters shown in table are nominal. Q and V are based on imperial I.D.s

1 m^3/s = 1000 litres per second

V = Metre per second

Q = $Metre^3$ per second

n = 0.013

To obtain V and Q if n = 0.010, multiply values in the table by 1.300

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: JANUARY 2014 | Rev. 1 | NTS

VELOCITY AND DISCHARGE FOR 150mm TO 375mm CIRCULAR PIPE

REGION STANDARD RH 2000.01

FOR PIPES FLOWING FULL

GRADE	200 mm		250 mm		300 mm		375 mm	
%	V	Q	V	Q	V	Q	V	Q
0.80	0.944	.031	1.095	.056	1.237	.090	1.435	.164
0.78	0.932	.030	1.081	.055	1.221	.089	1.417	.162
0.76	0.920	.030	1.067	.054	1.205	.088	1.399	.160
0.74	0.908	.030	1.053	.053	1.189	.087	1.380	.157
0.72	0.895	.029	1.039	.053	1.173	.086	1.361	.155
0.70	0.883	.029	1.024	.052	1.157	.084	1.342	.153
0.68	0.870	.028	1.010	.051	1.140	.083	1.323	.151
0.66	0.857	.028	0.995	.050	1.123	.082	1.303	.149
0.64	0.844	.027	0.980	.050	1.106	.081	1.284	.146
0.62	0.831	.027	0.964	.049	1.089	.080	1.263	.144
0.60	0.817	.027	0.948	.048	1.071	.078	1.243	.142
0.58	0.804	.026	0.932	.047	1.053	.077	1.222	.139
0.56	0.790	.026	0.916	.046	1.035	.076	1.201	.137
0.54	0.775	.025	0.900	.046	1.016	.074	1.179	.134
0.52	0.761	.025	0.883	.045	0.997	.073	1.157	.132
0.50	0.746	.024	0.866	.044	0.978	.071	1.135	.129
0.48	0.731	.024	0.848	.043	0.958	.070	1.112	.127
0.46	0.716	.023	0.830	.042	0.938	.068	1.088	.124
0.44	0.700	.023	0.812	.041	0.917	.067	1.064	.121
0.42	0.684	.022	0.794	.040	0.896	.065	1.040	.119
0.40	0.667	.022	0.774	.039	0.874	.064	1.015	.116
0.35	0.624	.020	0.724	.037	0.818	.060	0.949	.108
0.30	0.578	.019	0.671	.034	0.757	.055	0.879	.100
0.25	0.528	.017	0.612	.031	0.691	.050	0.802	.091
0.20	0.472	.015	0.548	.028	0.618	.045	0.718	.082

Diameters shown in table are nominal. Q and V are based on imperial I.D.s

1 m^3 /s = 1000 litres per second

V = Metre per second

Q = $Metre^3$ per second

n = 0.013

To obtain V and Q if n = 0.010, multiply values in the table by 1.300

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: JANUARY 2014 | Rev. 1 | NTS

VELOCITY AND DISCHARGE FOR 150mm TO 375mm CIRCULAR PIPE

REGION STANDARD RH 2000.02

FOR PIPES FLOWING FULL

GRADE	450 mm		525 mm		600 mm		675 mm		750 mm	
%	V	Q	V	Q	V	Q	V	Q	V	Q
6.00	4.438	.729	4.918	1.099	5.376	1.569	5.815	2.148	6.238	2.845
5.00	4.051	.665	4.490	1.003	4.908	1.432	5.308	1.961	5.695	2.597
4.00	3.623	.595	4.016	.897	4.389	1.281	4.748	1.754	5.094	2.323
3.50	3.389	.556	3.756	.839	4.106	1.198	4.441	1.641	4.765	2.173
3.00	3.138	.515	3.478	.777	3.801	1.109	4.112	1.519	4.411	2.012
2.50	2.865	.470	3.175	.709	3.470	1.013	3.754	1.387	4.027	1.836
2.00	2.562	.421	2.839	.635	3.104	.906	3.357	1.240	3.602	1.643
1.80	2.431	.399	2.694	.602	2.945	.859	3.185	1.177	3.417	1.558
1.60	2.292	.376	2.540	.568	2.776	.810	3.003	1.109	3.221	1.469
1.50	2.219	.364	2.459	.550	2.688	.785	2.908	1.074	3.119	1.422
1.40	2.144	.352	2.376	.531	2.597	.758	2.809	1.038	3.013	1.374
1.30	2.066	.339	2.289	.512	2.502	.730	2.707	1.000	2.904	1.324
1.20	1.985	.326	2.199	.491	2.404	.702	2.601	.961	2.790	1.272
1.10	1.900	.312	2.106	.471	2.302	.672	2.490	.920	2.671	1.218
1.00	1.812	.298	2.008	.449	2.195	.641	2.374	.877	2.547	1.161
0.98	1.794	.295	1.988	.444	2.173	.634	2.350	.868	2.521	1.150
0.96	1.775	.291	1.967	.440	2.150	.628	2.326	.859	2.495	1.138
0.94	1.757	.289	1.947	.435	2.128	.621	2.302	.850	2.469	1.126
0.92	1.738	.285	1.926	.430	2.105	.614	2.277	.841	2.443	1.114
0.90	1.719	.282	1.905	.426	2.082	.608	2.252	.832	2.416	1.102
0.88	1.700	.279	1.883	.421	2.059	.601	2.227	.823	2.389	1.090
0.86	1.680	.276	1.862	.416	2.035	.594	2.202	.813	2.362	1.077
0.84	1.661	.273	1.840	.411	2.011	.587	2.176	.804	2.334	1.064
0.82	1.641	.269	1.818	.406	1.987	.580	2.150	.794	2.306	1.052

Diameters shown in table are nominal. Q and V are based on imperial I.D.s

1 m^3 /s = 1000 litres per second

V = Metre per Second

Q = $Metre^3$ per Second

n = 0.013

To obtain V and Q if n = 0.010, multiply values in the table by 1.300

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: JANUARY 2014 | Rev. 1 | NTS

VELOCITY AND DISCHARGE FOR 450mm TO 750mm CIRCULAR PIPE

REGION STANDARD RH 2000.03

FOR PIPES FLOWING FULL

GRADE %	450 mm		525 mm		600 mm		675 mm		750 mm	
	V	Q	V	Q	V	Q	V	Q	V	Q
0.80	1.620	.266	1.796	.401	1.963	.573	2.123	.784	2.278	1.039
0.78	1.600	.263	1.773	.396	1.938	.566	2.097	.775	2.249	1.026
0.76	1.579	.259	1.750	.391	1.913	.558	2.070	.754	2.220	1.013
0.74	1.559	.256	1.727	.386	1.888	.551	2.042	.749	2.191	.999
0.72	1.537	.252	1.704	.381	1.862	.543	2.014	.744	2.161	.986
0.70	1.516	.249	1.680	.375	1.836	.536	1.986	.734	2.131	.972
0.68	1.494	.245	1.656	.370	1.810	.528	1.958	.723	2.100	.958
0.66	1.472	.242	1.631	.364	1.783	.520	1.929	.712	2.069	.944
0.64	1.449	.238	1.606	.359	1.756	.512	1.899	.702	2.037	.929
0.62	1.427	.234	1.581	.353	1.728	.504	1.869	.691	2.005	.915
0.60	1.403	.230	1.555	.348	1.700	.496	1.839	.679	1.973	.900
0.58	1.380	.227	1.529	.342	1.671	.488	1.808	.668	1.940	.885
0.56	1.356	.223	1.502	.336	1.64	.479	1.777	.656	1.906	.869
0.54	1.331	.219	1.475	.330	1.61	.471	1.745	.644	1.871	.854
0.52	1.306	.214	1.448	.324	1.58	.462	1.712	.632	1.836	.838
0.50	1.281	.210	1.420	.317	1.55	.453	1.679	.620	1.801	.821
0.48	1.255	.206	1.391	.311	1.52	.444	1.645	.608	1.764	.805
0.46	1.229	.202	1.362	.304	1.49	.434	1.610	.595	1.727	.788
0.44	1.202	.197	1.332	.298	1.46	.425	1.575	.582	1.689	.770
0.42	1.174	.193	1.301	.291	1.42	.415	1.539	.568	1.650	.753
0.40	1.146	.188	1.270	.284	1.39	.405	1.501	.555	1.611	.735
0.35	1.072	.176	1.188	.265	1.30	.379	1.404	.519	1.507	.687
0.30	0.992	.163	1.100	.246	1.20	.351	1.300	.480	1.395	.636
0.25	0.906	.149	1.004	.224	1.10	.320	1.187	.439	1.273	.581
0.20	0.810	.133	0.898	.201	0.98	.286	1.062	.392	1.139	.519

Diameters shown in table are nominal. Q and V are based on imperial I.D.s

1 m^3 /s = 1000 litres per second

V = Metre per Second

Q = $Metre^3$ per Second

n = 0.013

To obtain V and Q if n = 0.010, multiply values in the table by 1.300

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: JANUARY 2014 | Rev. 1 | NTS

VELOCITY AND DISCHARGE FOR 450mm TO 750mm CIRCULAR PIPE

REGION STANDARD RH 2000.04

FOR PIPES FLOWING FULL

GRADE	825 mm		900 mm		975 mm		1050 mm		1200 mm	
%	V	Q	V	Q	V	Q	V	Q	V	Q
6.00	6.647	3.668	7.044	4.626	7.431	5.727	7.807	6.978	8.534	9.963
5.00	6.068	3.349	6.431	4.223	6.783	5.228	7.127	6.370	7.790	9.095
4.00	5.428	2.995	5.752	3.777	6.067	4.676	6.374	5.698	6.968	8.135
3.50	5.077	2.802	5.380	3.533	5.675	4.374	5.963	5.330	6.518	7.609
3.00	4.700	2.594	4.981	3.271	5.254	4.050	5.520	4.934	6.034	7.045
2.50	4.291	2.368	4.547	2.986	4.796	3.697	5.039	4.504	5.509	6.431
2.00	3.838	2.118	4.067	2.671	4.290	3.306	4.507	4.029	4.927	5.752
1.80	3.641	2.009	3.858	2.534	4.070	3.137	4.276	3.822	4.674	5.457
1.60	3.433	1.894	3.638	2.389	3.837	2.957	4.031	3.604	4.407	5.145
1.50	3.324	1.834	3.522	2.313	3.715	2.863	3.903	3.489	4.267	4.981
1.40	3.211	1.772	3.403	2.235	3.589	2.766	3.771	3.371	4.122	4.813
1.30	3.094	1.707	3.279	2.153	3.459	2.666	3.634	3.248	3.972	4.637
1.20	2.973	1.640	3.150	2.069	3.323	2.561	3.491	3.121	3.816	4.456
1.10	2.846	1.571	3.016	1.981	3.182	2.452	3.343	2.988	3.654	4.266
1.00	2.714	1.498	2.876	1.889	3.034	2.338	3.187	2.849	3.484	4.067
0.98	2.687	1.482	2.847	1.870	3.003	2.315	3.155	2.820	3.449	4.026
0.96	2.659	1.467	2.818	1.850	2.972	2.291	3.123	2.791	3.414	3.985
0.94	2.631	1.452	2.788	1.831	2.941	2.267	3.090	2.762	3.378	3.943
0.92	2.603	1.436	2.758	1.811	2.910	2.243	3.057	2.732	3.342	3.901
0.90	2.575	1.421	2.728	1.792	2.878	2.218	3.024	2.703	3.305	3.859
0.88	2.546	1.405	2.698	1.772	2.846	2.193	2.990	2.672	3.268	3.815
0.86	2.517	1.389	2.667	1.751	2.813	2.168	2.956	2.642	3.231	3.772
0.84	2.487	1.372	2.636	1.731	2.780	2.143	2.921	2.611	3.193	3.728
0.82	2.457	1.356	2.604	1.710	2.747	2.117	2.886	2.580	3.155	3.683

Diameters shown in table are nominal. Q and V are based on imperial I.D.s

1 m^3 /s = 1000 litres per second

V = Metre per second

Q = Metre^3 per Second

n = 0.013

To obtain V and Q if n = 0.010, multiply values in the table by 1.300

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

VELOCITY AND DISCHARGE FOR 825mm TO 1200mm CIRCULAR PIPE

Date: JANUARY 2014 | Rev. 1 | NTS

REGION STANDARD RH 2000.05

FOR PIPES FLOWING FULL

GRADE	825 mm		900 mm		975 mm		1050 mm		1200 mm	
%	V	Q	V	Q	V	Q	V	Q	V	Q
0.80	2.427	1.339	2.572	1.689	2.713	2.091	2.851	2.548	3.116	3.638
0.78	2.397	1.323	2.540	1.668	2.679	2.065	2.815	2.516	3.077	3.592
0.76	2.366	1.306	2.507	1.646	2.645	2.038	2.779	2.484	3.037	3.546
0.74	2.335	1.288	2.474	1.625	2.610	2.011	2.742	2.451	2.997	3.499
0.72	2.303	1.271	2.440	1.603	2.574	1.983	2.704	2.417	2.956	3.451
0.70	2.271	1.253	2.406	1.580	2.538	1.956	2.667	2.383	2.915	3.403
0.68	2.238	1.235	2.372	1.557	2.502	1.928	2.628	2.349	2.873	3.354
0.66	2.205	1.217	2.336	1.534	2.464	1.899	2.589	2.314	2.830	3.304
0.64	2.171	1.198	2.301	1.511	2.427	1.870	2.550	2.279	2.787	3.254
0.62	2.137	1.179	2.264	1.487	2.389	1.841	2.510	2.243	2.743	3.203
0.60	2.102	1.160	2.228	1.463	2.350	1.811	2.469	2.207	2.699	3.151
0.58	2.067	1.140	2.190	1.438	2.310	1.781	2.427	2.170	2.653	3.098
0.56	2.031	1.121	2.152	1.413	2.270	1.750	2.385	2.132	2.607	3.044
0.54	1.994	1.100	2.113	1.388	2.229	1.718	2.342	2.093	2.560	2.989
0.52	1.957	1.080	2.074	1.362	2.188	1.686	2.298	2.054	2.512	2.933
0.50	1.919	1.059	2.034	1.334	2.145	1.653	2.254	2.014	2.463	2.876
0.48	1.880	1.038	1.992	1.308	2.102	1.620	2.208	1.974	2.414	2.818
0.46	1.841	1.016	1.951	1.281	2.057	1.586	2.162	1.932	2.363	2.759
0.44	1.800	.993	1.908	1.253	2.012	1.551	2.114	1.890	2.311	2.698
0.42	1.759	.971	1.864	1.224	1.966	1.515	2.066	1.846	2.258	2.636
0.40	1.716	.947	1.819	1.194	1.919	1.479	2.016	1.802	2.203	2.572
0.35	1.606	.886	1.701	1.117	1.795	1.383	1.886	1.685	2.061	2.406
0.30	1.486	.820	1.575	1.034	1.662	1.281	1.746	1.560	1.908	2.228
0.25	1.357	.749	1.438	.944	1.517	1.169	1.594	1.424	1.742	2.034
0.20	1.214	.670	1.286	.845	1.357	1.046	1.425	1.274	1.558	1.819

Diameters shown in table are nominal. Q and V are based on imperial I.D.s

1 m^3 /s = 1000 litres per second

V = Metre per Second

Q = $Metre^3$ per Second

n = 0.013

To obtain V and Q if n = 0.010, multiply values in the table by 1.300

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

VELOCITY AND DISCHARGE FOR 825mm TO 1200mm CIRCULAR PIPE

Date: JANUARY 2014 | Rev. 1 | NTS

REGION STANDARD RH 2000.06

FOR PIPES FLOWING FULL

GRADE	1350 mm		1500 mm		1650 mm		1800 mm		1950 mm	
%	V	Q	V	Q	V	Q	V	Q	V	Q
6.00	9.231	13.639	9.903	18.064	10.552	23.291	11.182	29.374	11.795	36.362
5.00	8.427	12.451	9.040	16.490	9.633	21.262	10.208	26.814	10.768	33.196
4.00	7.537	11.136	8.085	14.749	8.616	19.017	9.130	23.984	9.631	29.691
3.50	7.050	10.417	7.563	13.796	8.059	17.789	8.541	22.435	9.009	27.773
3.00	6.527	9.644	7.002	12.773	7.462	16.469	7.907	20.770	8.341	25.714
2.50	5.959	8.804	6.392	11.660	6.811	15.034	7.218	18.961	7.614	23.473
2.00	5.329	7.875	5.717	10.429	6.092	13.447	6.456	16.959	6.810	20.994
1.80	5.056	7.471	5.424	9.894	5.780	12.757	6.125	16.089	6.461	19.918
1.60	4.767	7.043	5.114	9.328	5.449	12.028	5.775	15.169	6.091	18.777
1.50	4.615	6.820	4.951	9.032	5.276	11.646	5.591	14.687	5.898	18.182
1.40	4.459	6.588	4.783	8.726	5.097	11.251	5.402	14.189	5.698	17.566
1.30	4.297	6.349	4.609	8.408	4.912	10.841	5.205	13.673	5.490	16.925
1.20	4.128	6.100	4.429	8.078	4.719	10.416	5.001	13.138	5.275	16.262
1.10	3.952	5.840	4.240	7.735	4.518	9.973	4.788	12.577	5.050	15.568
1.00	3.768	5.568	4.043	7.375	4.308	9.509	4.565	11.992	4.815	14.844
0.98	3.731	5.512	4.002	7.300	4.265	9.413	4.519	11.871	4.767	14.696
0.96	3.692	5.456	3.961	7.226	4.221	9.316	4.473	11.750	4.718	14.545
0.94	3.654	5.399	3.920	7.150	4.177	9.219	4.426	11.627	4.669	14.394
0.92	3.615	5.341	3.878	7.073	4.132	9.120	4.379	11.502	4.619	14.240
0.90	3.575	5.283	3.835	6.996	4.087	9.021	4.331	11.377	4.568	14.082
0.88	3.535	5.224	3.792	6.918	4.041	8.920	4.283	11.249	4.517	13.925
0.86	3.495	5.164	3.749	6.839	3.995	8.818	4.234	11.121	4.466	13.768
0.84	3.454	5.103	3.705	6.759	3.948	8.715	4.184	10.991	4.413	13.604
0.82	3.413	5.042	3.661	6.678	3.901	8.610	4.134	10.859	4.361	13.444

Diameters shown in table are nominal. Q and V are based on imperial I.D.s

1 m^3 /s = 1000 litres per second

V = Metre per Second

Q = $Metre^3$ per Second

n = 0.013

To obtain V and Q if n = 0.010, multiply values in the table by 1.300

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: JANUARY 2014 | Rev. 1 | NTS

VELOCITY AND DISCHARGE FOR 1350mm TO 1950mm CIRCULAR PIPE

REGION STANDARD RH 2000.07

FOR PIPES FLOWING FULL

GRADE	1350 mm		1500 mm		1650 mm		1800 mm		1950 mm	
%	V	Q	V	Q	V	Q	V	Q	V	Q
0.80	3.371	4.980	3.616	6.596	3.853	8.505	4.083	10.726	4.307	13.278
0.78	3.328	4.918	3.570	6.513	3.805	8.398	4.032	10.591	4.253	13.111
0.76	3.285	4.854	3.524	6.429	3.756	8.289	3.980	10.454	4.198	12.942
0.74	3.242	4.790	3.478	6.344	3.706	8.180	3.927	10.316	4.142	12.769
0.72	3.198	4.725	3.430	6.258	3.655	8.068	3.874	10.175	4.086	12.596
0.70	3.153	4.659	3.382	6.170	3.604	7.955	3.820	10.033	4.029	12.421
0.68	3.108	4.592	3.334	6.081	3.552	7.841	3.765	9.889	3.971	12.242
0.66	3.062	4.524	3.284	5.991	3.500	7.725	3.709	9.742	3.912	12.060
0.64	3.015	4.455	3.234	5.900	3.446	7.607	3.652	9.593	3.852	11.875
0.62	2.967	4.384	3.183	5.807	3.392	7.487	3.595	9.442	3.792	11.690
0.60	2.919	4.313	3.131	5.712	3.337	7.365	3.536	9.289	3.730	11.499
0.58	2.870	4.241	3.079	5.616	3.281	7.242	3.477	9.135	3.667	11.305
0.56	2.820	4.167	3.025	5.519	3.224	7.116	3.416	8.974	3.604	11.110
0.54	2.769	4.092	2.971	5.419	3.166	6.987	3.355	8.912	3.539	10.910
0.52	2.718	4.015	2.915	5.318	3.106	6.857	3.292	8.647	3.472	10.704
0.50	2.665	3.937	2.859	5.215	3.046	6.724	3.228	8.480	3.405	10.497
0.48	2.611	3.858	2.801	5.109	2.985	6.588	3.163	8.308	3.336	10.284
0.46	2.556	3.777	2.742	5.002	2.922	6.449	3.096	8.133	3.266	10.069
0.44	2.500	3.694	2.682	4.892	2.858	6.307	3.028	7.955	3.194	9.847
0.42	2.442	3.609	2.620	4.779	2.792	6.162	2.959	7.772	3.121	9.621
0.40	2.383	3.522	2.557	4.664	2.725	6.014	2.887	7.584	3.046	9.390
0.35	2.229	3.294	2.392	4.363	2.549	5.625	2.701	7.094	2.849	8.783
0.30	2.064	3.050	2.214	4.039	2.360	5.208	2.500	6.568	2.638	8.133
0.25	1.884	2.784	2.021	3.687	2.154	4.754	2.283	5.996	2.408	7.423
0.20	1.685	2.490	1.808	3.298	1.927	4.242	2.042	5.363	2.154	6.640

Diameters shown in table are nominal. Q and V are based on imperial I.D.s

1 m^3 /s = 1000 litres per second

V = Metre per Second

Q = $Metre^3$ per Second

n = 0.013

To obtain V and Q if n = 0.010, multiply values in the table by 1.300

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: JANUARY 2014 | Rev. 1 | NTS

VELOCITY AND DISCHARGE FOR 1350mm TO 1950mm CIRCULAR PIPE

REGION STANDARD RH 2000.08

FOR PIPES FLOWING FULL

GRADE	2100 mm		2250 mm		2400 mm	
%	V	Q	V	Q	V	Q
6.00	12.393	44.309	12.976	53.258	13.547	63.262
5.00	11.313	40.448	11.846	48.620	12.366	57.747
4.00	10.119	36.179	10.595	43.485	11.061	51.635
3.50	9.465	33.841	9.911	40.678	10.346	48.314
3.00	8.763	31.331	9.176	37.661	9.579	44.732
2.50	8.000	28.603	8.376	34.378	8.744	40.833
2.00	7.155	25.582	7.492	30.750	7.821	36.523
1.80	6.788	24.269	7.107	29.170	7.420	34.650
1.60	6.400	22.882	6.701	27.503	6.995	32.665
1.50	6.196	22.153	6.488	26.629	6.773	31.629
1.40	5.986	21.402	6.268	25.726	6.544	30.559
1.30	5.769	20.626	6.040	24.790	6.306	29.448
1.20	5.542	19.815	5.803	23.817	6.058	28.290
1.10	5.306	18.971	5.556	22.804	5.800	27.085
1.00	5.059	18.088	5.298	21.745	5.530	25.824
0.98	5.009	17.909	5.244	21.523	5.475	25.567
0.96	4.957	17.723	5.190	21.302	5.419	25.306
0.94	4.905	17.537	5.136	21.080	5.362	25.040
0.92	4.853	17.351	5.081	20.854	5.305	24.773
0.90	4.800	17.162	5.026	20.628	5.247	24.503
0.88	4.746	16.969	4.970	20.399	5.188	24.227
0.86	4.692	16.775	4.913	20.165	5.129	23.952
0.84	4.637	16.579	4.855	19.927	5.069	23.671
0.82	4.581	16.379	4.797	19.689	5.008	23.386

Diameters shown in table are nominal. Q and V are based on imperial I.D.s

1 m^3 /s = 1000 litres per second

V = Metre per Second

Q = $Metre^3$ per Second

n = 0.013

To obtain V and Q if n = 0.010, multiply values in the table by 1.300

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: JANUARY 2014 | Rev. 1 | NTS

VELOCITY AND DISCHARGE FOR 2100mm TO 2400mm CIRCULAR PIPE

REGION STANDARD RH 2000.09

FOR PIPES FLOWING FULL

GRADE	2100 mm		2250 mm		2400 mm	
%	V	Q	V	Q	V	Q
0.80	4.525	16.178	4.738	19.446	4.947	23.102
0.78	4.468	15.975	4.679	19.204	4.884	22.807
0.76	4.411	15.771	4.618	18.954	4.821	22.513
0.74	4.352	15.560	4.557	18.703	4.757	22.214
0.72	4.293	15.349	4.495	18.449	4.693	21.916
0.70	4.233	15.134	4.432	18.190	4.627	21.607
0.68	4.172	14.916	4.368	17.928	4.561	21.299
0.66	4.110	14.695	4.304	17.665	4.493	20.982
0.64	4.048	14.473	4.238	17.394	4.424	20.659
0.62	3.984	14.244	4.171	17.119	4.355	20.337
0.60	3.919	14.012	4.103	16.840	4.284	20.006
0.58	3.853	13.776	4.034	16.557	4.212	19.669
0.56	3.786	13.536	3.964	16.270	4.139	19.328
0.54	3.718	13.293	3.893	15.978	4.046	18.978
0.52	3.648	13.043	3.820	15.679	3.988	18.623
0.50	3.578	12.793	3.746	15.375	3.911	18.264
0.48	3.505	12.532	3.670	15.063	3.832	17.895
0.46	3.431	12.267	3.593	14.747	3.751	17.517
0.44	3.356	11.999	3.514	14.423	3.668	17.129
0.42	3.279	11.724	3.433	14.090	3.584	16.737
0.40	3.200	11.441	3.350	13.750	3.498	16.335
0.35	2.993	10.701	3.134	12.863	3.272	15.280
0.30	2.771	9.907	2.902	11.911	3.029	14.145
0.25	2.530	9.046	2.649	10.872	2.765	12.912
0.20	2.263	8.091	2.369	9.723	2.473	11.549

Diameters shown in table are nominal. Q and V are based on imperial I.D.s

1 m^3 /s = 1000 litres per second

V = Metre per Second

Q = $Metre^3$ per Second

n = 0.013

To obtain V and Q if n = 0.010, multiply values in the table by 1.300

THE REGIONAL MUNICIPALITY OF HALTON
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VELOCITY AND DISCHARGE FOR 2100mm TO 2400mm CIRCULAR PIPE

Date: JANUARY 2014 | Rev. 1 | NTS

REGION STANDARD RH 2000.10

P	M	P	M	P	M	P	M	P	M	P	M
.025	4.37	.475	3.99	.925	3.82	2.600	3.49	6.200	3.16	9.800	2.96
.050	4.31	.500	3.97	.950	3.81	2.800	3.47	6.400	3.14	10.000	2.95
.075	4.28	.525	3.96	.975	3.81	3.000	3.44	6.600	3.13	10.200	2.95
.100	4.24	.550	3.95	1.000	3.80	3.200	3.42	6.800	3.12	10.400	2.94
.125	4.22	.575	3.94	1.050	3.79	3.400	3.40	7.000	3.11	10.600	2.93
.150	4.19	.600	3.93	1.100	3.77	3.600	3.37	7.200	3.09	10.800	2.92
.175	4.17	.625	3.92	1.150	3.76	3.800	3.35	7.400	3.08	11.000	2.91
.200	4.15	.650	3.91	1.200	3.75	4.000	3.33	7.600	3.07	11.200	2.91
.225	4.13	.675	3.90	1.300	3.72	4.200	3.31	7.800	3.06	11.400	2.90
.250	4.11	.700	3.89	1.400	3.70	4.400	3.30	8.000	3.05	11.600	2.89
.275	4.09	.725	3.89	1.500	3.68	4.600	3.28	8.200	3.04	11.800	2.88
.300	4.08	.750	3.88	1.600	3.66	4.800	3.26	8.400	3.03	12.000	2.88
.325	4.06	.775	3.87	1.700	3.64	5.000	3.25	8.600	3.02	12.200	2.87
.350	4.05	.800	3.86	1.800	3.62	5.200	3.23	8.800	3.01	12.400	2.86
.375	4.04	.825	3.85	1.900	3.60	5.400	3.21	9.000	3.00	12.600	2.85
.400	4.02	.850	3.84	2.000	3.59	5.600	3.20	9.200	2.99	12.800	2.85
.425	4.01	.875	3.84	2.200	3.55	5.800	3.18	9.400	2.98	13.000	2.84
.450	4.00	.900	3.83	2.400	3.52	6.000	3.17	9.600	2.97	13.200	2.83

HARMON FORMULA $M = 1 + \frac{14}{4 + P^{1/2}}$

M = Ratio of the peak flow to the average rate of flow

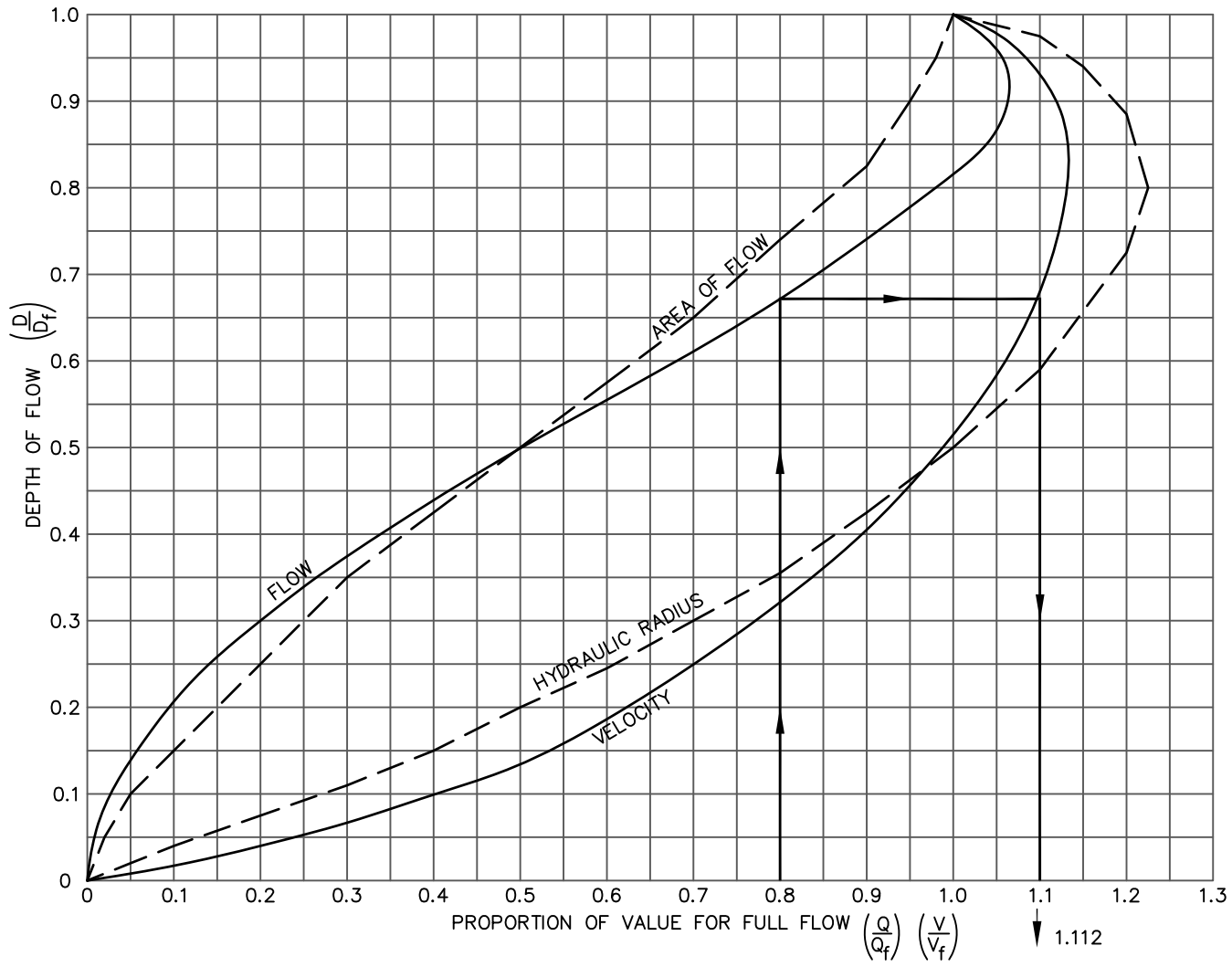
P = Tributary population in thousands

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: JANUARY 2014. | Rev. 1 | NTS

PEAKING FACTORS FOR WASTEWATER MAIN

REGION STANDARD RH 2002.01



EXAMPLE:

Given: Discharge = 1.313 m^3/s through a pipe which has a capacity flowing full at 1.614 m^3/s at velocity = 4.44 ms

Find: V for Q = 1.313 m^3/s

Since percentage of full discharge $= \frac{1.313}{1.614} = 80\ \%$

enter chart at 80 % of value for full section

of Hydraulic Elements, find V = 1.112 % x 4.44 = 4.94 mps

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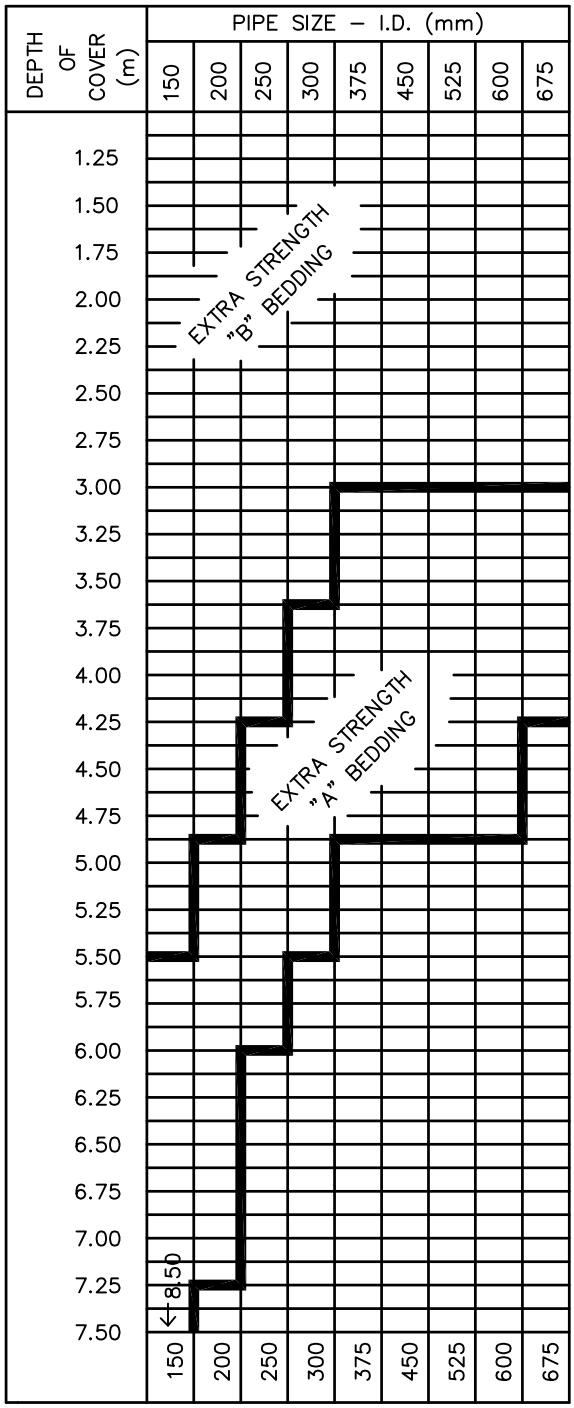
VALUES OF HYDRAULIC ELEMENTS OF CIRCULAR SECTION FOR VARIOUS DEPTHS OF FLOW

Date: JANUARY 2014	Rev. 1	NTS

REGION STANDARD RH 2003.01



NOTES

1. PIPE MANUFACTURED TO CURRENT ASTM SPECIFICATIONS FOR VITRIFIED CLAY – C–200
2. SAFETY FACTOR: 1.5
3. BEDDING FOR RIGID PIPE AS PER OPSD 802.030, 802.031, 802.032, 802.033 and 802.034
4. THE LOAD FACTORS USED FOR:
   CLASS "A" BEDDING = 2.8
   CLASS "B" BEDDING = 1.9
5. THE TABLE IS BASED ON A BACKFILL WEIGHT OF 2100 kg/m^3 AND K_u VALUE OF 0.130
6. THE DEPTH OF COVER IS MEASURED FROM THE FINISHED GRADE TO THE TOP OF PIPE.
7. THE TRANSITION WIDTH WAS USED IN THE DEVELOPMENT OF THIS TABLE.
8. THIS TABLE DOES NOT INCLUDE LIVE LOADS. FOR DEPTHS LESS THAN 2.5m, LIVE LOAD IS TO BE CHECKED

THE REGIONAL MUNICIPALITY OF HALTON
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Date: JANUARY 2014 | Rev. 1 | NTS

VITRIFIED CLAY PIPE CLASS REQUIREMENTS

REGION STANDARD RH 2004.01