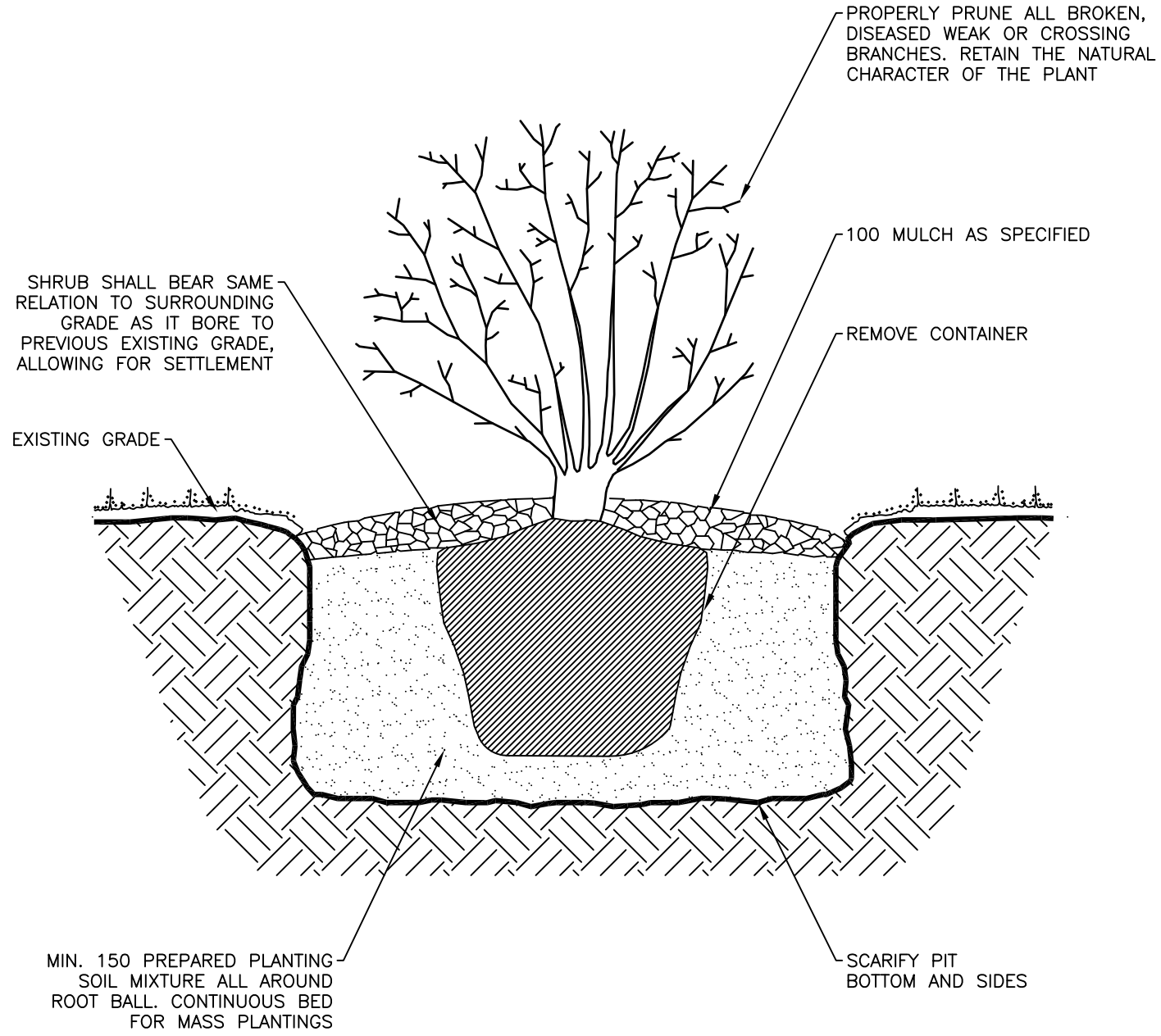
Regional Municipality of Halton

Water and Wastewater Standard Drawings

Version 5

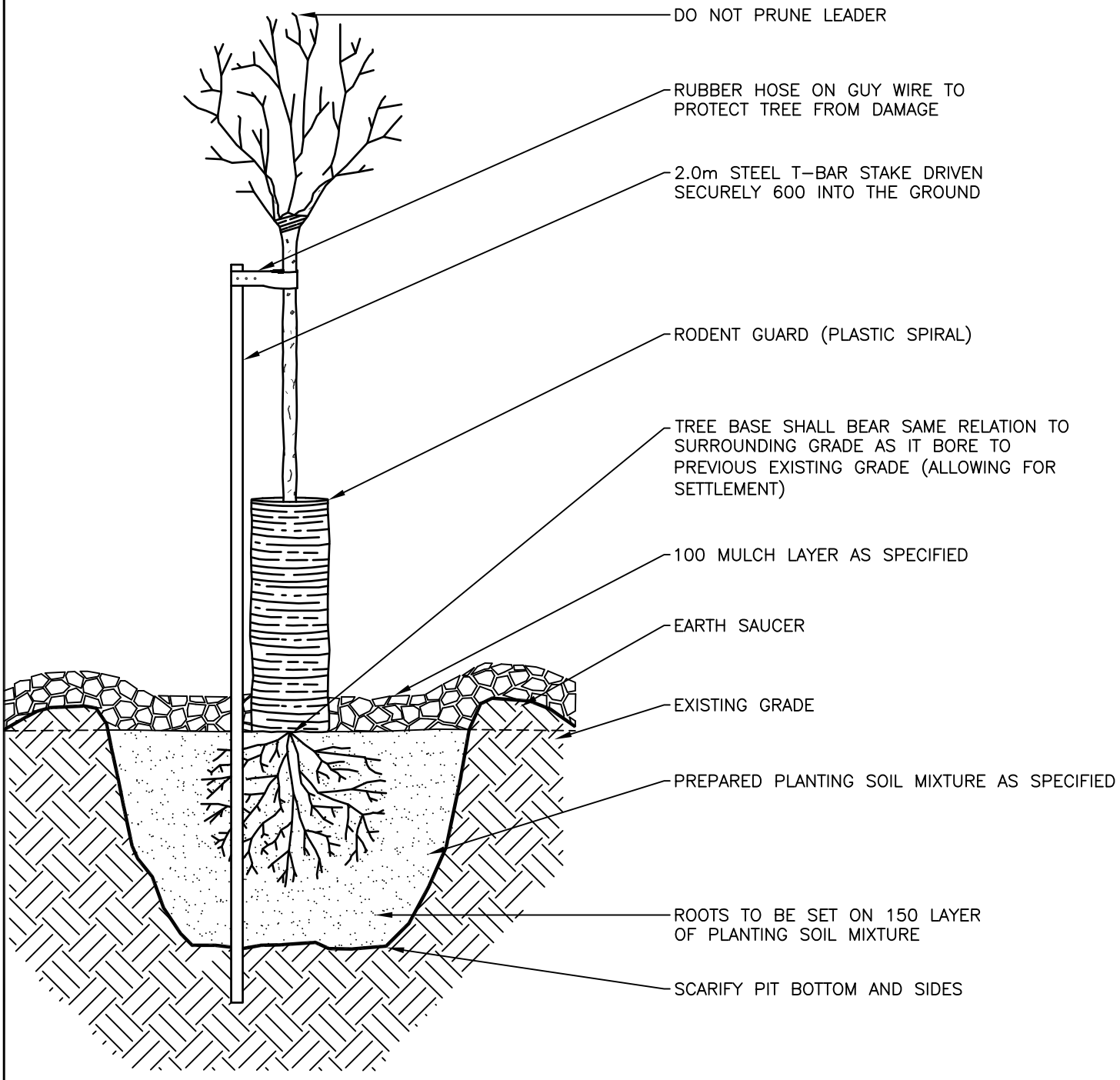
October 2019

Q-Infra-MS-BUILD-1265



NOTE: 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		



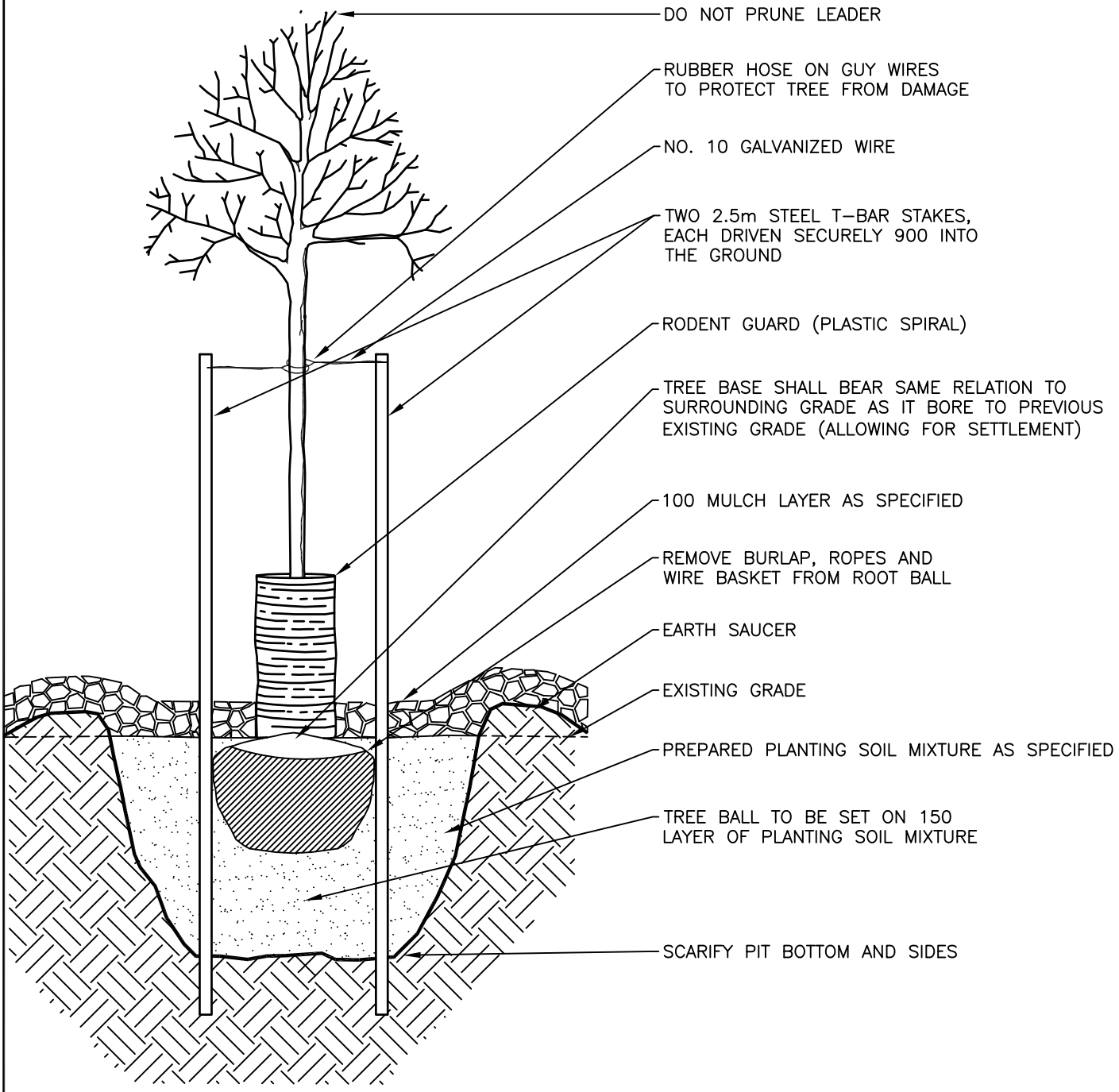
NOTE: ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

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



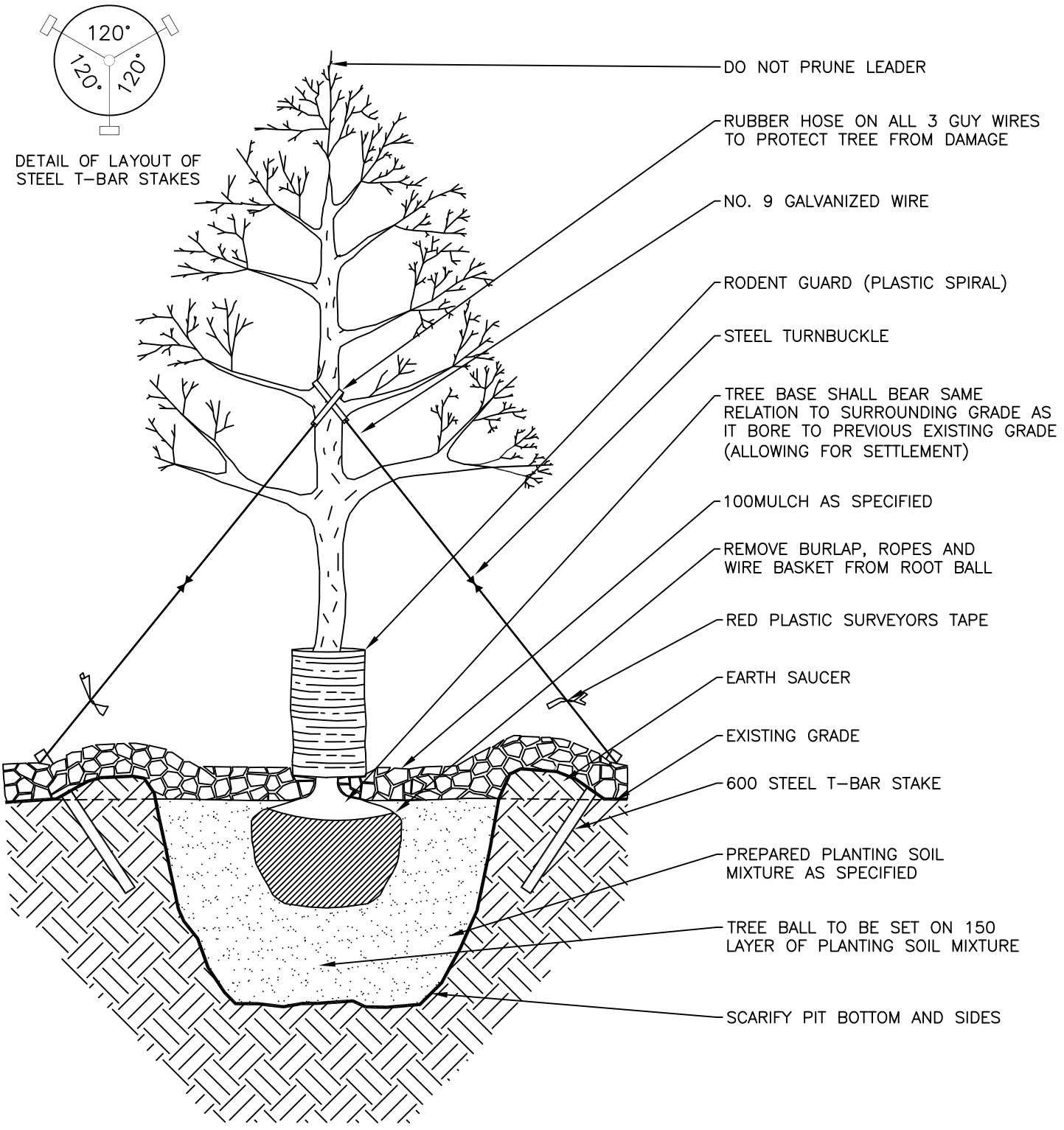
NOTE: ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

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



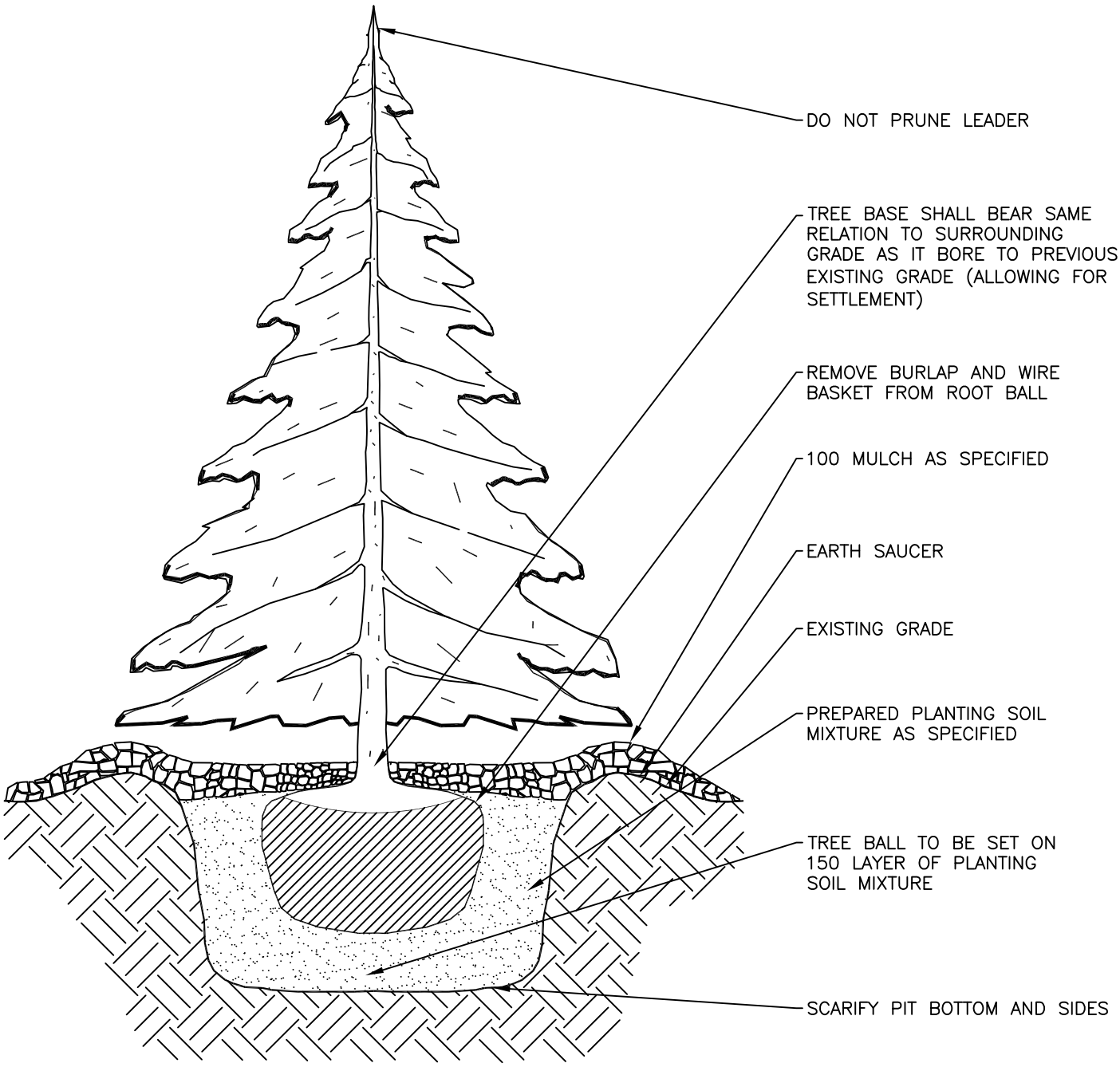
NOTE: ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

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



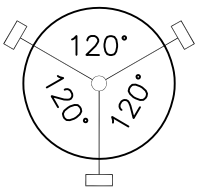
NOTE: ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

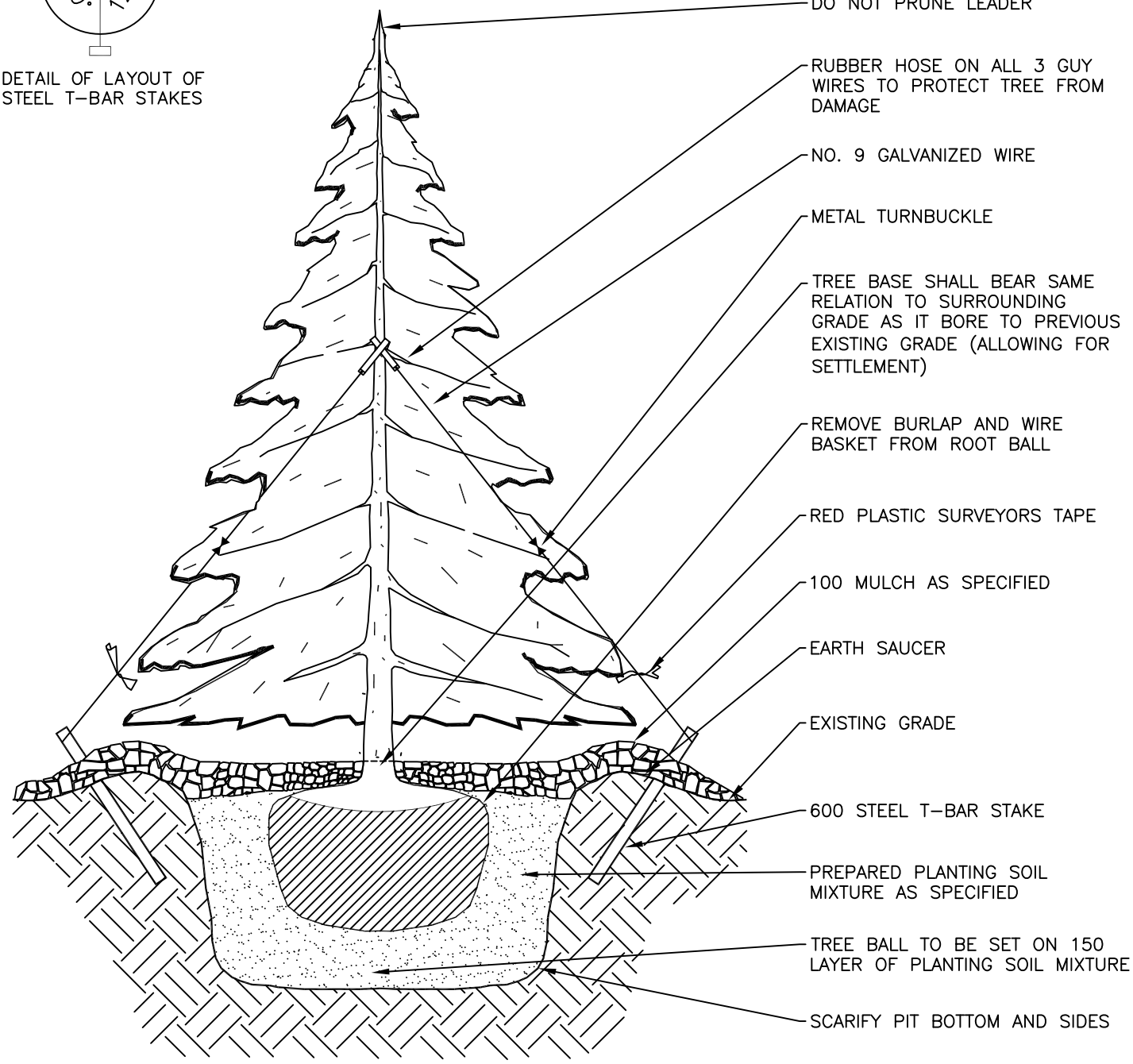
Date: January 2014	Rev. 1	NTS

CONIFEROUS TREE PLANTING 1.25m HEIGHT AND SMALLER

REGION STANDARD RH 100.05



DETAIL OF LAYOUT OF STEEL T–BAR STAKES



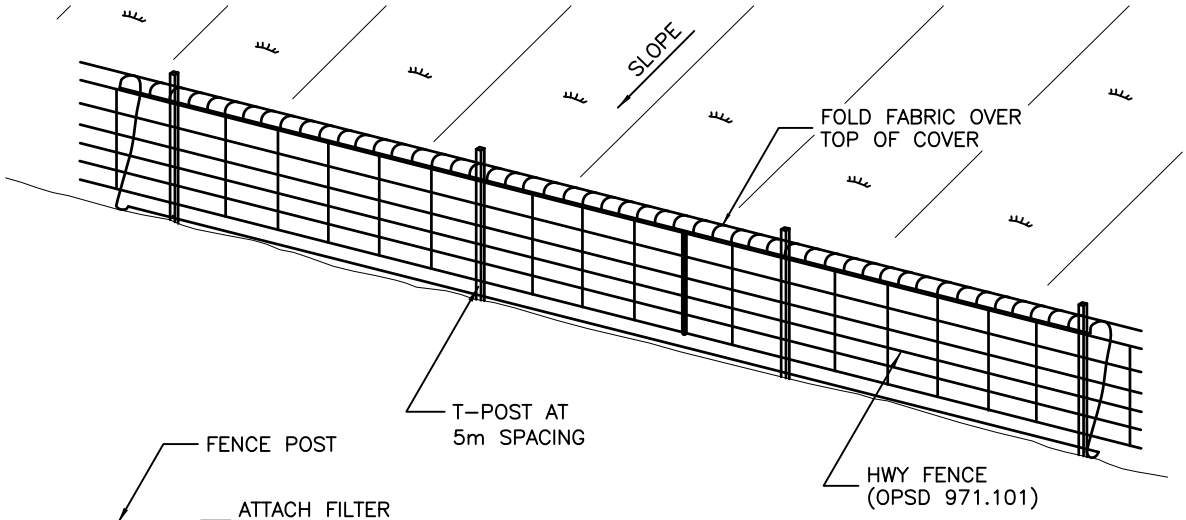
NOTE: ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

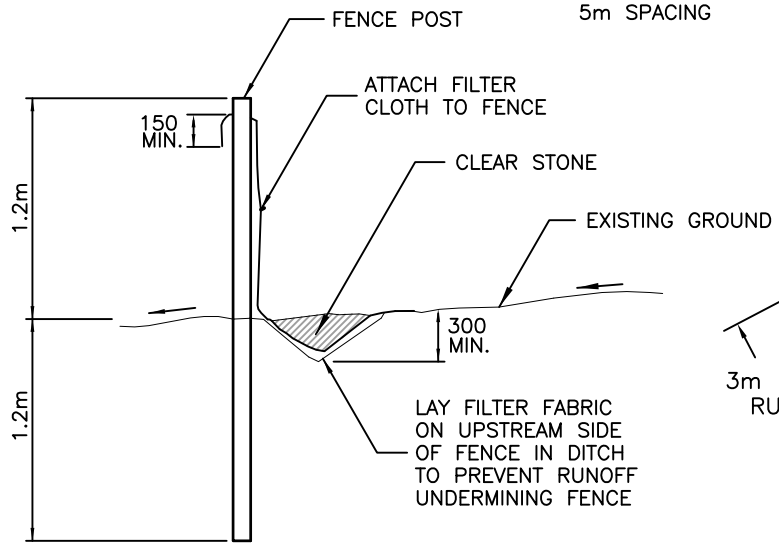
THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: January 2014	Rev. 1	NTS

CONIFEROUS TREE PLANTING 1.50m HEIGHT AND LARGER

REGION STANDARD RH 100.06





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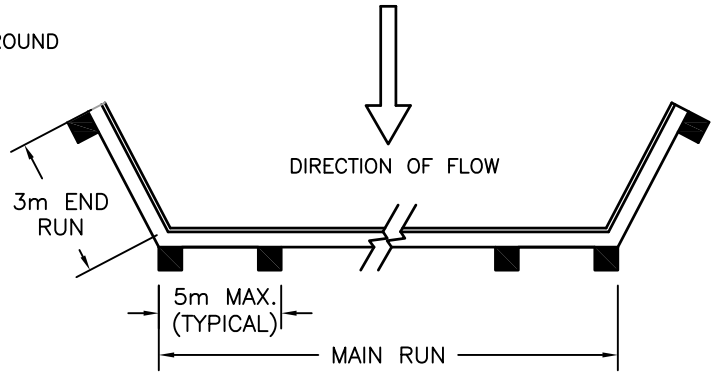
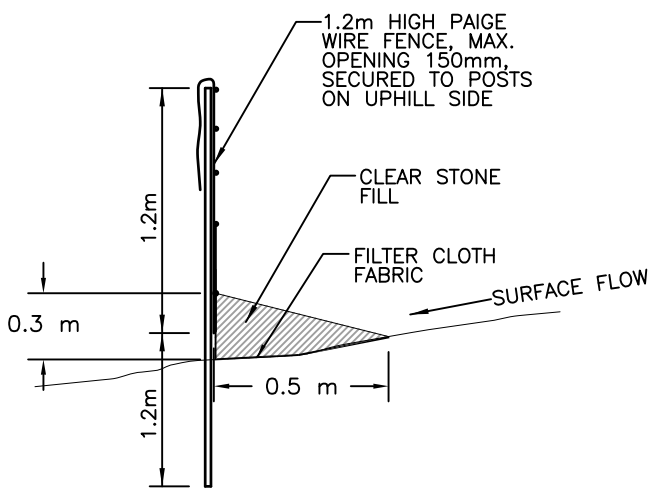
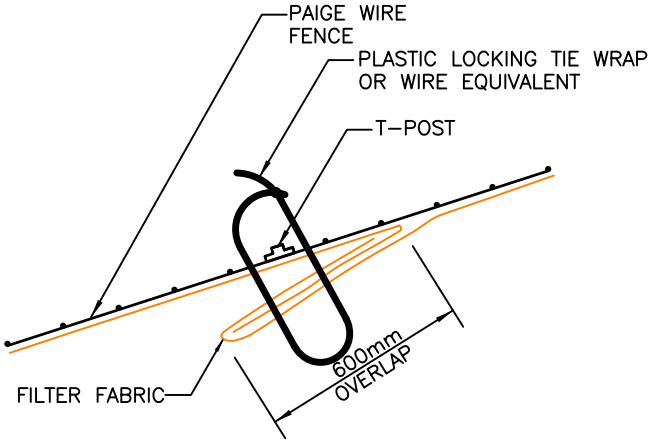


PLAN VIEW



NON KEY–IN



CONNECTION AT T–POST

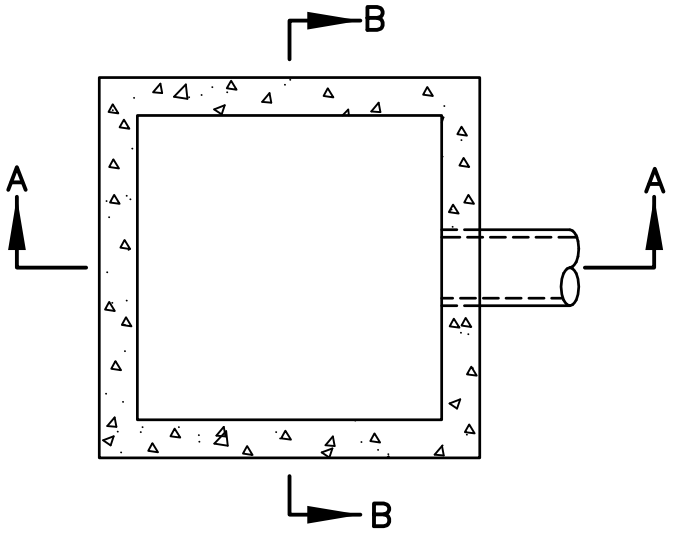
NOTE: ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

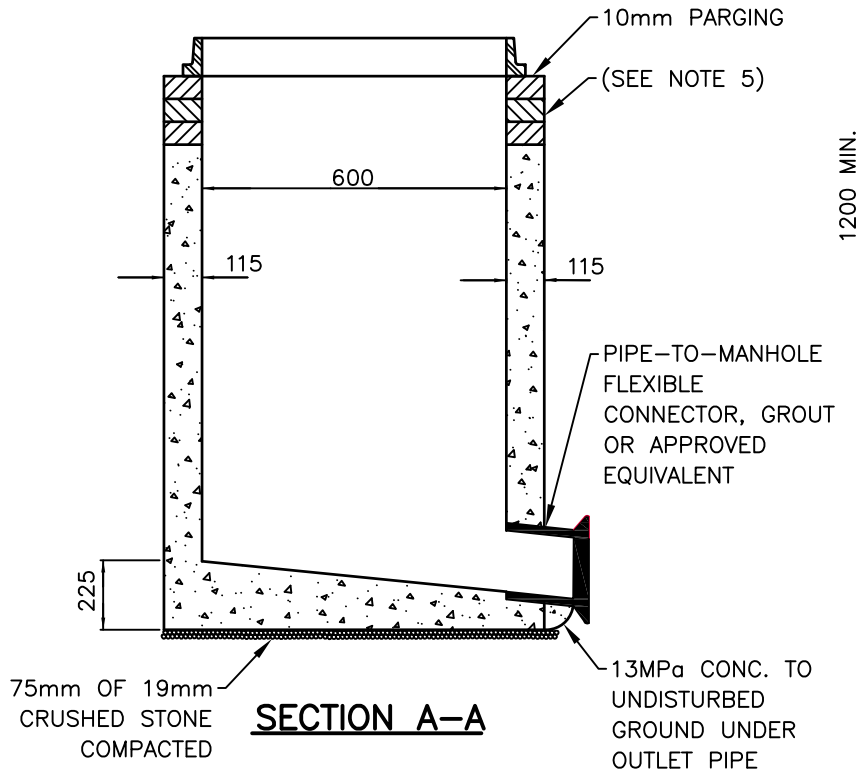
Date: August 2018	Rev. 1	NTS

HEAVY DUTY SILT FENCE

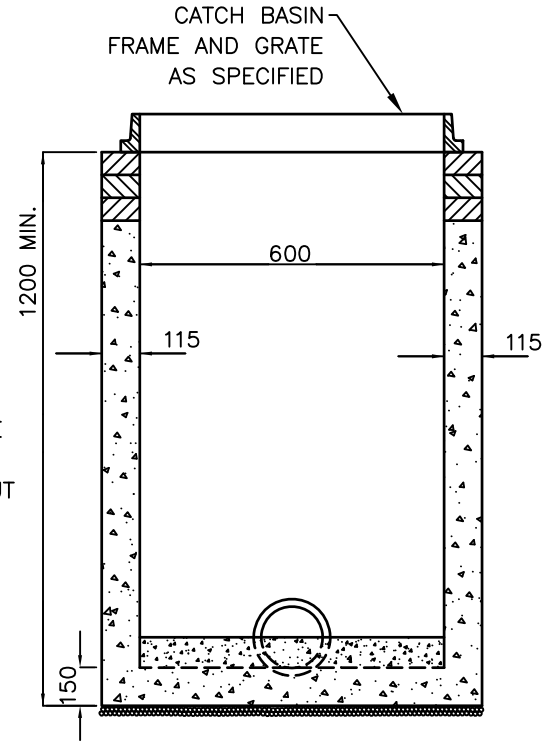
REGION STANDARD RH 200.040



PLAN



SECTION A–A



SECTION B–B

NOTES:

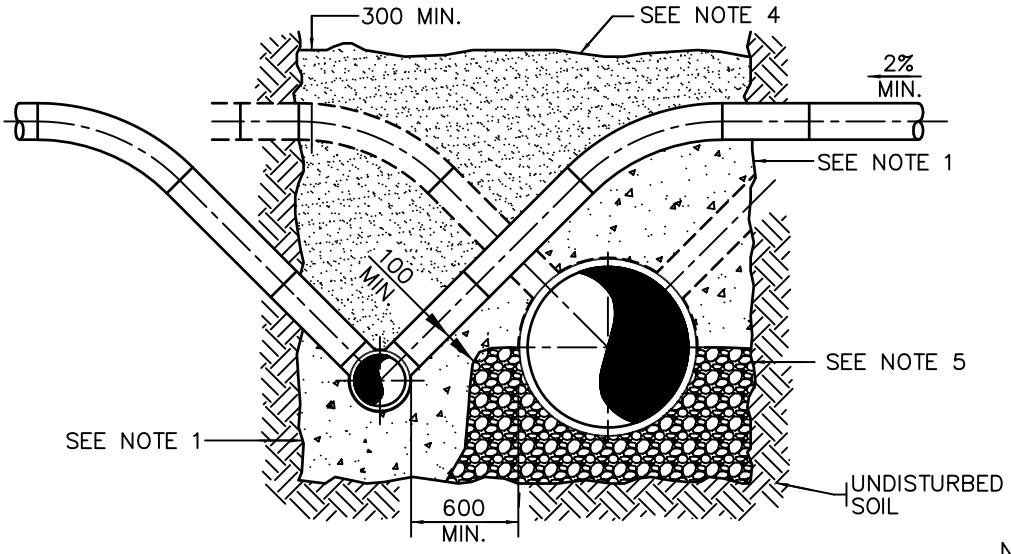
1. CONCRETE TO BE 27 MPa AT 28 DAYS.
2. PARGING MIX ON ANY BRICKWORK TO BE 1:3 MORTAR MIX AND APPLIED 10mm THICK, OUTSIDE ONLY.
3. ALL JOINTS AND LIFTING HOLES TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
4. FOR USE IN SPECIAL LOCATIONS ONLY WITH THE APPROVAL OF THE DESIGN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

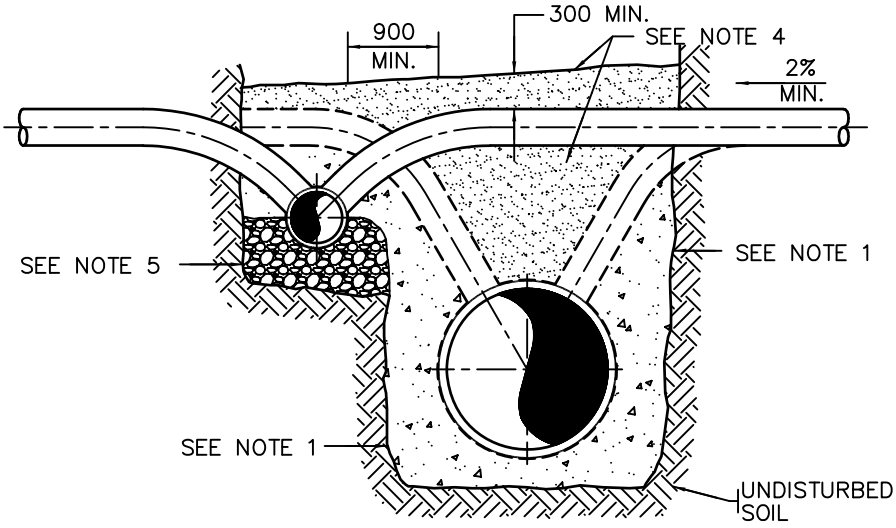
THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

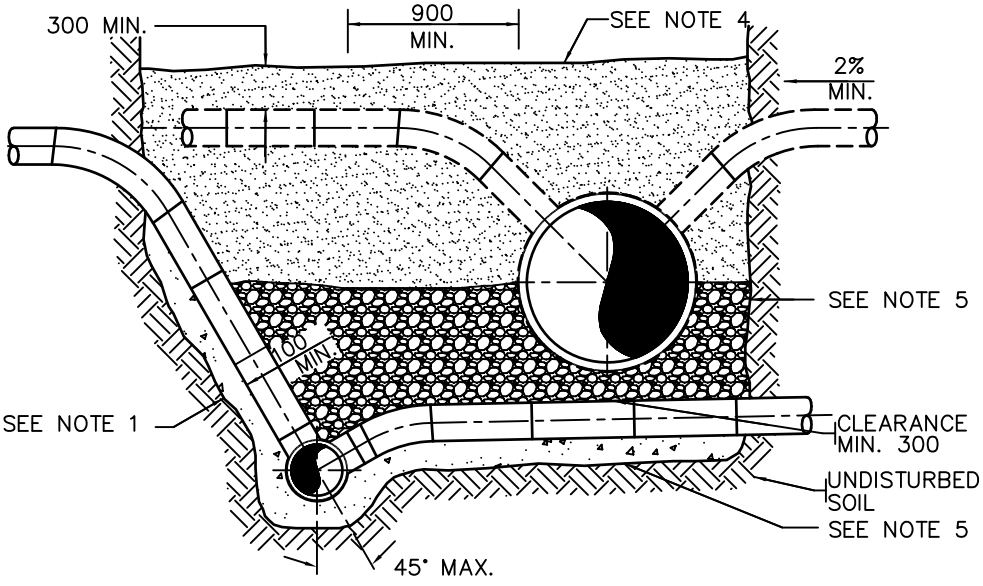
Date: August 2018	Rev. 2	NTS

PRECAST CATCHBASIN WITHOUT SUMP

REGION STANDARD RH 301.01







NOTES:

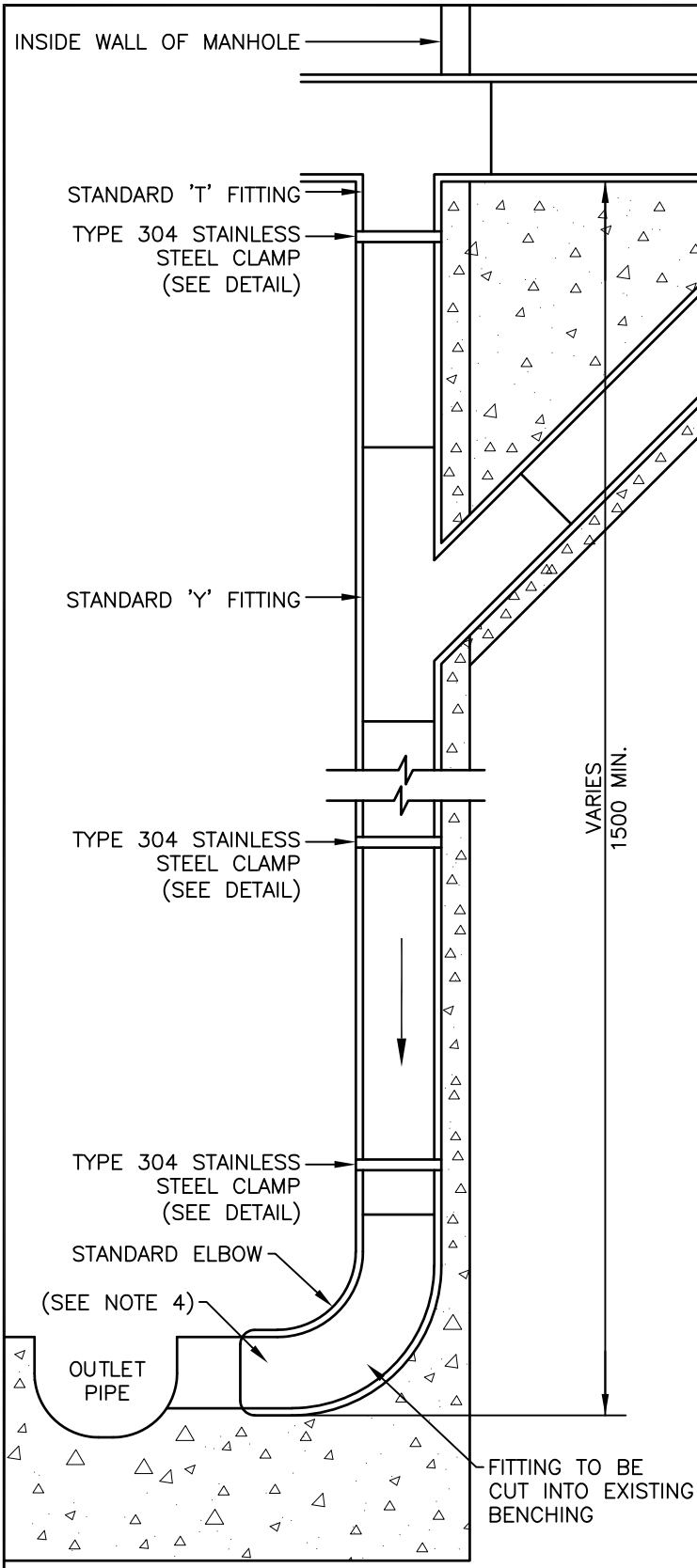
1. CONCRETE TO BE AT 20MPa AT 28 DAYS.
2. USE FACTORY INSTALLED 'TEES' UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
3. THE USE AND LOCATION OF ELBOWS TO BE AS DIRECTED BY THE ENGINEER.
4. GRANULAR MATERIAL COMPACTED TO 95% STD. PROCTOR. STONE SIZE WITHIN 300mm OF SURFACE OF PIPE, SHALL NOT EXCEED 25mm.
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.

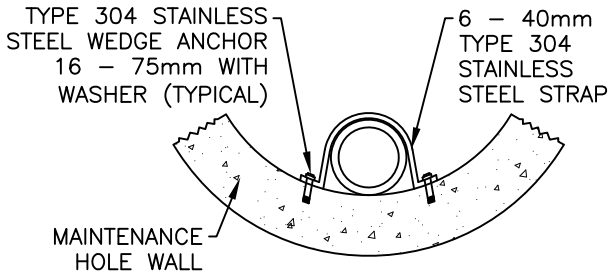
THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: January 2014	Rev. 1	NTS

COMMON TRENCH FOR SEWER SERVICE CONNECTIONS FOR FLEXIBLE PIPE

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. MIN. 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 20MPa 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. CENTERS.
10. THIS STRUCTURE IS TO BE USED ONLY WITH THE CONSENT OF HALTON REGION FOR RETROFIT AT EXISTING MANHOLES.
11. MIN. REMAINING INTERNAL DIAMETER OF MANHOLE SHALL BE 1200mm.
12. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

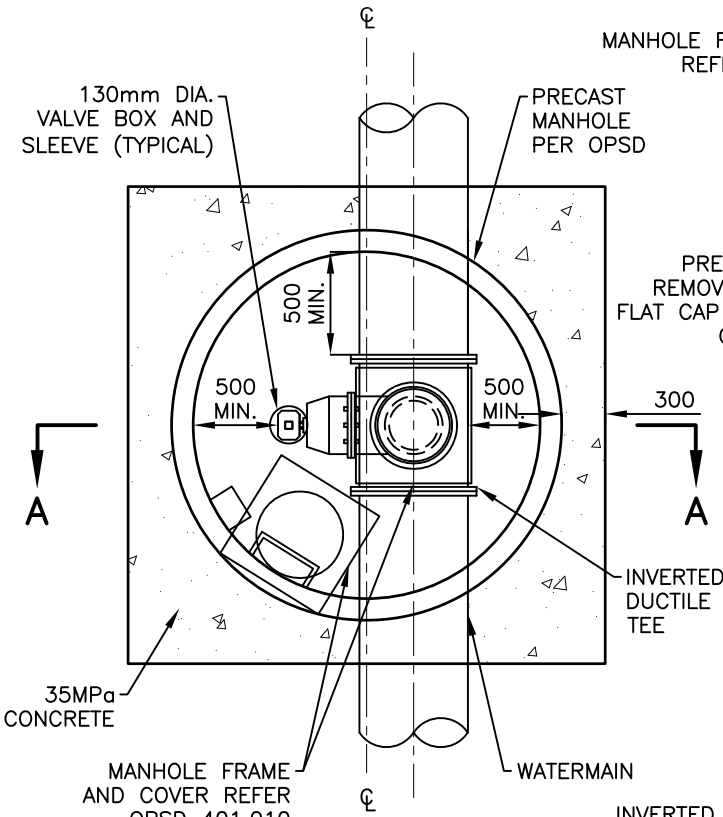
THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: August 2018	Rev. 3	NTS

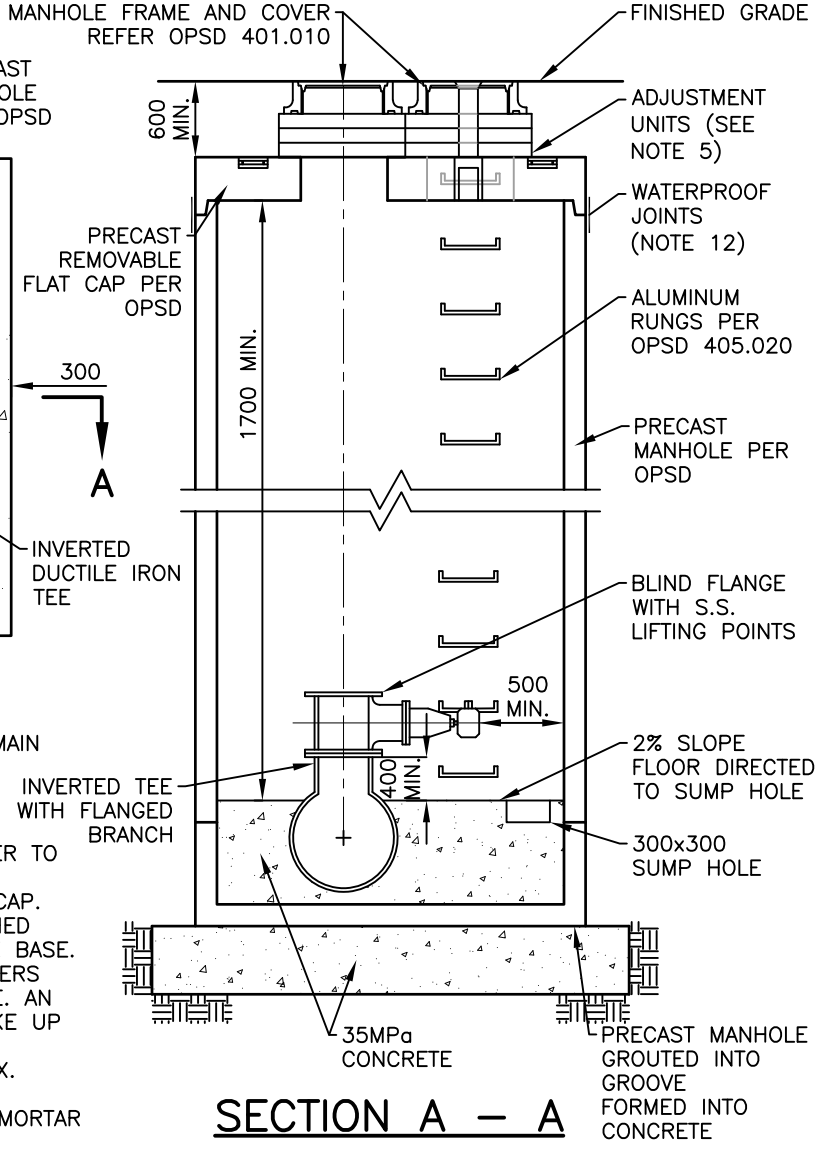
INTERNAL DROP STRUCTURE FOR MANHOLES

SPECIAL CONSIDERATION ONLY

REGION STANDARD RH 303.01



PLAN



SECTION A – A

NOTES:

1. REINF. CONC. PRECAST OR MONOLITHIC CHAMBER TO MEET CURRENT OPSD.
2. LIFTING POINTS TO BE COUNTERSUNK IN FLAT CAP.
3. STEPS: 1ST STEP TO BE 450mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300mm ABOVE BASE.
4. THE TOP OF THE ROOF SLAB OF VALVE CHAMBERS SHALL BE MIN. 600mm BELOW FINISHED GRADE. AN ENGINEERED COLLAR MAY BE REQUIRED TO MAKE UP FOR ELEVATION DIFFERENCES.
5. ADJUSTMENT UNITS TO BE MIN. 150mm TO MAX. 300mm.
6. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15mm THICK.
7. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
8. JOINT FILLER RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
9. RESTRAINING RODS AND T–HEAD BOLT WITH NUT ARE CORROSION–RESISTANT, FLUOROPOLYMER COATED, HIGH–STRENGTH LOW–ALLOY STEEL THAT CONFORMS TO ANSI/AWWA C111/A21.11.
10. PETROLATUM COATING ON ALL FITTINGS AND BOLTS
11. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
12. WATERPROOF MEMBRANE SHALL BE SELF–ADHESIVE, RUBBERIZED ROLL–TYPE BITUMINOUS WATERPROOFING MEMBRANE AND PRIMER. WATERPROOFING SHALL EXTEND COMPLETELY AROUND ALL JOINTS WITH A MINIMUM 300mm WIDE STRIP CENTERED ON THE JOINT, INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.

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

THE REGIONAL MUNICIPALITY OF HALTON
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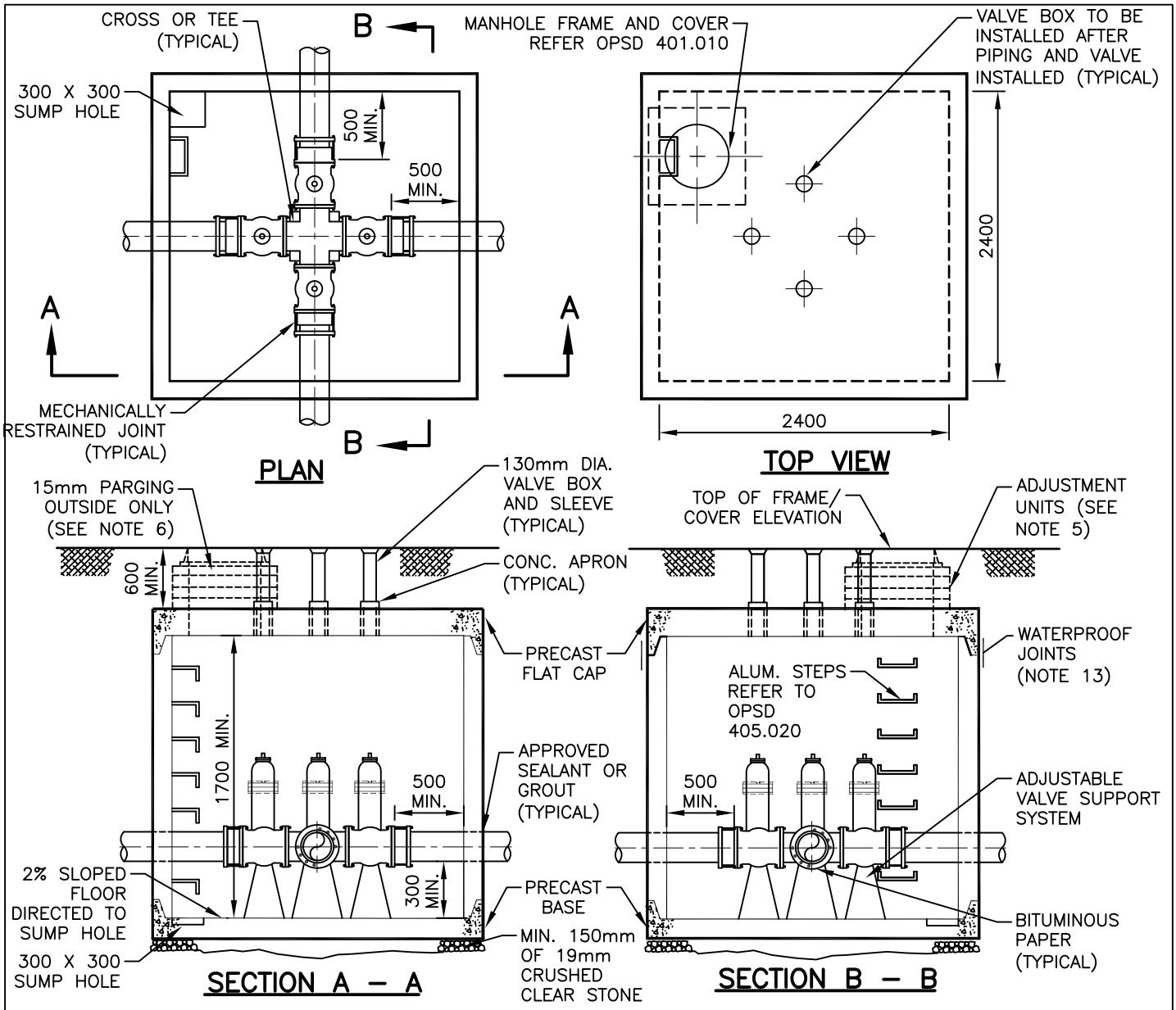
Date: March 2019 | Rev. 1 | NTS

SWABBING PORT CHAMBER DETAIL

REGION STANDARD RH 401.010



NOTES:

1. REINF. CONC. PRECAST CHAMBER OR MONOLITHIC CHAMBER TO MEET CURRENT OPSD.
2. STEPS: 1ST STEP TO BE 450mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300mm ABOVE BASE.
3. VALVES TO BE FLANGED.
4. THE TOP OF THE ROOF SLAB OF VALVE CHAMBERS SHALL BE MIN. 600mm BELOW FINISHED GRADE. AN ENGINEERED COLLAR MAY BE REQUIRED TO MAKE UP FOR ELEVATION DIFFERENCES.
5. ADJUSTMENT UNITS TO BE MIN. 150mm TO MAX. 300mm.
6. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15mm THICK
7. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
8. JOINT FILLER RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
9. RESTRAINING RODS AND T–HEAD BOLT WITH NUT ARE CORROSION–RESISTANT, FLUOROPOLYMER COATED, HIGH–STRENGTH LOW–ALLOY STEEL THAT CONFORMS TO ANSI/AWWA C111/A21.11.
10. FOR 300mm AND 400mm TEES, THE MAIN LINE CAN BE OFFSET FROM THE CENTRELINE OF CHAMBER UP TO 200mm AS NEEDED.
11. PETROLATUM COATING ON ALL FITTINGS AND BOLTS
12. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
13. WATERPROOF MEMBRANE SHALL BE SELF–ADHESIVE, RUBBERIZED ROLL–TYPE BITUMINOUS WATERPROOFING MEMBRANE AND PRIMER. WATERPROOFING SHALL EXTEND COMPLETELY AROUND ALL JOINTS WITH A MINIMUM 300mm WIDE STRIP CENTERED ON THE JOINT, INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.

THE REGIONAL MUNICIPALITY OF HALTON
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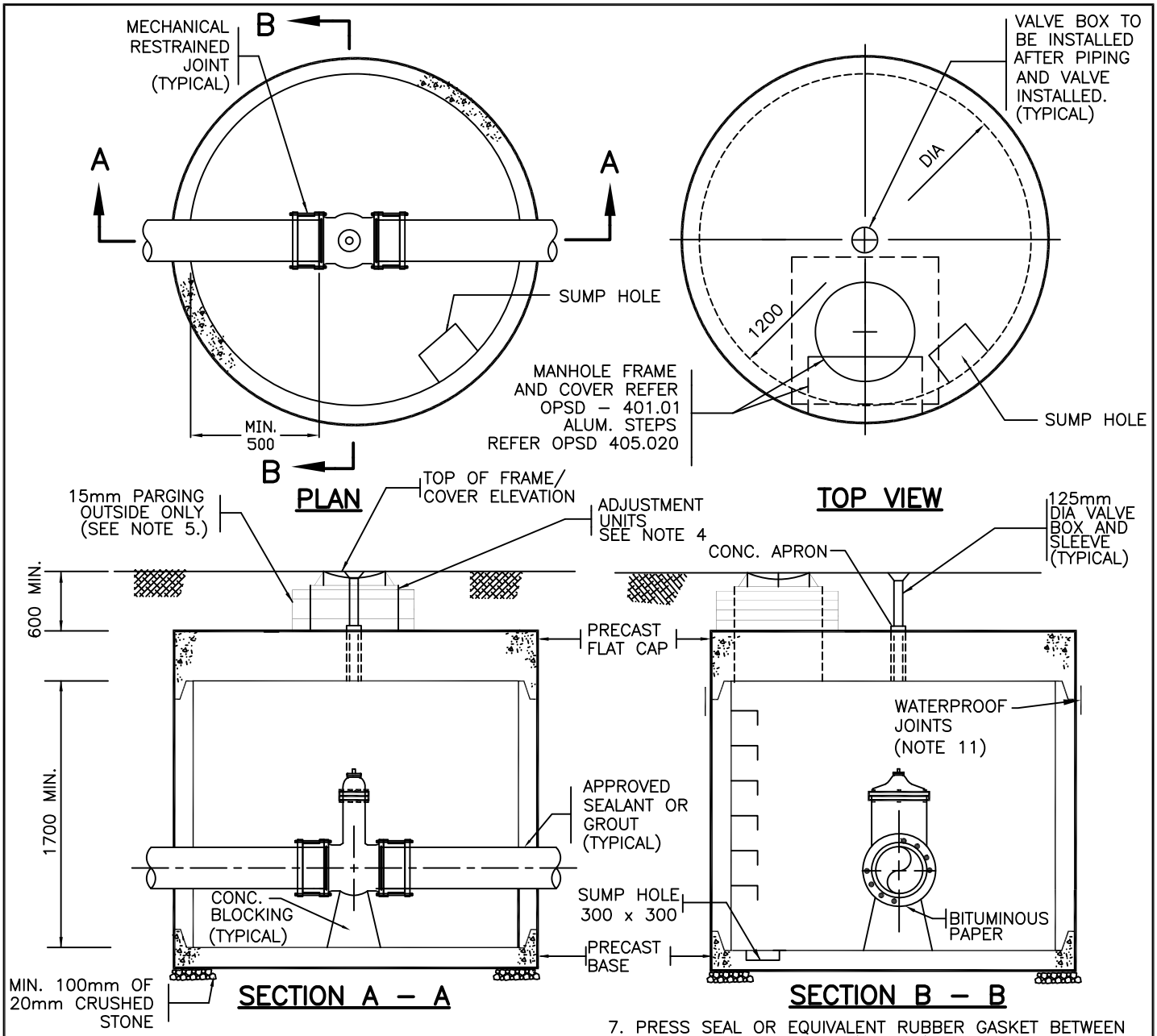
Date: March 2019	Rev. 3	NTS

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

REGION STANDARD RH 402.020



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. RESTRAININGS RODS & T–HEAD BOLT WITH NUT ARE CORROSION–RESISTANT, FLOUROPOLYMER COATED, HIGH STRENGTH LOW–ALLOY STEEL THAT CONFORMS TO ANSI /AWWA C111/A21.11.
9. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
10. PETROLATUM COATING ON ALL FITTINGS AND BOLTS. NOTED.
11. WATERPROOF MEMBRANE SHALL BE SELF–ADHESIVE, RUBBERIZED ROLL–TYPE BITUMINOUS WATERPROOFING MEMBRANE AND PRIMER. WATERPROOFING SHALL EXTEND COMPLETELY AROUND ALL JOINTS WITH A MINIMUM 300mm WIDE STRIP CENTERED ON THE JOINT, INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.

THE REGIONAL MUNICIPALITY OF HALTON
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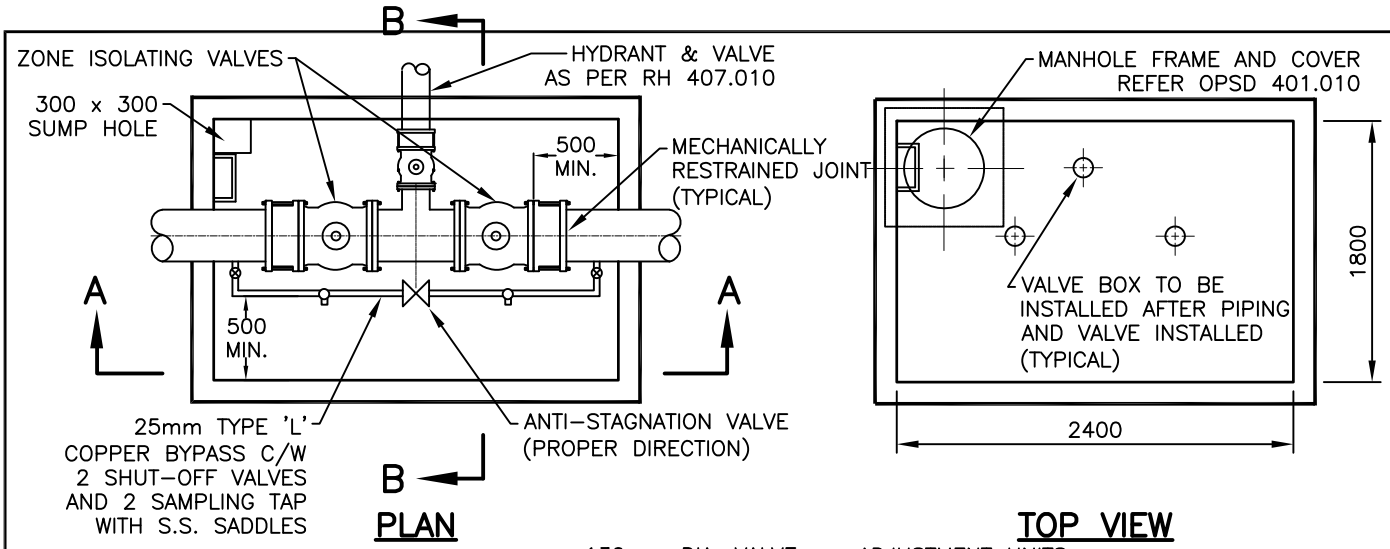
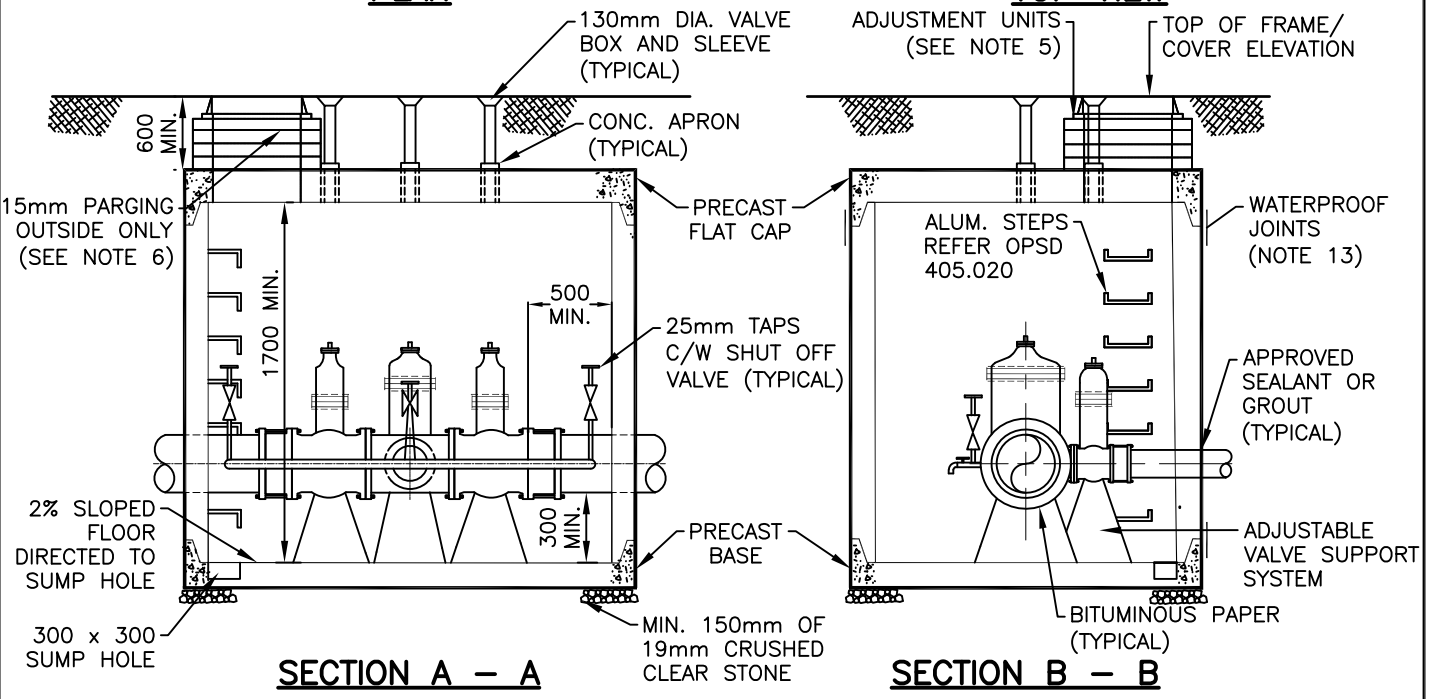
Date: July 2019	Rev. 0	NTS

PRECAST VALVE CHAMBER FOR SINGLE VALVE 150 mm TO 400 mm

REGION STANDARD RH 402.060





NOTES:

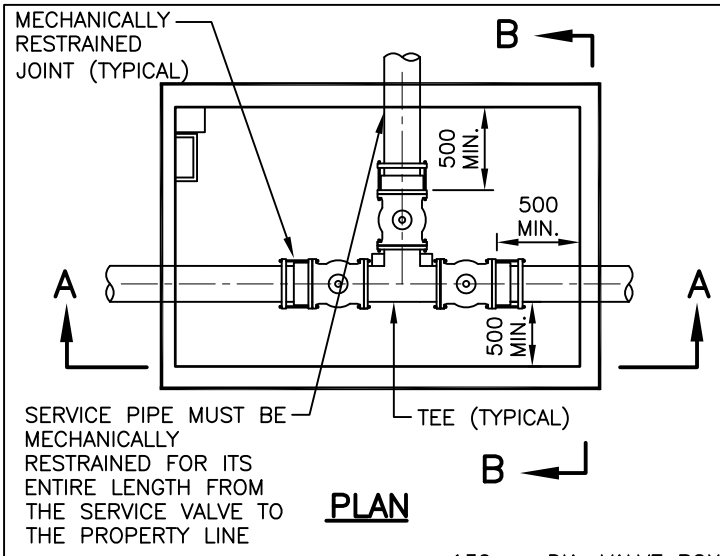
1. REINF. CONC. PRECAST CHAMBER OR MONOLITHIC CHAMBER TO MEET CURRENT OPSD.
2. STEPS: 1ST STEP TO BE 450mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300mm ABOVE BASE.
3. VALVES TO BE FLANGED.
4. THE TOP OF THE ROOF SLAB OF VALVE CHAMBERS SHALL BE MIN. 600mm BELOW FINISHED GRADE. AN ENGINEERED COLLAR MAY BE REQUIRED TO MAKE UP FOR ELEVATION DIFFERENCES.
5. ADJUSTMENT UNITS TO BE MIN. 150mm TO MAX. 300mm.
6. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15mm THICK.
7. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
8. JOINT FILLER RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
9. RESTRAINING RODS AND T-HEAD BOLT WITH NUT ARE CORROSION-RESISTANT, FLOUROPOLYMER COATED, HIGH-STRENGTH LOW-ALLOY STEEL THAT CONFORMS TO ANSI/AWWA C111/A21.11.
10. FOR 300mm AND 400mm TEES, THE MAIN LINE CAN BE OFFSET FROM THE CENTRELINE OF CHAMBER UP TO 200mm AS NEEDED.
11. PETROLATUM COATING ON ALL FITTINGS AND BOLTS
12. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
13. WATERPROOF MEMBRANE SHALL BE SELF-ADHESIVE, RUBBERIZED ROLL-TYPE BITUMINOUS WATERPROOFING MEMBRANE AND PRIMER. WATERPROOFING SHALL EXTEND COMPLETELY AROUND ALL JOINTS WITH A MINIMUM 300mm WIDE STRIP CENTERED ON THE JOINT, INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

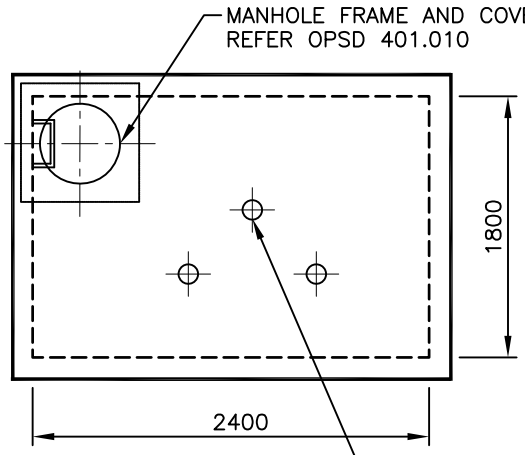
Date: July 2019	Rev. 0	NTS

ZONE ISOLATING VALVE CHAMBER 150mm & LARGER

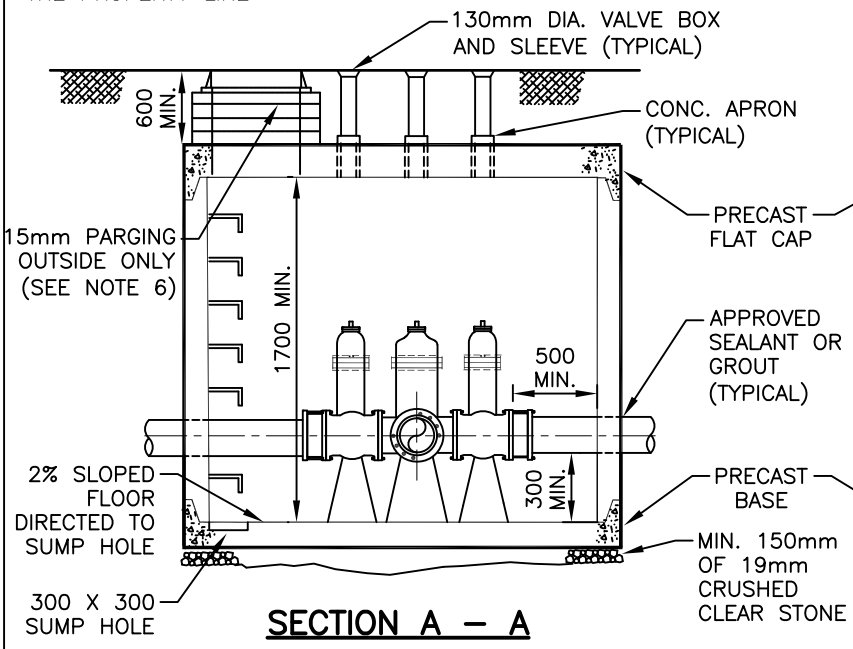
REGION STANDARD RH 402.070



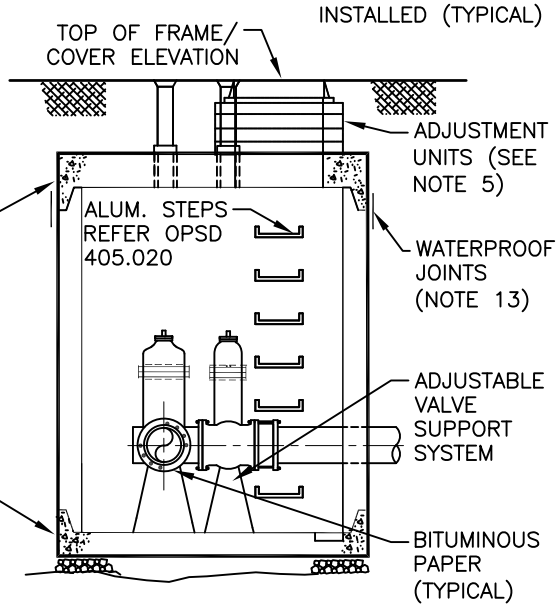
PLAN



TOP VIEW



SECTION A – A



SECTION B – B

NOTES:

1. REINF. CONC. PRECAST CHAMBER OR MONOLITHIC CHAMBER TO MEET CURRENT OPSD.
2. STEPS: 1ST STEP TO BE 450mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300mm ABOVE BASE.
3. VALVES TO BE FLANGED.
4. THE TOP OF THE ROOF SLAB OF VALVE CHAMBERS SHALL BE MIN. 600mm BELOW FINISHED GRADE. AN ENGINEERED COLLAR MAY BE REQUIRED TO MAKE UP FOR ELEVATION DIFFERENCES.
5. ADJUSTMENT UNITS TO BE MIN. 150mm TO MAX. 300mm.
6. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15 mm THICK.
7. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
8. JOINT FILLER RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
9. RESTRAINING RODS AND T–HEAD BOLT WITH NUT ARE CORROSION–RESISTANT, FLUOROPOLYMER COATED, HIGH–STRENGTH LOW–ALLOY STEEL THAT CONFORMS TO ANSI/AWWA C111/A21.11.
10. FOR 300mm AND 400mm TEES, THE MAIN LINE CAN BE OFFSET FROM THE CENTRELINE OF CHAMBER UP TO 200mm AS NEEDED.
11. PETROLATUM COATING ON ALL FITTINGS AND BOLTS
12. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
13. WATERPROOF MEMBRANE SHALL BE SELF–ADHESIVE, RUBBERIZED ROLL–TYPE BITUMINOUS WATERPROOFING MEMBRANE AND PRIMER. WATERPROOFING SHALL EXTEND COMPLETELY AROUND ALL JOINTS WITH A MINIMUM 300mm WIDE STRIP CENTERED ON THE JOINT, INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.

THE REGIONAL MUNICIPALITY OF HALTON
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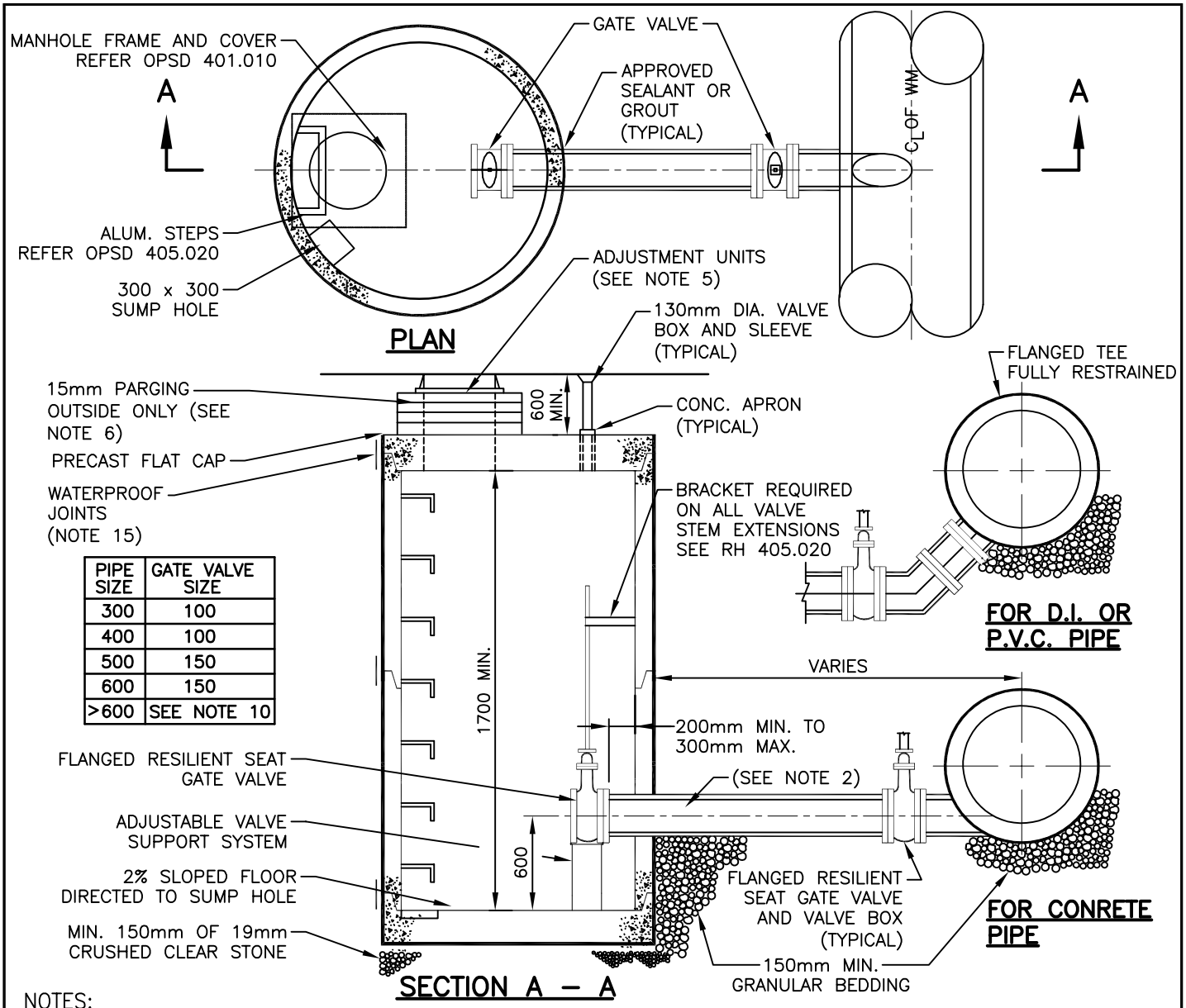
Date: July 2019	Rev. 0	NTS

PRECAST VALVE CHAMBERS FOR MAXIMUM 3 VALVES 150mm TO 300mm

REGION STANDARD RH 402.080



PIPE SIZE	GATE VALVE SIZE
300	100
400	100
500	150
600	150
>600	SEE NOTE 10

NOTES:

1. REINF. CONC. PRECAST OR MONOLOTHIC 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. THE TOP OF THE ROOF SLAB OF VALVE CHAMBERS SHALL BE MIN. 600mm BELOW FINISHED GRADE. AN ENGINEERED COLLAR MAY BE REQUIRED TO MAKE UP FOR ELEVATION DIFFERENCES.
5. ADJUSTMENT UNITS TO BE MIN. 150mm TO MAX. 300mm.
6. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15mm THICK.
7. STEPS: 1ST STEP TO BE 450mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300mm ABOVE BASE.
8. VALVES TO BE FLANGED.
9. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
10. OUTLET PIPE/VALVE SIZING TO BE DETERMINED BY ENGINEER AND APPROVED BY REGION.
11. JOINT FILLER RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
12. PETROLATUM COATING ON ALL FITTINGS, FLANGES AND VALVES. DUCTILE IRON PIPE COATED TO THE OUTSIDE.
13. RESTRAINING RODS AND T–HEAD BOLT WITH NUT ARE CORROSION–RESISTANT, FLUOROPOLYMER COATED, HIGH–STRENGTH LOW–ALLOY STEEL THAT CONFORMS TO ANSI/AWWA C111/A21.11.
14. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
15. WATERPROOF MEMBRANE SHALL BE SELF–ADHESIVE, RUBBERIZED ROLL–TYPE BITUMINOUS WATERPROOFING MEMBRANE AND PRIMER. WATERPROOFING SHALL EXTEND COMPLETELY AROUND ALL JOINTS WITH A MINIMUM 300mm WIDE STRIP CENTERED ON THE JOINT, INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.

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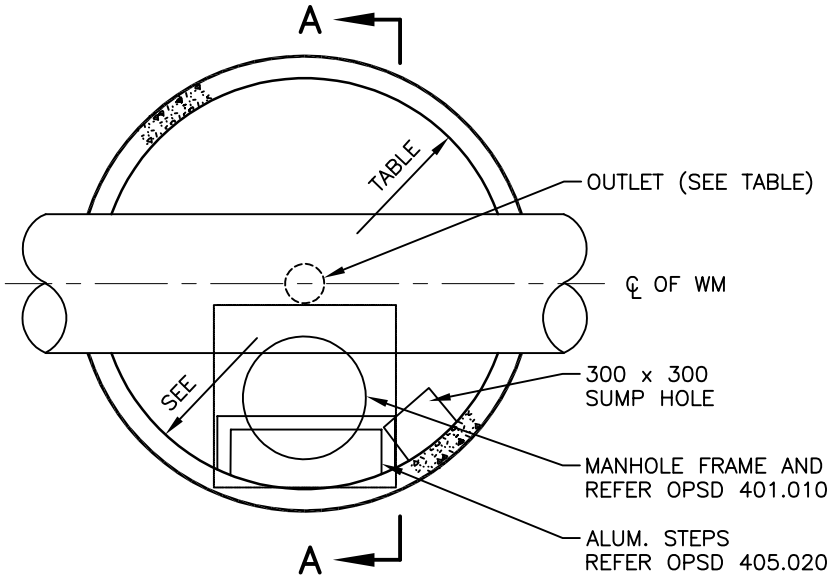
Date: March 2019	Rev. 2	NTS

1200mm PRECAST DRAIN CHAMBER

REGION STANDARD RH 403.010

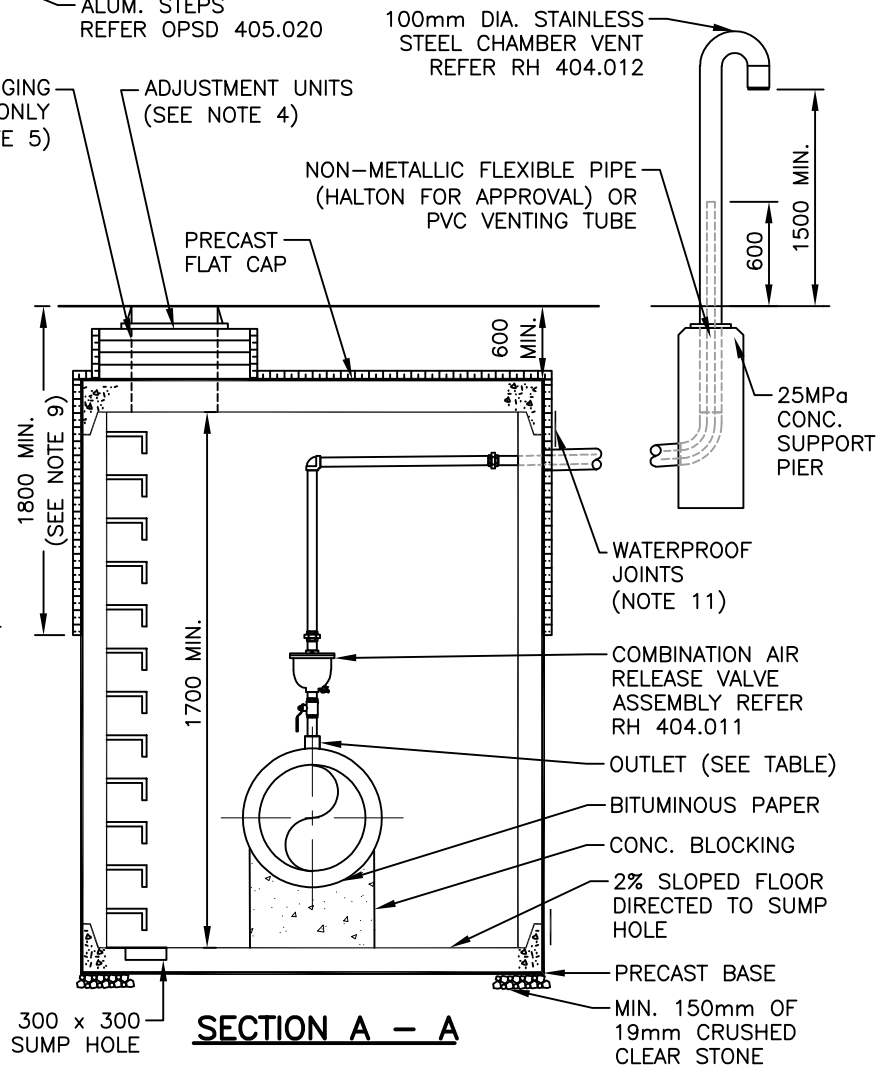


DIAMETER	OUTLET		CHAMBER
WATERMAIN	SIZE	TYPE	SIZE
400mm	SEE NOTE 8	THREADED	1200
450mm		"	1200
500mm		"	1200
600mm		"	1200
750mm		FLANGED	1500
900mm		"	1800
>900mm	SEE NOTE 8		

PLAN

NOTES:

1. REINF. CONC. PRECAST OR MONOLITHIC CHAMBER TO MEET CURRENT OPSD.
2. STEPS: 1ST STEP TO BE 450mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300mm ABOVE BASE.
3. THE TOP OF THE ROOF SLAB OF VALVE CHAMBERS SHALL BE MIN. 600mm BELOW FINISHED GRADE. AN ENGINEERED COLLAR MAY BE REQUIRED TO MAKE UP FOR ELEVATION DIFFERENCES.
4. ADJUSTMENT UNITS TO BE MIN. 150mm TO MAX. 300mm.
5. PARGING MIX ON ALL BRICKWORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15mm THICK.
6. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
7. JOINT FILLER RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
8. PIPE OPENING AND VALVE OUTLET SIZE WILL BE DETERMINED BY THE DESIGNER AND APPROVED BY THE REGION.
9. 50mm TH. EXPANDED STYRENE (DOW HI-100 INSULATION OR APPROVED EQUAL), WITH PROTECTION BOARD (CEMENT BOARD) AND WATERPROOFING.
10. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
11. WATERPROOF MEMBRANE SHALL BE SELF-ADHESIVE, RUBBERIZED ROLL-TYPE BITUMINOUS WATERPROOFING MEMBRANE AND PRIMER. WATERPROOFING SHALL EXTEND COMPLETELY AROUND ALL JOINTS WITH A MINIMUM 300mm WIDE STRIP CENTERED ON THE JOINT, INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.



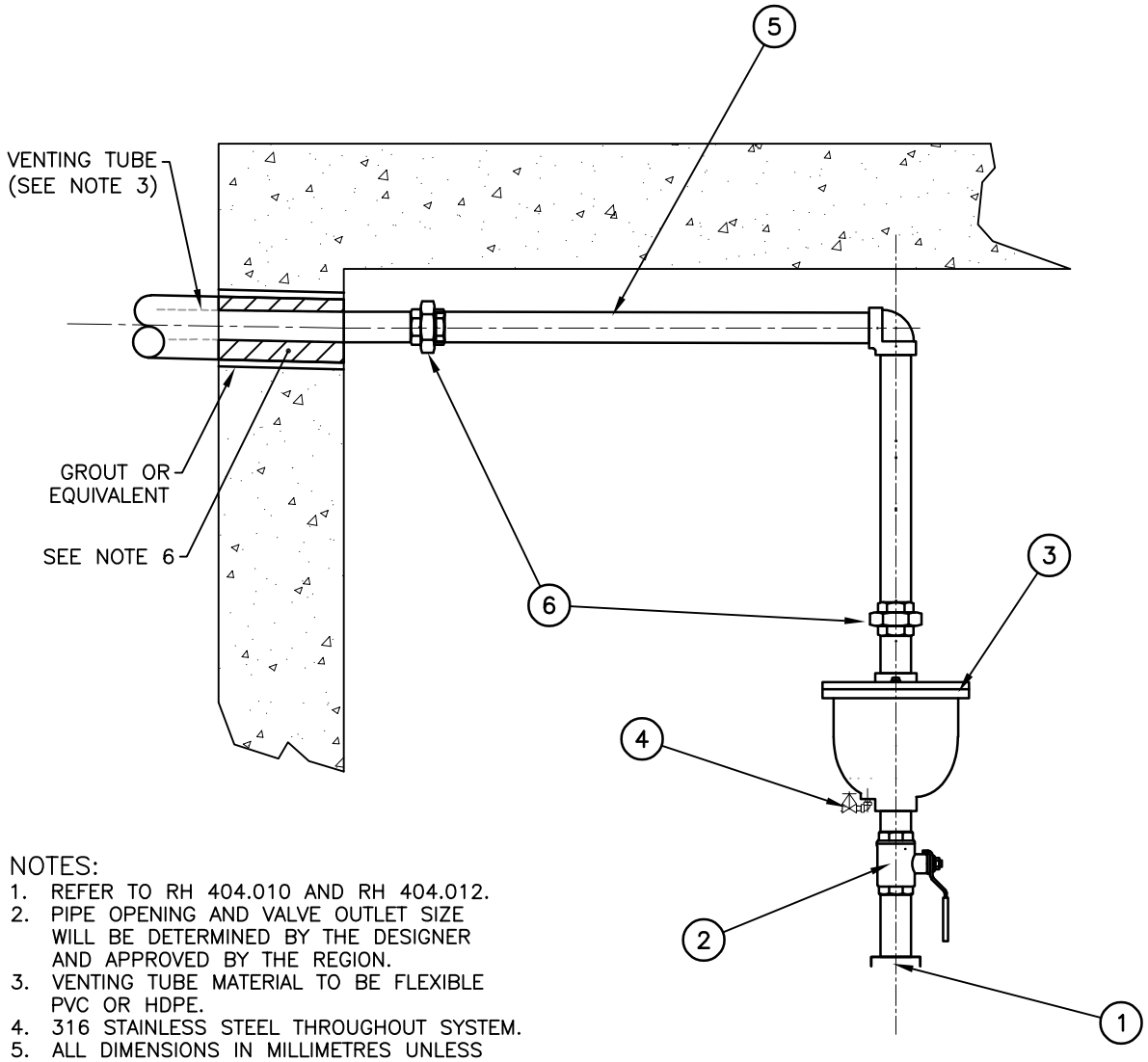
SECTION A – A

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: March 2019 | Rev. 1 | 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 OR HDPE.
4. 316 STAINLESS STEEL THROUGHOUT SYSTEM.
5. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
6. INSULATE BETWEEN STAINLESS STEEL VENT PIPE AND FLEXIBLE TUBE MATERIAL.

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	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
4	THREADED, STAINLESS STEEL, 1000 WAG BALL VALVE (OR APPROVED EQUAL) WITH PTFE SEALS AND SEATS, SISE TO SUIT AIR VALVE DRAIN PORT
5	STAINLESS STEEL. VENT PIPE SUPPORT PIPE AS REQUIRED
6	UNION

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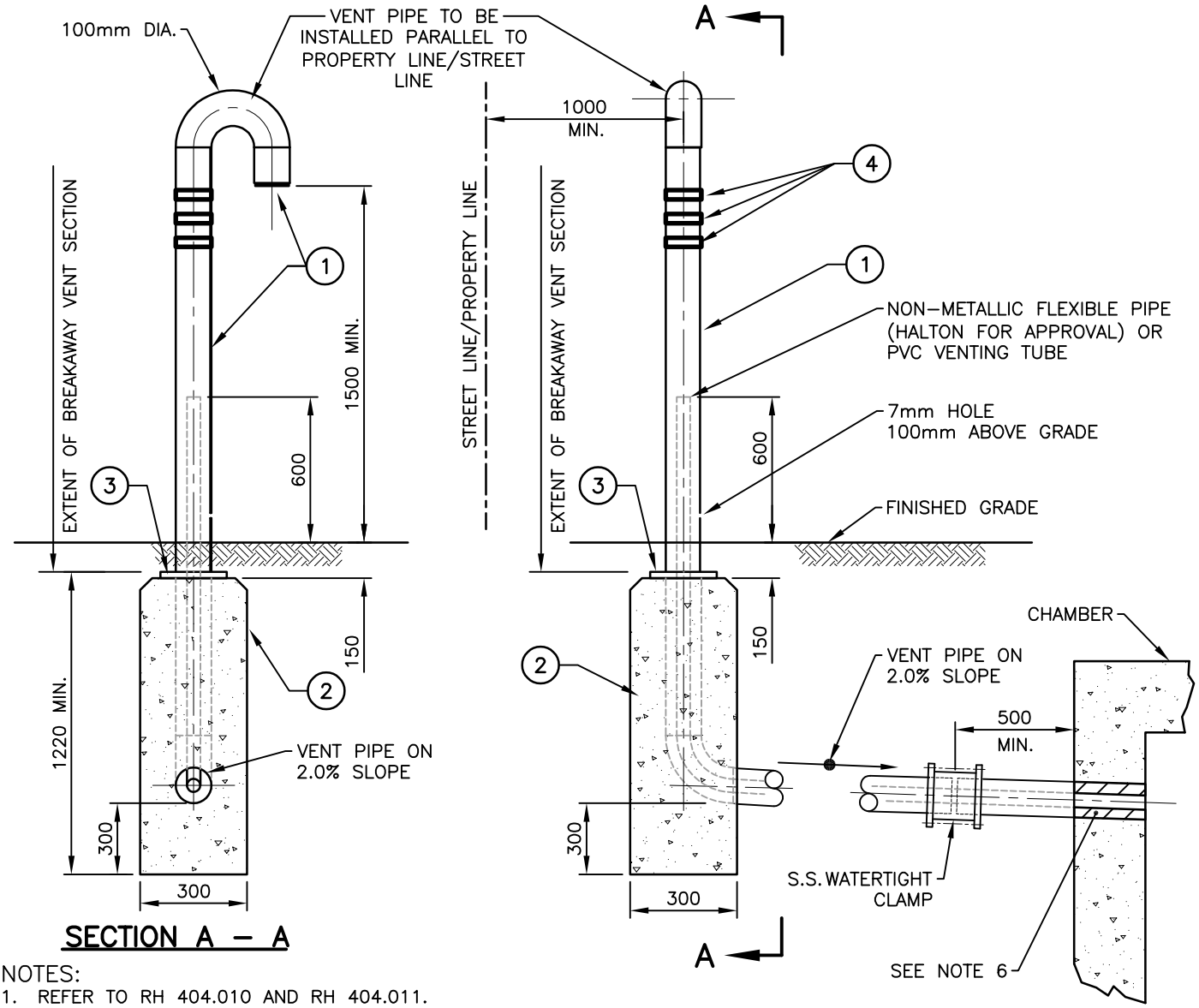
TYPICAL LAYOUT
COMBINATION AIR RELEASE/
VACUUM BREAK VALVE

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 HALTON REGION AND LOCAL AREA MUNICIPALITY.
3. PIPE OPENING AND VALVE OUTLET SIZE WILL BE DETERMINED BY THE DESIGNER AND APPROVED BY HALTON REGION.
4. 316 STAINLESS STEEL THROUGHOUT SYSTEM.
5. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
6. INSULATE BETWEEN STAINLESS STEEL VENT PIPE AND FLEXIBLE TUBE MATERIAL.

ITEM	ITEM DESCRIPTION
1	100mm ø 316 S.S. VENTILATION HOOK–UP, FLANGE & 180° RETURN BEND C/W REMOVABLE 316 S.S. INSECT SCREEN
2	CONCRETE SUPPORT PIER 25MPa 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 100mm WIDE REFLECTIVE TAPES (ASTM D4956) 100mm APART.

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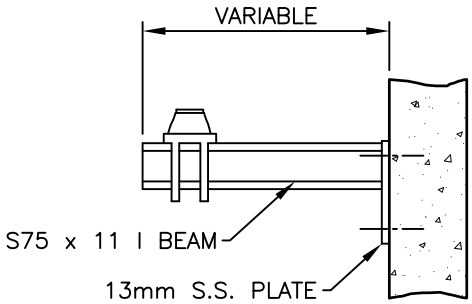
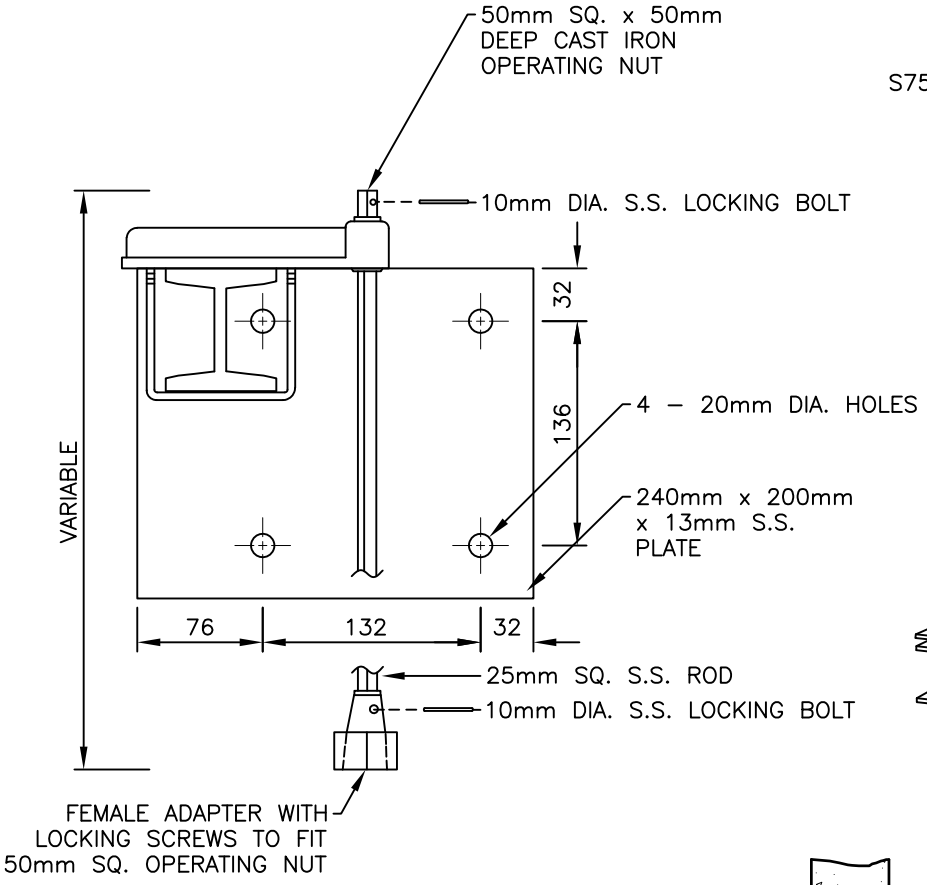
100mm ø STAINLESS STEEL CHAMBER VENT

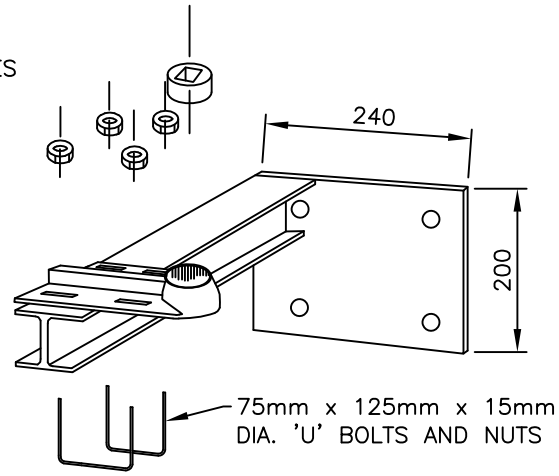
REGION STANDARD RH 404.012



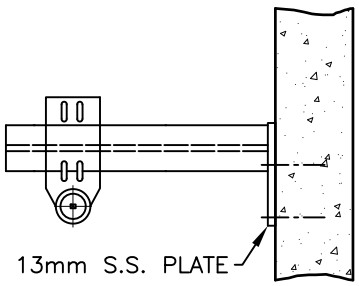
SIDE VIEW



END VIEW



ISOMETRIC VIEW



PLAN VIEW

NOTES:

1. ALL STEEL (INCLUDING FASTENERS) TO BE TYPE 316 STAINLESS STEEL.
2. ON EXISTING CHAMBERS FASTEN BRACKET TO WALL USING 15mm DIA. X 75mm LONG LAG SCREWS WITH 75mm LONG EXPANSION SHIELDS.
3. ON PROPOSED CHAMBERS FASTEN BRACKET TO WALL USING 15mm DIA. X 200mm LONG BOLTS WITH WASHERS AND NUTS.
4. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

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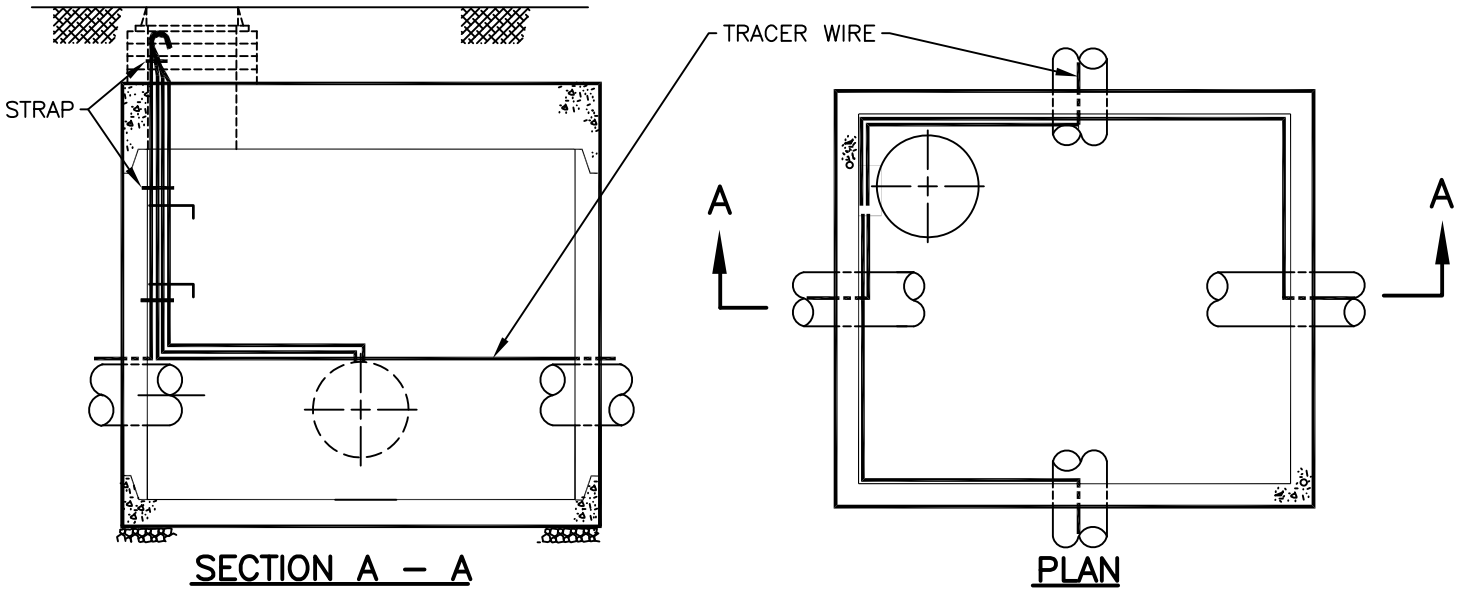
WALL BRACKET DETAIL FOR VALVE STEM EXTENSION

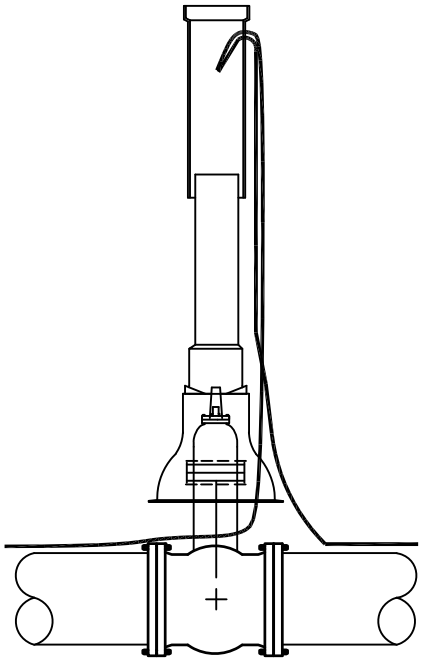
REGION STANDARD RH 405.020

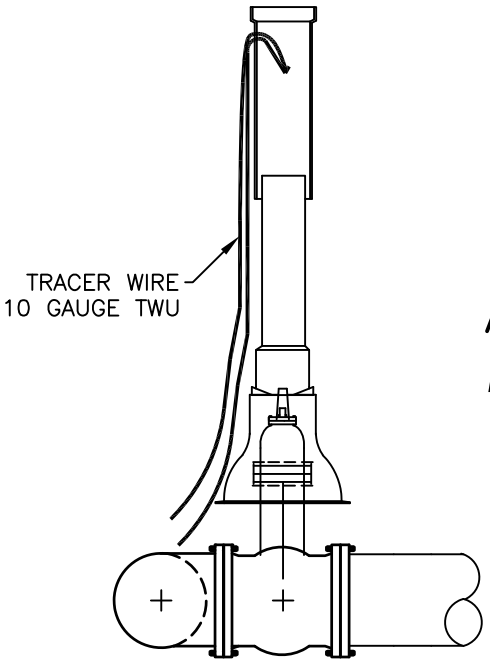


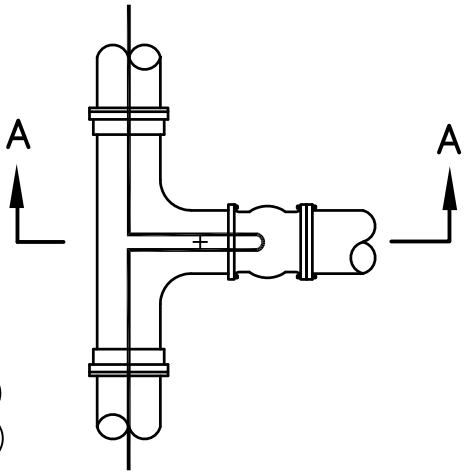
SECTION A – A

PLAN

VALVE CHAMBER







SECTION A – A

PLAN

LINE VALVE

SECONDARY VALVE

NOTES:

1. TRACER WIRE TO BE INSTALLED ON OUTSIDE OF VALVE BOX AND THROUGH HOLE.
2. MINIMUM OF 300mm 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 50mm 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.

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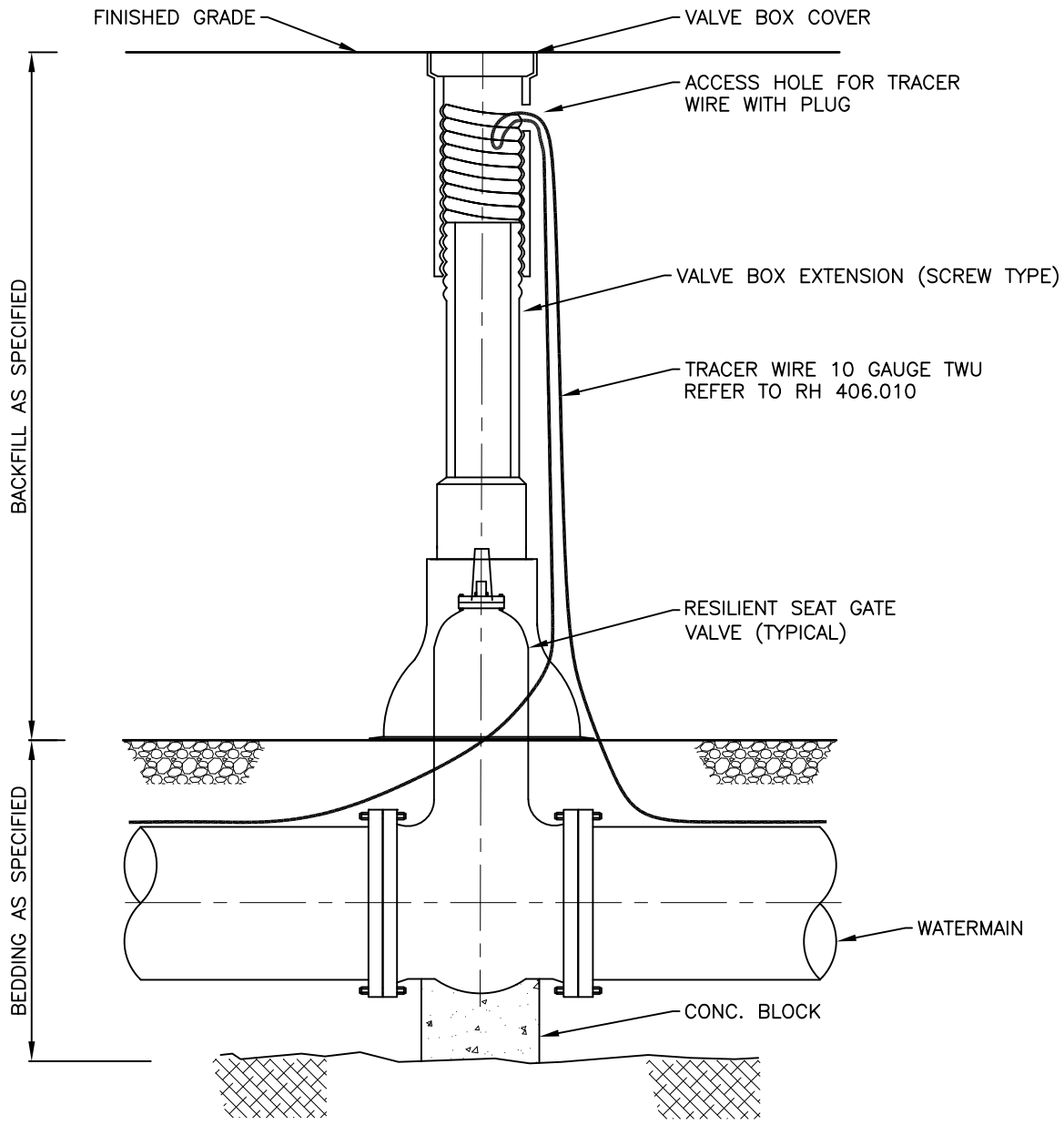
TRACER WIRE INSTALLATION IN VALVE CHAMBER, VALVE BOX AND SECONDARY VALVE BOX

REGION STANDARD RH 406.010



NOTES:
1. VALVE BOX TO BE ADEQUATELY BRACED WHILE BACKFILLING AND MUST REMAIN PLUMB.
2. VALVE BOX EXTENSION TO BE USED ONLY IF REQUIRED.
3. VALVE BOX TO BE CAST IRON SCREW TYPE

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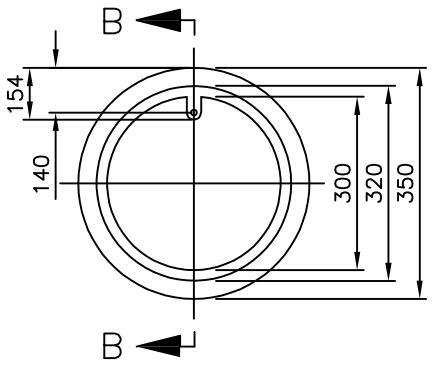
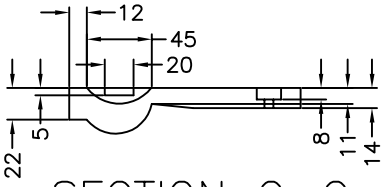
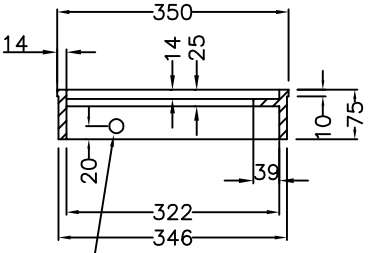
VALVE BOX INSTALLATIONS 100mm TO 300mm DIA. WATERMAINS			
	REGION STANDARD	RH	406.020



PLAN–FRAME

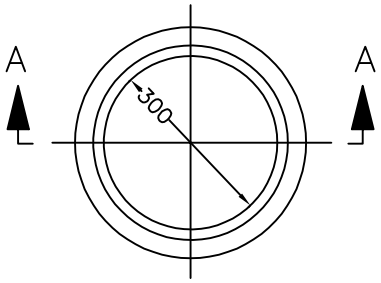


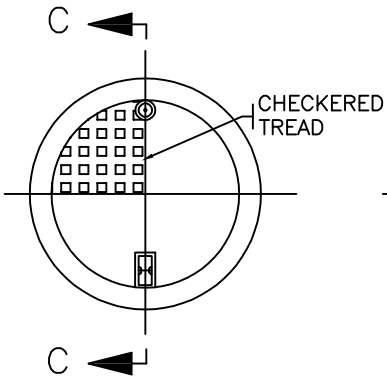
SECTION C–C



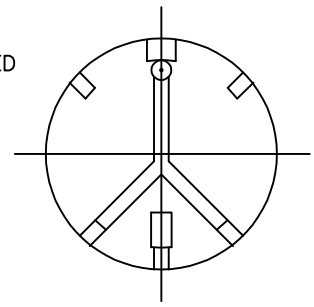
SECTION B–B

3–11mm HOLES EQUIDISTANT IN SIDEWALL OF FRAME

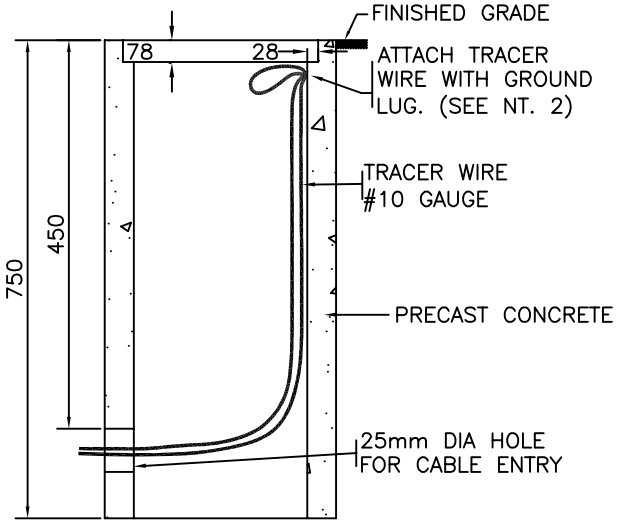




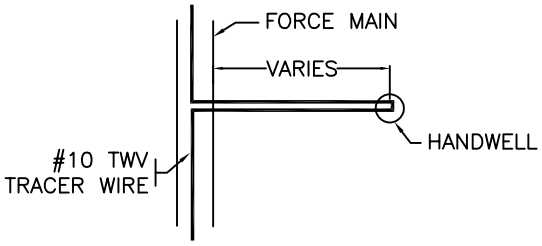
PLAN–COVER



UNDERSIDE OF COVER



SECTION A–A



PLAN VIEW

NOTES:

1. TRACER WIRE TO BE INSTALLED THROUGH CABLE ENTRY HOLE TO INSIDE OF HANDHOLE.
2. MINIMUM OF 300mm OF TRACER WIRE TO BE LEFT IN THE TOP OF HANDHOLE
3. 25mm HOLE TO BE DRILLED IN THE BOTTOM SECTION OF HANDHOLE 450mm BELOW BOTTOM OF LID.
4. COVER TO BE RETAINED WITH 12mm DIA x 20mm LONG STAINLESS STEEL HEX HEAD MACHINE BOLT TO BE FLUSH WITH TOP OF COVER WHEN FASTENED.
5. MATERIAL FOR FRAME AND COVER–ANSI/ASTM STANDARD A48–1990 GRAY IRON CASTING, CLASS NO 30C.
4. ENDS OF TRACER WIRE TO BE JOINED SO THAT A CONTINUOUS CURRENT CAN BE MEASURED.
5. TRACER WIRE TO BE ATTACHED TO GROUND LUG IN HANDWELL WALL.
6. THE WORD "WATER" "SAN" OR "FM" SHALL BE CAST INTO THE LID.
7. FRAME TO BE ATTACHED USING 3–10mm DIA x38mm LONG MACHINE BOLTS ANCHORED IN CONCRETE WALL.
8. FOR GENERAL INSTALLATION REFER TO OPSD–2117.02
9. ALL DIMENIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON
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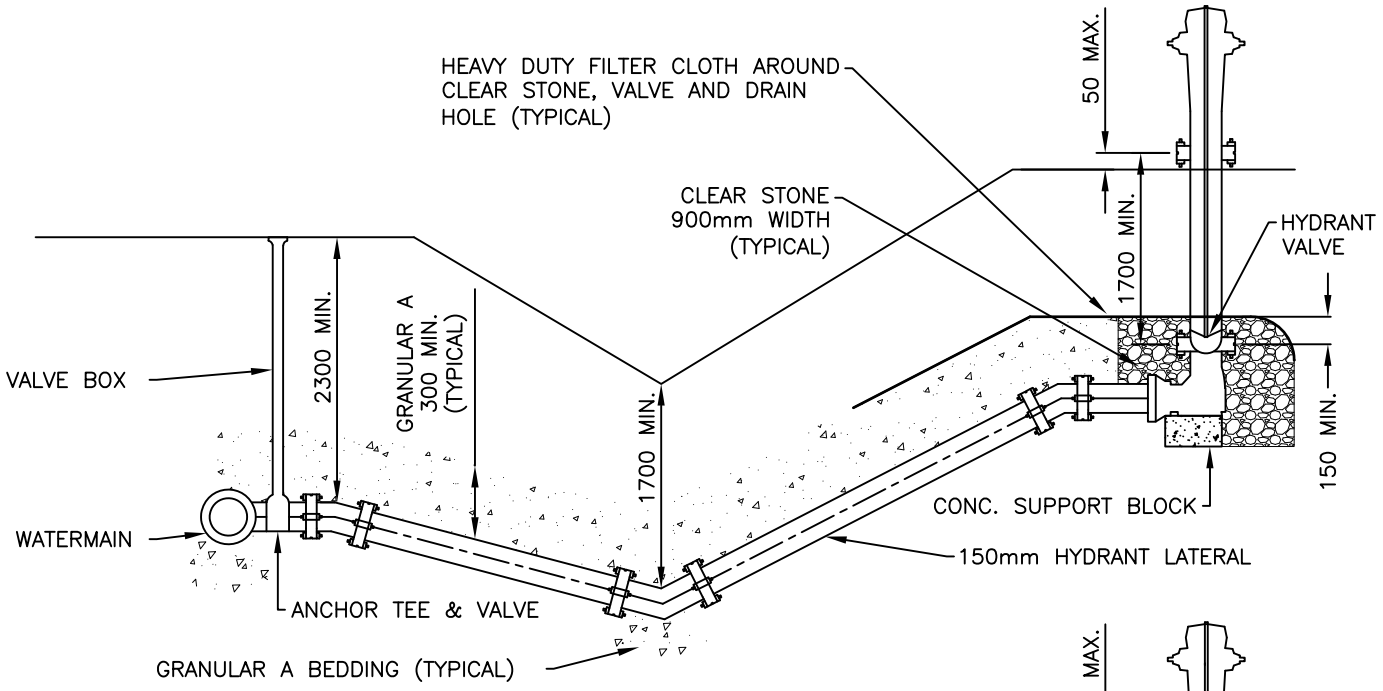
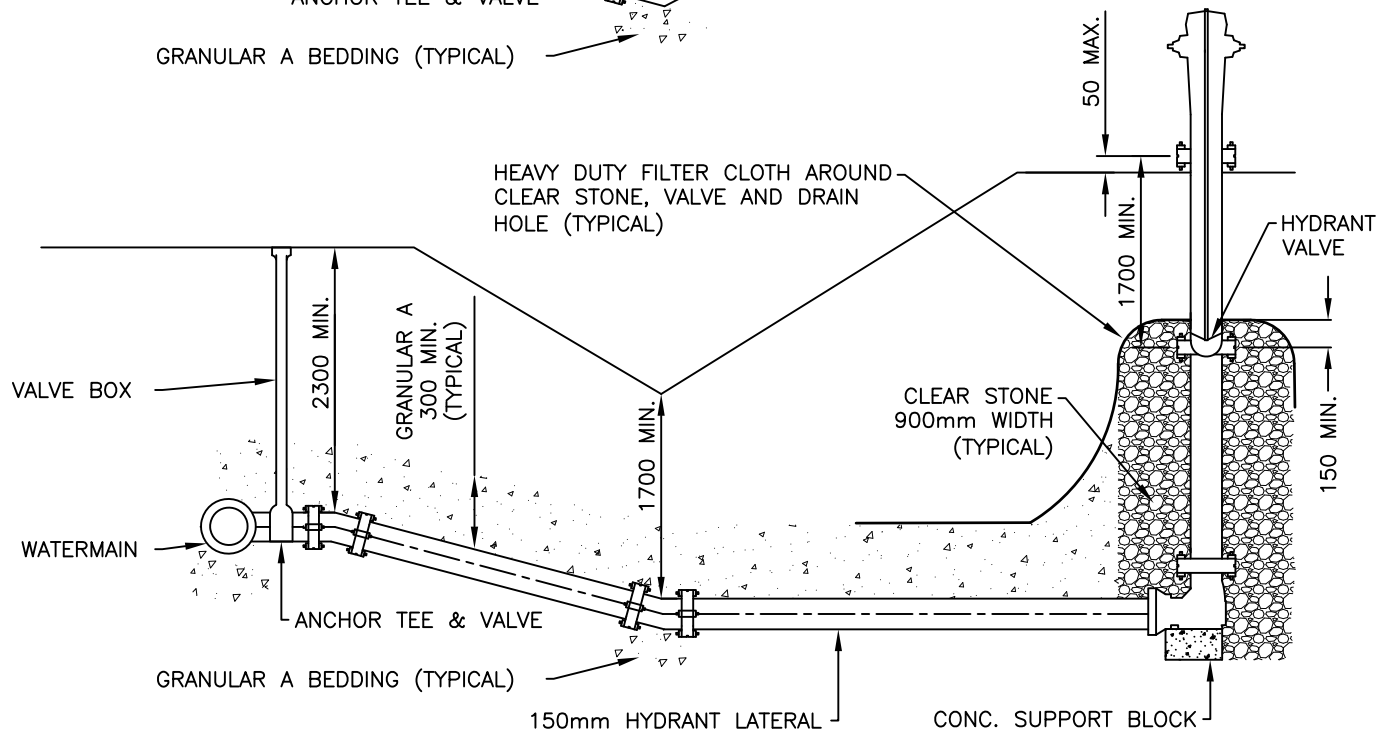
FORCEMAIN TRACER WIRE INSTALLATION IN PRECAST HANDWELL WITH COVER

REGION STANDARD RH 406.030





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 BELOW THE HYDRANT.
3. LOWER ROD LENGTH SHALL NOT EXCEED 1.7m 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.

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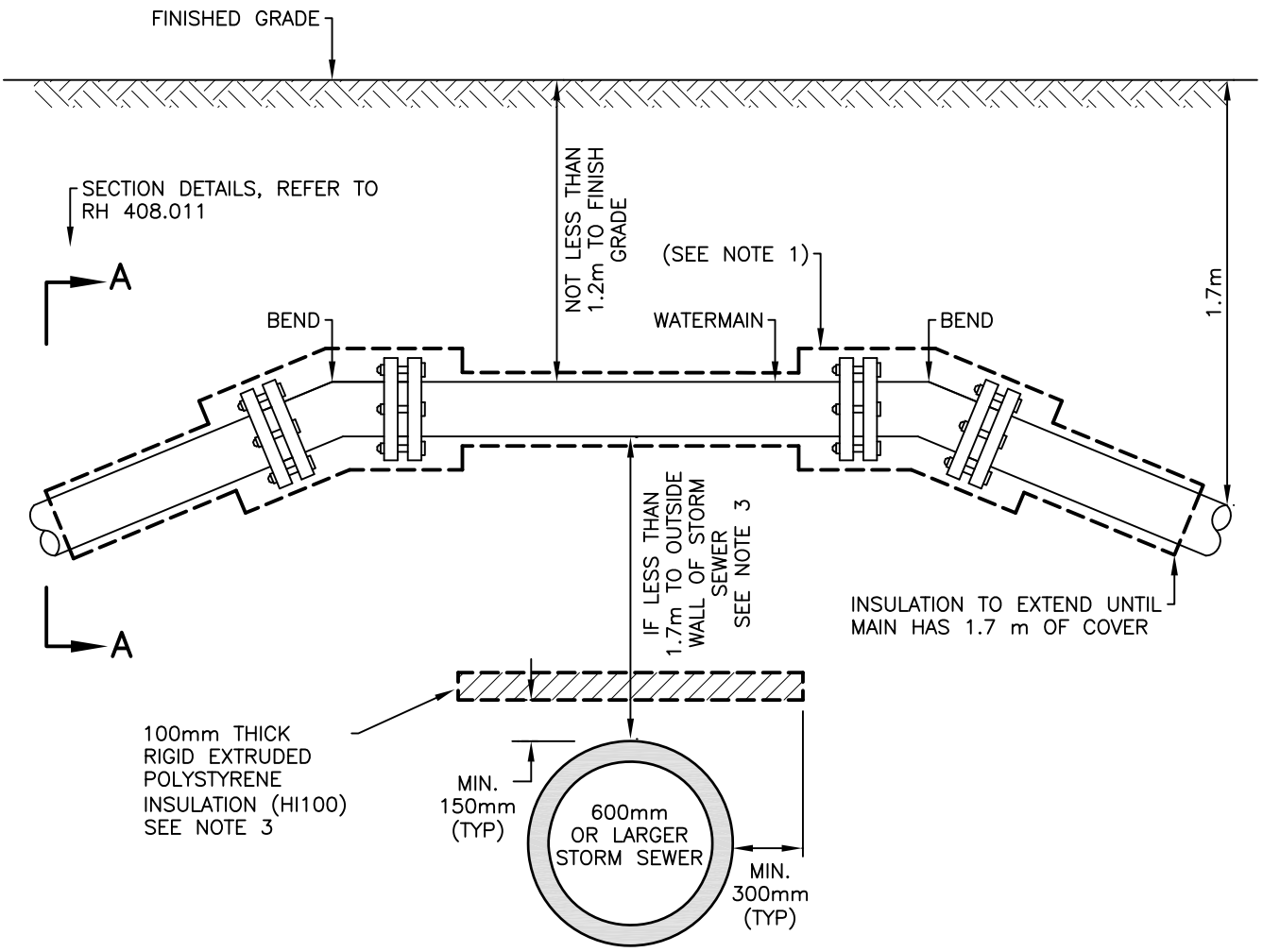
HYDRANT INSTALLATION FOR RURAL ROAD SECTION

REGION STANDARD RH 407.010

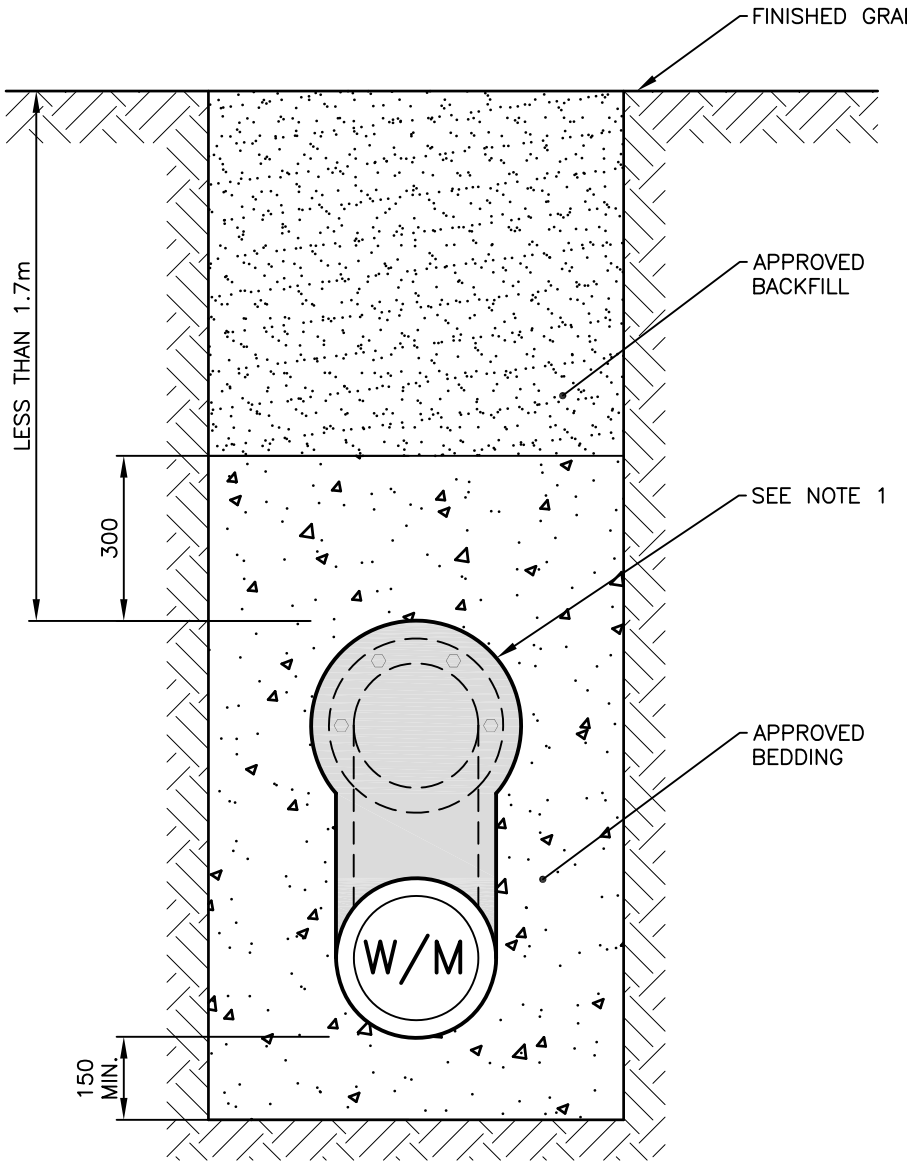


INSULATION DETAIL FOR PIPE UNDER ROADWAY EXCAVATION

NOTES:

1. USE OF PRE–INSULATED PIPE IS REQUIRED WHEN COVER IS LESS THAN 1.7m.
2. THE LENGTH OF WATERMAIN TO BE PRE–INSULATED SHALL BE FULL LENGTH OF WATERMAIN UNTIL PIPE COVER IS 1.7m MIN.
3. WHERE WATERMAIN CROSSES WITHIN 1.7m OF A 600mm OR LARGER STORM SEWER (FROM OUTSIDE WALL OF STORM SEWER), THE STORM SEWER TO BE INSULATED WITH RIGID POLYSTYRENE INSULATION (HI100) AS INSTRUCTED BY CONTRACT ADMINISTATOR.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON PUBLIC WORKS DEPARTMENT	Date: July 2019	Rev. 0	NTS
WATERMAIN AND WATER SERVICE INSULATION DETAIL **SITE SPECIFIC – APPROVED BY HALTON REGION**	REGION STANDARD RH 408.020		

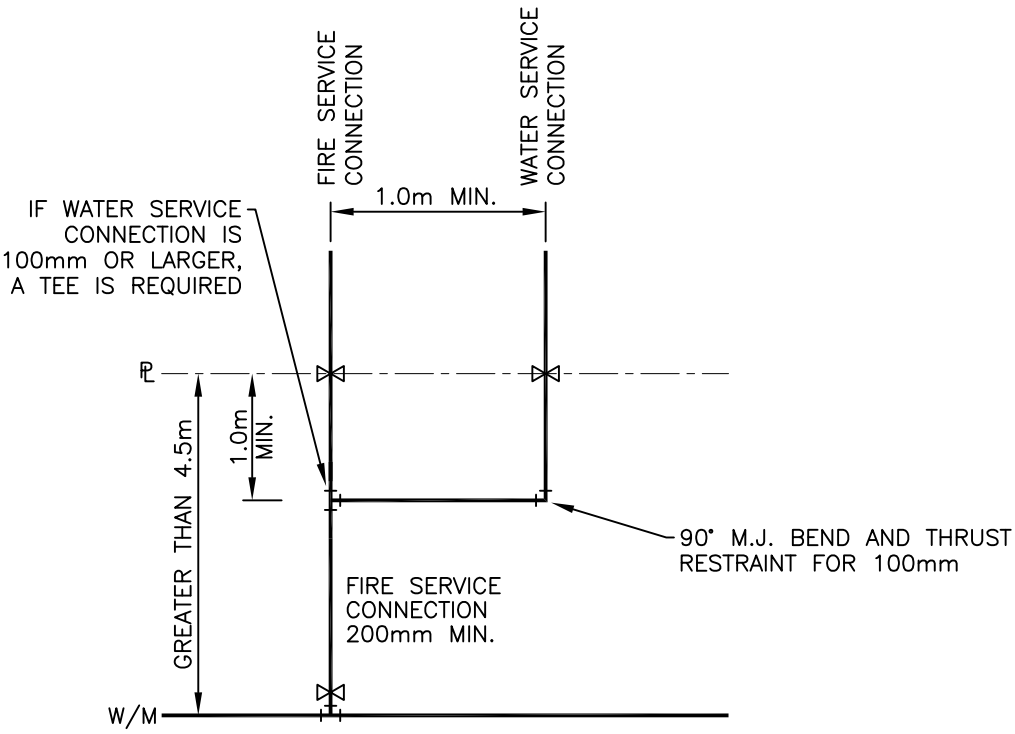


INSULATION DETAIL FOR PIPE IN AN EXCAVATION

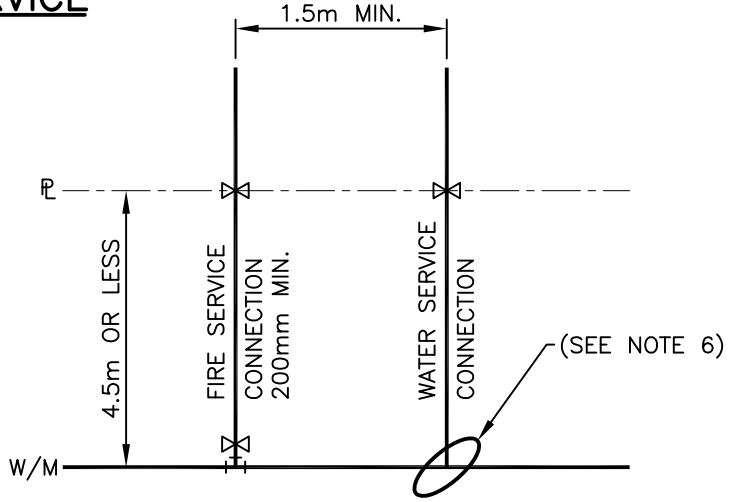
NOTES:

1. USE OF PRE–INSULATED PIPE IS REQUIRED WHEN DEPTH OF COVER IS BETWEEN 1.2m AND 1.7m. IF DEPTH OF COVER IS LESS THAN 1.2m WATERMAIN IS TO CROSS UNDER STRUCTURE.
2. THE LENGTH OF WATERMAIN TO BE PRE–INSULATED SHALL BE FULL LENGTH OF WATERMAIN UNTIL PIPE COVER IS 1.7m MIN.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESSOTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON PUBLIC WORKS DEPARTMENT	Date: July 2019	Rev. 0	NTS
WATERMAIN AND WATER SERVICE INSULATION DETAIL SPECIAL CONSIDERATION ONLY			
	REGION STANDARD	RH	408.030



GREATER THAN 4.5m SERVICE



LESS THAN 4.5m SERVICE

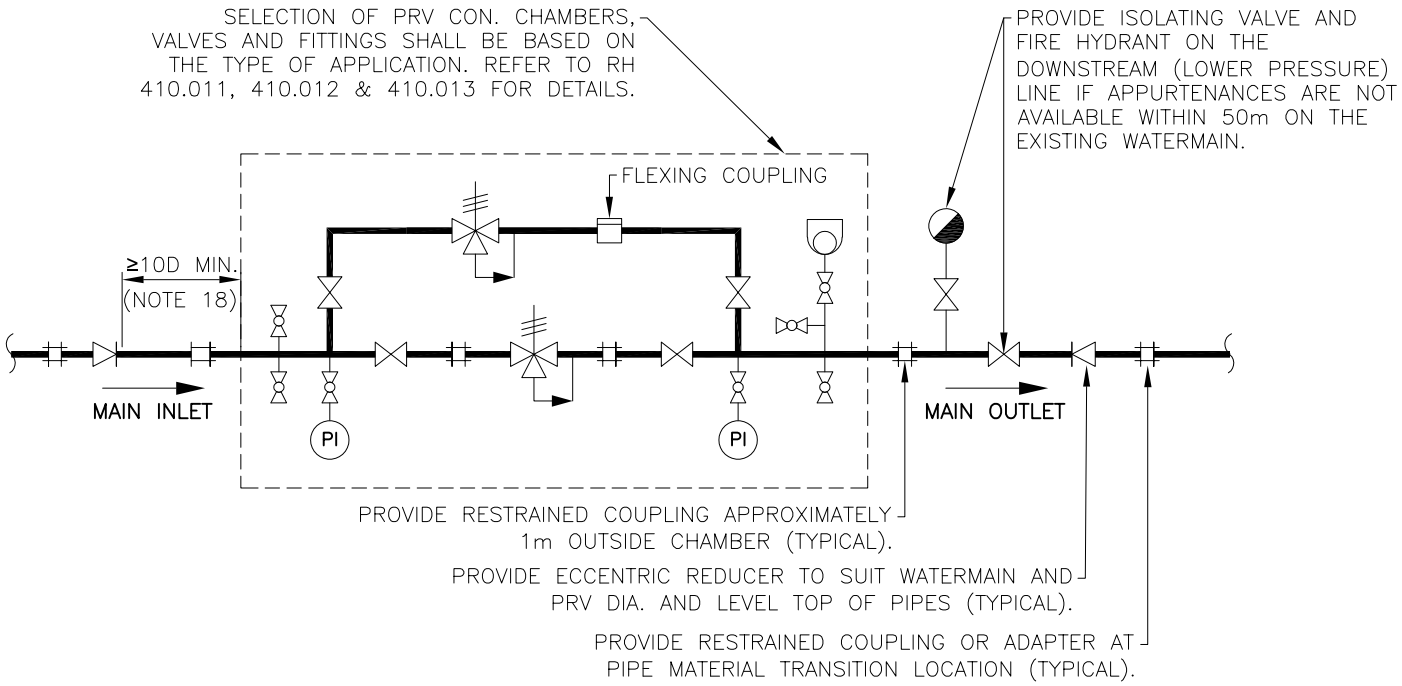
NOTES
1. COMPRESSION TYPE FITTINGS ONLY. NO SOLDERED JOINTS ARE PERMITTED BEFORE THE WATER METER.
2. WATER SERVICE CONNECTION 25, 38, 50 TO BE TYPE 'K' SOFT COPPER, 100 AND LARGER TO BE PVC OR DI.
3. FIRE SERVICE CONNECTION TO BE MIN. 200mm.
4. IF THE WATERMAIN IS 4.5m OR LESS FROM THE PROPERTY LINE, 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 50mm OR LESS TO HAVE A MAIN STOP, CURB STOP AND BOX. ALL SERVICES GREATER THAN 50mm 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.

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: August 2018	Rev. 2	NTS

WATER SERVICE AND FIRE SERVICE CONNECTION INSTALLATIONS

REGION STANDARD RH 409.010



NOTES:

1. THIS STANDARD DRAWING IS A GUIDE FOR THE DESIGN OF CONCRETE PRV CHAMBERS. IT IS THE DESIGNER'S RESPONSIBILITY TO CONFIRM WITH THE REGION IN ADVANCE THE TYPE OF PRV CHAMBER PREFERENCE (CONCRETE OR STEEL) FOR EACH INDIVIDUAL APPLICATION PRIOR TO DESIGN COMMENCEMENT.
2. CHAMBERS SHALL BE PRECAST REINFORCED CONCRETE AND SHALL MEET CURRENT OPSS AND OPSD.
3. CHAMBERS SHALL HAVE A MONOLITHIC BASE AND SHALL BE WATERTIGHT.
4. THE TOP OF THE ROOF SLAB OF VALVE CHAMBERS SHALL BE MIN. 600mm BELOW FINISHED GRADE. AN ENGINEERED COLLAR MAY BE REQUIRED TO MAKE UP FOR ELEVATION DIFFERENCES.
5. ADJUSTMENT UNITS SHALL BE MIN. 150mm TO MAX. 300mm.
6. CHAMBER'S FIRST STEP SHALL BE 450mm BELOW FINISHED GRADE AND LAST STEP SHALL BE 300mm ABOVE BASE.
7. PARGING MIX ON ALL BRICK WORK TO BE 1:3 MORTAR MIX AND BE APPLIED 15mm THICK.
8. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX AND POINTED BEFORE BACKFILLING.
9. CHAMBERS SHALL HAVE A JOINT FILLER RUBBER GASKET BETWEEN ALL PRECAST SECTIONS (TYPICAL).
10. RESTRAINING RODS AND T–HEAD BOLT WITH NUT ARE CORROSION–RESISTANT, FLUOROPOLYMER COATED, HIGH–STRENGTH LOW–ALLOY STEEL THAT CONFORMS TO ANSI/AWWA C111/A21.11.
11. PETROLADUM COATING ON ALL FITTINGS AND BOLTS
12. CHAMBER SECTIONS SHALL NOT EXCEED THE LOCAL TRANSPORT RESTRICTIONS.
13. SIZE AND TYPE OF THE PRVs SHALL BE CONFIRMED BY THE ENGINEER VIA HYDRAULIC MODELING/CALCULATIONS.
14. ANTI–STAGNATION DEVICE IS ASSEMBLED AS PART OF VALVE.
15. ALL SPECIFIED EQUIPMENT SHALL BE PER HALTON REGION APPROVED MANUFACTURER'S PRODUCT LIST FOR WATER SYSTEMS (LINEAR) AND APPROVED EQUIPMENT LIST FOR WATER AND WASTEWATER FACILITIES.
16. TRACER WIRE INSTALLATION SHALL BE PER RH 406.010.
17. PIPE MATERIAL AND FITTINGS BETWEEN THE TWO REDUCER ADAPTERS INCLUDING THE INSIDE OF THE CHAMBER SHALL BE DUCTILE IRON.
18. DISTANCE FROM REDUCER TO OUTSIDE WALL OF CHAMBER ON UPSTREAM SIDE TO BE EQUAL TO, OR GREATER THAN, 10 TIMES THE DIAMETER OF THE REDUCED PIPE SIZE FOR POTENTIAL FUTURE FLOW MONITORING CHAMBER INSTALLATION.
19. ALL COMPONENTS WHICH ARE IN DIRECT CONTACT WITH THE WATER SHALL BE NSF APPROVED.
20. LOCATIONS AND SIZES OF TRUST WALLS SHALL BE DESIGNED AND SPECIFIED BY THE ENGINEER.
21. WALL BRACKET DETAIL FOR VALVE STEM EXTENSION SHALL BE PER TO RH 405.020.
22. CHAMBER INSTALLATION LOCATION, EXTERNAL CONNECTIONS AND ORIENTATION DETAILS SHALL BE PER DETAILED DESIGN.
23. CHAMBERS SHALL BE EQUIPPED WITH CHAMBER VENT PER RH 404.010 AND RH 404.012 AT LOCATIONS IDENTIFIED IN DETAILED DESIGN.
24. CHAMBER TOP SECTIONS AND SIDE WALLS SHALL BE INSULATED WITH 50mm EXPANDED STYRENE (DOW HI–100 INSULATION OR APPROVED EQUAL), WITH PROTECTION BOARD (CEMENT BOARD) AND WATERPROOFING FROM BASE TO ROOF SLAB.
25. CHAMBER FOUNDATION AND BACKFILL SHALL BE DESIGNED BY THE ENGINEER BASED ON LOADING AND SOIL CONDITIONS.
26. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
27. APPROVED VALVE CHAMBER FLOOD FLOAT SWITCH ALARM

THE REGIONAL MUNICIPALITY OF HALTON
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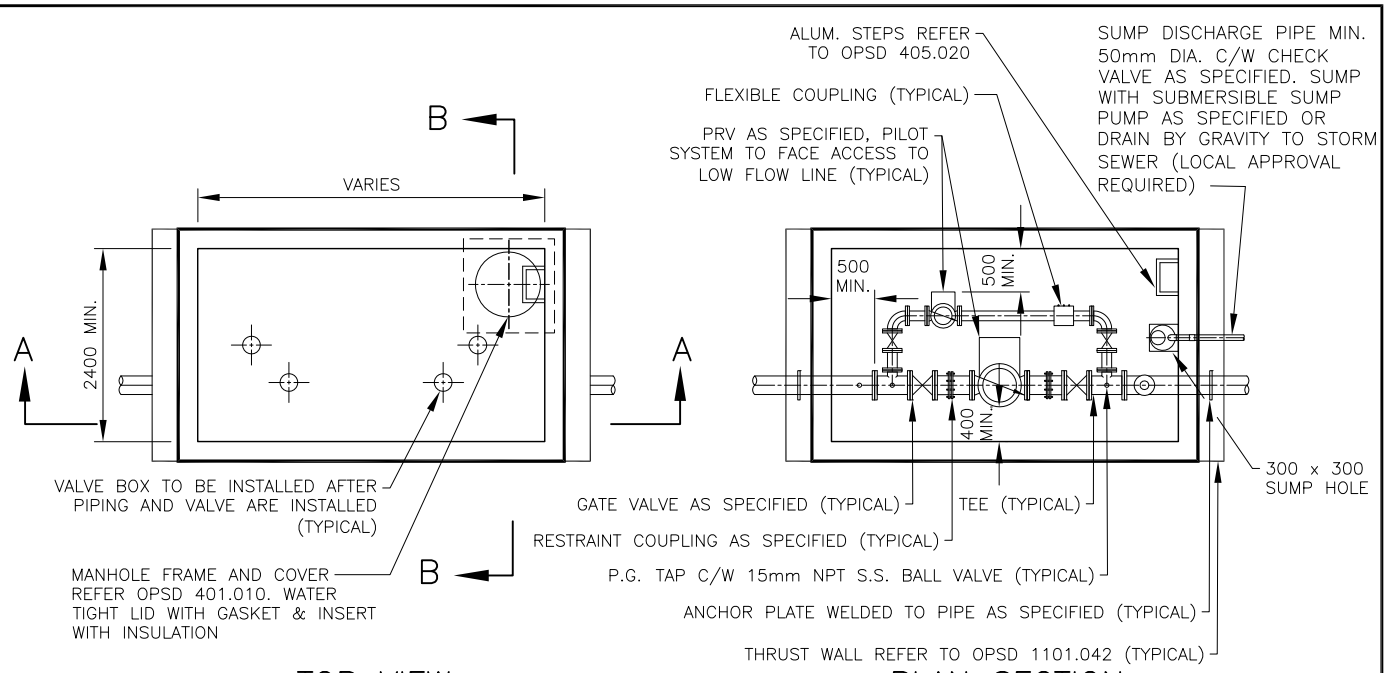
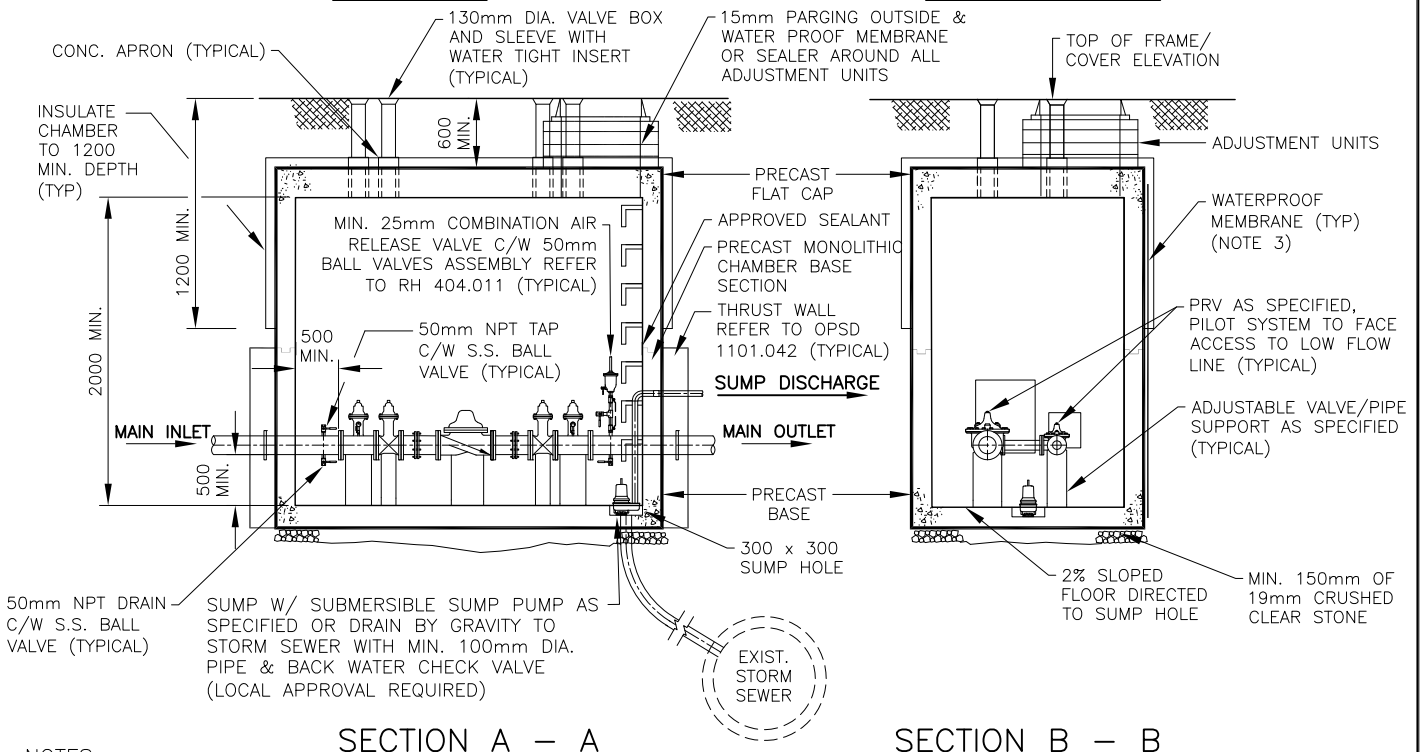
PRV CONCRETE CHAMBER GENERAL NOTES AND PROCESS FLOW DIAGRAM

REGION STANDARD RH 410.010



TOP VIEW

PLAN SECTION



SECTION A – A

SECTION B – B

NOTES:

1. SEE RH 410.010 FOR GENERAL NOTES.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
3. WATERPROOF MEMBRANE SHALL BE SELF–ADHESIVE, RUBBERIZED ROLL–TYPE BITUMINOUS WATERPROOFING MEMBRANE AND PRIMER. WATERPROOFING SHALL EXTEND COMPLETELY AROUND THE CHAMBER FROM BASE TO ROOF SLAB, INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.

THE REGIONAL MUNICIPALITY OF HALTON
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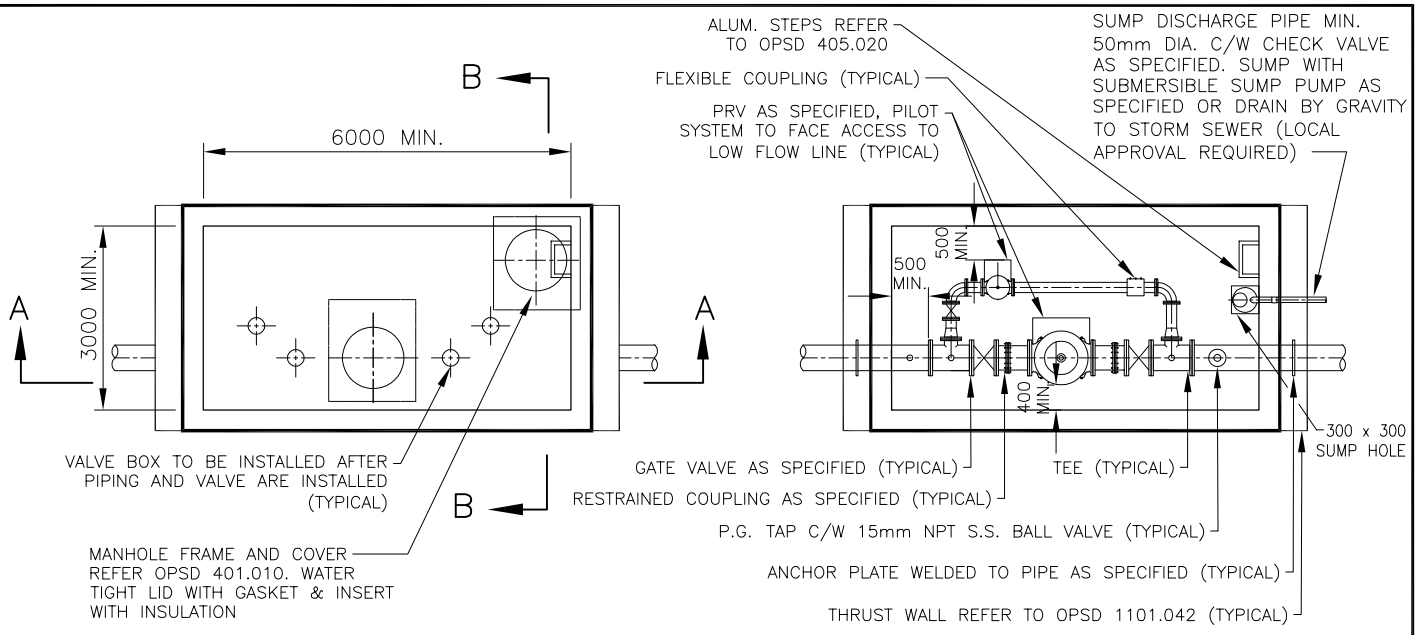
PRV CONCRETE CHAMBER LAYOUT FOR 200mm OR LESS HIGH FLOW LINE AND 100mm OR LESS LOW FLOW LINE

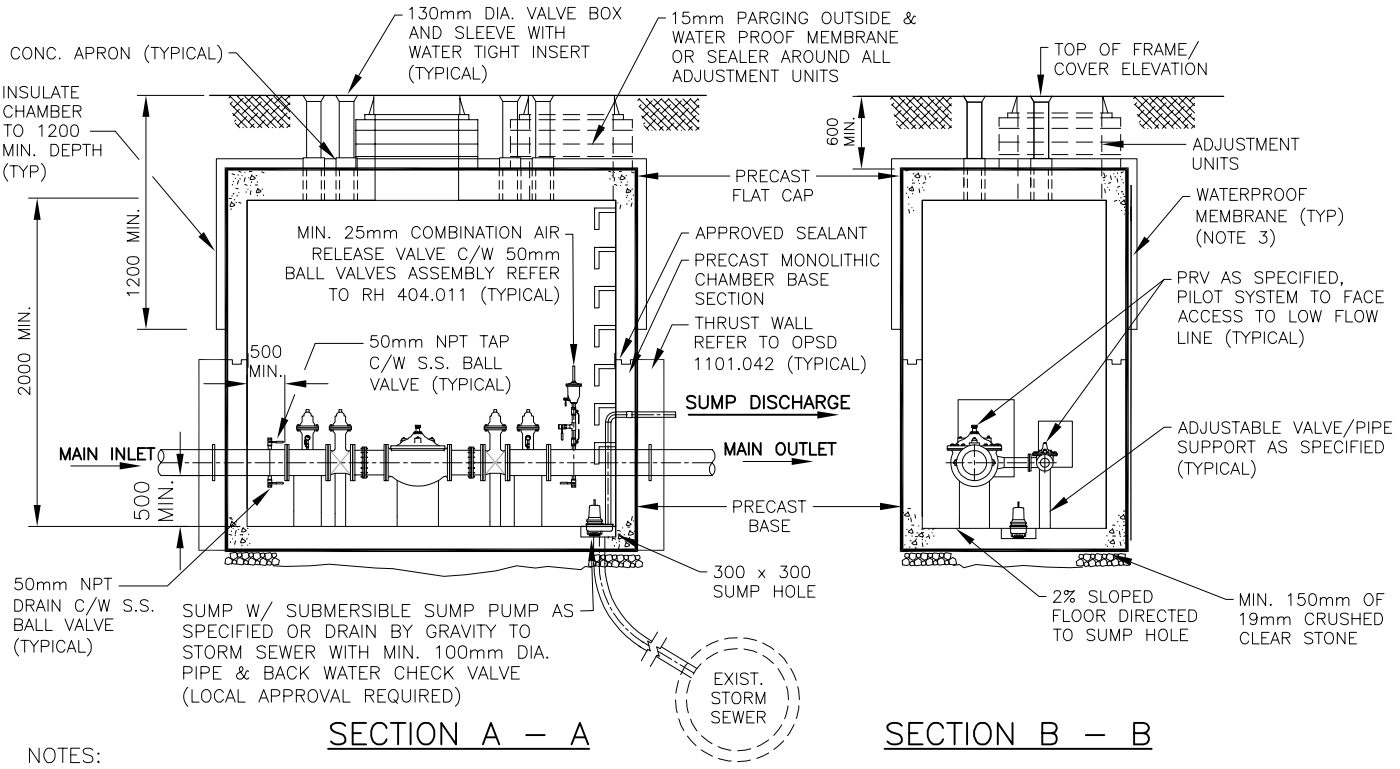
Date: October 2019	Rev. 2	NTS

REGION STANDARD RH 410.011



TOP VIEW

PLAN SECTION



SECTION A – A

SECTION B – B

NOTES:

1. SEE RH 410.010 FOR GENERAL NOTES.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
3. WATERPROOF MEMBRANE SHALL BE SELF–ADHESIVE, RUBBERIZED ROLL–TYPE BITUMINOUS WATERPROOFING MEMBRANE AND PRIMER. WATERPROOFING SHALL EXTEND COMPLETELY AROUND THE CHAMBER FROM BASE TO ROOF SLAB, INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.

THE REGIONAL MUNICIPALITY OF HALTON
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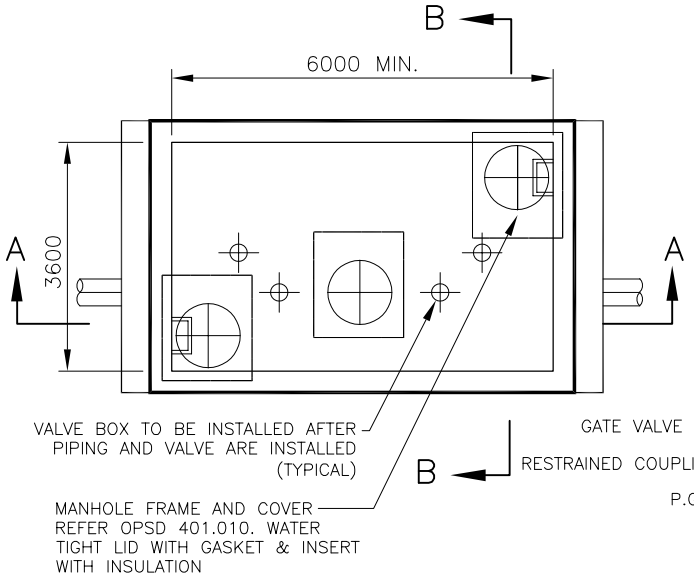
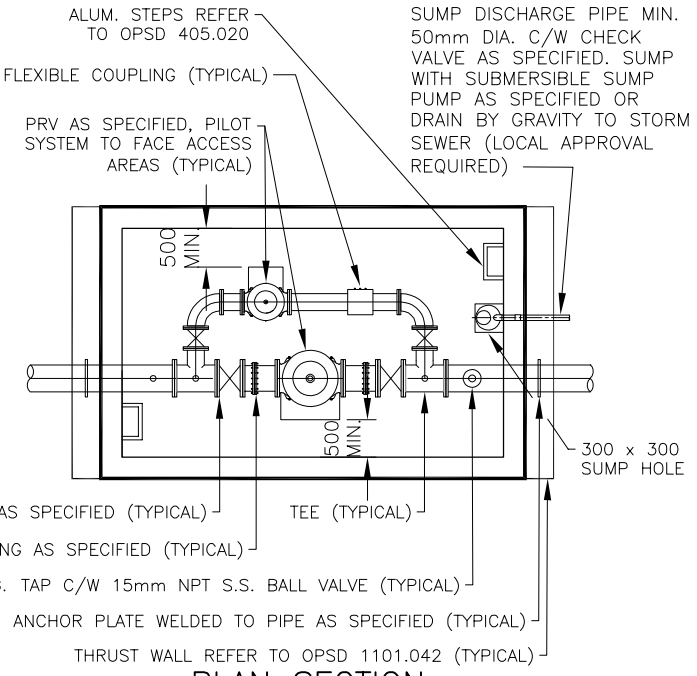
Date: October 2019 | Rev. 2 | NTS

PRV CONCRETE CHAMBER LAYOUT FOR 200mm TO 400mm HIGH FLOW LINE AND 150mm OR LESS LOW FLOW LINE

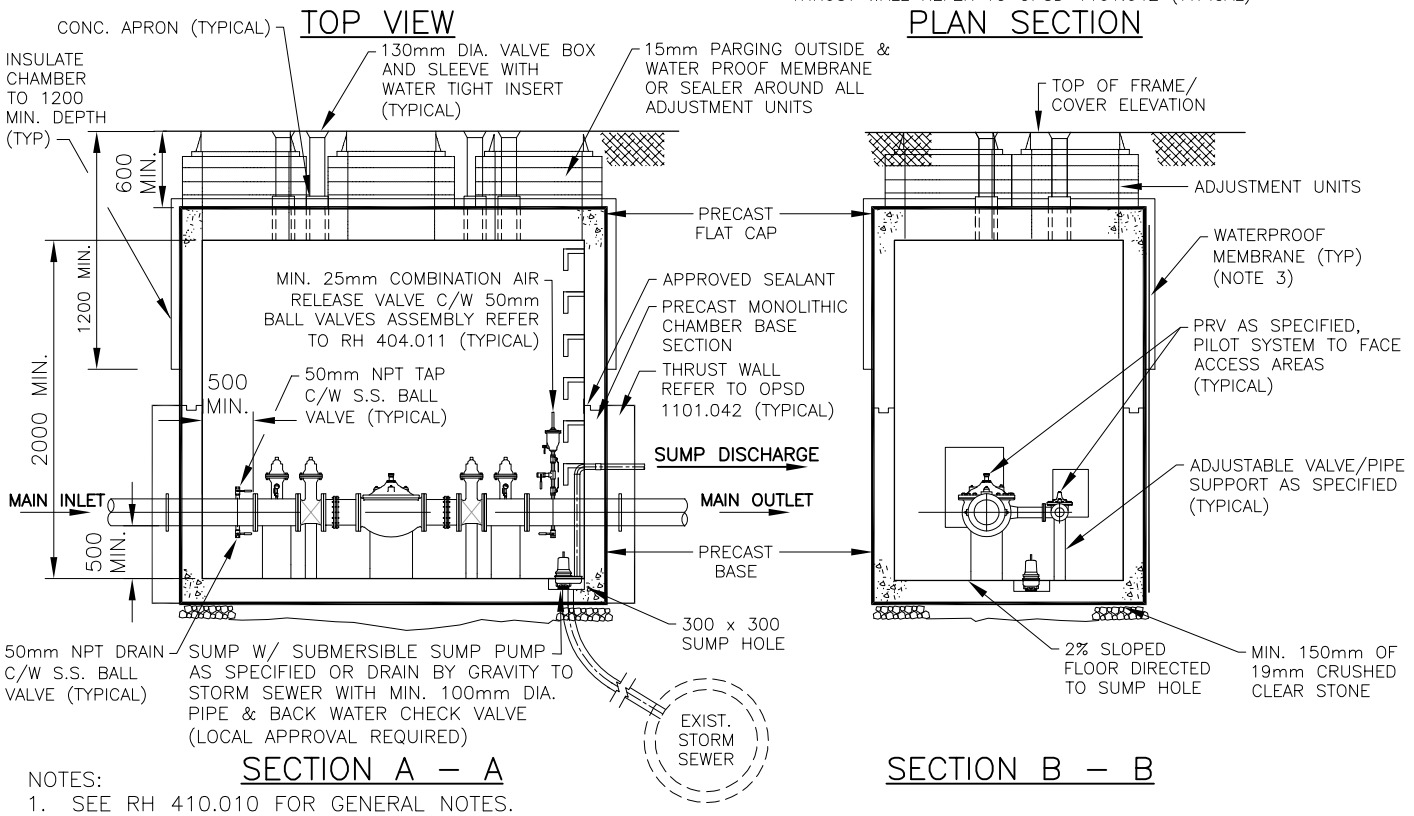
REGION STANDARD RH 410.012



TOP VIEW



PLAN SECTION



SECTION A – A

SECTION B – B

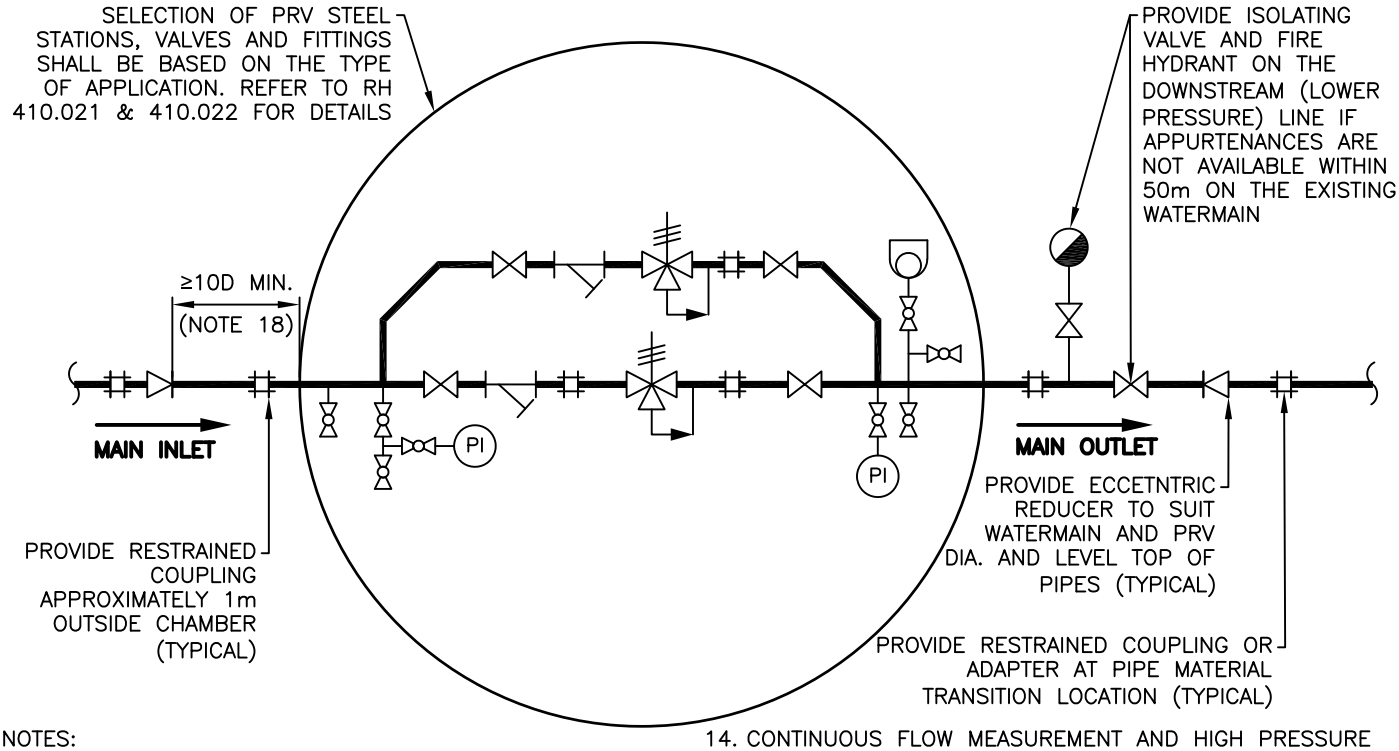
NOTES:
1. SEE RH 410.010 FOR GENERAL NOTES.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
3. WATERPROOF MEMBRANE SHALL BE SELF–ADHESIVE, RUBBERIZED ROLL–TYPE BITUMINOUS WATERPROOFING MEMBRANE AND PRIMER. WATERPROOFING SHALL EXTEND COMPLETELY AROUND THE CHAMBER FROM BASE TO ROOF SLAB, INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date: October 2019 | Rev. 2 | NTS

PRV CONCRETE CHAMBER LAYOUT FOR 200mm TO 400mm HIGH FLOW LINE AND 200mm TO 250mm LOW FLOW LINE

REGION STANDARD RH 410.013



NOTES:

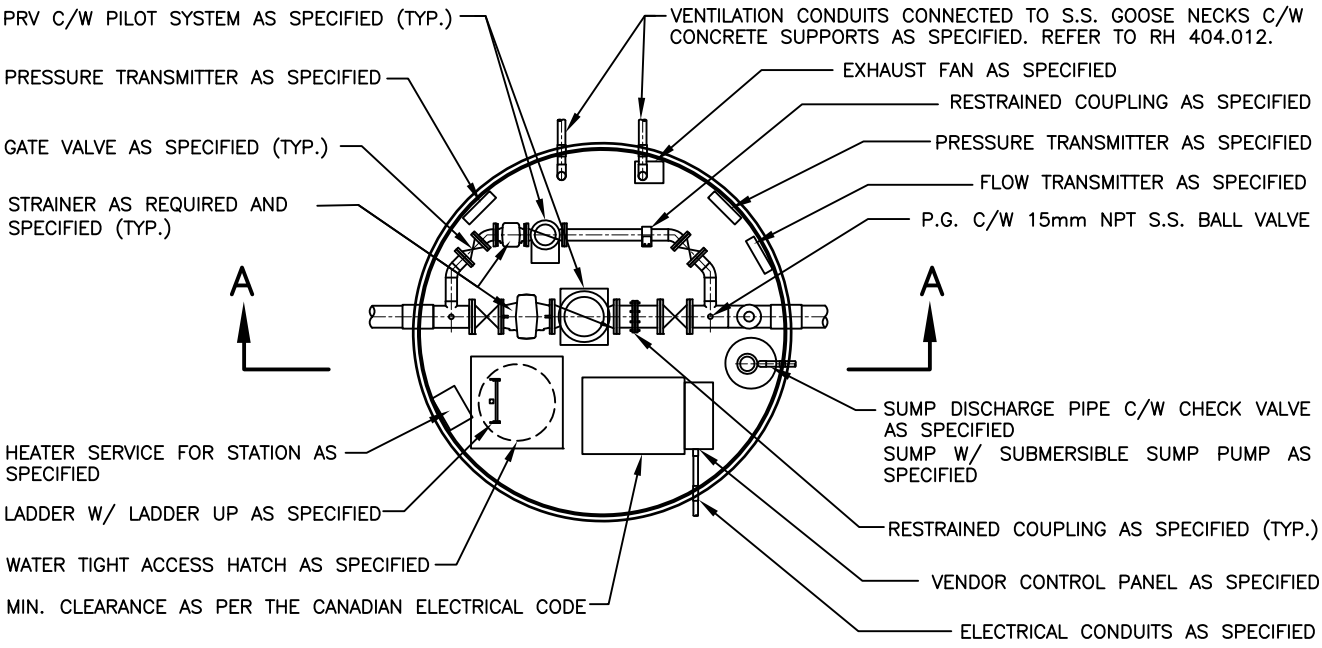
1. THIS STANDARD DRAWING IS A GUIDE FOR THE DESIGN OF STEEL PRV STATIONS. IT IS THE DESIGNER'S RESPONSIBILITY TO CONFIRM WITH THE REGION IN ADVANCE THE TYPE OF PRV CHAMBER PREFERENCE (CONCRETE OR STEEL) FOR EACH INDIVIDUAL APPLICATION PRIOR TO DESIGN COMMENCEMENT.
2. STATIONS SHALL BE WELDED STEEL AND WATERTIGHT.
3. STATION FOOTPRINT SHALL BE CIRCULAR AND SHALL NOT EXCEED THE LOCAL TRANSPORT RESTRICTIONS.
4. INTERIOR COATING OF THE ENTIRE STATION AND WATERMAIN PIPING SHALL BE PROVIDED.
5. EXTERIOR COATING OF THE ENTIRE STATION SHALL BE PROVIDED.
6. INSULATION FOR TOP AND FULL DEPTH OF STATION SHALL BE PROVIDED.
7. STATIONS SHALL BE EQUIPPED WITH PROCESS PIPING AND VALVES, POWER DISTRIBUTION AND CONTROL PANEL, INSTRUMENTATION AND AUTOMATION DEVICES AS REQUIRED, CONDUITS AND WIRING, VENTILATION (INCLUDING HEATING AND DEHUMIDIFICATION), LIGHTING, FLOOR SUMP AND SUMP PUMP, ACCESS LADDER, MAN-WAY, WATER-TIGHT HATCH, ETC. BY SUPPLIER.
8. ALL SPECIFIED EQUIPMENT SHALL BE AS PER HALTON REGION APPROVED MANUFACTURER'S PRODUCT LIST FOR WATER SYSTEMS (LINEAR) AND APPROVED EQUIPMENT LIST FOR WATER AND WASTEWATER FACILITIES.
9. ALL COMPONENTS WHICH ARE IN DIRECT CONTACT WITH THE WATER SHALL BE NSF APPROVED.
10. SIZE AND TYPE OF THE PRVS SHALL BE CONFIRMED BY THE ENGINEER VIA HYDRAULIC MODELLING/CALCULATIONS.
11. FLOW METER AND PRESSURE TRANSMITTER DEVICES TO BE INTEGRATED WITHIN THE PRVS AS REQUIRED.
12. ANTI-STAGNATION DEVICE TO BE IMPLEMENTED AS REQUIRED USING THE 50mm PORTS PROVIDED.
13. IN-LINE STRAINER SHALL BE INSTALLED AS REQUIRED AND SHALL BE AS PER PRV SUPPLIER SPECIFICATION.
14. CONTINUOUS FLOW MEASUREMENT AND HIGH PRESSURE /LOW PRESSURE MEASUREMENTS SHALL HAVE 4 TO 20 mA DC OUTPUT SIGNALS.
15. CONTINUOUS CHLORINE RESIDUAL ANALYSER SHALL HAVE 4 TO 20 mA DC OUTPUT SIGNAL.
16. ALL PROCESS MONITORING SIGNALS, EQUIPMENT STATUS SIGNALS AND ALARM SIGNALS SHALL BE INTEGRATED WITHIN THE REGION SCADA SYSTEM AS PER HALTON REGION SCADA STANDARD AND SYSTEM INTEGRATION REQUIREMENTS. THE REGION WILL SUPPLY THE COMMUNICATION DEVICE.
17. WATERMAIN PIPE MATERIAL INSIDE THE STATION SHALL BE 316 STAINLESS STEEL.
18. DISTANCE FROM REDUCER TO OUTSIDE WALL OF CHAMBER ON UPSTREAM SIDE TO BE EQUAL TO, OR GREATER THAN, 10 TIMES THE DIAMETER OF THE REDUCED PIPE SIZE FOR POTENTIAL FUTURE FLOW MONITORING CHAMBER INSTALLATION.
19. THE WATER-TIGHT HATCH LOADING SPECIFICATIONS SHALL BE SELECTED BASED ON THE PROPOSED INSTALLATION LOCATION (I.E. BOULEVARD, ROADWAY ETC.)
20. STATIONS LOCATED IN THE ROADWAY OR BOULEVARD MUST HAVE MIN. 600mm OR MIN. 300mm COVER RESPECTIVELY.
21. STATION INSTALLATION LOCATION, EXTERNAL CONNECTIONS AND ORIENTATION DETAILS SHALL BE AS PER DETAILED DESIGN.
22. STATION SHALL BE FULLY EQUIPPED WHEN DELIVERED ONSITE AND SHALL ONLY REQUIRE FOUNDATION, BACKFILL, AND CONNECTIONS TO EXTERNAL PIPING, DUCTS AND ALL CABLING BY THE CONTRACTOR.
23. STATION FOUNDATION AND BACKFILL SHALL BE DESIGNED BY THE ENGINEER BASED ON LOADING AND SOIL CONDITIONS.
24. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

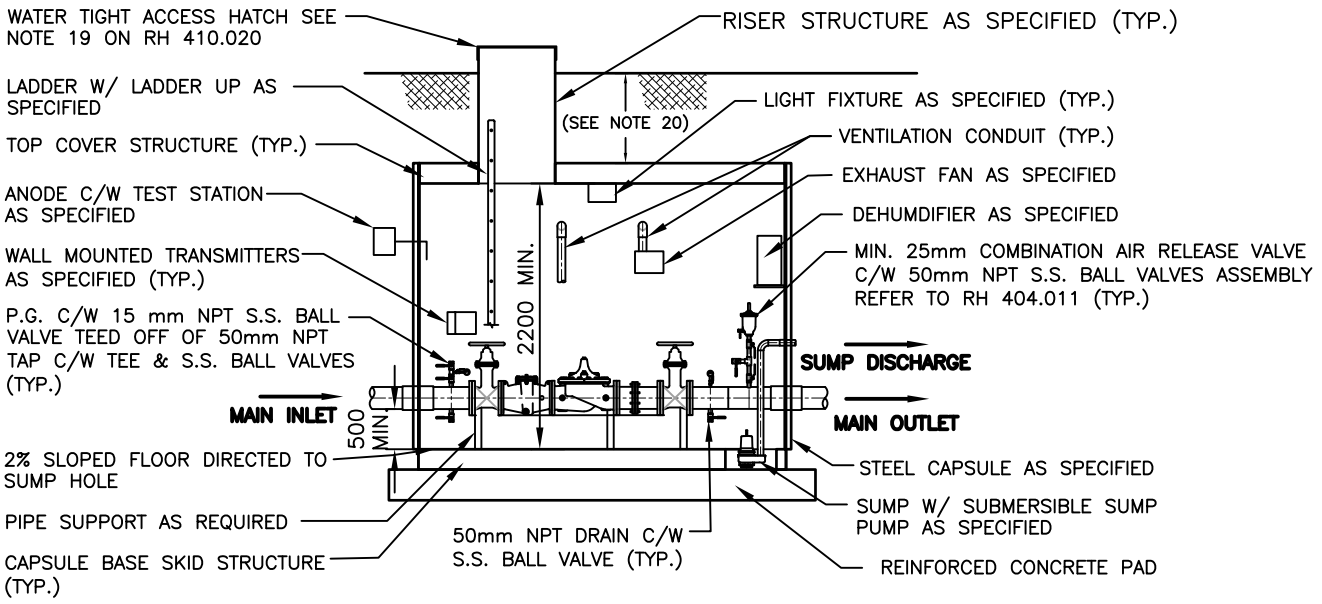
Date:	March 2019	Rev. 0	NTS

PRV STEEL STATION GENERAL NOTES AND PROCESS FLOW DIAGRAM

REGION STANDARD RH 410.020



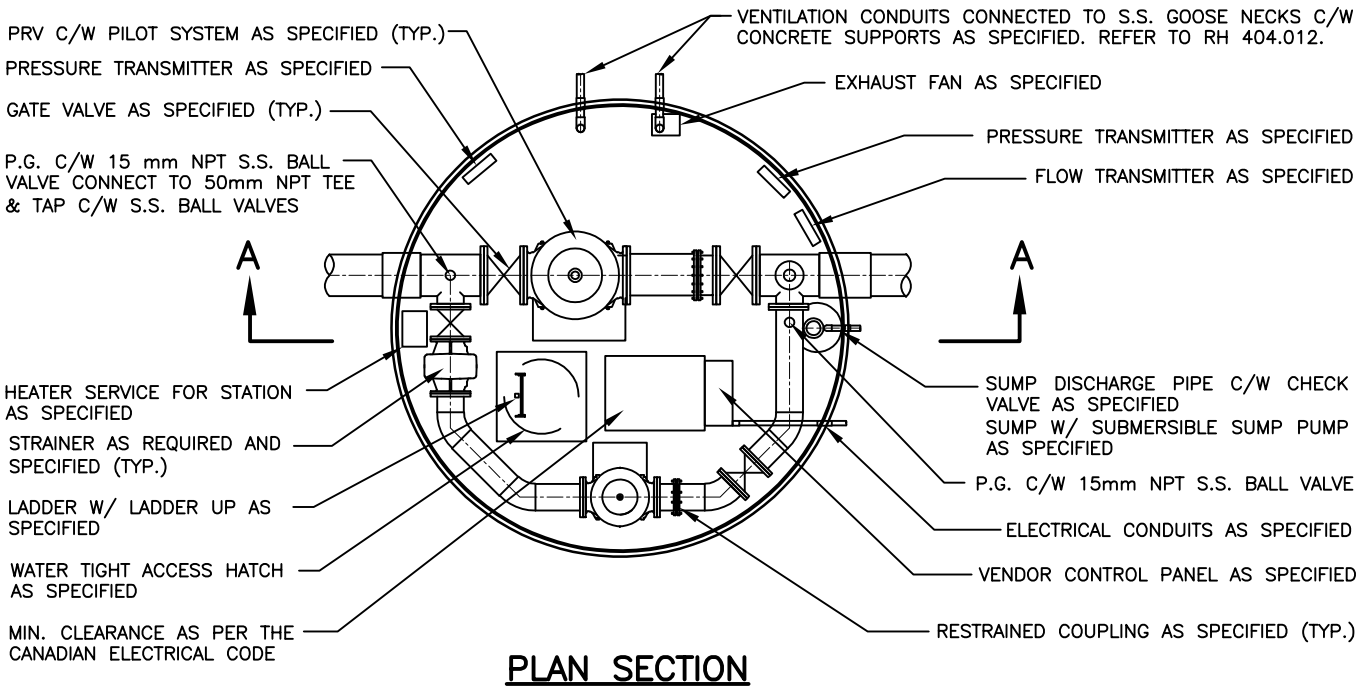
PLAN SECTION



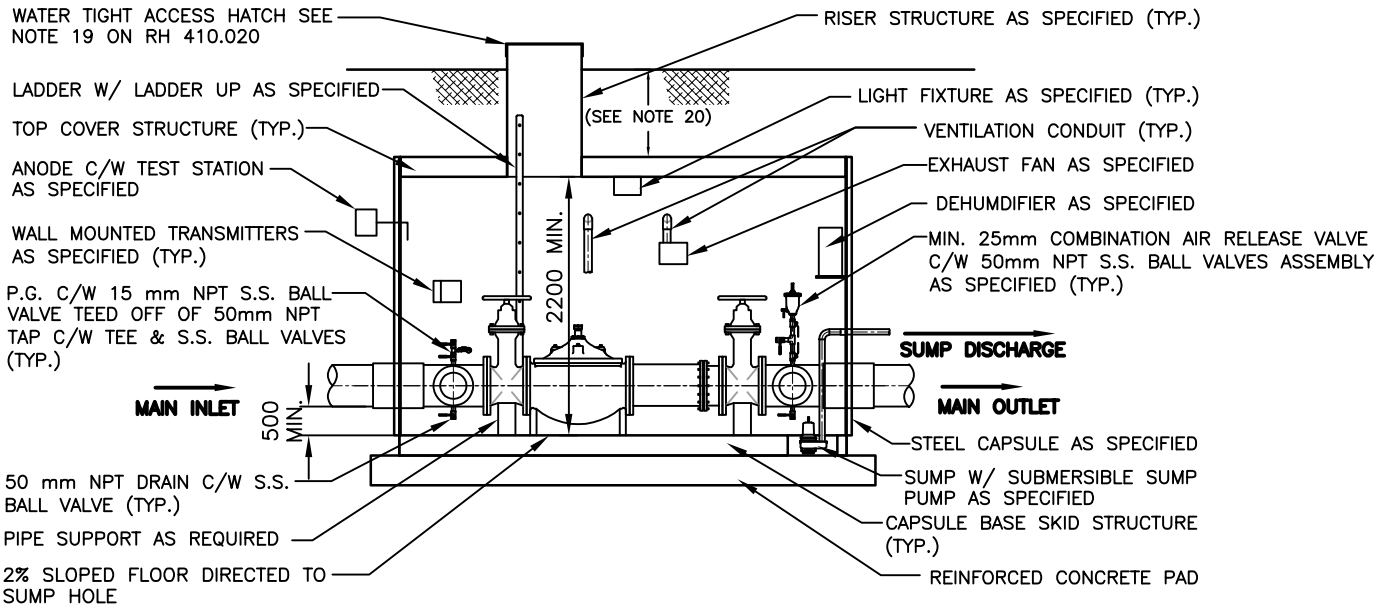
SECTION A – A

NOTES:
1. SEE RH 410.020 FOR GENERAL NOTES
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

THE REGIONAL MUNICIPALITY OF HALTON PUBLIC WORKS DEPARTMENT	Date: March 2019	Rev. 0	NTS
PRV STEEL STATION LAYOUT FOR 200mm OR LESS HIGH FLOW LINE AND 100mm OR LESS LOW FLOW LINE			
	REGION STANDARD	RH 410.021	



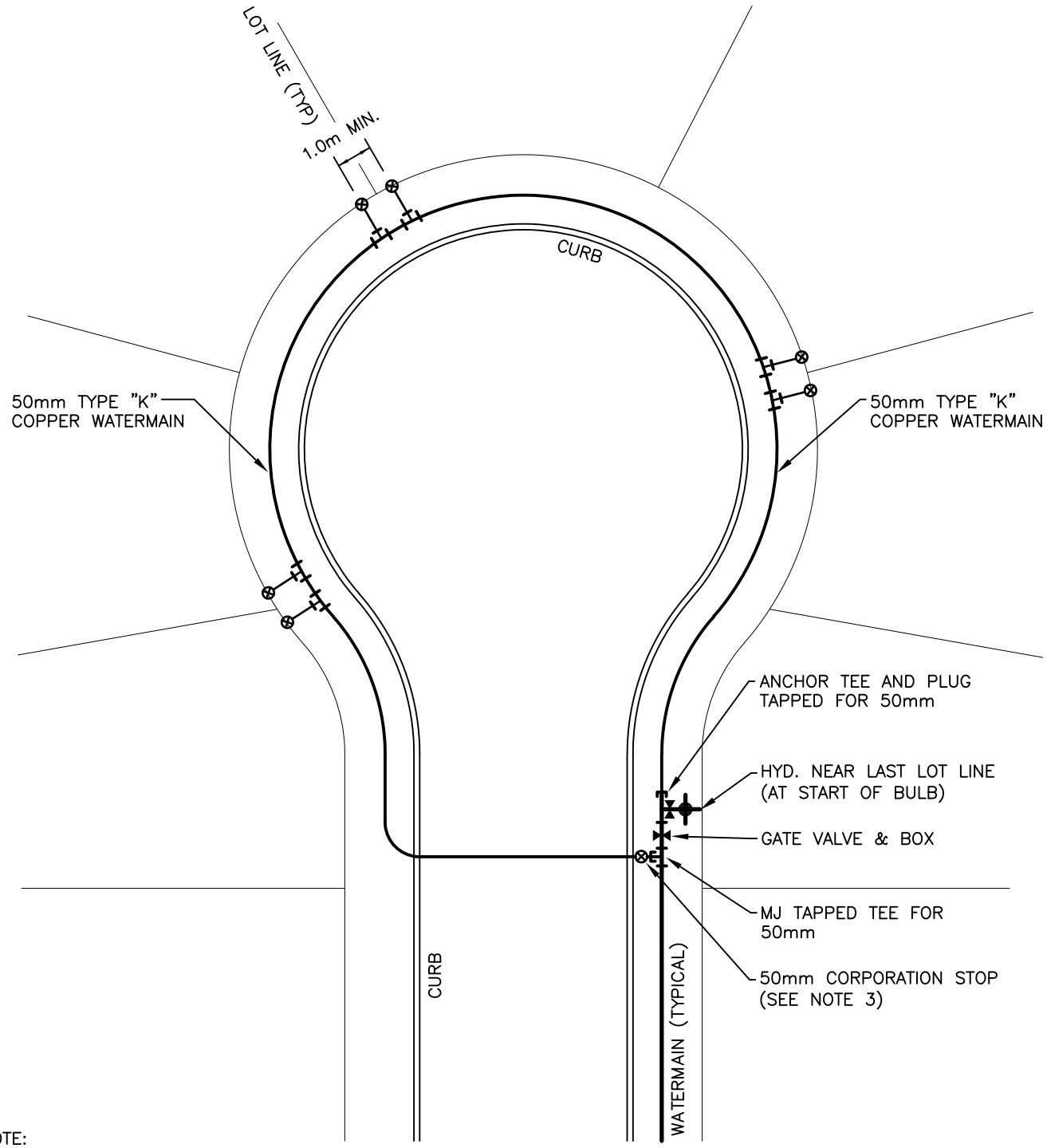
PLAN SECTION



SECTION A – A

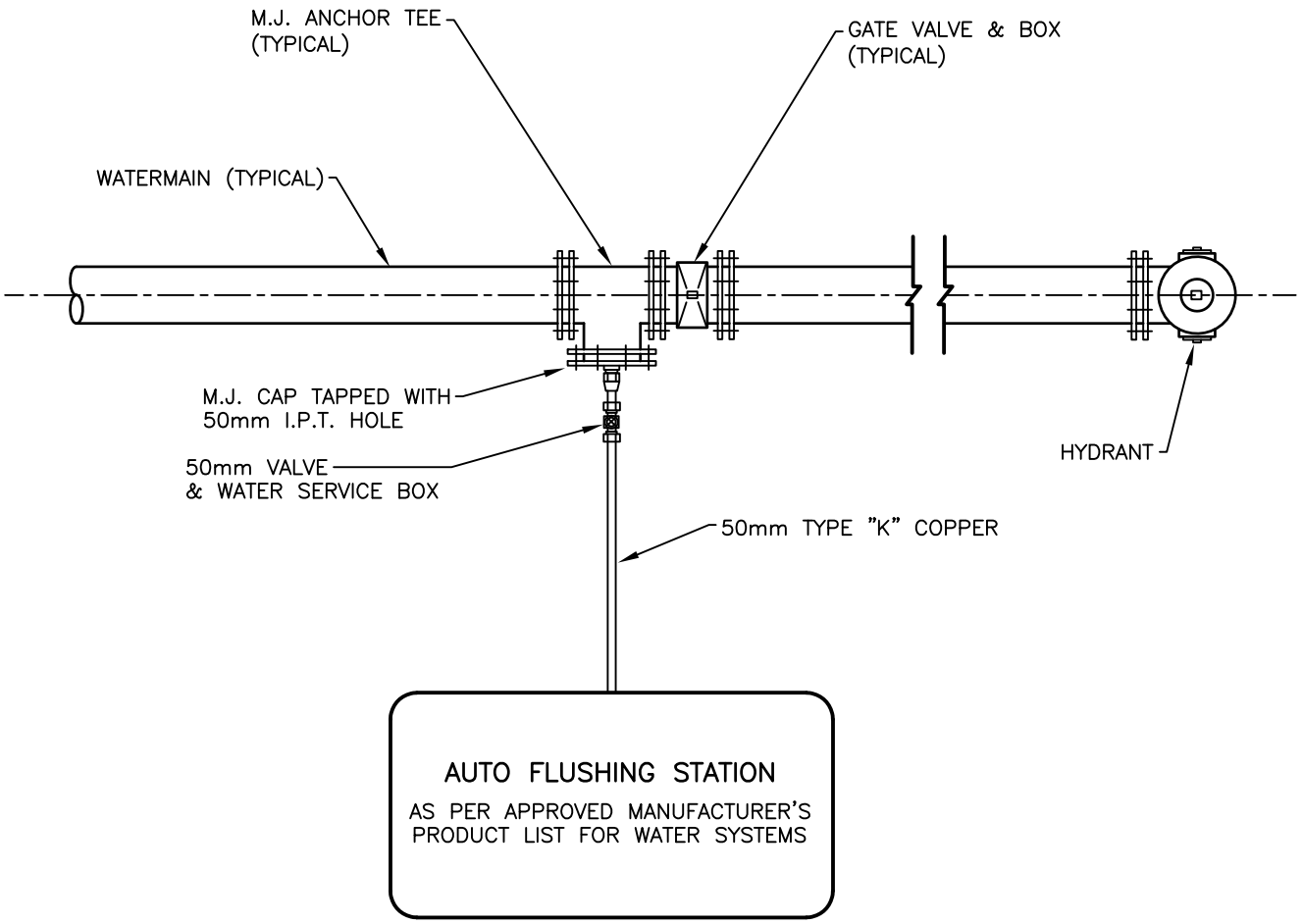
NOTES:
1. SEE RH 410.020 FOR GENERAL NOTES
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

THE REGIONAL MUNICIPALITY OF HALTON PUBLIC WORKS DEPARTMENT	Date: March 2019	Rev. 0	NTS
PRV STEEL STATION LAYOUT FOR 200mm TO 400mm HIGH FLOW LINE AND 250mm OR LESS LOW FLOW LINE			
	REGION STANDARD	RH 410.022	

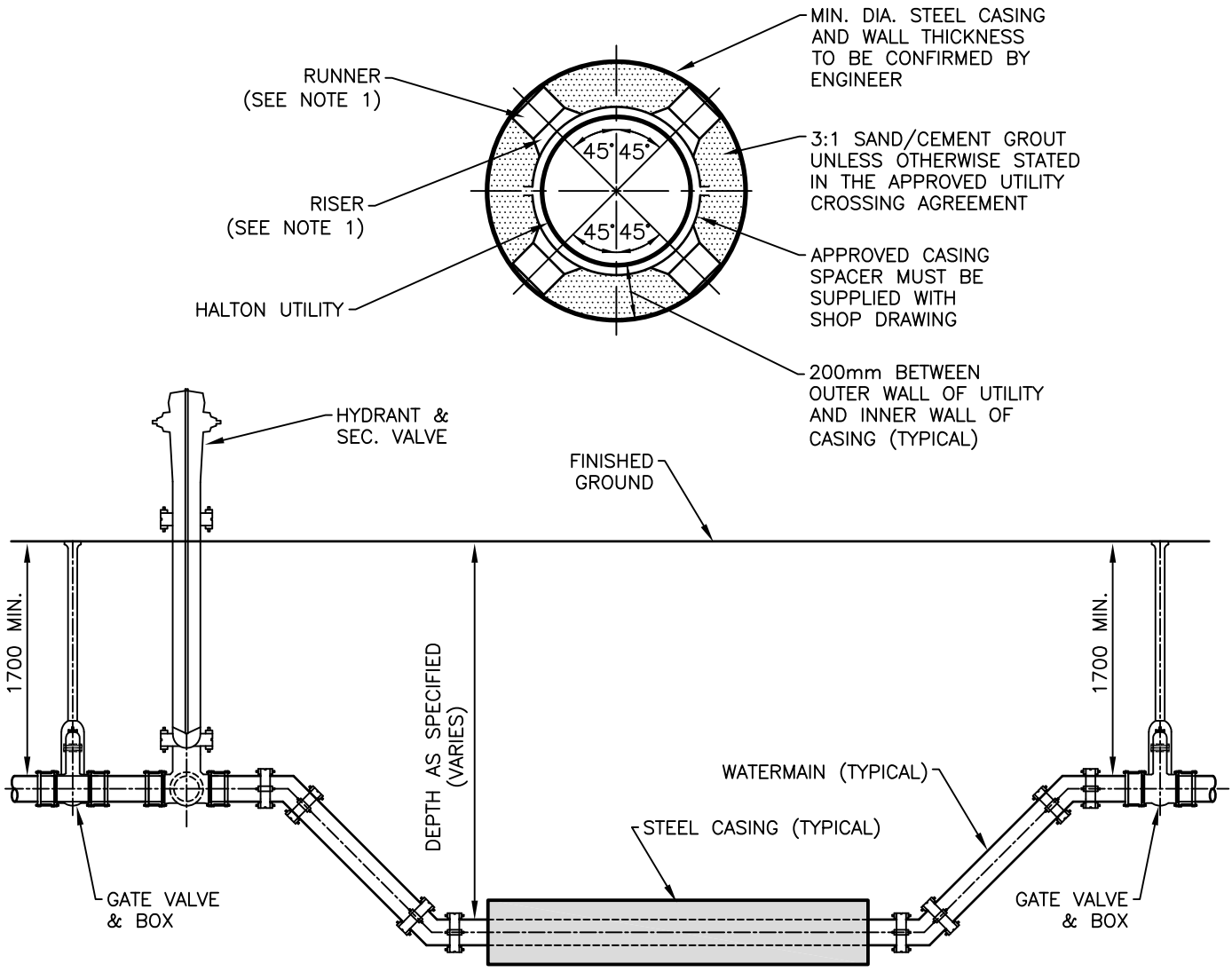


NOTE:
1. ALL SERVICES TO BE 25mm DIA.
2. FOR OFFSET OF WATERMAIN FROM STREETLINE, REFER TO LOCAL MUNICIPALITIES STANDARD DRAWINGS
3. IF IN THE ROAD YOU SHALL INSTALL VALVE BOX TO PROTECT CORPORATION STOP.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
5. RESTRAINING RODS AND T–HEAD BOLT WITH NUT ARE CORROSION–RESISTANT, FLUOROPOLYMER COATED, HIGH–STRENGTH LOW–ALLOY STEEL THAT CONFORMS TO ANSI/AWWA C111/A21.11.

THE REGIONAL MUNICIPALITY OF HALTON PUBLIC WORKS DEPARTMENT	Date: March 2019	Rev. 0	NTS
# TYPICAL # 50mm WATERMAIN # ON CUL–DE–SAC			
	REGION STANDARD	RH 411.010	



THE REGIONAL MUNICIPALITY OF HALTON PUBLIC WORKS DEPARTMENT	Date: December 2018	Rev. 0	NTS
AUTOMATIC FLUSHING STATION DETAIL			
	REGION STANDARD	RH	411.020



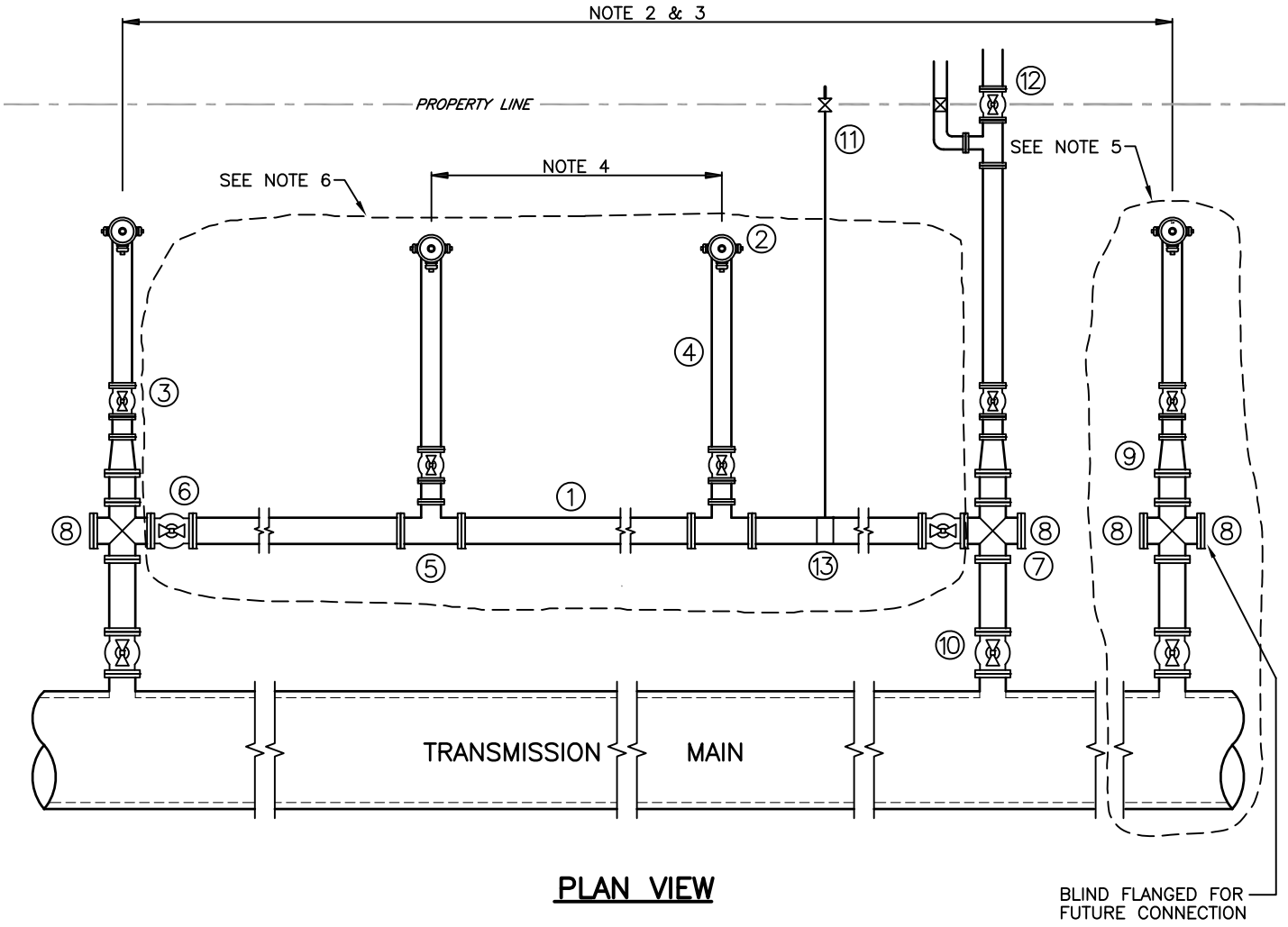
BORING AND JACKING CASING DETAIL

NOTES:

1. CASING SPACER SHALL BE COMPRISED OF RUNNER (MINIMUM 50mm) AND RISER.
2. CASING SPACERS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS (WOOD BLOCKING IS NOT AN APPROVED OR EQUIVALENT PRODUCT).
3. SPECIAL CARE MUST BE TAKEN TO ENSURE THAT ALL COMPONENT PARTS ARE CORRECTLY ASSEMBLED AND EVENLY TIGHTENED, AND THAT NO DAMAGE OCCURS DURING TIGHTENING OF THE SPACERS OR THE PIPE INSERTION.
4. THE LINER CASING AND PIPE SHALL BE SEALED WRAPPED WITH HIGH QUALITY RUBBER END SEALS. THEY MUST BE SECURED WITH TYPE 316 STAINLESS STEEL BANDS TO PREVENT ENTRY OF WATER OR EXCESS MOISTURE.
5. THE PIPE IN THE CASING IS REQUIRED TO BE CENTERED AND RESTRAINED.
6. CORROSION PROTECTION IS REQUIRED. CATHODIC PROTECTION USING APPROPRIATELY SIZED AND NUMBER OF ANODES (MINIMUM 14.5Kg. MAGNESIUM) MUST BE INSTALLED FOR ALL STEEL CASINGS.

THE REGIONAL MUNICIPALITY OF HALTON PUBLIC WORKS DEPARTMENT	Date: December 2018	Rev. 0	NTS
BORING AND JACKING DETAIL FOR STEEL CASING ONLY			
	REGION STANDARD	RH	412.010

MATERIAL LIST			
1	SERVICE MAIN (SIZE VARIES)	8	BLIND FLANGE
2	HYDRANT	9	200x150mm REDUCER
3	150mm SECONDARY VALVE	10	200mm GATE VALVE & BOX
4	150mm HYDRANT LEAD	11	DOMESTIC TYPE SERVICE
5	HYDRANT ANCHOR TEE	12	INDUSTRIAL/COMMERCIAL SERVICE
6	IN-LINE VALVE	13	DOMESTIC WATER SERVICE SADDLE
7	CROSS (200mm x LOCAL MAIN SIZE)		



PLAN VIEW

NOTES:

1. SERVICE IS ONLY POSSIBLE IN DESIGNATED URBAN AREAS
2. HYDRANTS THAT ARE FED OFF TRANSMISSION MAIN TO HAVE VALVES AT LIVE ENDS OF CROSS
3. SPACING AS REQUIRED FOR TESTING
4. HYDRANT SPACING AS PER CURRENT HALTON STANDARDS
5. INSTALLED AS PART OF FEEDERMAIN CONSTRUCTION
6. INSTALLED BY LANDOWNER

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

Date December 2018	Rev. 0	NTS

SERVICE MAIN LAYOUT SCHEMATIC

REGION STANDARD RH 413.010

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 200mm 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 200mm 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

VELOCITY AND DISCHARGE FOR 1350mm TO 1950mm CIRCULAR PIPE

Date: January 2014	Rev. 1	NTS

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
PUBLIC WORKS DEPARTMENT

VELOCITY AND DISCHARGE FOR 2100mm TO 2400mm CIRCULAR PIPE

Date: January 2014	Rev. 1	NTS

REGION STANDARD RH 2000.10

PROJECT NO: _____

LOCATION: _____

_____

THE REGIONAL MUNICIPALITY OF HALTON

SANITARY SEWER DESIGN

DATE: _____

DESIGNED BY: _____

CHECKED BY: _____

STREET	MANHOLE		LENGTH IN METERS	TRIBUTARY AREA HA.						POPULATION TRIBUTARY						AVG L/s INCR.	AVG L/s TOTAL	PEAK FACTOR	MAX L/s	INFIL-TRATION L/s	MAX FLOW EXPECT	SEWER					PI	PE	REMARKS
	FROM	TO		INCREMENT					TOTAL	INCREMENT					TOTAL							SIZE	SLOPE	Q L/s	V m/s		TYPE	CLASS	
																									FULL	ACTUAL			

PLEASE ENSURE TO USE THE ABOVE COLUMNS
IN YOUR DESIGN SHEET SUBMISSION.

DEVIATION FROM THESE COLUMNS REQUIRE PRE-APPROVAL FROM
THE REGION'S PROJECT MANAGER.

THE REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

SANITARY SEWER DESIGN SHEET

Date: August 2019 | Rev. 0 | NTS

REGION STANDARD RH 2001.010

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

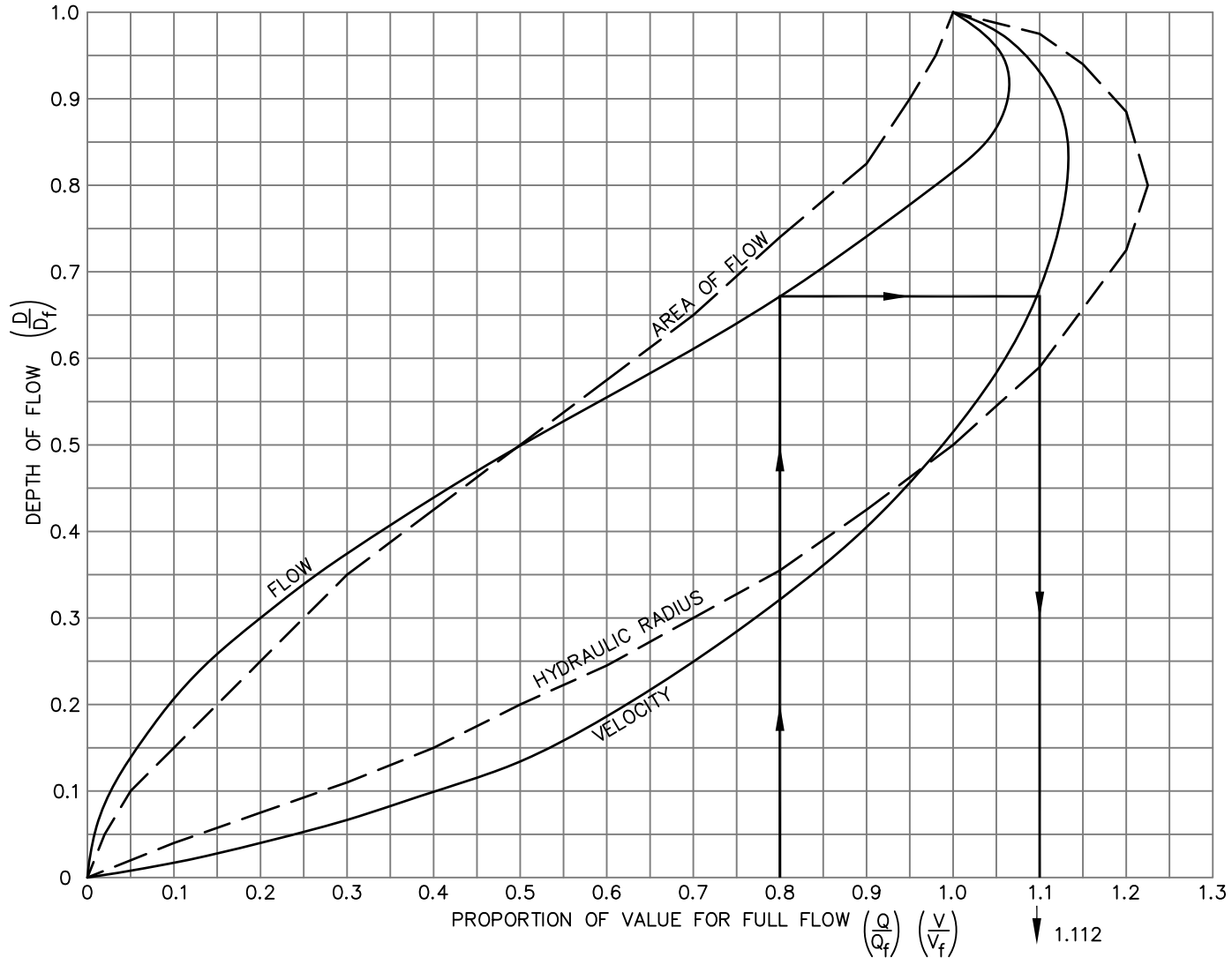
P = Tributary population in thousands

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

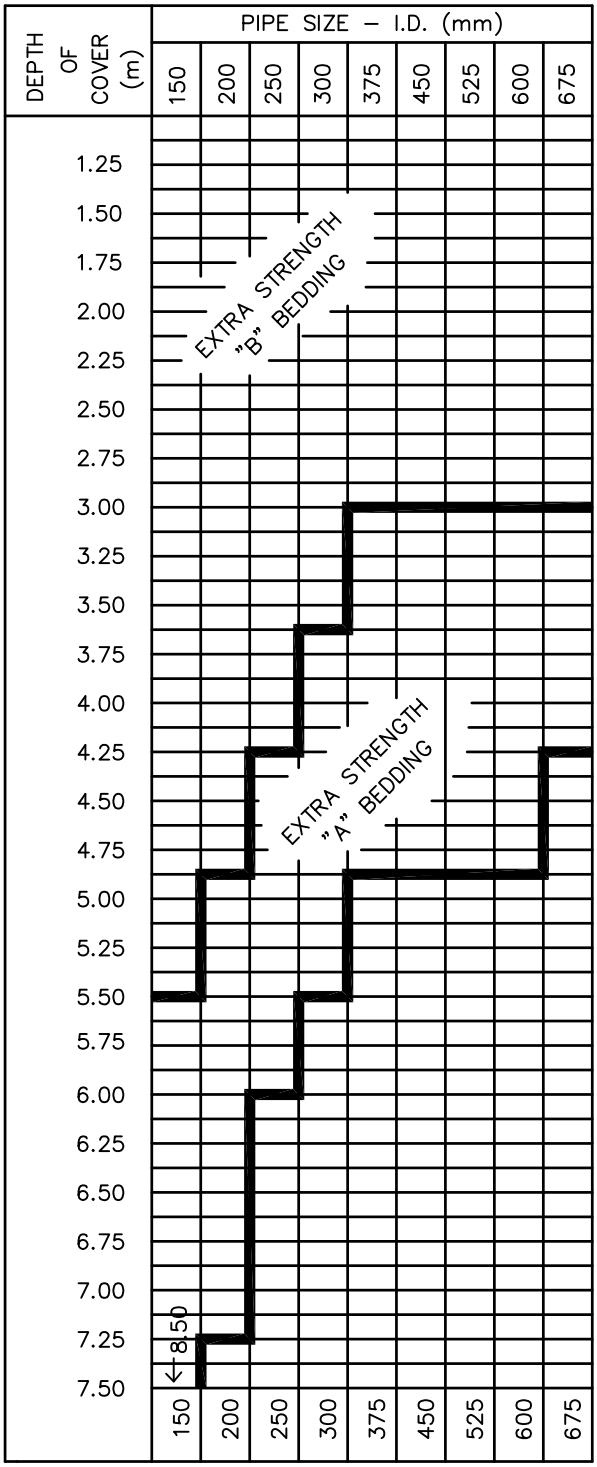
Find: V for Q = 1.313 m^3/s

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

THE REGIONAL MUNICIPALITY OF HALTON PUBLIC WORKS DEPARTMENT	Date: January 2014	Rev. 1	NTS
VALUES OF HYDRAULIC ELEMENTS OF CIRCULAR SECTION FOR VARIOUS DEPTHS OF FLOW			
	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
PUBLIC WORKS DEPARTMENT

Date: January 2014	Rev. 1	NTS

VITRIFIED CLAY PIPE CLASS REQUIREMENTS

REGION STANDARD RH 2004.01