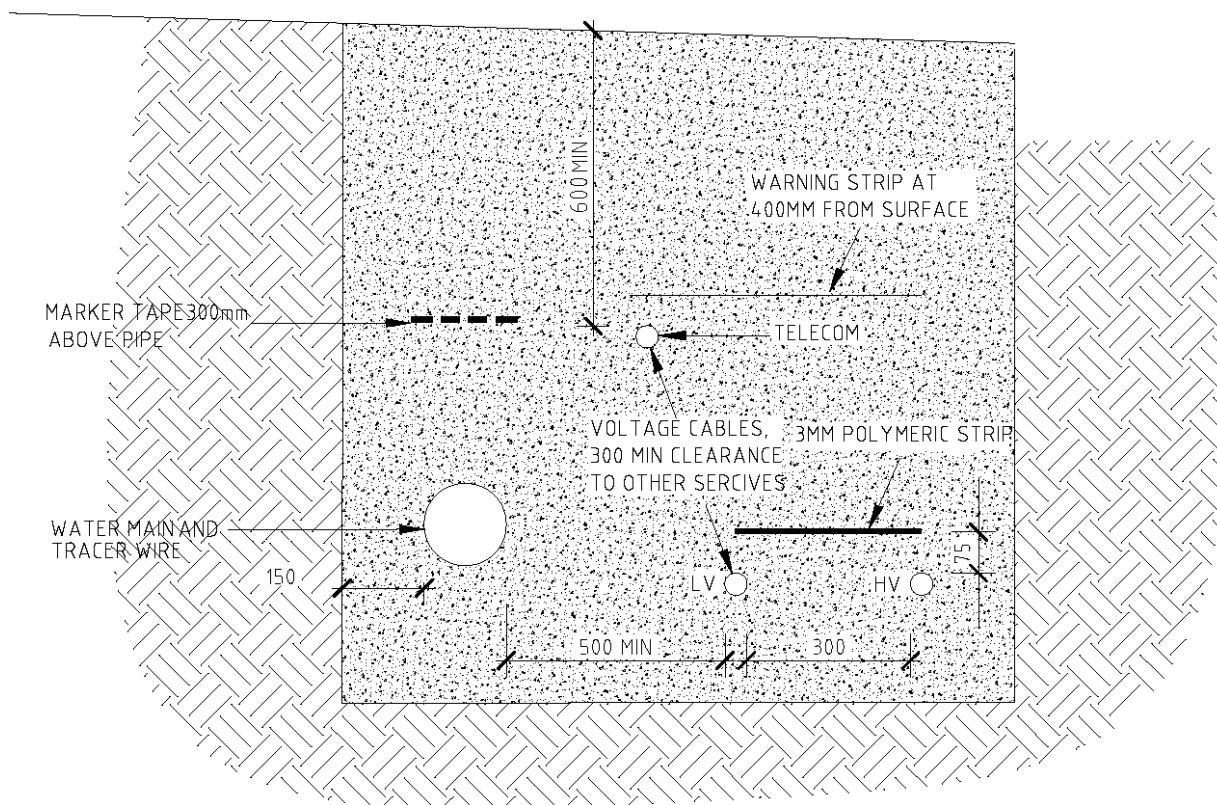


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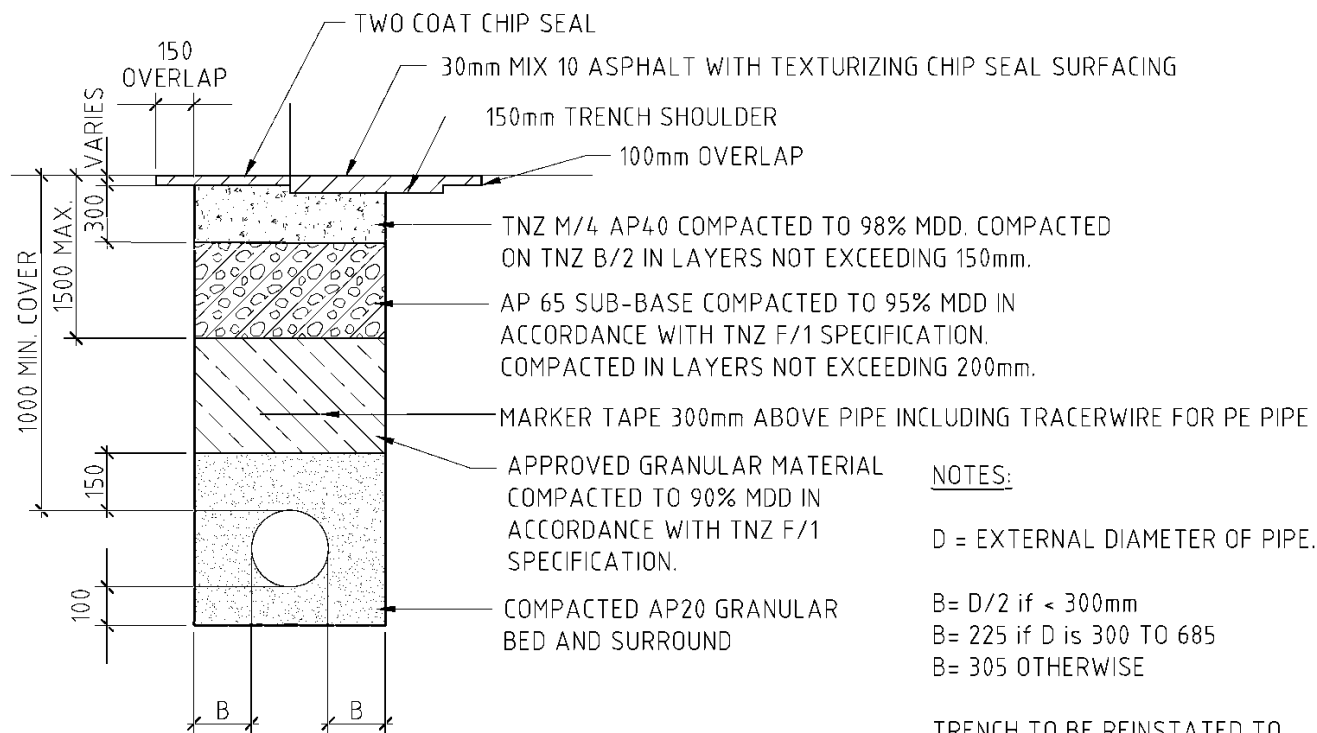


TRENCH DETAILS & UNDERGROUND UTILITIES IN VERGE

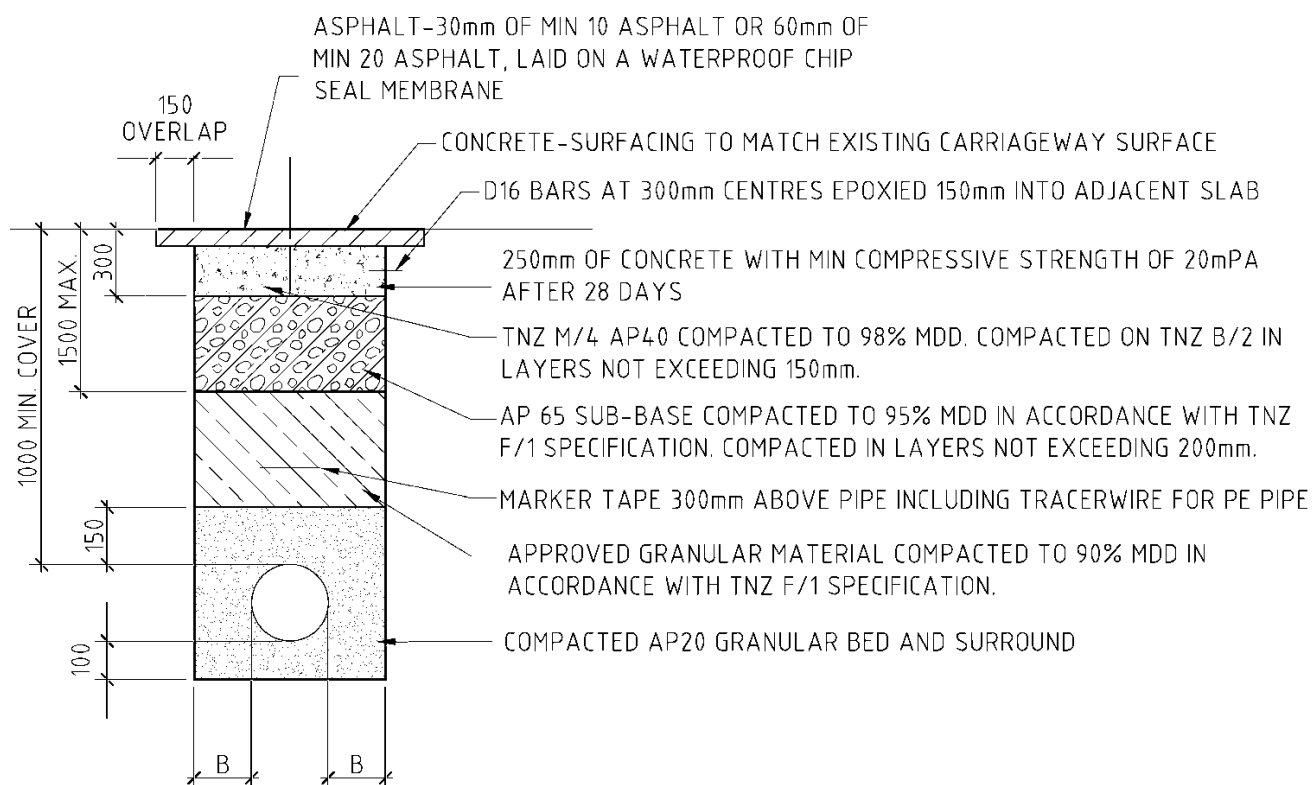
NTS

NOTE
SEPERATION FROM WATERMAIN DEFINED IN COP TABLE 6.4
(VARIES WITH PIPE SIZE)

Drawing B1-1 Typical Combined Service Trench Detail

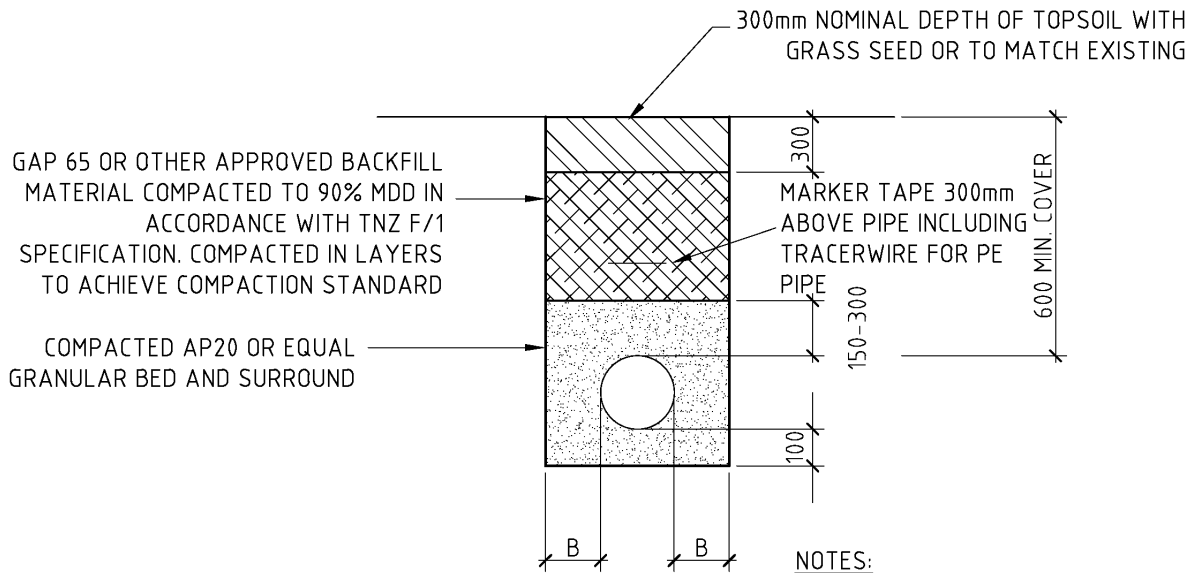


CHIPSEAL CARRIAGEWAY CROSS SECTION



ASPHALT/CONCRETE CARRIAGEWAY CROSS SECTION

Drawing B1-3 Typical Pipe Bedding & Backfill for Carriageways



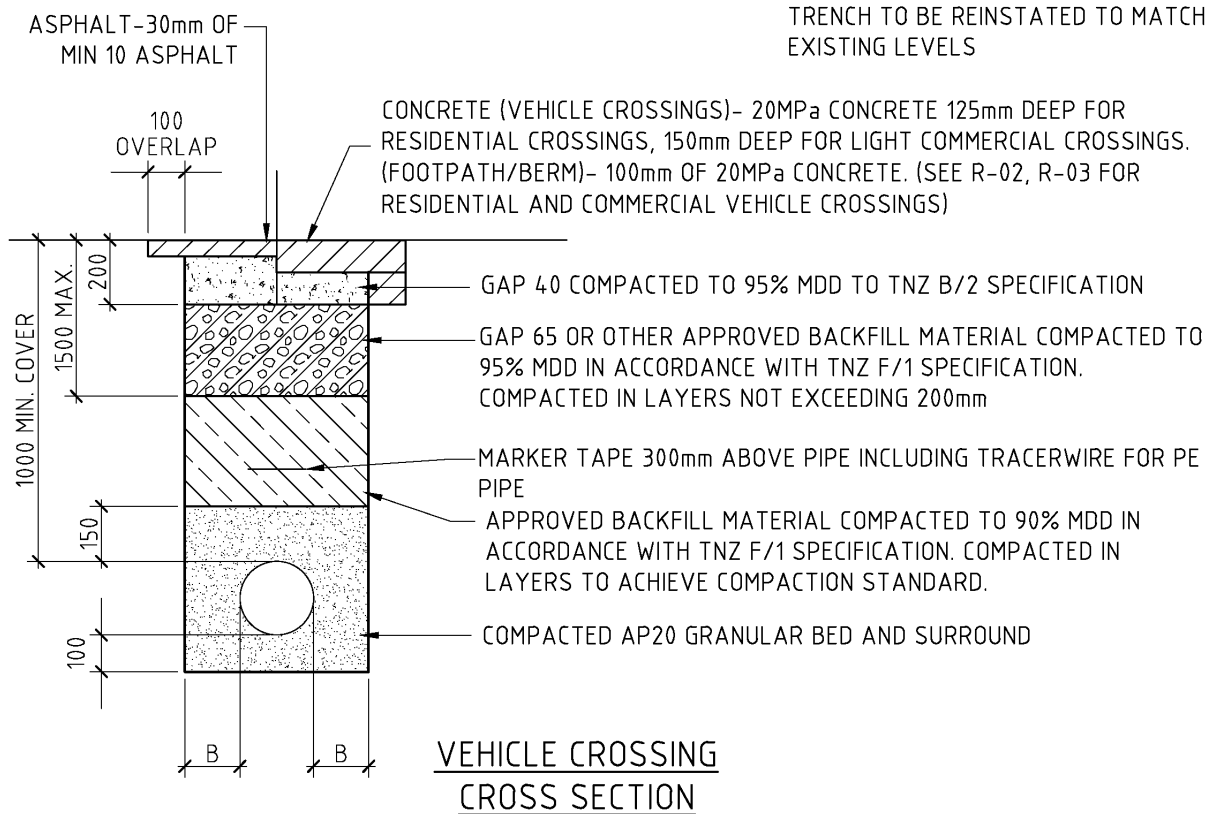
BERM/NON TRAFFICABLE CROSS SECTION

D = EXTERNAL DIAMETER OF PIPE.

B = D/2 if < 300mm

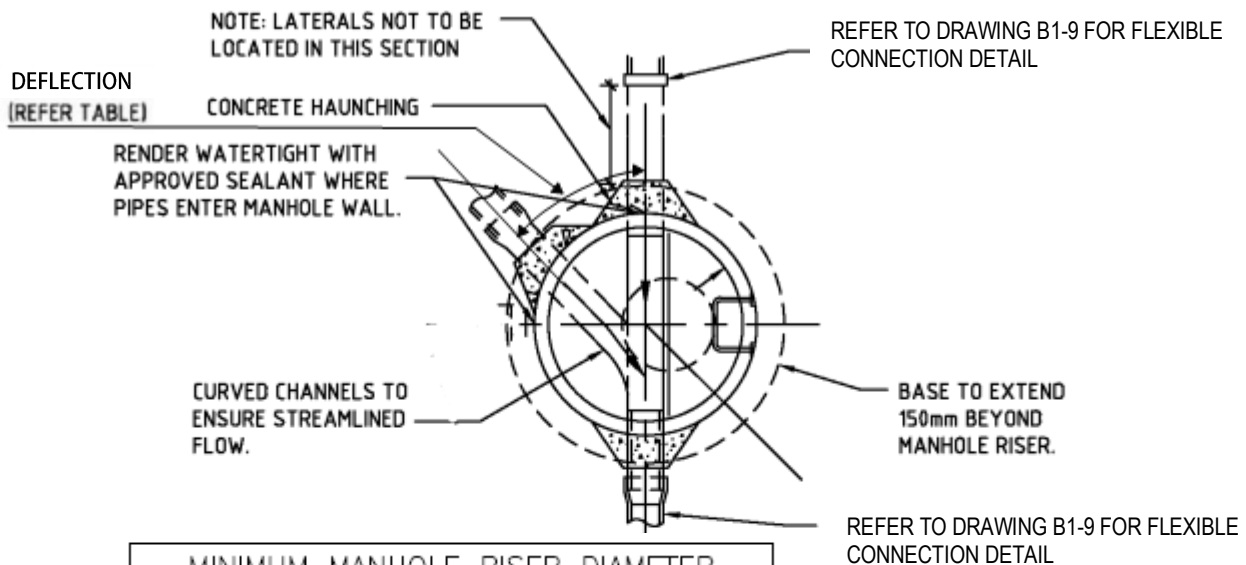
B = 225 if D is 300 TO 685

B = 305 OTHERWISE



TRENCH TO BE REINSTATED TO MATCH EXISTING LEVELS

Drawing B1-4 Typical Pipe Bedding & Backfill for Vehicle Crossings & non trafficable



MINIMUM MANHOLE RISER DIAMETER						
PIPE DIA	DEFLECTION					
	0'	15'	30'	45'	60'	75'
450	1050	1050	1050	1200	1500	1800
525	1050	1050	1200	1200	1500	1800
600	1200	1200	1500	1500	1800	1800
750	1500	1500	1800	1800	SD*	SD*
825	1800	1800	1800	SD*	SD*	SD*
900	1800	1800	SD*	SD*	SD*	SD*
1050	SD*	SD*	SD*	SD*	SD*	SD*

PLAN

SD*: SPECIFIC DESIGN.

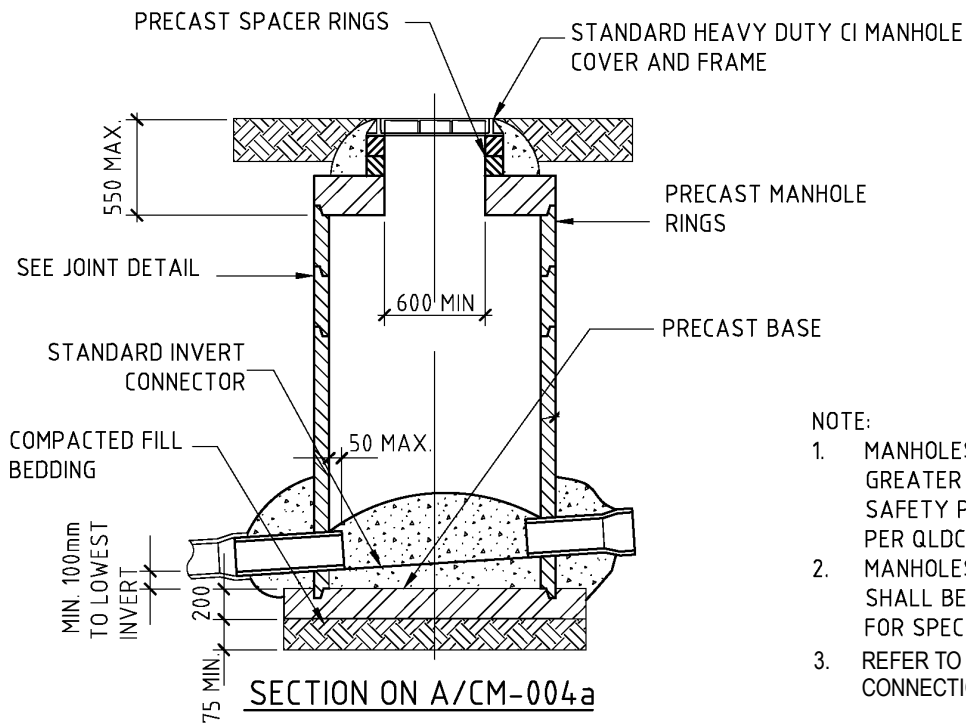
>75' DEFLECTION SHALL REQUIRE 'SPECIFIC DESIGN' FOR MANHOLE RISERS FOR ANY DIAMETER OF PIPE >375mm

* TO BE USED AS A MINIMUM GUIDE ONLY. LARGER DIAMETERS MAY BE REQUIRED WHERE MORE THAN 1 INLET PIPE IS TO BE CONSTRUCTED OR IF DEPTH EXCEEDS 4M OR WHERE REQUIRED BY THE MANUFACTURERS STANDARDS OR TO ACHIEVE HYDRAULIC EFFICIENCY IN THE BASE OF THE MANHOLE.

NOTES

1. ALL IN SITU CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 20MPa @ 28 DAYS.
2. ALL PRECAST MANHOLE UNITS (SHOWN SHADED IN DRAWING D02) TO BE STANDARD MANUFACTURED UNITS. (IE. HUMES OR SIMILAR APPROVED)
3. ALL BRANCHES SHALL BE CONSTRUCTED SUCH THAT THEY CAN BE READILY ACCESSED BY CCTV CAMERA. THE HAUNCHING DETAIL (IE. CROSS SECTION) SHALL NOT BE COMPROMISED. IF REQUIRED, THE "STRAIGHT THROUGH" CHANNEL SHALL BE OFFSET FROM THE MANHOLE CENTRELINE AND THE BRANCH CHANNELLING LEFT STRAIGHT FOR A SUFFICIENT LENGTH TO ACHIEVE THE DESIRED RESULT.
4. ACCESS OPENING & RUNGS TO BE LOCATED OVER THE SIDE OF THE MANHOLE. RUNGS TO BE FORMED AS PER DIAGRAM CM-004 OF NZS 4404:2004.

Drawing B1-5 Manhole Detail A –Typical Plan view



APPROVED SEALANT
NOTE: TYPE IN
APPROVED
MATERIALS

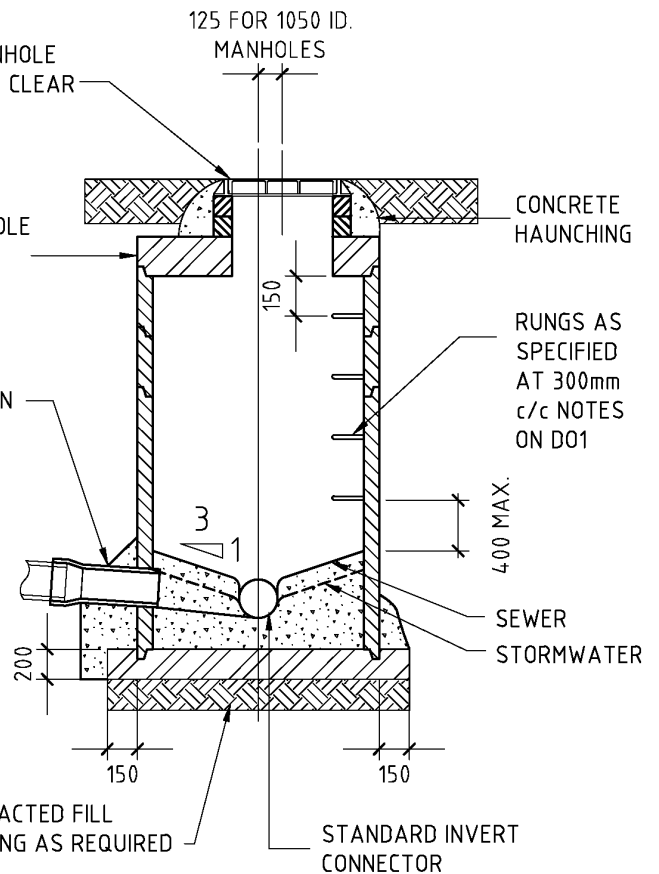
MANHOLE
INTERIOR

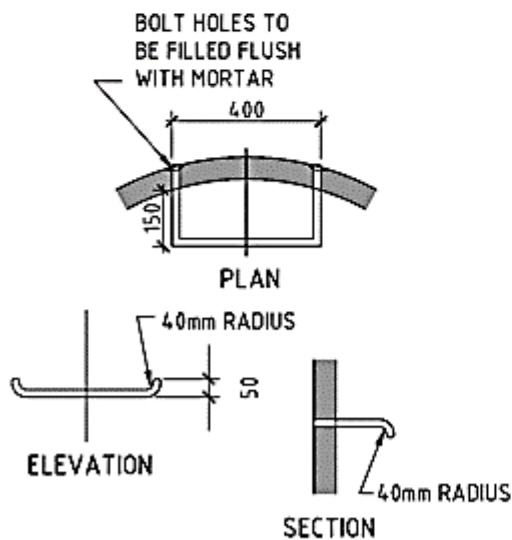
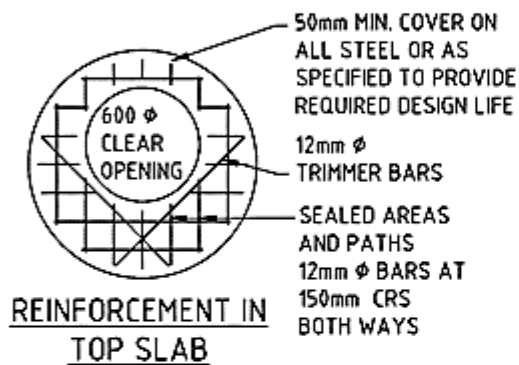
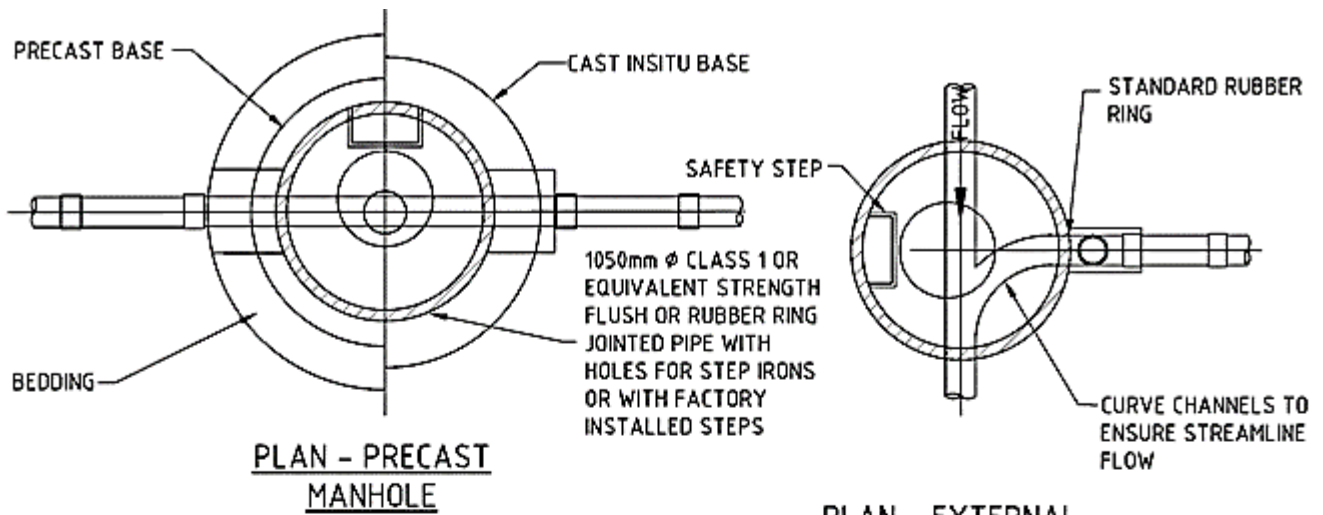
**TYPICAL JOINT
DETAIL**

STANDARD HEAVY DUTY CI MANHOLE
LID AND FRAME WITH 600mm MIN CLEAR
OPENING FLUSH WITH SURFACE.

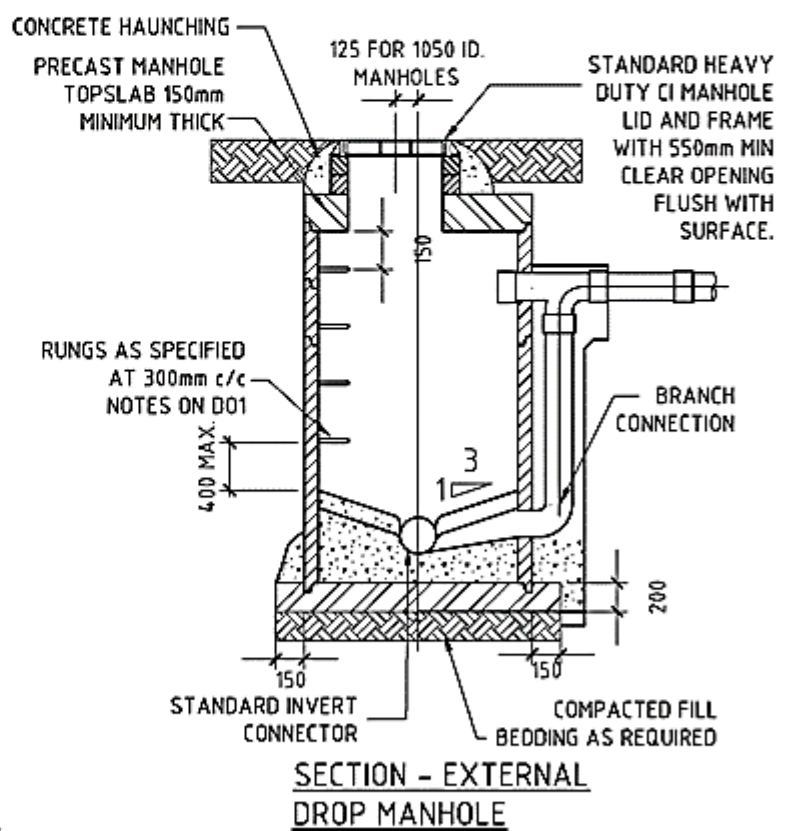
PRECAST MANHOLE
TOPSLAB 150mm
MINIMUM THICK

BRANCH CONNECTION



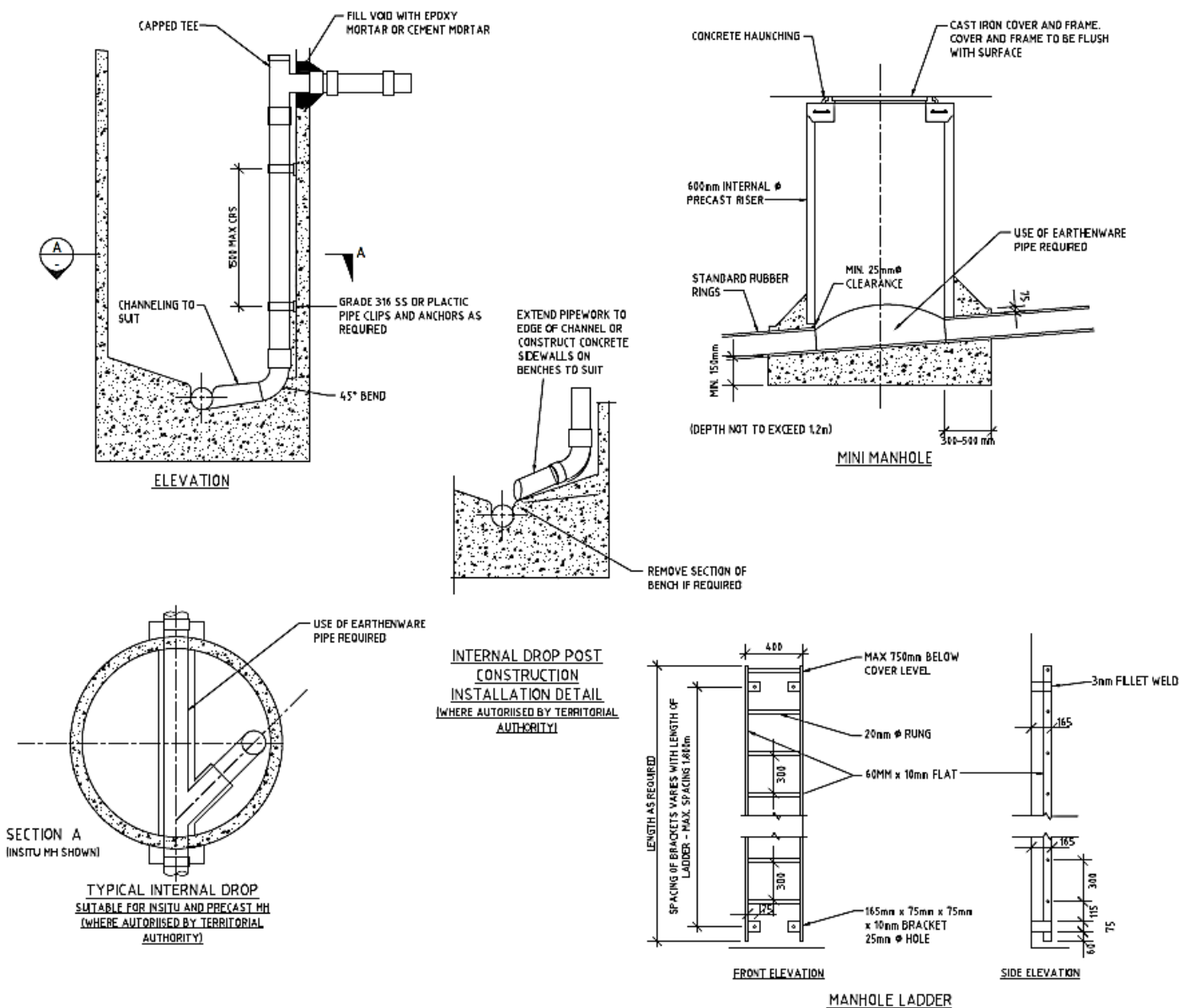


DETAILS OF STEPPED IRONS
 NOTE: STEPPED IRONS SHALL BE 20MM DIA GRADE 316 STAINLESS STEEL



NOTES

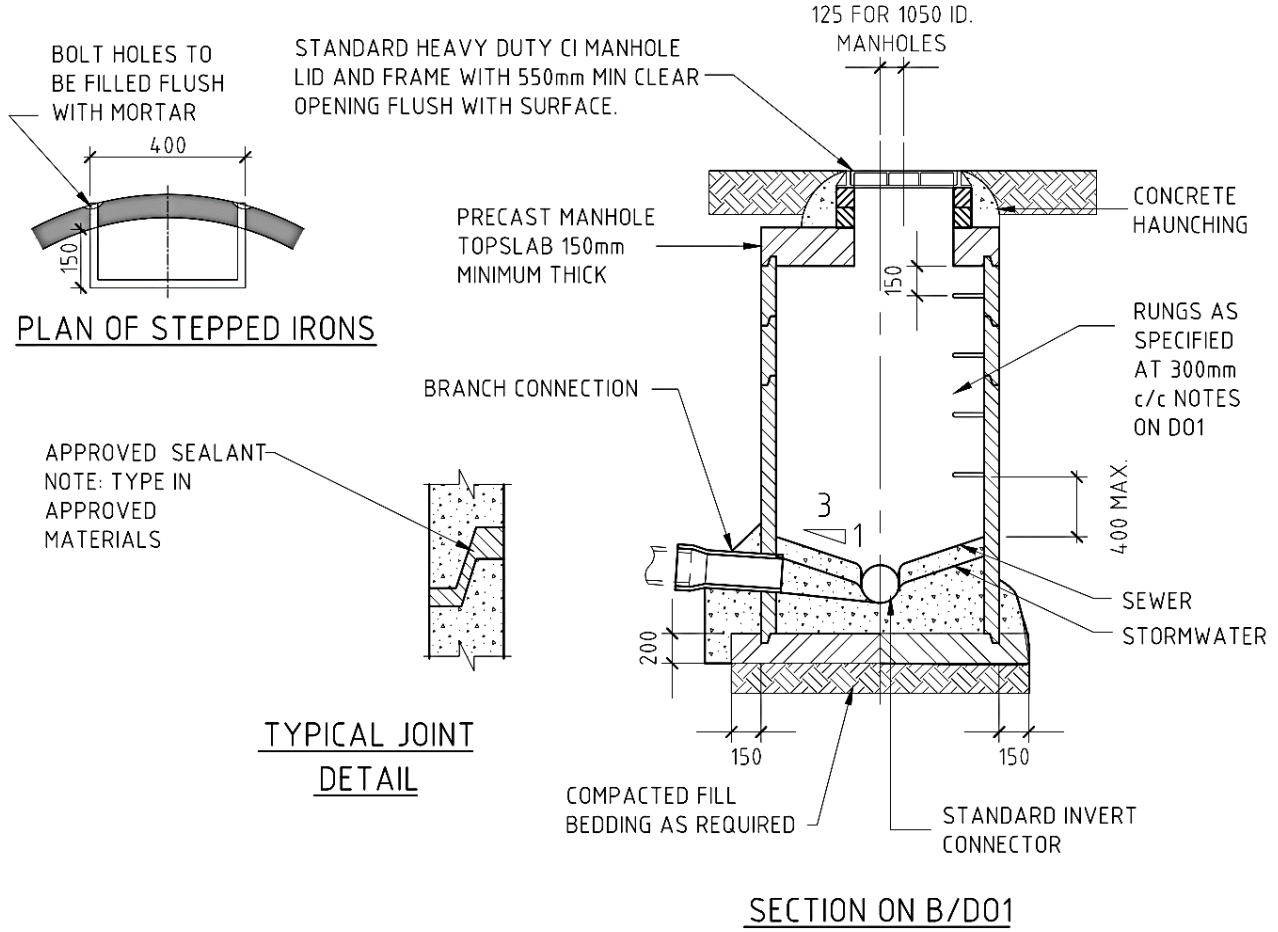
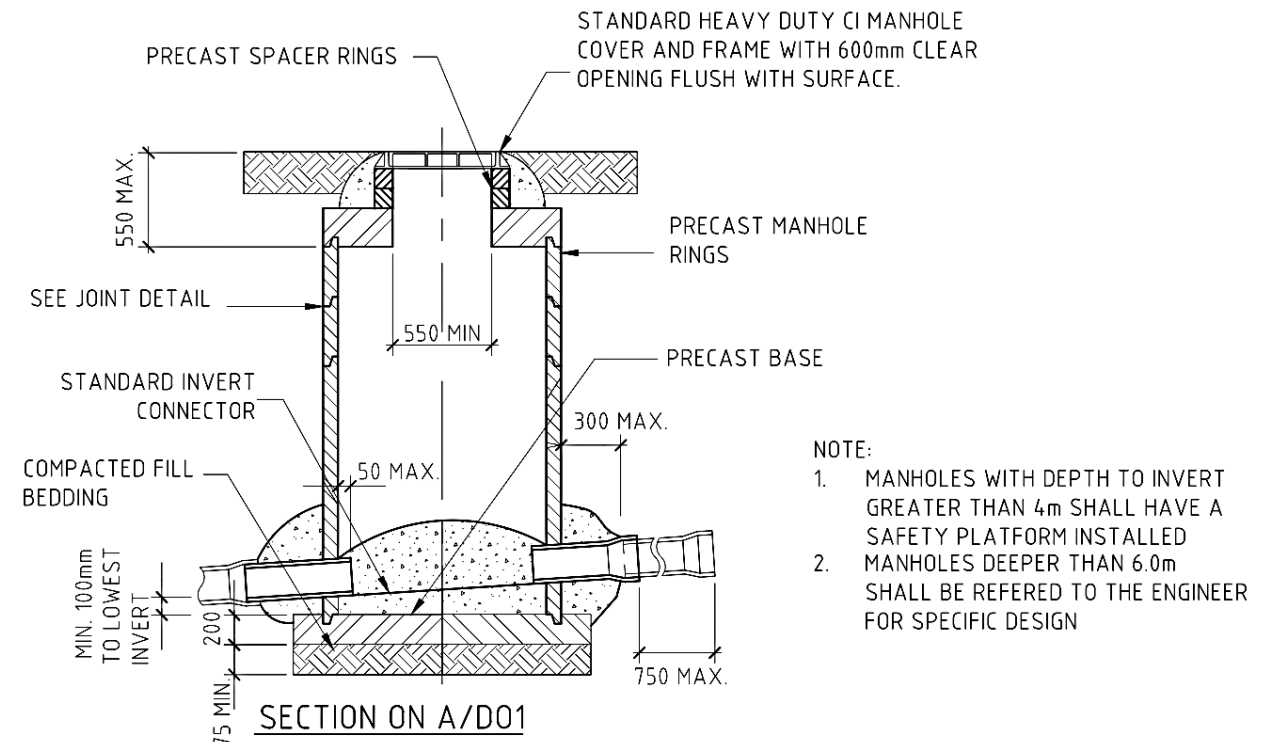
1. MANHOLES WITH DEPTH TO INVERT GREATER THAN 4m SHALL HAVE A SAFETY PLATFORM INSTALLED AS PER QLDC DRAWING D05
2. MANHOLES DEEPER THAN 6.0m SHALL BE REFERED TO THE ENGINEER FOR SPECIFIC DESIGN



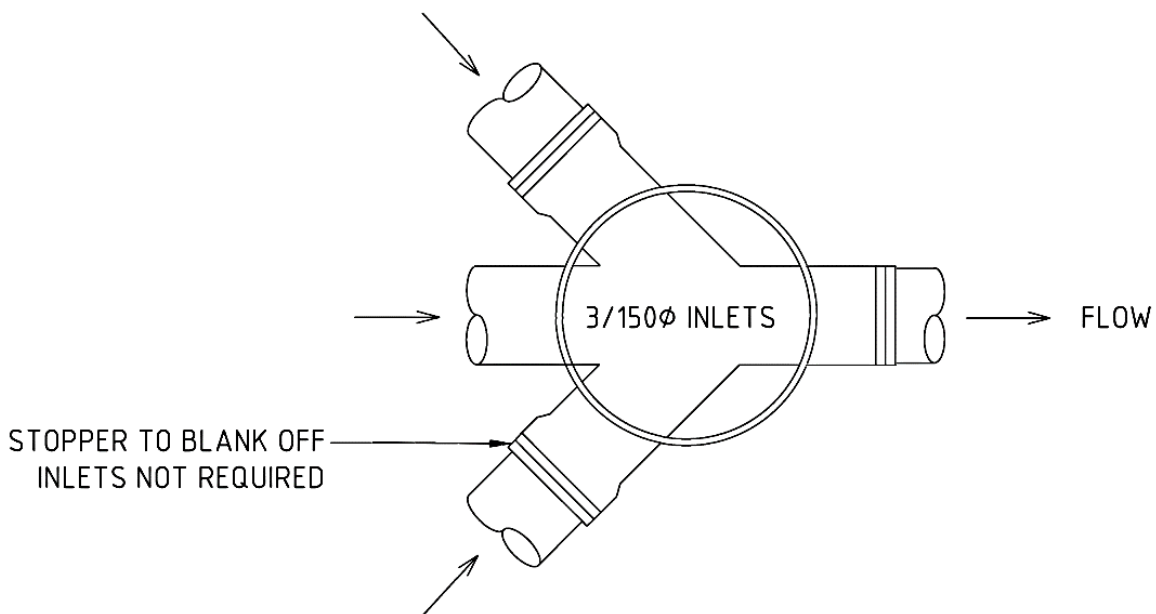
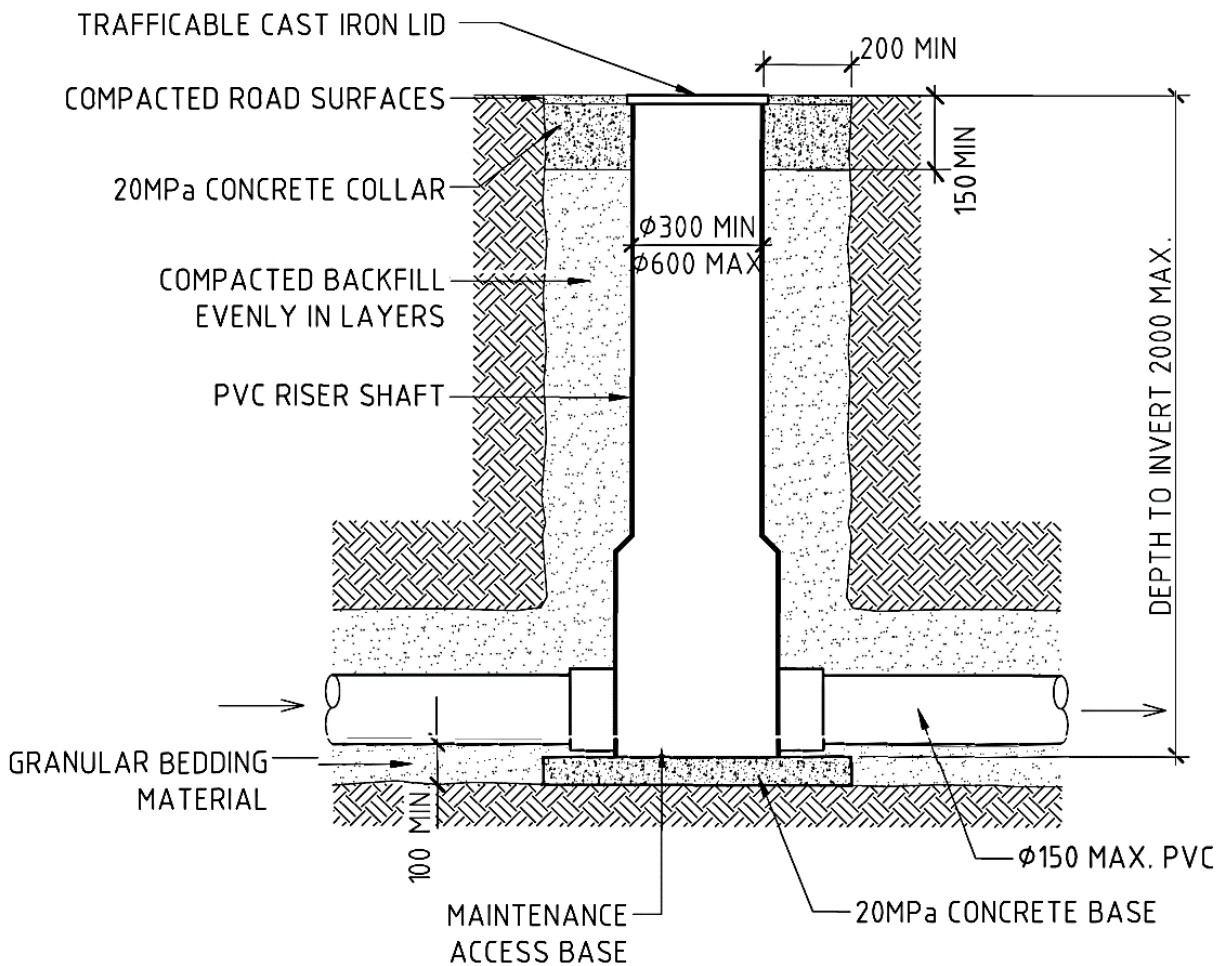
NOTE:

1. ALL DIMENSIONS IN MILLIMETERS.
2. ALL STEEL FITTINGS (INCLUDING BOLTS) TO BE GRADE 316 STAINLESS STEEL.
3. ON 1200 MH TO BE USED WHERE DROP PIPE > DN 150 OR MORE THAN ONE DN 150 INTERNAL DROP IS USED.
4. INTERNAL DROP NOT NORMALLY USED IN STORMWATER APPLICATIONS.
5. ALL CAST IN-SITU BENCHING AND HAUNCHING TO BE 30MPa CONCRETE UNLESS OTHERWISE SPECIFIED BY TA.

Drawing B1-8 Mini & Drop Manhole Detail



Drawing B1-9: Manhole Detail – Typical Cross Section

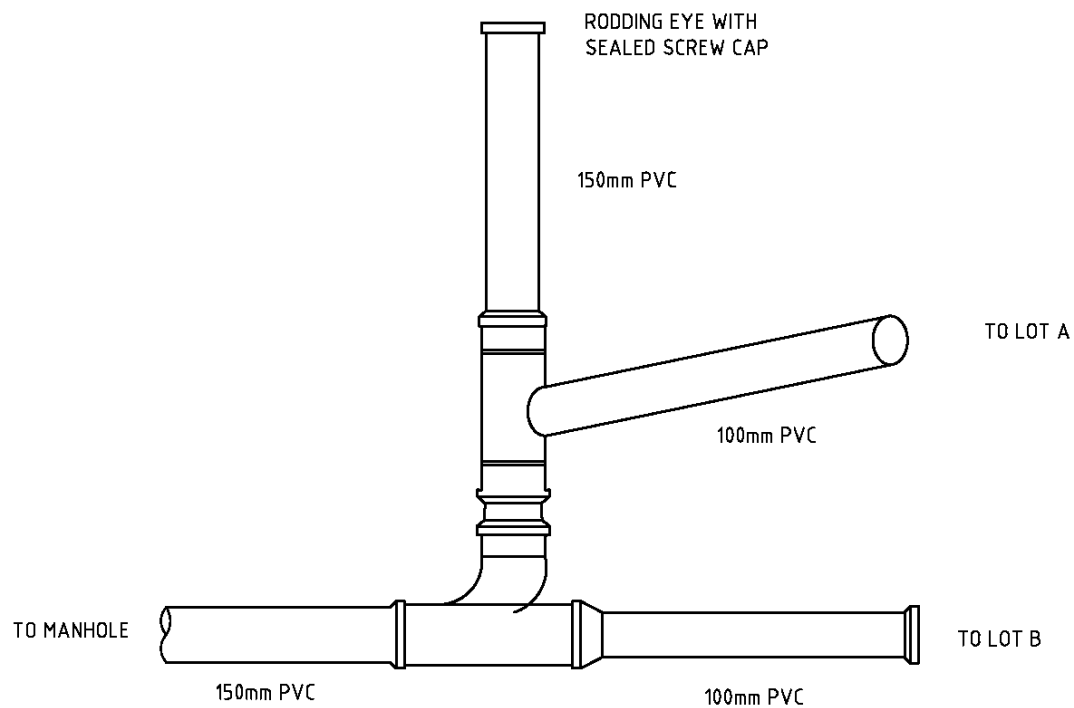


NOTE:

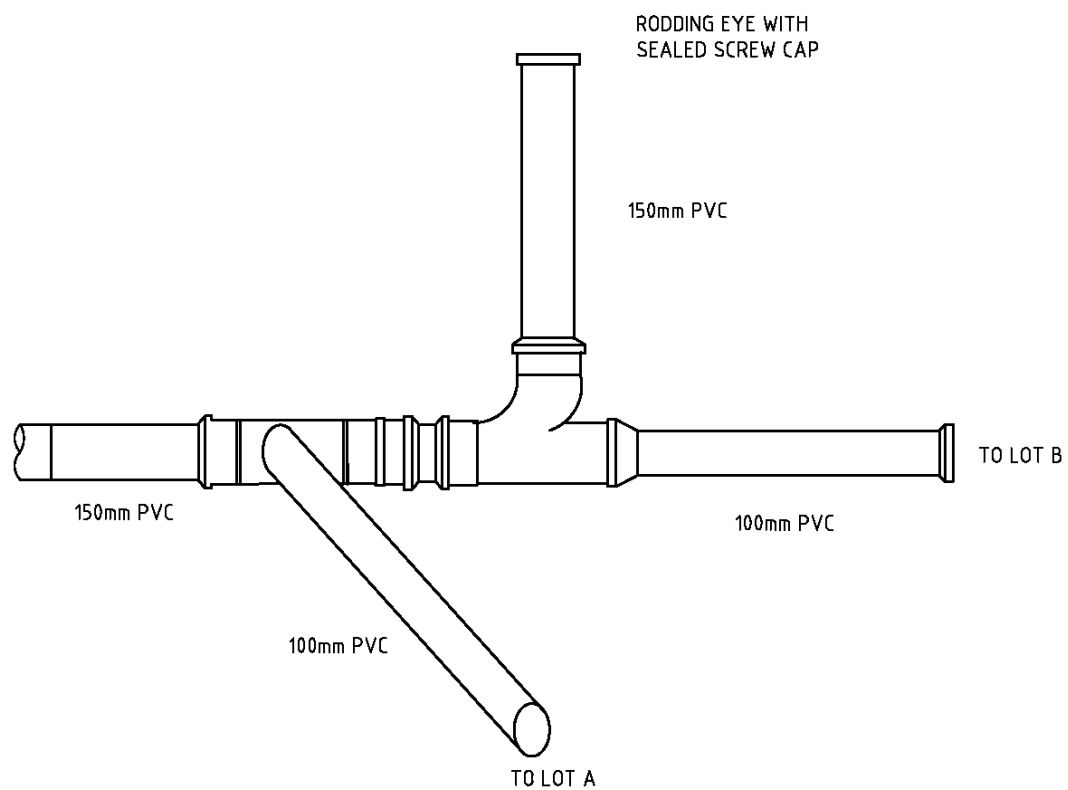
ONLY TO BE USED FOR THE TERMINATING MANHOLES IN COMMON EASEMENTS OR RIGHT OF WAY ACCESS FOR RESIDENTIAL SITES WITH A MAXIMUM OF THREE 100mm ϕ HOUSE CONNECTIONS, OR WHERE DIRECTED BY THE ENGINEER.

Drawing B1-10: PVC Inspection Chamber (Residential Only)

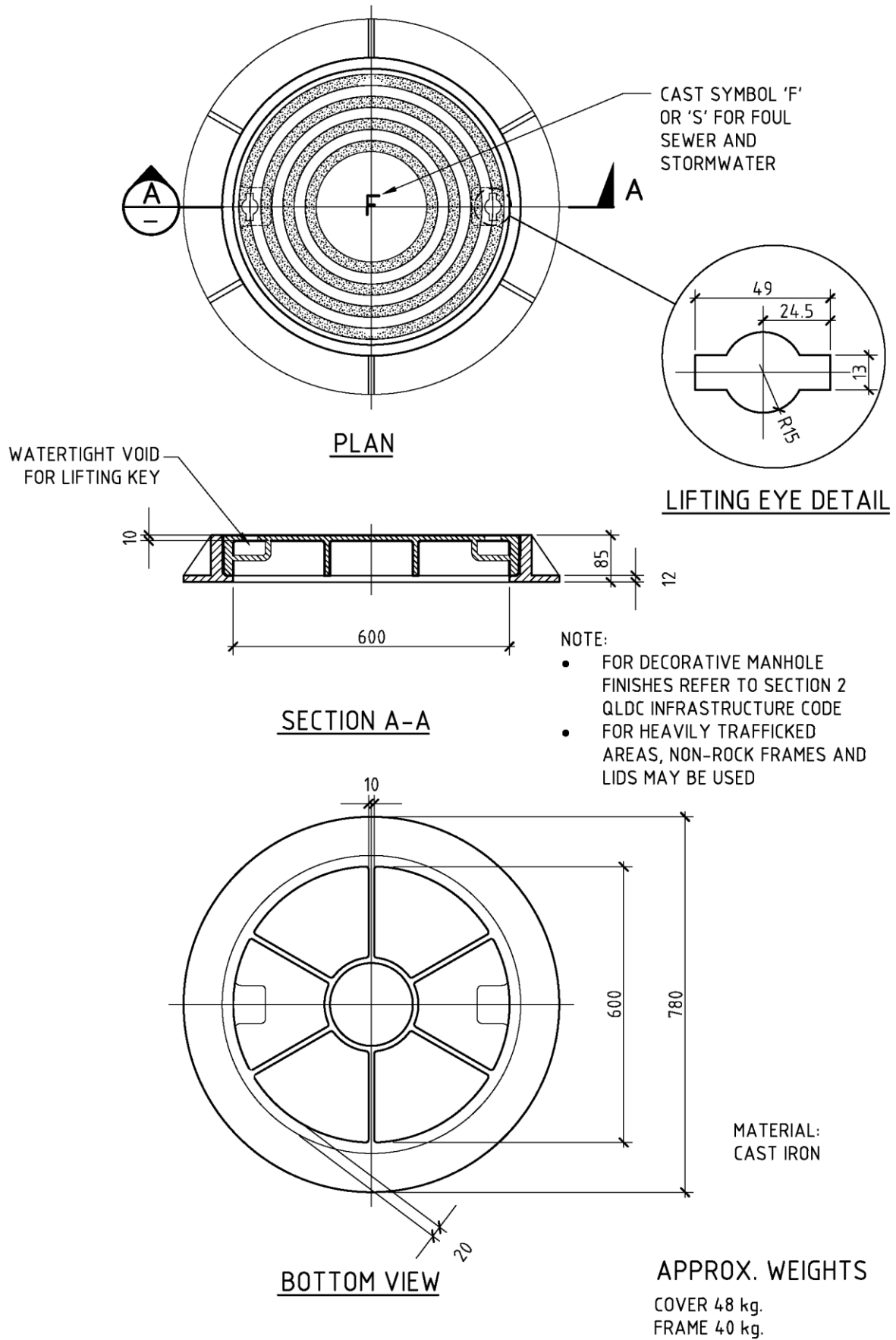
OPTION 1 - LATERAL OFF RODDING EYE STANDPIPE



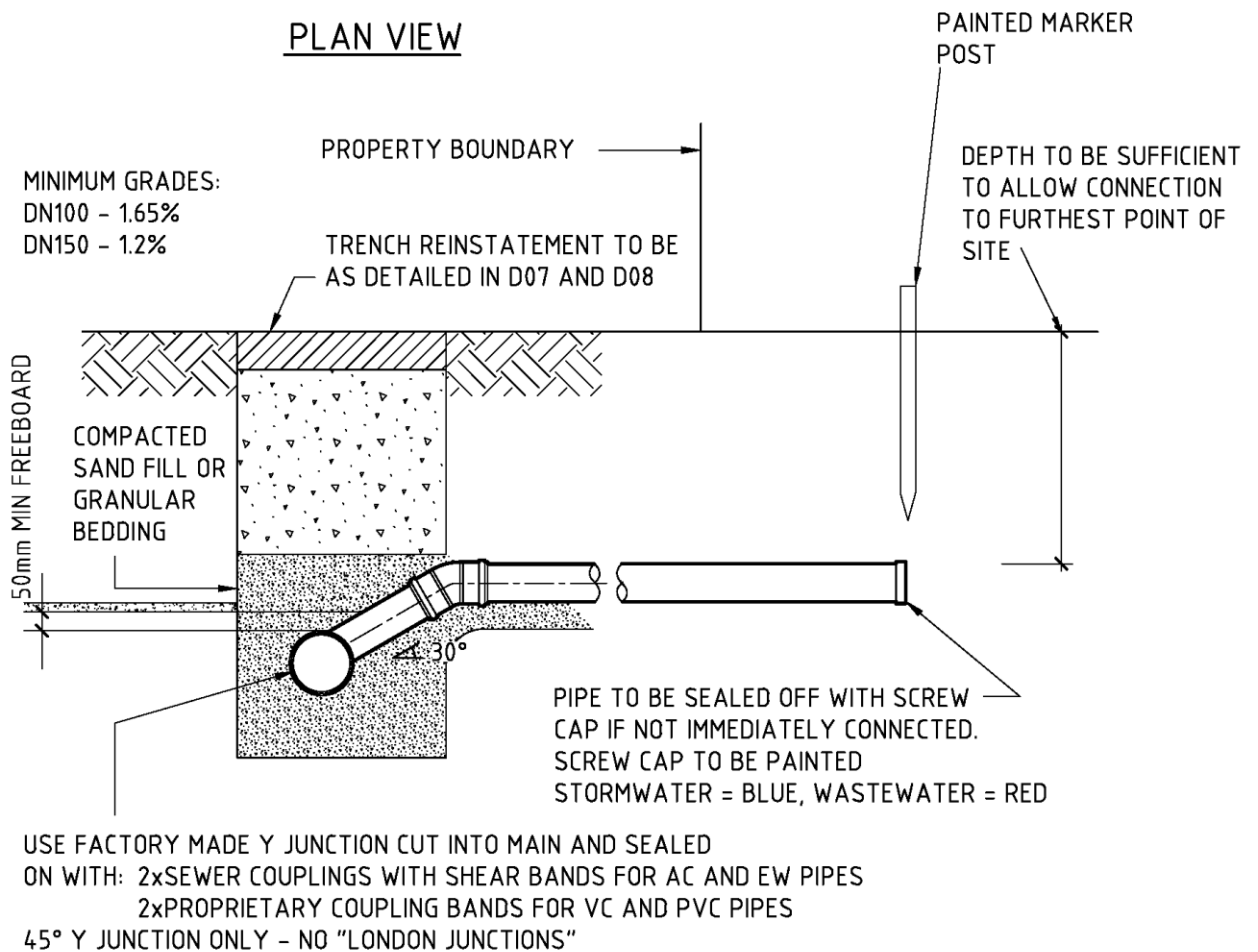
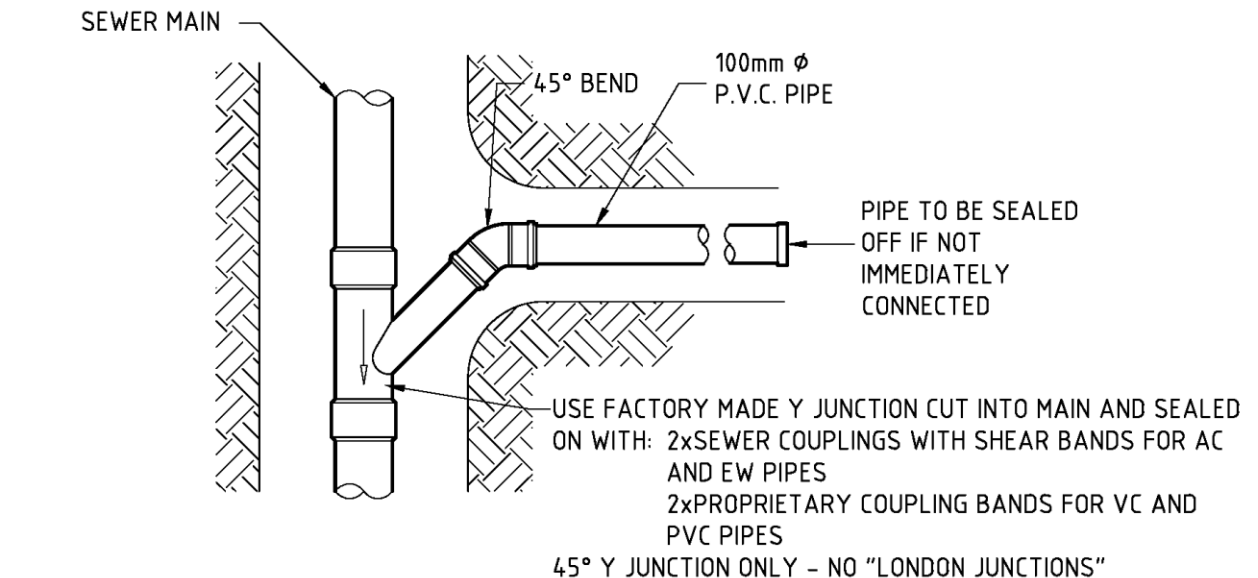
OPTION 2 - LATERAL OFF 150mm CONNECTION TO MANHOLE



Drawing B1-11: Lateral Connections for two Properties



Drawing B1-12: Manhole Typical Heavy Duty Frame & Lid



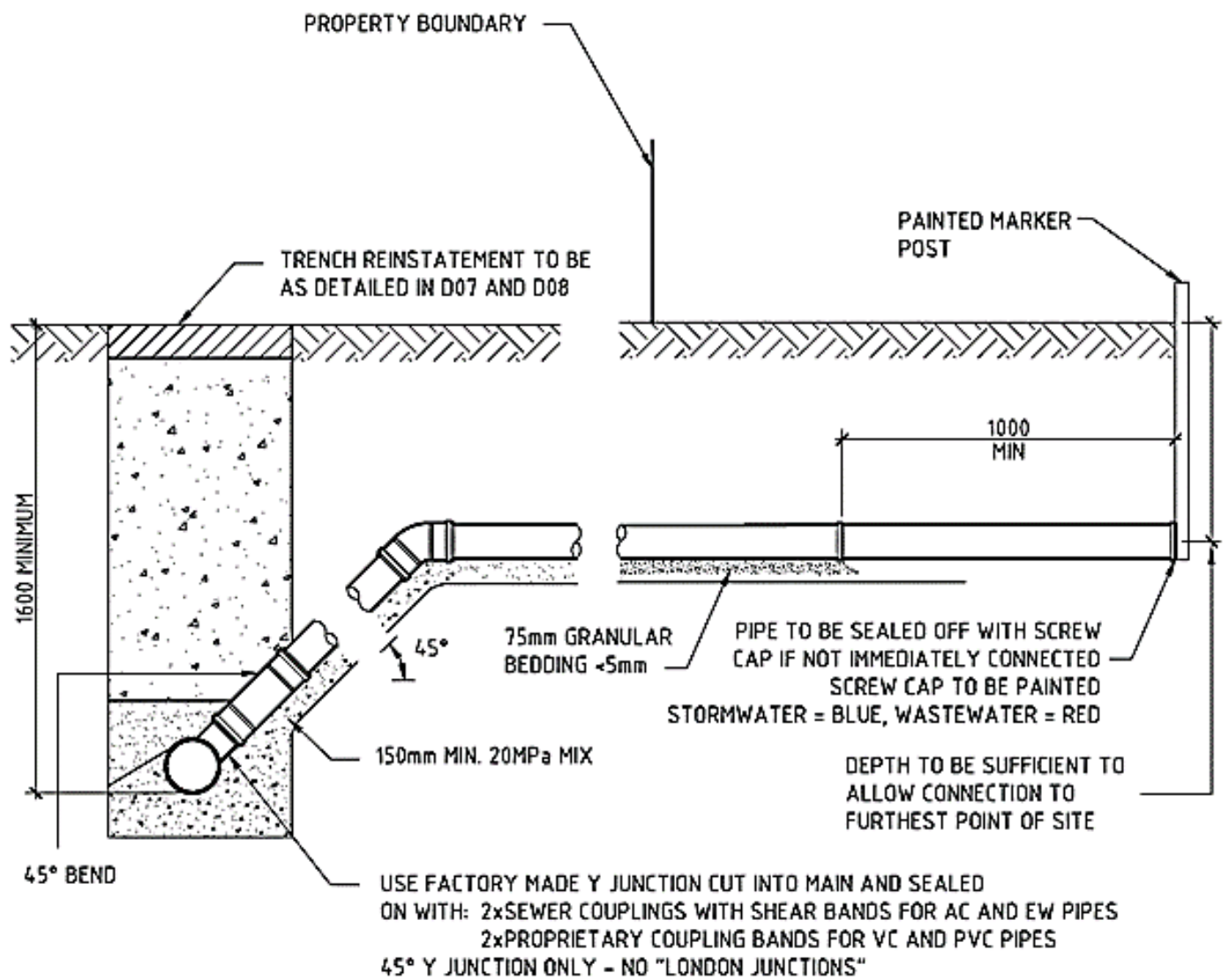
SHALLOW CONNECTION

DEPTH TO INVERT LESS THAN 1.2m

NOTES:

1. MARKER POSTS TO BE PAINTED BLUE FOR STORMWATER CONNECTIONS OR RED FOR FOUL SEWER CONNECTIONS
2. ALL CONNECTIONS SHALL HAVE NO ACCESS FITTINGS ON LINE, NO CHANGE OF DIRECTION, OR CHANGE OF GRADE WITHIN 3m OF MAIN CONNECTION.

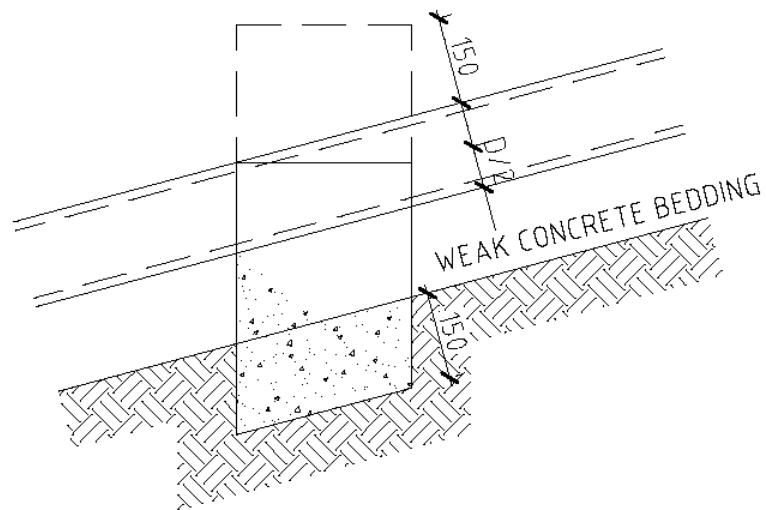
Drawing B1-13: Domestic Drainage (Shallow Connection) Detail



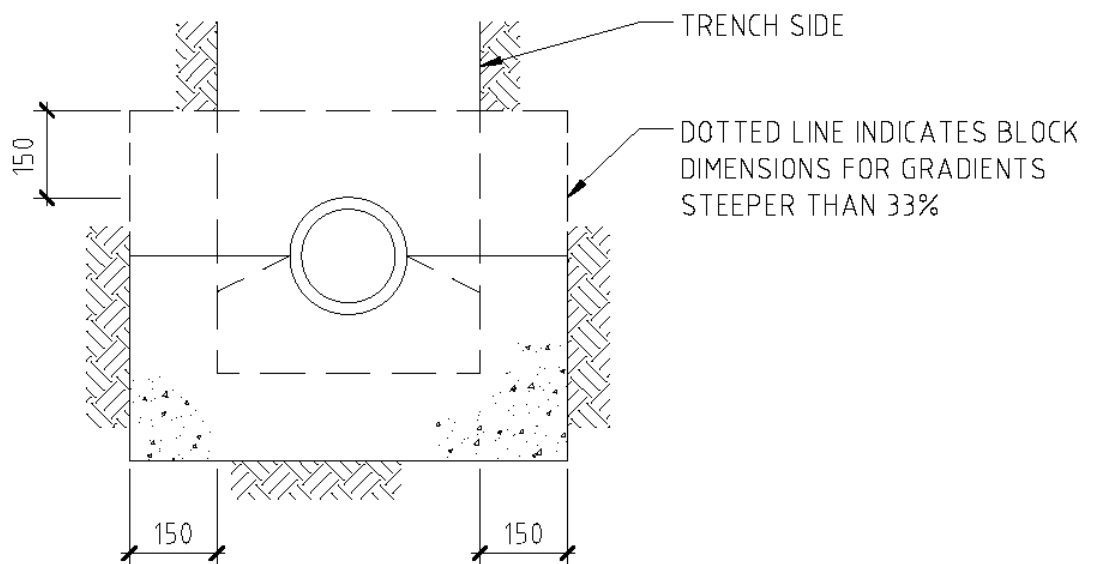
DEEP CONNECTION

DEPTH TO INVERT MORE THAN 1.2m

Drawing B1-14: Domestic Drainage (Deep Connection) Detail

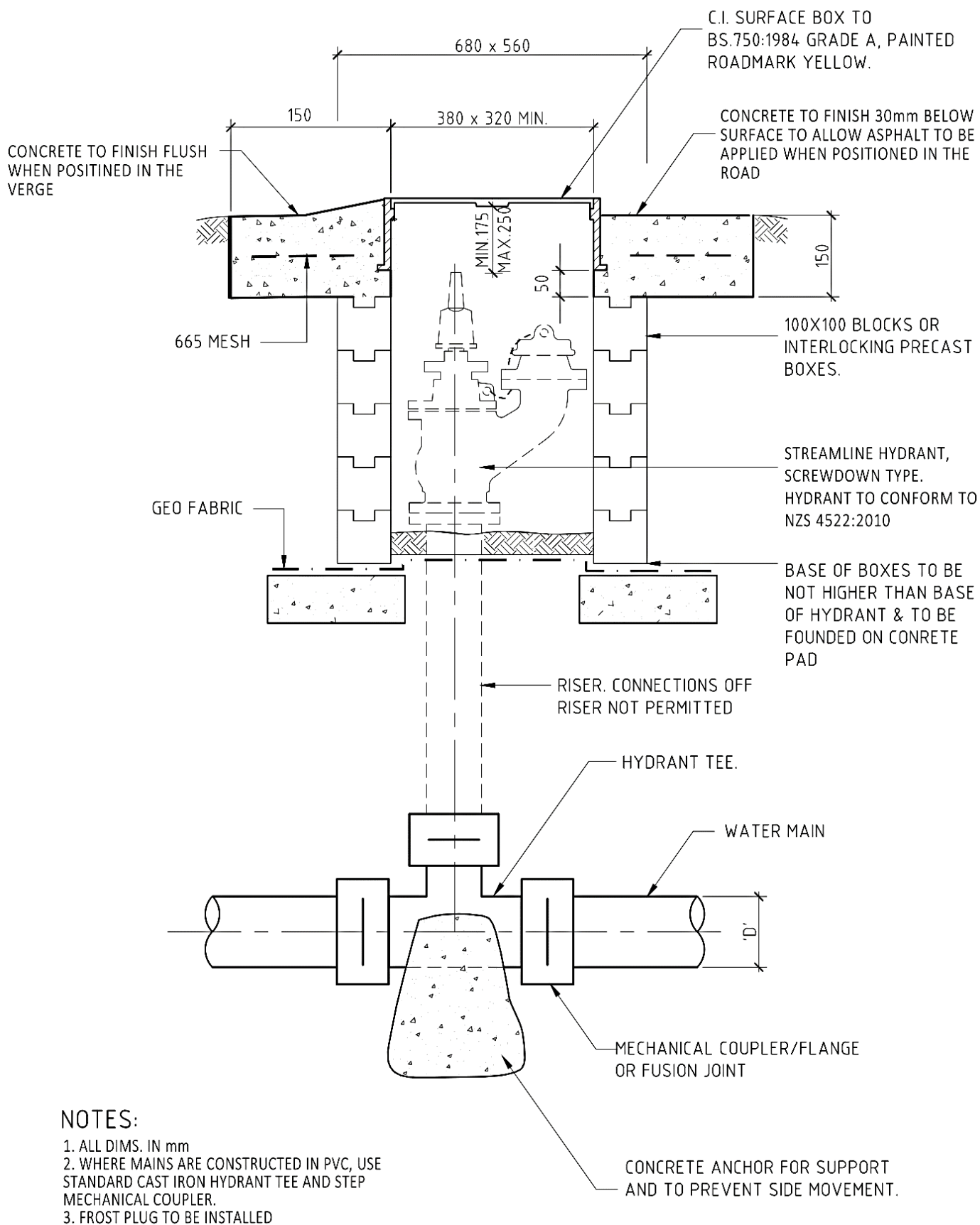


LONGITUDINAL SECTION

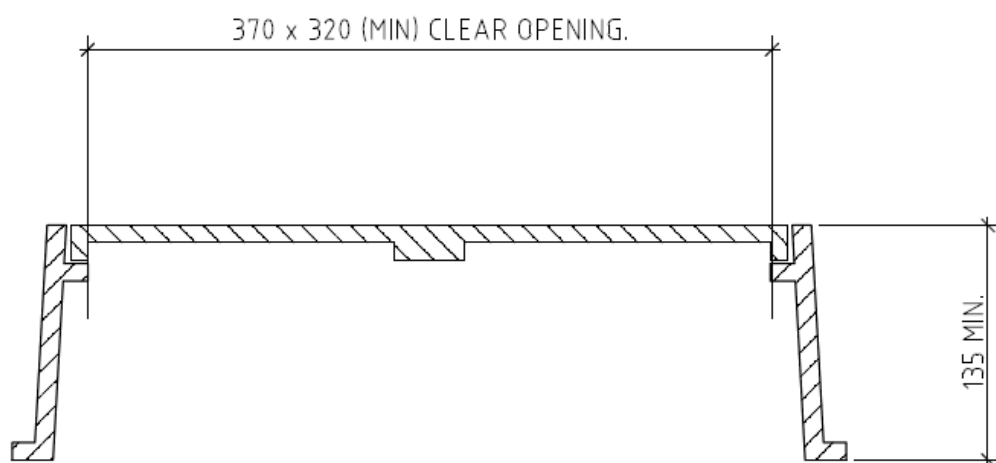


CROSS SECTION

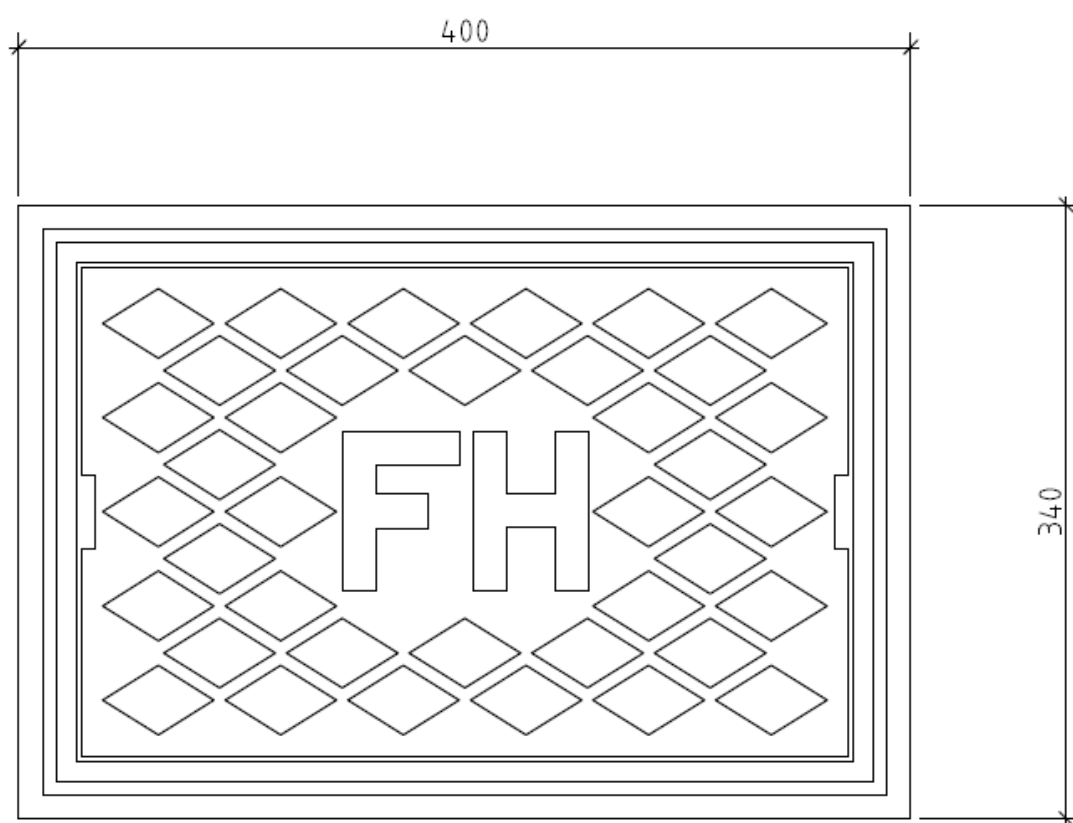
Drawing B1-15: Anti-Scour Blocks For Steep Lines



Drawing B2-1 Fire Hydrant

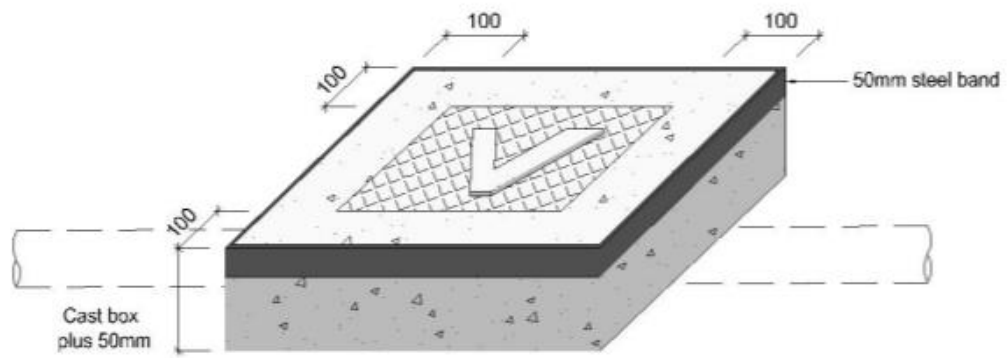


SECTION THROUGH FRAME AND COVER

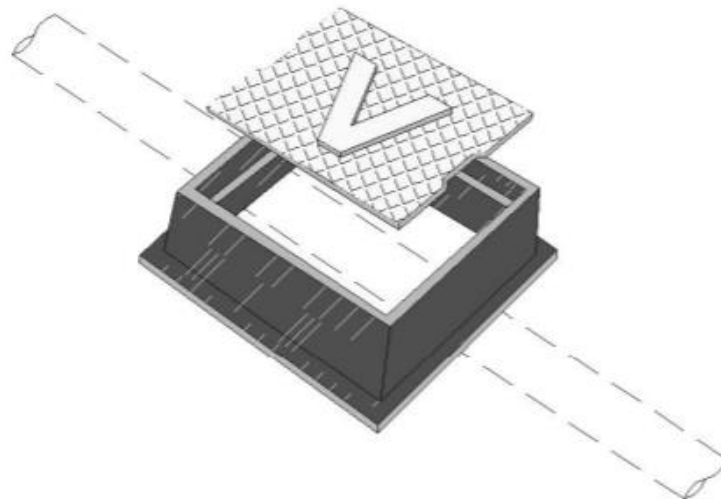


PLAN VIEW

APPROX. WEIGHT: FRAME 22kg
COVER 8kg

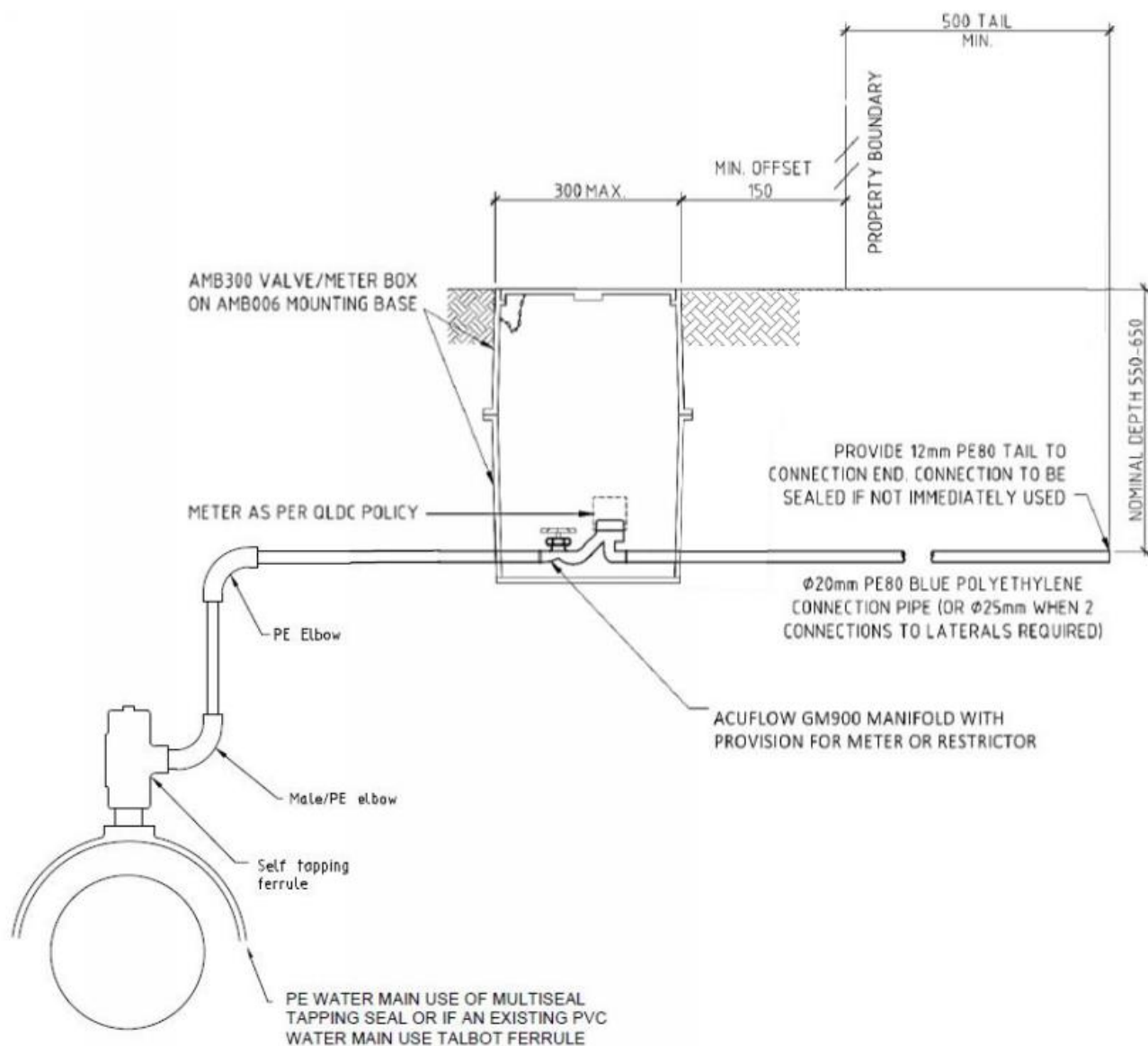


VALVE BOX & COVER
(with concrete surroundings)



VALVE BOX & COVER

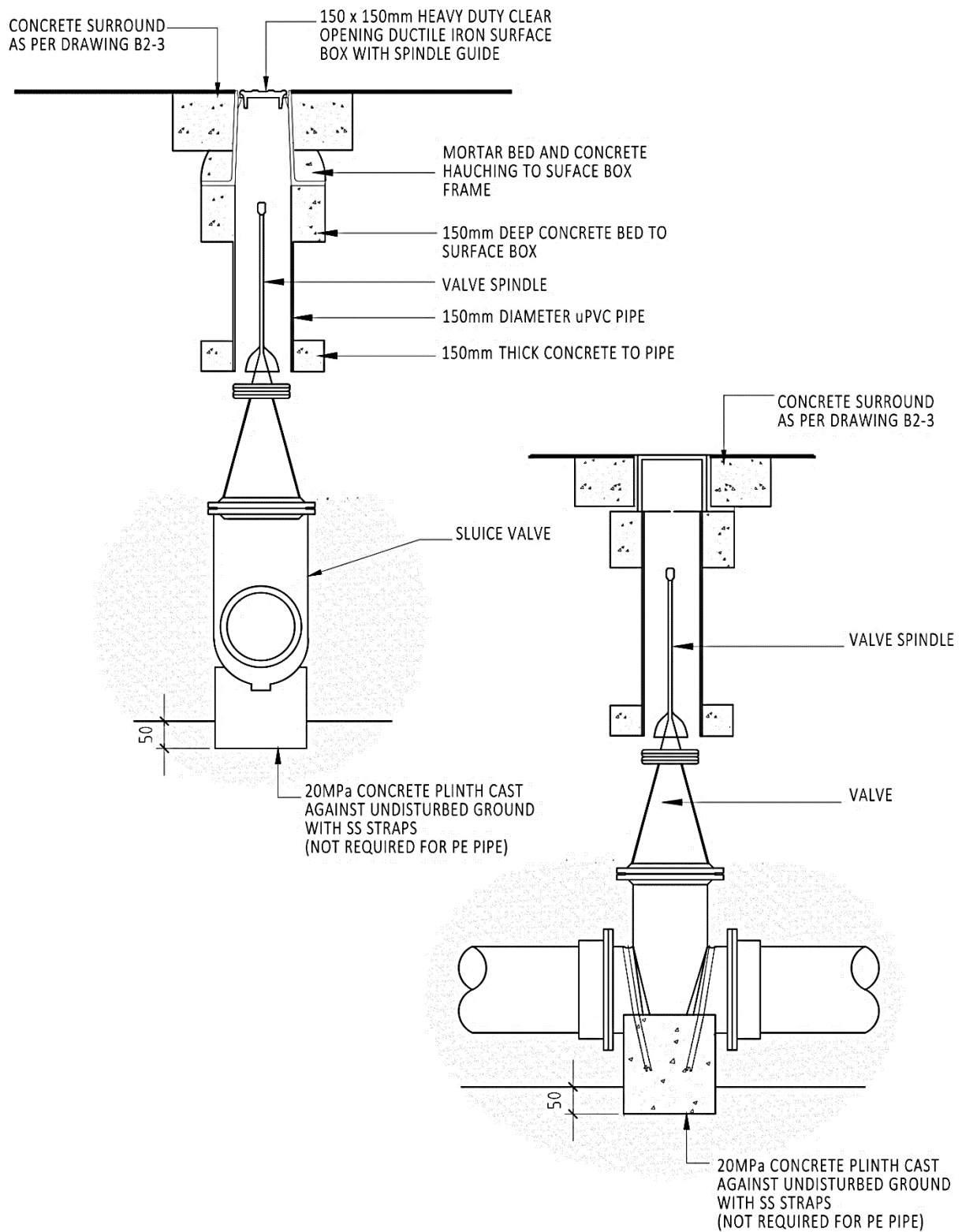
Drawing B2-3 Typical Cast Iron Valve Box



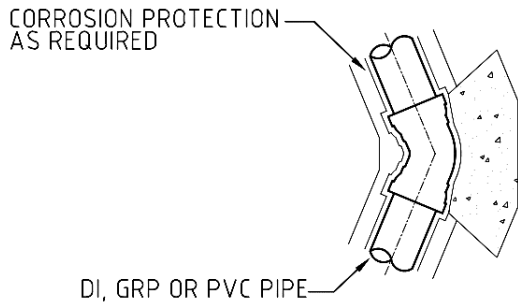
NOTES

1. OPTION OF USING 50 mm BRASS TALBOT INSTEAD OF ELBOW OFF MAIN
2. ELECTRO FUSION (EF) ELBOWS ONLY TO BE USED
3. WHEN THERE IS NO OPTION BUT TO INSTALL TOBY BOX IN TRAFFICABLE DRIVEWAY/RIDERWAY THEN A 150mm x 150mm (WxD) CONCRETE NIB IS REQUIRED
4. 25mm ID CONNECTIONS REQUIRE 2 x ACUFLOW BOXES OR 500mm BOX WITH BASES

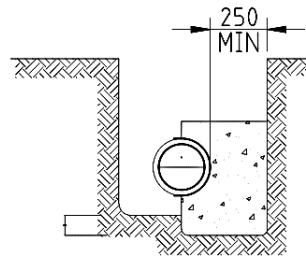
Drawing B2-4 Typical Service Connection



Drawing B2-5: Sluice Valve Detail

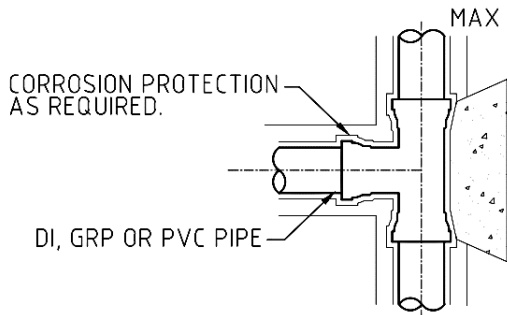


PLAN

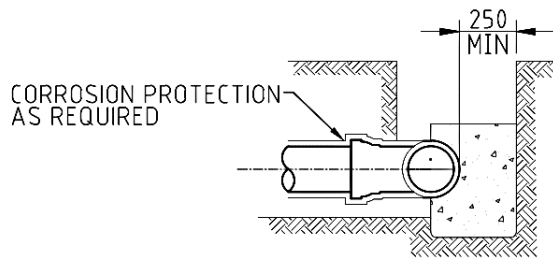


ELEVATION

THRUST BLOCK FOR BENDS (FOR HORIZONTAL THRUST)

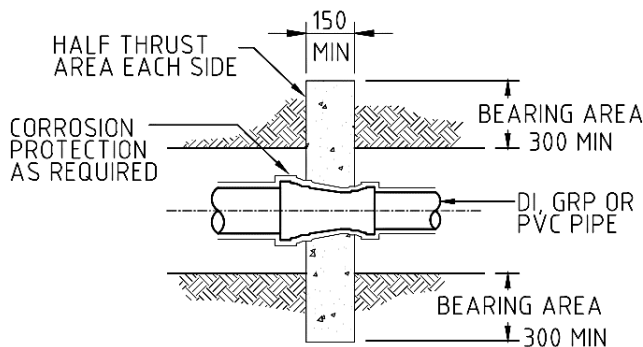


PLAN



ELEVATION

THRUST BLOCK FOR TEES (FOR HORIZONTAL THRUST)



PLAN

TAPER THRUST BLOCK (FOR HORIZONTAL THRUST)

SOIL CLASSIFICATION AND
ALLOWABLE HORIZONTAL BEARING
PRESSURE OF GROUND.
(SEE NOTE 3)

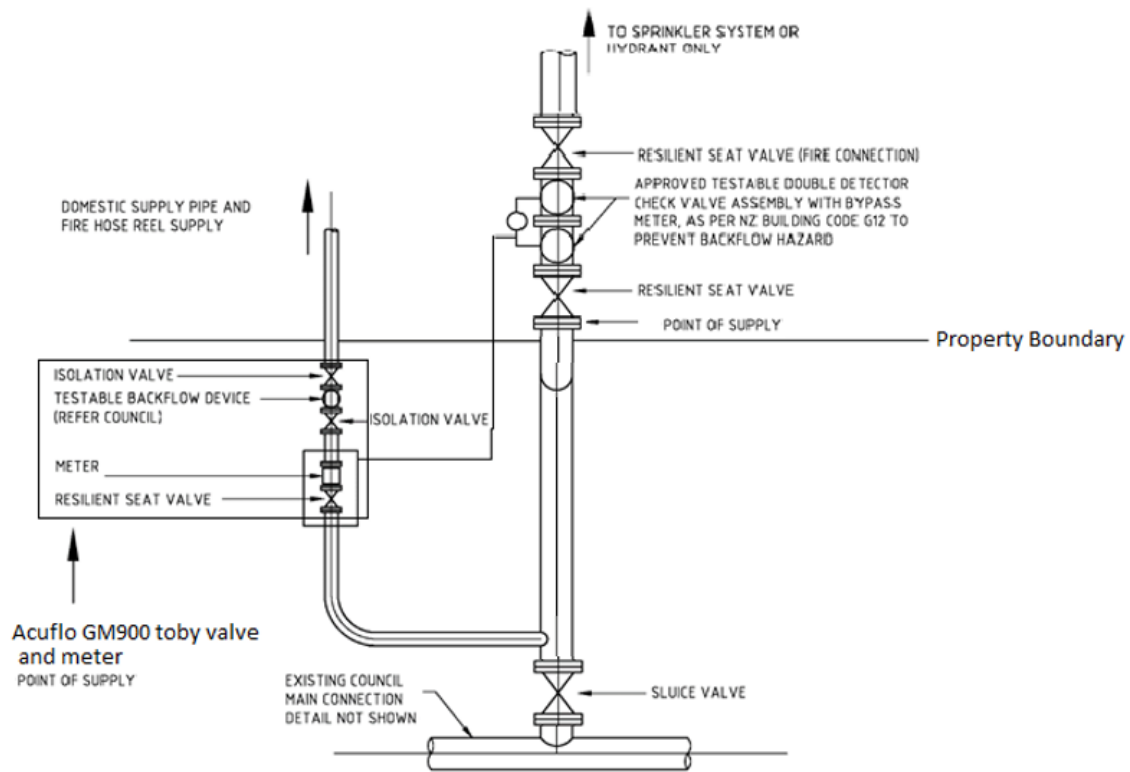
MINIMUM THRUST AREA FOR BLOCKS IN SQUARE METRES (m²)
DESIGN PRESSURE 1000 kPa (NOM. 100 m HEAD)

	90° & 60° HORIZ. BENDS				45° & 30° HORIZ. BENDS				22.5° HORIZ. BENDS				11.25° HORIZ. BENDS				TEES AND DEAD ENDS			
	STIFF CLAY	MEDIUM DENSE CLEAN SAND	VERY STIFF CLAY DENSE SAND/GRAVEL DECOMPOSED ROCK	HARD CLAY	STIFF CLAY	MEDIUM DENSE CLEAN SAND	VERY STIFF CLAY DENSE SAND/GRAVEL DECOMPOSED ROCK	HARD CLAY	STIFF CLAY	MEDIUM DENSE CLEAN SAND	VERY STIFF CLAY DENSE SAND/GRAVEL DECOMPOSED ROCK	HARD CLAY	STIFF CLAY	MEDIUM DENSE CLEAN SAND	VERY STIFF CLAY DENSE SAND/GRAVEL DECOMPOSED ROCK	HARD CLAY	STIFF CLAY	MEDIUM DENSE CLEAN SAND	VERY STIFF CLAY DENSE SAND/GRAVEL DECOMPOSED ROCK	HARD CLAY
NOMINAL DIAMETER OF FITTING (DN)	PBH kPa	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200	50
100	0.34	0.17	N	0.18	N	N	N	N	N	N	N	N	N	N	N	N	0.24	0.12	N	N
150	0.70	0.35	0.18	0.38	0.19	N	0.20	N	N	N	N	N	N	N	N	N	0.50	0.25	0.12	N
200	1.20	0.60	0.30	0.64	0.32	0.16	0.34	0.17	N	0.16	N	N	N	N	N	N	0.84	0.42	0.21	N
225	1.52	0.75	0.38	0.81	0.41	0.21	0.42	0.22	0.11	0.22	N	N	N	N	N	N	1.06	0.53	0.27	N
250	1.80	0.91	0.45	0.98	0.49	0.25	0.50	0.25	0.12	0.26	0.13	N	N	N	N	N	1.28	0.64	0.32	N
300	2.66	1.33	0.66	1.44	0.72	0.36	0.74	0.37	0.18	0.36	0.18	N	N	N	N	N	1.88	0.94	0.47	N
375	4.04	2.02	1.01	2.18	1.09	0.55	1.12	0.56	0.28	0.56	0.28	0.14	2.86	1.43	0.72	N	N	N	N	N
225	5.71	2.86	0.73	3.09	1.55	0.40	1.58	0.79	0.20	1.58	0.79	0.20	4.04	2.02	0.52	N	N	N	N	N
250	6.98	3.49	0.89	3.78	1.89	0.49	1.93	0.98	0.25	1.93	0.98	0.25	4.93	2.37	0.63	N	N	N	N	N
300	9.89	4.95	1.27	5.36	2.68	0.68	2.73	1.36	0.35	2.73	1.36	0.35	6.90	3.50	0.89	N	N	N	N	N
375	15.16	7.58	1.94	8.21	4.10	1.05	4.19	2.10	0.53	4.19	2.10	0.53	10.72	5.36	1.37	N	N	N	N	N

NOTES:

N DENOTES NOMINAL THRUST AREA - (SEE NOTES 4 & 5)
PBH - ALLOWABLE HORIZONTAL BEARING PRESSURE

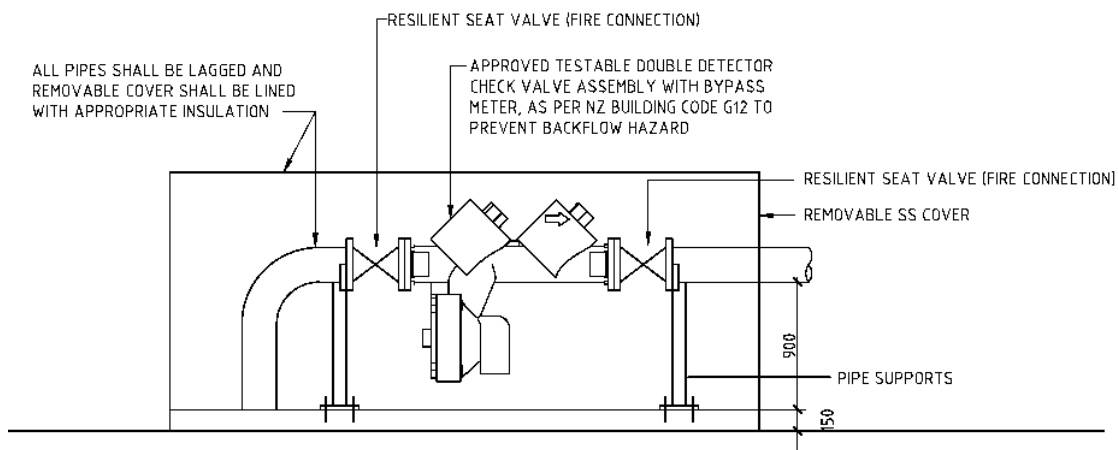
- ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
- CAST THE THRUST AREA OF ALL THRUST BLOCKS AGAINST A CLEAN FACE OF UNDISTURBED NATURAL SOIL. THRUST BLOCKS NOT TO INTERFERE WITH OTHER SERVICES.
- DO NOT USE STANDARD THRUST BLOCKS AS SPECIFIED IN THIS DRAWING IN:
 - VERY SOFT, SOFT OR FIRM CLAY.
 - LOOSE CLEAN SAND.
 - UNCOMPACTED FILL OR REFUSE.
 A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS.
- THE NOMINAL THRUST AREA N TO BE ACHIEVED BY POURING CONCRETE THE FULL LENGTH OF THE FITTING AND EXTENDING FROM THE FLOOR OF THE TRENCH TO ABOVE THE FITTING (SEE ALSO NOTE 7).
- DESIGN PRESSURES OTHER THAN 1000 kPa REDUCE OR INCREASE THE MINIMUM THRUST AREA BY THE RATIO OF THE DESIGN PRESSURES EXCEPT WHERE:
 - MIN THRUST AREA IS <0.1 m², AND
 - N APPEARS IN THE TABLE AND DESIGN PRESSURE IS ABOVE 1000 kPa. CALCULATE THE AREA.
- FINISH THRUST BLOCKS APPROXIMATELY 100 ABOVE THE TOP OF THE FITTING OR BEARING PAD AND EXTEND TO THE FLOOR OF THE TRENCH OR DEEPER IF NECESSARY TO ACHIEVE THE REQUIRED THRUST AREA. MAXIMUM ENCASEMENT TO BE 180.
- THE MINIMUM THRUST AREA FOR TAPER THRUST BLOCKS TO BE EQUAL TO THE DIFFERENCE BETWEEN THE THRUST AREAS FOR DEAD ENDS OF EQUIVALENT DIAMETER TO THOSE EACH SIDE OF TAPER. FOR DOWNWARD VERTICAL THRUST, THE ALLOWABLE BEARING PRESSURES FOR VARIOUS SOILS MAY BE TAKEN AS TWICE THAT FOR HORIZONTAL THRUST SHOWN.
- WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE, PVC OR FELT BETWEEN THE FITTING AND CONCRETE TO PREVENT DAMAGE TO THE FITTING. JOINTS TO BE CLEAR OF CONCRETE.
- CONCRETE TO BE KEPT CLEAR OF BOLTS & FLANGES OR GIBALT JOINTS TO ALLOW FITTINGS TO BE REMOVED WITHOUT INTERFERING WITH ANCHOR BLOCK.
- THE USE OF THRUST BLOCKS IS GENERALLY NOT REQUIRED FOR PE PIPE. THRUST BLOCKS MAY BE REQUIRED IN CASES WHERE SPECIAL GASKETED MECHANICAL FITTINGS ARE USED



PLAN

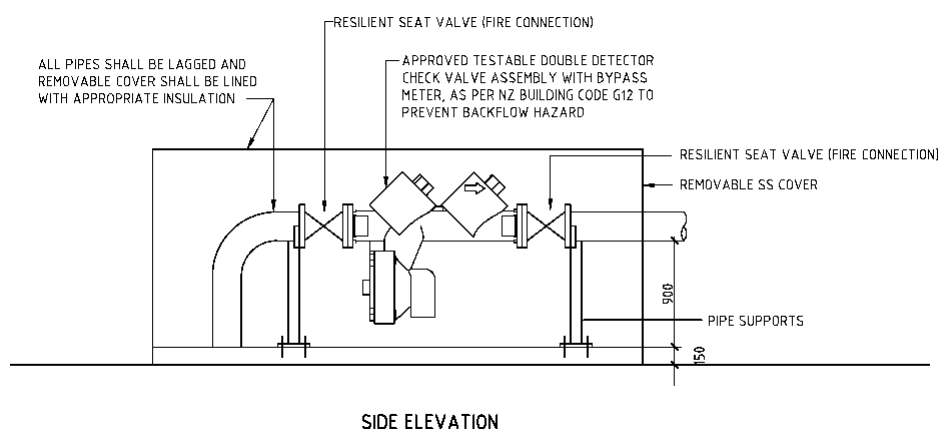
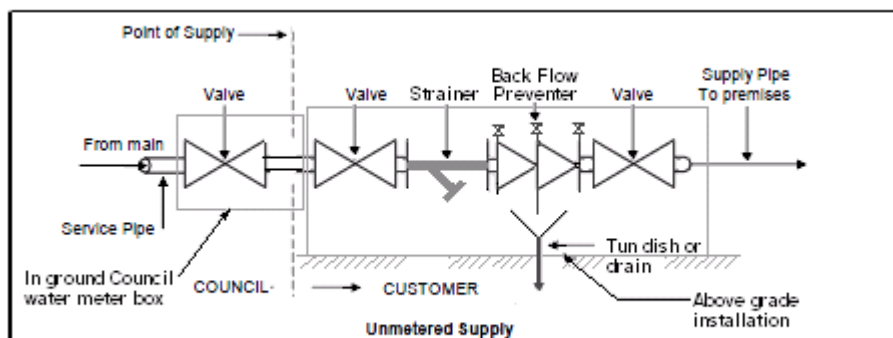
NOTES:

1. THIS ARRANGEMENT IS TO BE USED FOR ALL PREMISES REQUIRING A FIRE CONNECTION
2. UPSTREAM AND DOWNSTREAM METER CLEARANCE AS PER MANUFACTURERS SPECIFICATION.
3. WATER METERS SHALL CONFORM TO QLDC WATER METER POLICY.



SIDE ELEVATION

Drawing B2-7: Residential Fire System Connection with Potable Supply



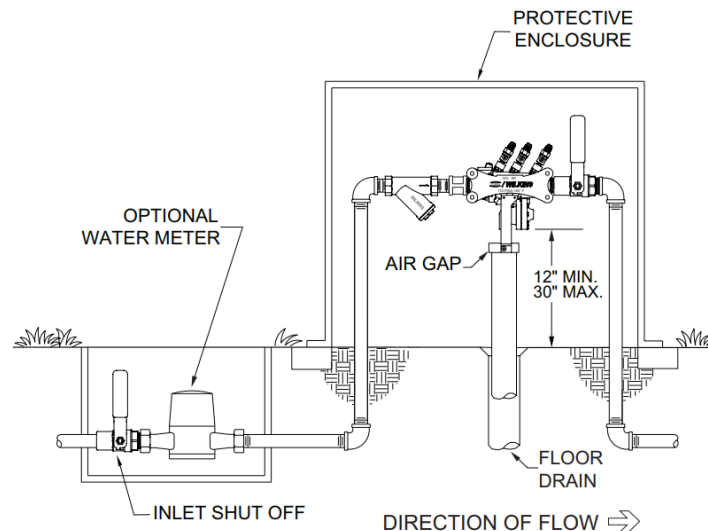
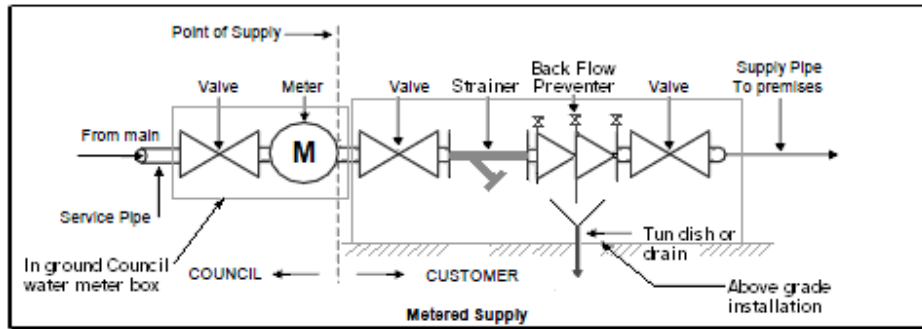
Commercial Fire Fighting Water Connection

1. A STANDARD ACUFLO BOX AND MANIFOLD WILL NOT BE APPLICABLE TO THIS INSTALLATION. ACUFLO HARDWARE IS ONLY SUITABLE FOR UP TO 25MM PIPE CONNECTIONS. THIS INSTALLATION WILL NEED TO BE CONFIGURED SPECIFIC TO THE SITE. REFER TO ITEMS BELOW THAT ARE MANDATORY:
 - THE SERVICE PIPE SHALL HAVE A BLUE RESILIENT SEATED SERVICE VALVE IN ITS OWN VALVE BOX.
 - A REDUCED PRESSURE ZONE BFP SHALL BE INSTALLED INSIDE THE BOUNDARY OF THE PRIVATE PROPERTY. IF THE WATER SUPPLY IS PROPOSED TO BE DIVIDED INTO MULTIPLE LINES TO SERVICE DIFFERENT AREAS OF THE SITE, THE BFP SHALL BE LOCATED ON THE SINGLE INCOMING WATER SUPPLY LINE IN ADVANCE OF ANY SUCH DIVISION.
 - THIS BFP IS THE POS BFP DEVICE REQUIRED BY THE HEALTH AMENDMENT ACT 2007. THE DEVICE SHALL BE LOCATED IN AN ABOVE GROUND ENCLOSURE WHERE POSSIBLE.

LOCATING BACK FLOW PREVENTERS AND WATER METERS

2. BACK FLOW PREVENTERS SHALL BE LOCATED ON THE PROPERTY SERVED IN EVERY INSTANCE EXCEPT WHERE IN A CBD ENVIRONMENT WHERE THERE MAY BE NO SPACE WITHIN THE BUILDING FRONTAGE FOR AN ABOVE GROUND CABINET.
3. THE BFP SHALL BE ABOVE GROUND AND ALLOW ANY WATER DISCHARGED TO DRAIN TO GROUND IN AN OBVIOUS MANNER.
4. THE FIRST ISOLATION VALVE IS THE SUPPLY POINT; THIS IS THE BOUNDARY BETWEEN COUNCIL RESPONSIBILITY AND PRIVATE OWNER'S RESPONSIBILITY FOR SERVICE AND WATER QUALITY.
5. THE ISOLATION VALVE SHALL BE LOCATED ON THE ROAD IN ALL INSTANCES AND SHALL NOT BE LOCATED ON A ROW OR EASEMENT.

Drawing B2-8: Commercial Fire System Connection with Potable Supply



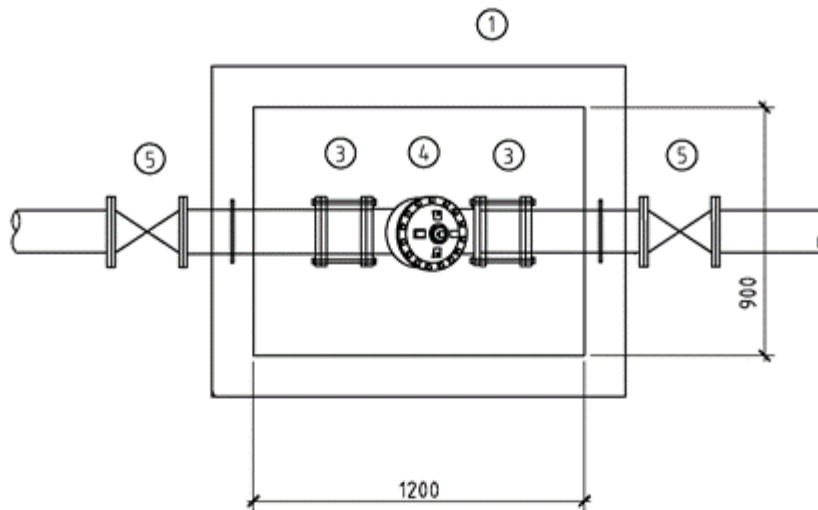
Water Supply with Bulk Flow Meter

1. A STANDARD ACUFLO BOX AND MANIFOLD WILL NOT BE APPLICABLE TO THIS INSTALLATION. ACUFLO HARDWARE IS ONLY SUITABLE FOR UP TO 25MM PIPE CONNECTIONS. THIS INSTALLATION WILL NEED TO BE CONFIGURED SPECIFIC TO THE SITE. REFER TO ITEMS BELOW THAT ARE MANDATORY:
 - THE SERVICE PIPE SHALL HAVE A BLUE RESILIENT SEATED SERVICE VALVE IN ITS OWN VALVE BOX PRIOR TO A WATER METER BOX.
 - A WATER METER BOX SHALL BE LOCATED 300MM BEFORE THE PRIVATE PROPERTY BOUNDARY. THE BOX SHALL CONTAIN A STRAINER AND APPROVED WATER METER OF A SUITABLE SIZE. THE METER SHALL HAVE THREE REGISTERS OF THE SUB M³ VALUES. THIS IS COUNCIL'S POINT OF SUPPLY BOUNDARY AND IS LOCATED IN THE STREET PRIOR TO THE REQUIRED BFP.
 - A BFP DEVICE OF EITHER RA TESTABLE DOUBLE CHECK VALVE ASSEMBLY OR REDUCED PRESSURE ZONE BFP SHALL BE INSTALLED INSIDE THE BOUNDARY OF THE PRIVATE PROPERTY. IF THE WATER SUPPLY IS PROPOSED TO BE DIVIDED INTO MULTIPLE LINES TO SERVICE DIFFERENT AREAS OF THE SITE, THE BFP SHALL BE LOCATED ON THE SINGLE INCOMING WATER SUPPLY LINE IN ADVANCE OF ANY SUCH DIVISION.
 - THIS BFP IS THE POS BFP DEVICE REQUIRED BY THE HEALTH AMENDMENT ACT 2007. IF THIS DEVICE IS ASSESSED TO BE A RPZ THEN IT SHOULD BE LOCATED IN AN ABOVE GROUND ENCLOSURE WHERE POSSIBLE.
 - AN **ELSTER HELIX 4000 OR C4000 / 4200 OR SENSUS MEITWIN; MEISTREAM; WP** WATER METER SHALL BE INSTALLED ON TO THE MANIFOLD.

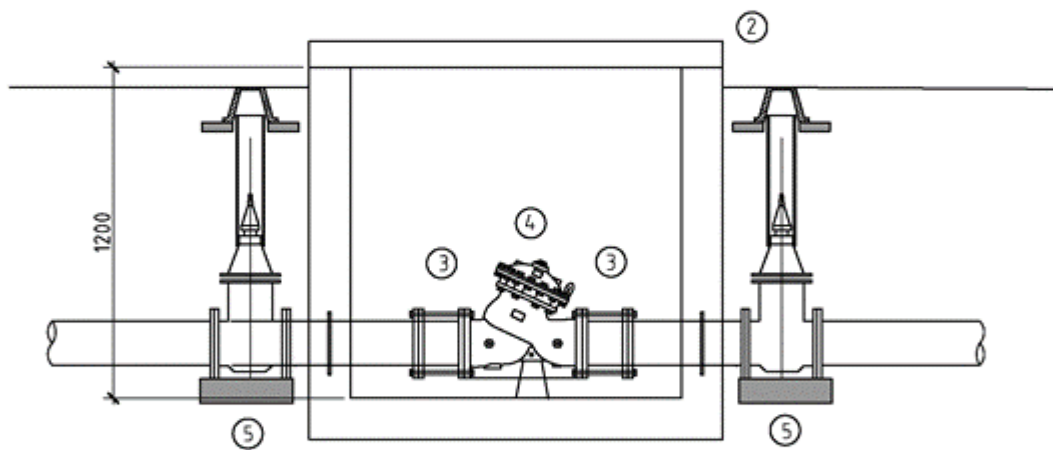
LOCATING BACK FLOW PREVENTERS AND WATER METERS

2. BACK FLOW PREVENTERS SHALL BE LOCATED ON THE PROPERTY SERVED IN EVERY INSTANCE EXCEPT WHERE IN A CBD ENVIRONMENT WHERE THERE MAY BE NO SPACE WITHIN THE BUILDING FRONTAGE FOR AN ABOVE GROUND CABINET.
3. THE BFP SHALL BE ABOVE GROUND AND ALLOW ANY WATER DISCHARGED TO DRAIN TO GROUND IN AN OBVIOUS MANNER. ANY PRV INSTALLED SUB GRADE (BELOW GROUND) OR IN A PIT SHALL HAVE A DRAIN CONNECTION TO DRAIN THE TUN-DISH OR TAKE ANY FULL FLOW FROM A FAILED DEVICE TO STORMWATER.
4. THE WATER METER IS THE SUPPLY POINT; THIS IS THE BOUNDARY BETWEEN COUNCIL RESPONSIBILITY AND PRIVATE OWNER'S RESPONSIBILITY FOR SERVICE AND WATER QUALITY.
5. THE WATER METER SHALL BE LOCATED ON THE ROAD IN ALL INSTANCES AND SHALL NOT BE LOCATED ON A ROW OR EASEMENT.
6. WATER METERS OF SIZES LARGER THAN 25MM WILL REQUIRE A JUMBO METER BOX AND A SEPARATE INDIVIDUAL TOBY VALVE WITH VALVE CHAMBER PRIOR TO THE WATER METER BOX.
7. THE WATER METER BOX SHALL HAVE A WORDS "METER" AND/OR "WATER METER" VISIBLE UPON THE COVER

Drawing B2-9: Water Supply with Bulk Flow Meter



PLAN



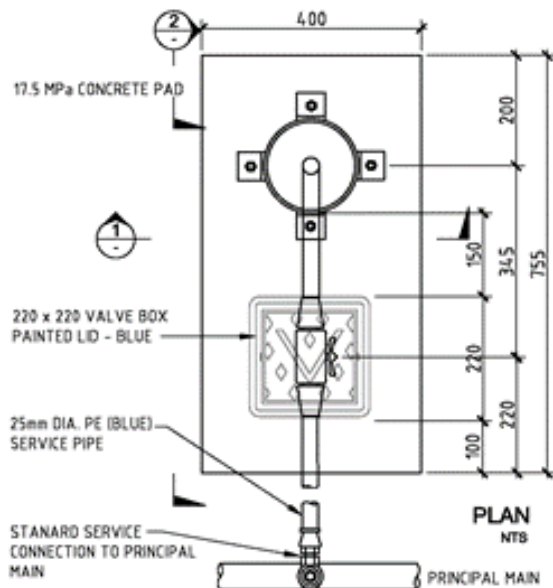
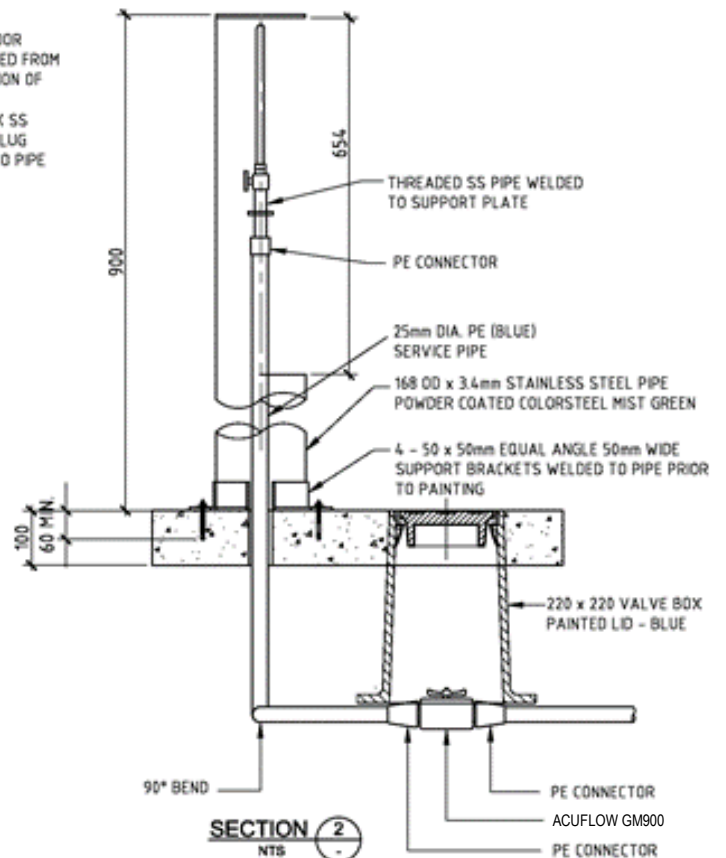
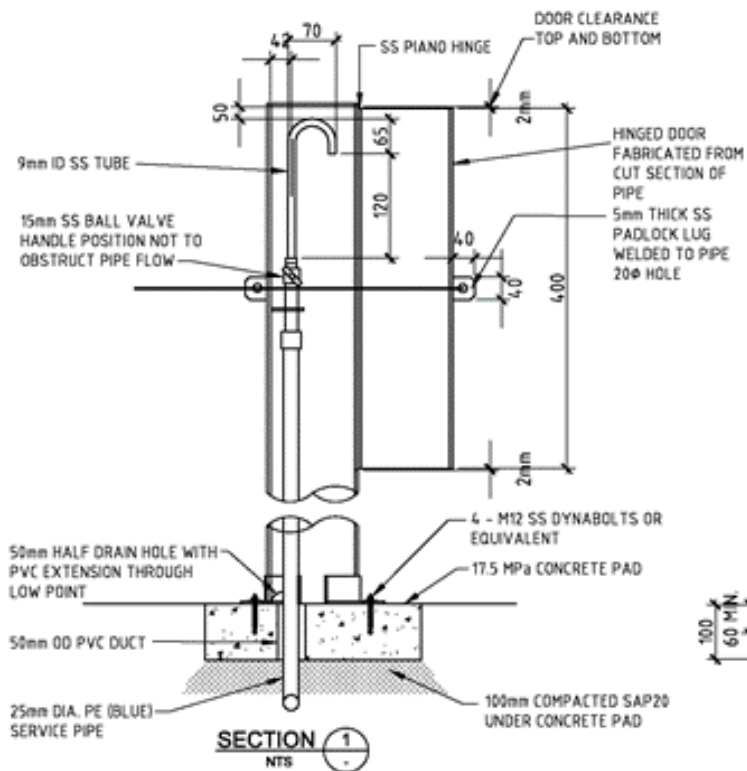
SECTION

NOTES

1. CONSIDERATION NEEDS TO BE GIVEN FOR UPSTREAM FILTER AND PRESSURE RELIEF VALVE WHEN DESIGNING THE INSTALLATION OF THESE VALVES.
2. CONSIDERATION NEEDS TO BE GIVEN FOR DRAINAGE WITHIN THE VALVE CHAMBER.

- ① HUMES CONCRETE ACCESS CHAMBER - 1200 x 900 x 1200 DEEP (CODE 04698)
- ② HUMES CONCRETE ACCESS CHAMBER LID (CODE 04695)
- ③ 2 x FLEXIBLE DISMANTLING JOINTS
- ④ PRESSURE REDUCING VALVE (BERMAD MODEL 720)
- ⑤ UPSTREAM AND DOWNSTREAM ISOLATING VALVE

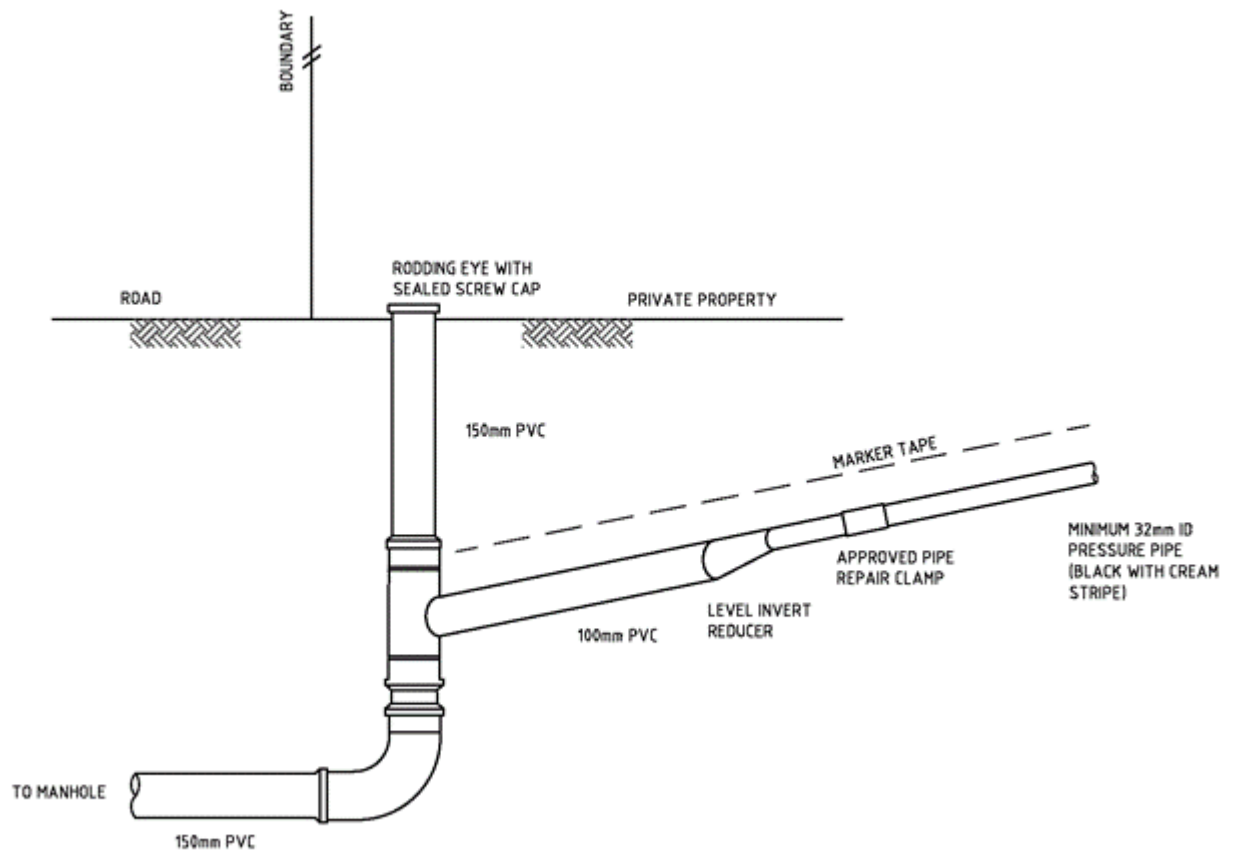
Drawing B2-10: PRV Valve Chamber



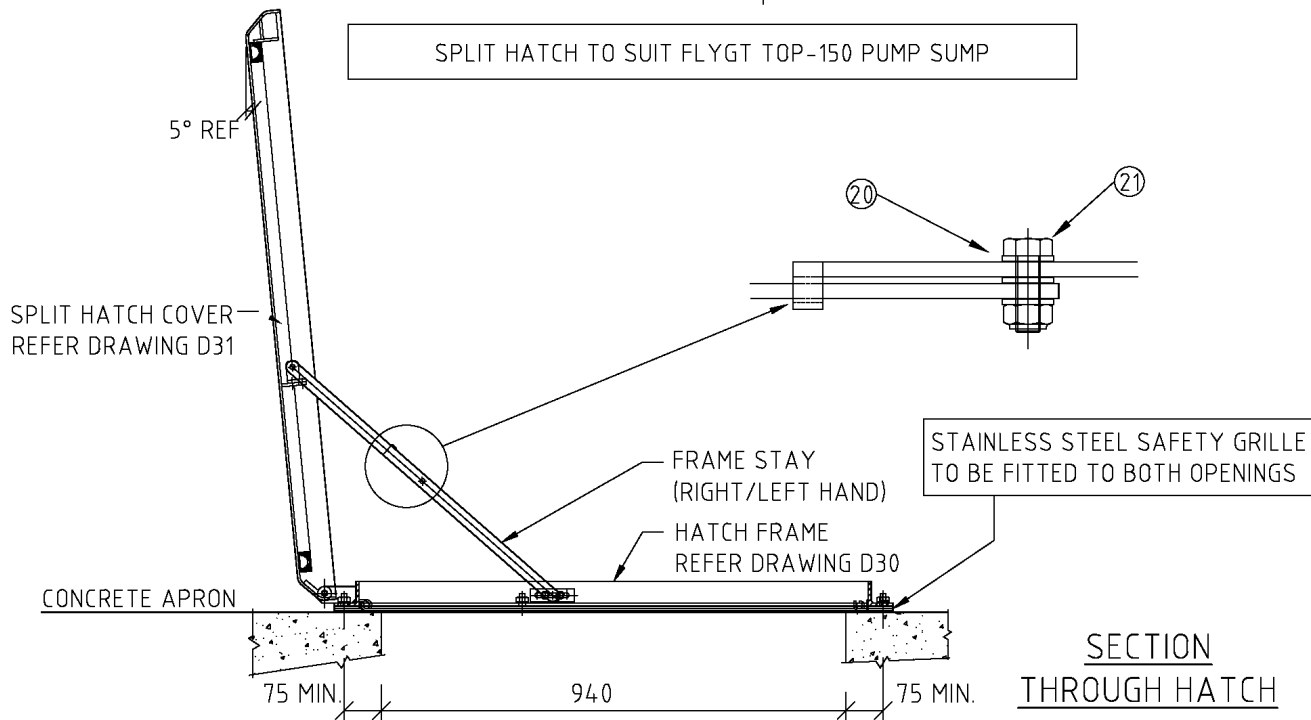
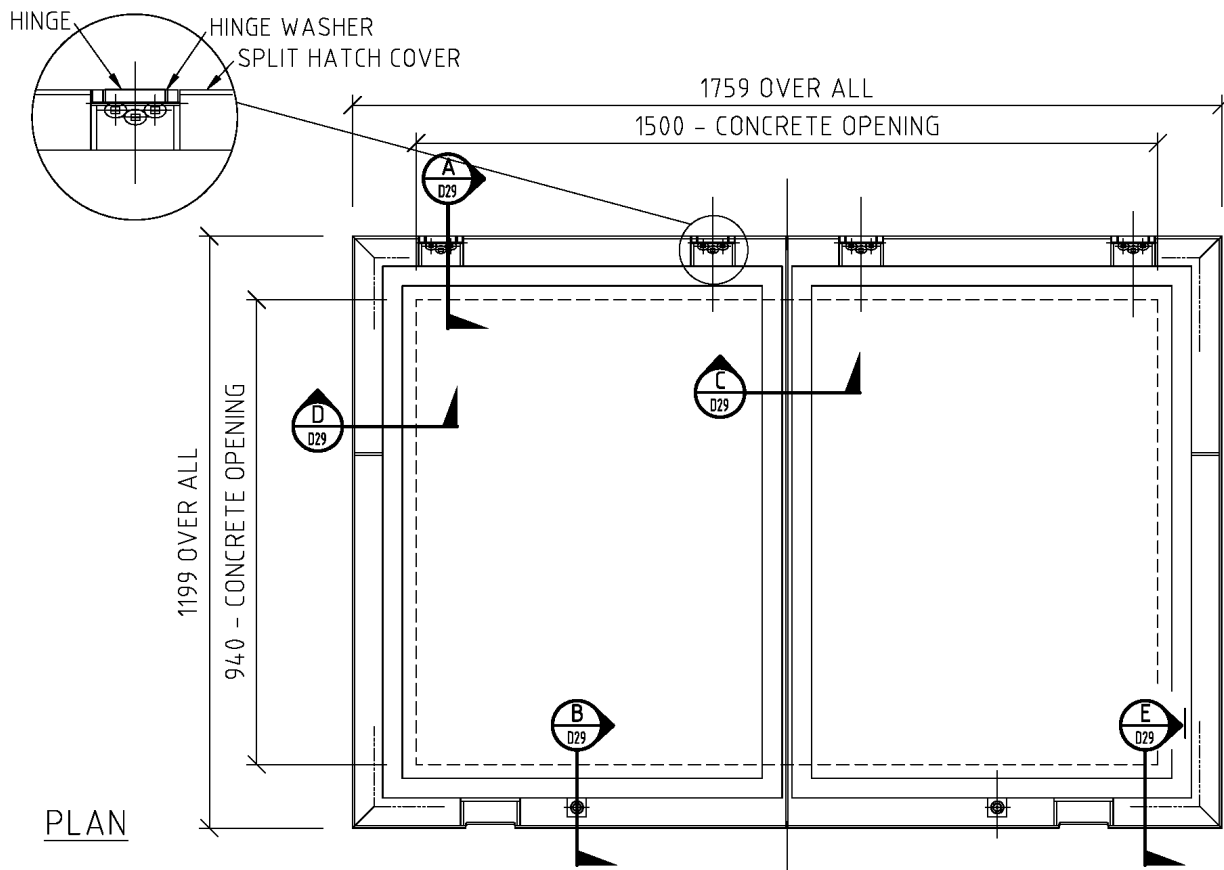
NOTES

1. THIS ARRANGEMENT IS TO BE USED FOR ALL SAMPLING POINTS IN THE DISTRIBUTION NETWORK.
2. ALL PE CONNECTORS TO BE EITHER PUSHLOK, PLASSON, PHILMAC OR SIMILAR APPROVED.
3. ON SLOPING GROUND INSTALL DOOR OPENING ON UPHILL SIDE
4. ALL WELDS TO BE 4mm FILLET

Drawing B2-11: Water Sampling Point

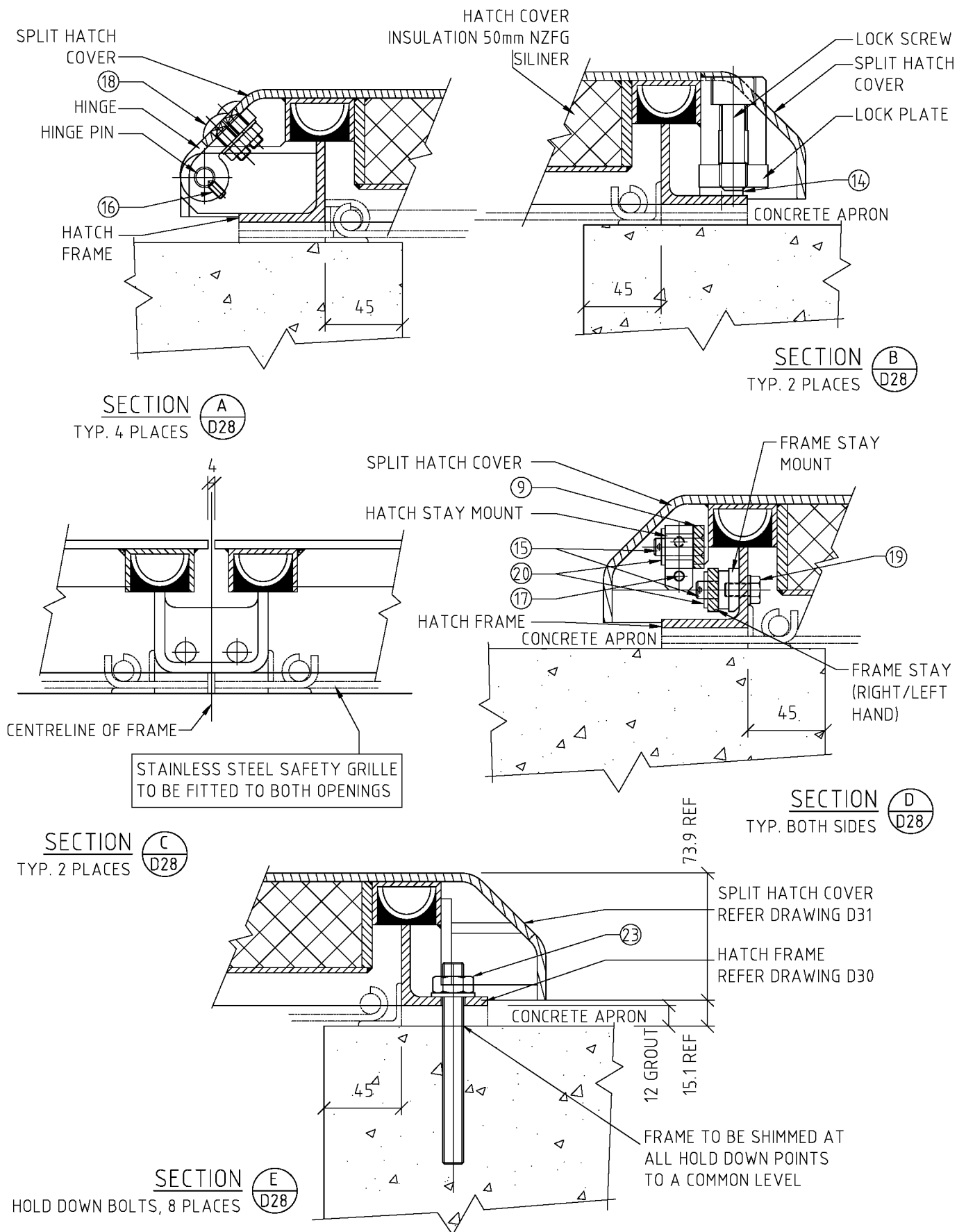


Drawing B3-1: Private Pressure Sewer Main Connection to Sewer Lateral

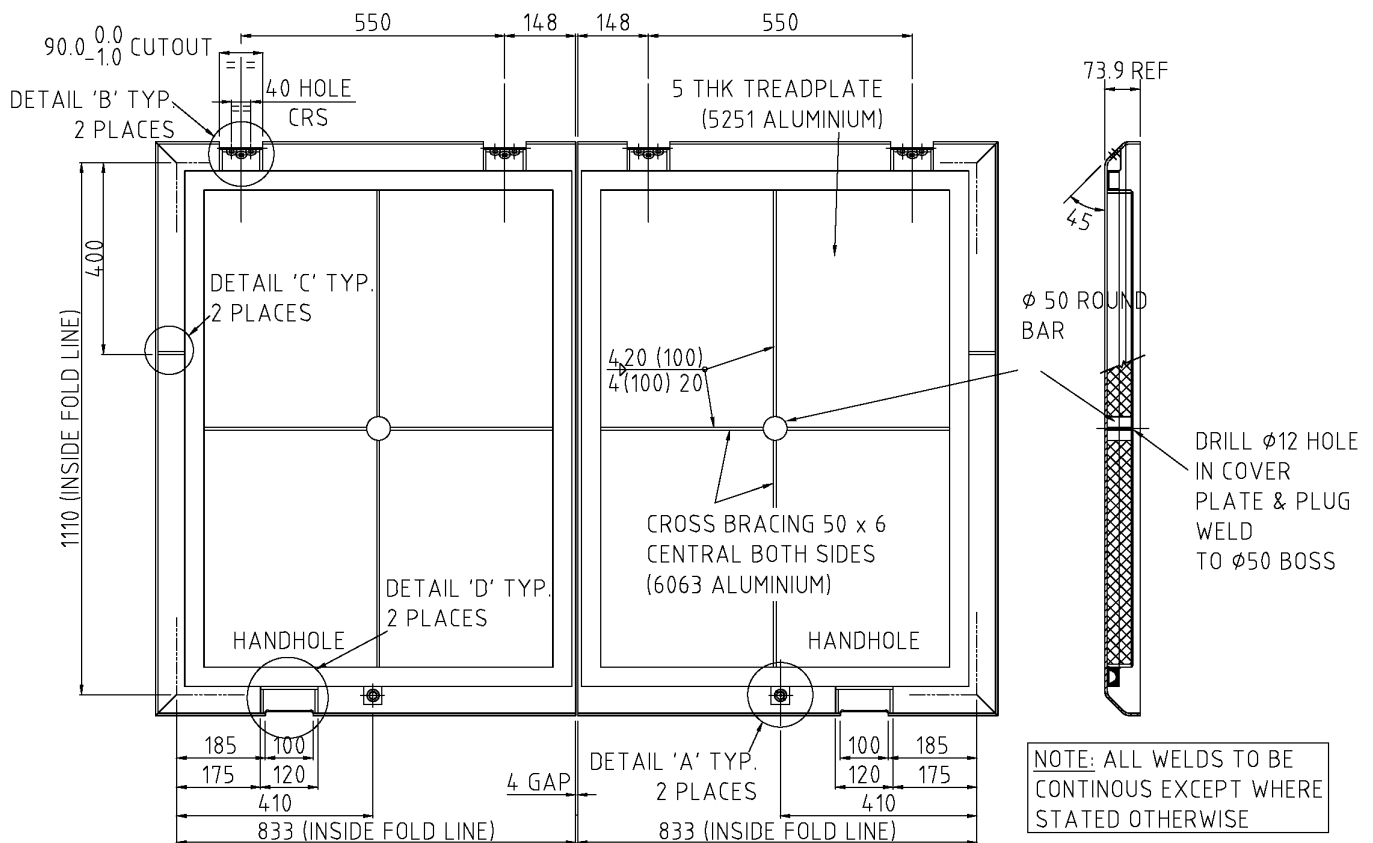


1. ACCESS HATCH UNIT WITH THE LID AND BASE FRAME SECURELY LOCKED TOGETHER TO BE LAID LOOSELY ON CONCRETE APRON AND CHECKED FOR LEVEL USING MIN. SHIMMING
2. AFTER INITIAL LEVELING, ALL OTHER BOLT DOWN POINTS MUST BE SHIMMED TO ENSURE NO DISTORTION OF THE FRAME OCCURS DURING FINAL TIGHTENING OF THE HOLD DOWN BOLTS
3. AFTER TIGHTENING HOLD DOWN BOLTS ALL VOIDS UNDER THE FRAME MUST BE FILLED WITH DRY PACK MORTAR
4. FOUR FOLD OUT SAFETY RAILS ARE TO BE INCLUDED IN THE LID CONSTRUCTION – THESE ARE AVAILABLE AS UNITS FROM PUMP STATION FITTING SUPPLIERS

Drawing B3-2: Pump Station: Split Access Hatch

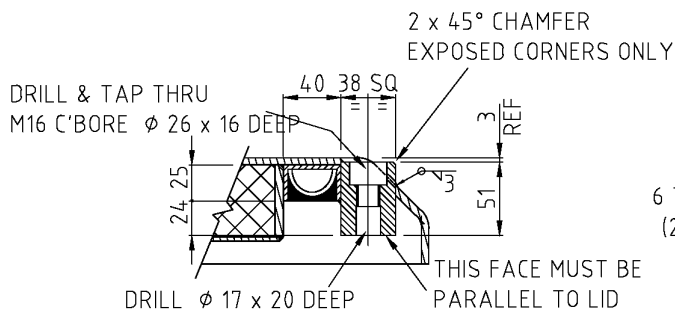


Drawing B3-3 Pump Station: Split Access Hatch Sections



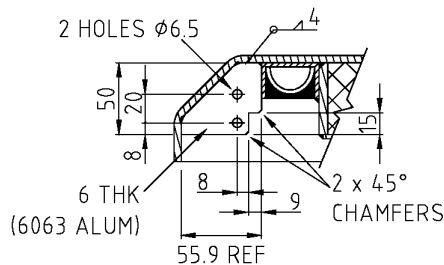
SPLIT HATCH COVER (SOUND INSULATED)

MATERIAL: 5251 ALUMINIUM (UNLESS STATED OTHERWISE)
MEDIUM STRENGTH ALUM. - MAGNESIUM ALLOY FOR MARINE
AND ROAD VEHICLES

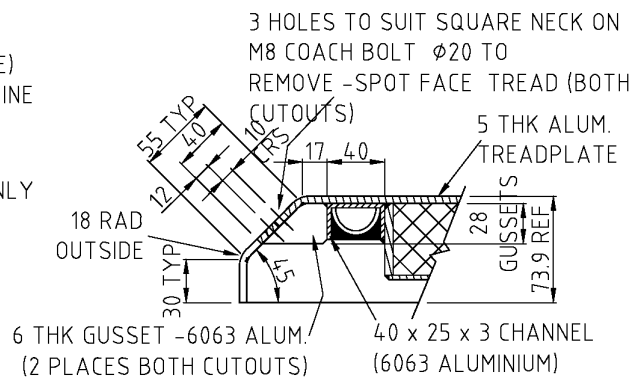


DETAIL 'A'

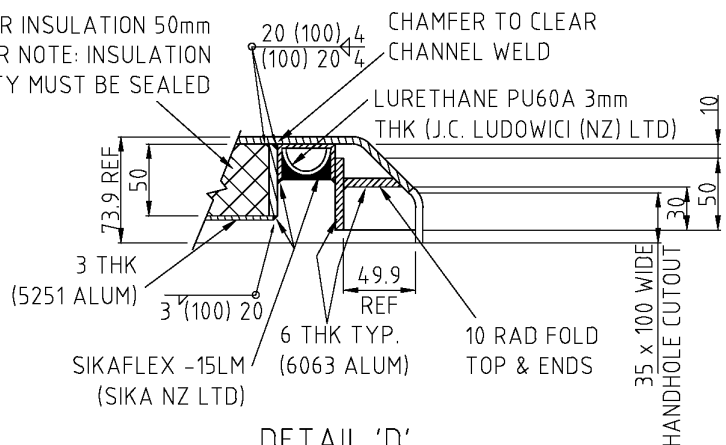
HATCH COVER INSULATION 50mm
NZFG SILINER NOTE: INSULATION
CAVITY MUST BE SEALED



DETAIL 'C'



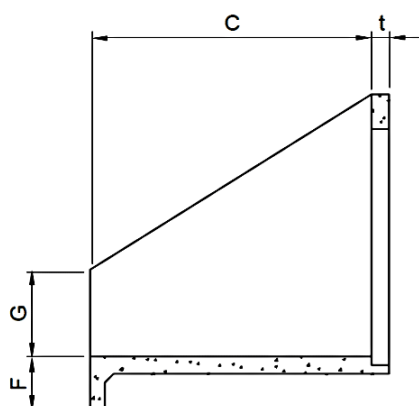
DETAIL 'B'



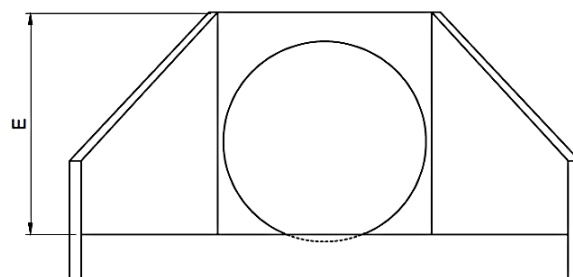
DETAIL 'D'

Drawing B3-5: Pump Station: Split Access Hatch Cover Details

B4 Stormwater

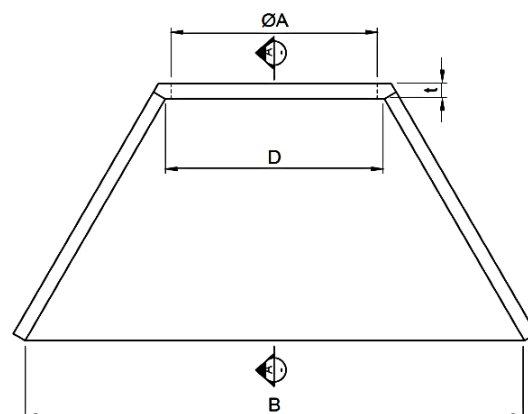


CROSS SECTION



FRONT ELEVATION

PIPE DIA.	PRINCIPAL DIMENSIONS (mm)							
	A	B	C	D	E	F	G	t
150-300	190-390	1000	600	460	520	200	160	50
300-600	370-700	1900	1100	750	900	280	500	80
600-1050	720-1225	3000	100	1270	1675	345	600	100
1200-1350	1380-1540	4100	2400	1600	1975	425	750	125
1600-1800	1727/2040	4900	2400	2150	2265	450	750	150

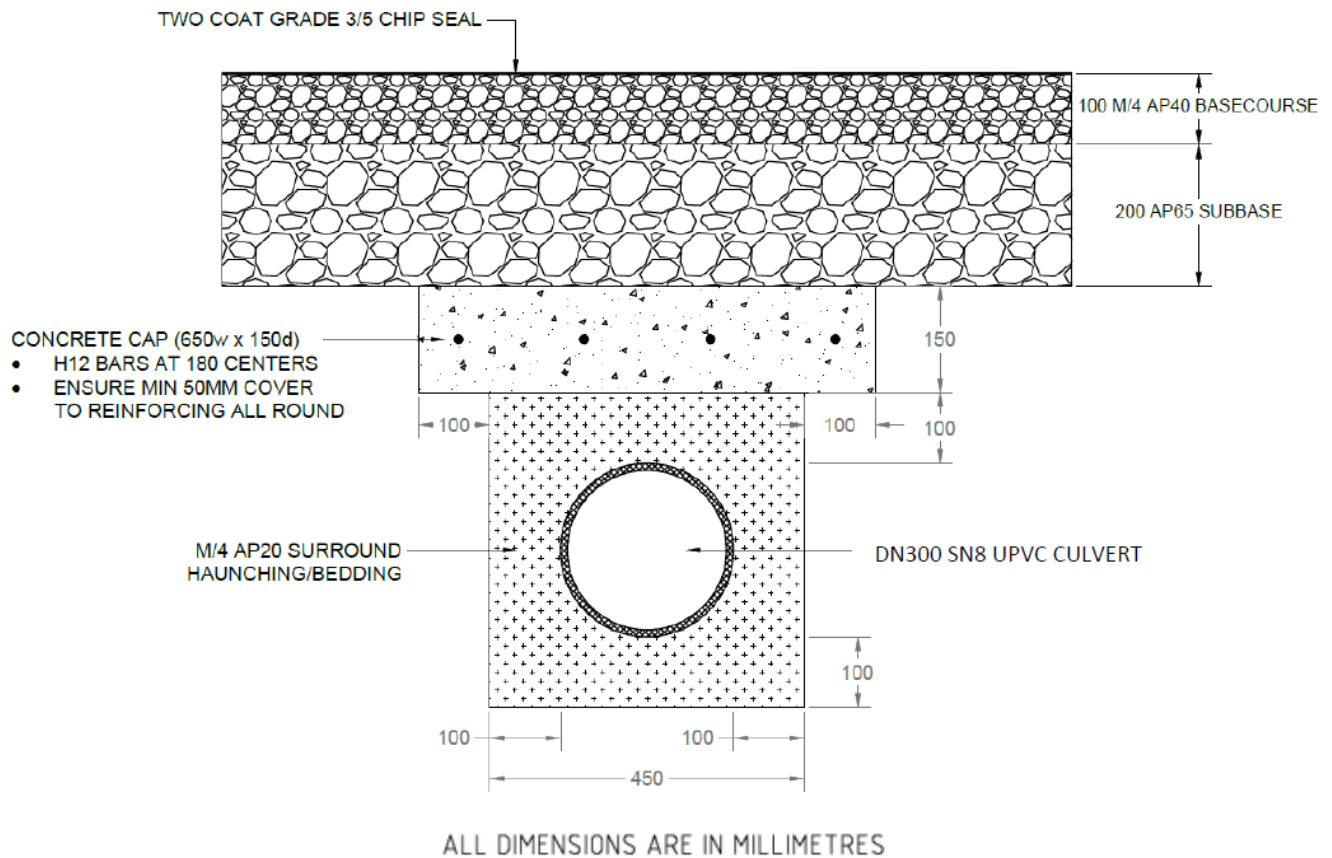


PLAN VIEW

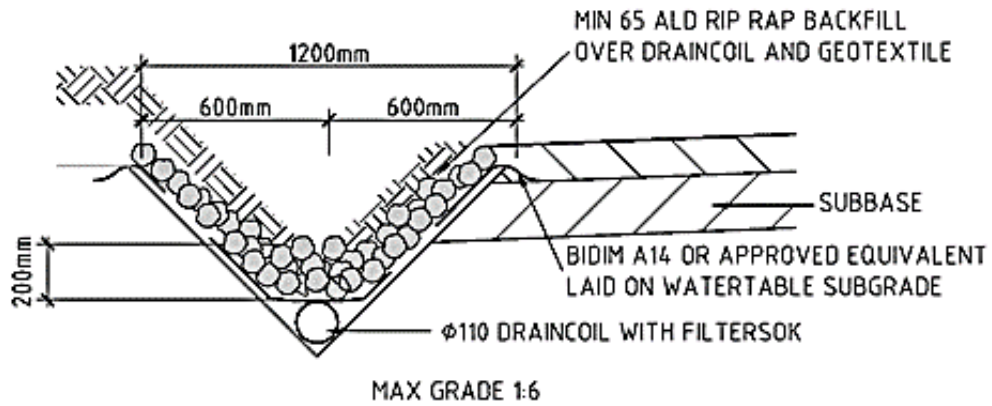
NOTES

1. REINFORCING FLOOR AND WALLS WITH
150 TO 375 - 665 MESH
450 TO 600 - 663 MESH OR 10 ϕ RODS @ 250 CRS
675 TO 900 - 12 ϕ RODS @ 250 CRS
1050 TO 1350 - 12 ϕ RODS @ 150 CRS
2. ALL REINFORCEMENT SHALL BE PLACED CENTRAL IN WALLS & FLOOR, AND SHALL BE CONTINUOUS BETWEEN WALL AND FLOOR.
3. LAPS IN STRUCTURAL GRADE BARS TO BE 300mm MINIMUM.
4. THERE SHALL BE AT LEAST TWO BARS WHETHER MESH OR MILD STEEL, OVER THE TOP OF THE PIPE.
5. CONCRETE COMPRESSIVE STRENGTH IS TO BE 20MPa @ 28 DAYS.
6. BAFFLES ARE TO BE CONSTRUCTED AS SHOWN WHEN OUTLET VELOCITIES AND SOIL CONDITIONS DICTATE. IN EXTREME CASES SPECIFIC DESIGN MAY BE REQUIRED.
7. INLETS/OUTLETS EXCEEDING 600mm ϕ TO HAVE ANTI-VERMIN SCREENS FITTED.

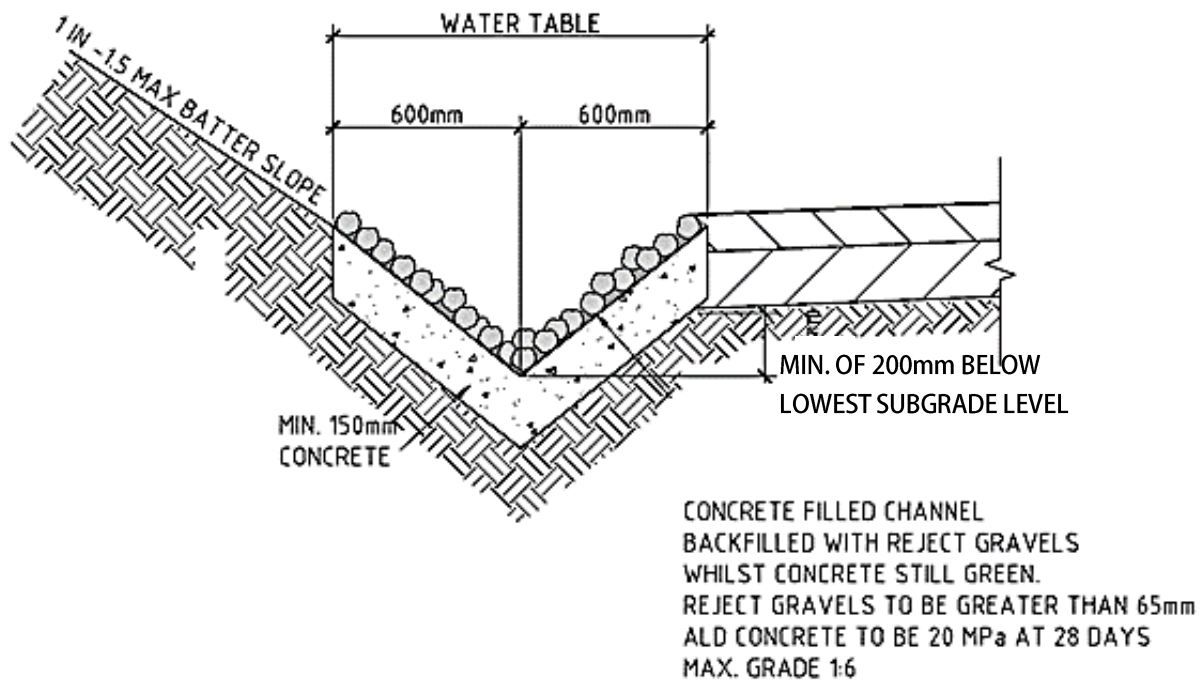
Drawing B4-1: Inlet & outlet Structures



Drawing B4-2: Concrete Capping Detail

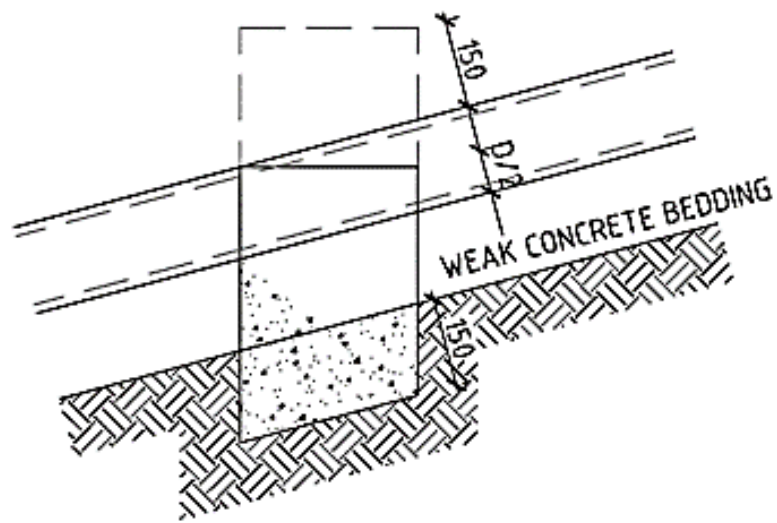


TYPICAL RIP RAP GEOTEXTILE LINED SWALE
SCALE 1:20

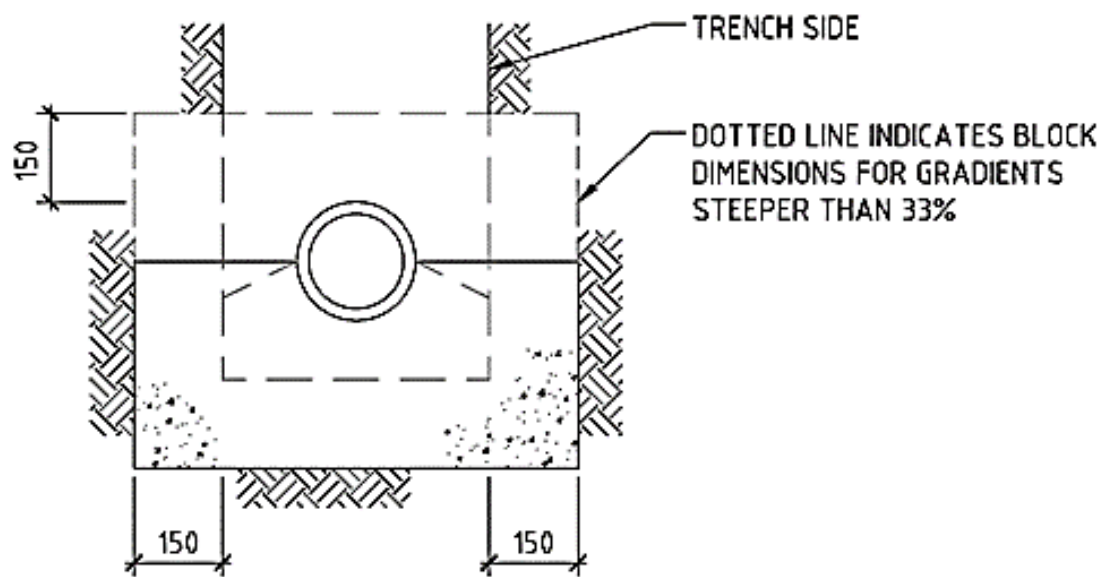


TYPICAL RIP RAP CONCRETE LINED SWALE
SCALE 1:20

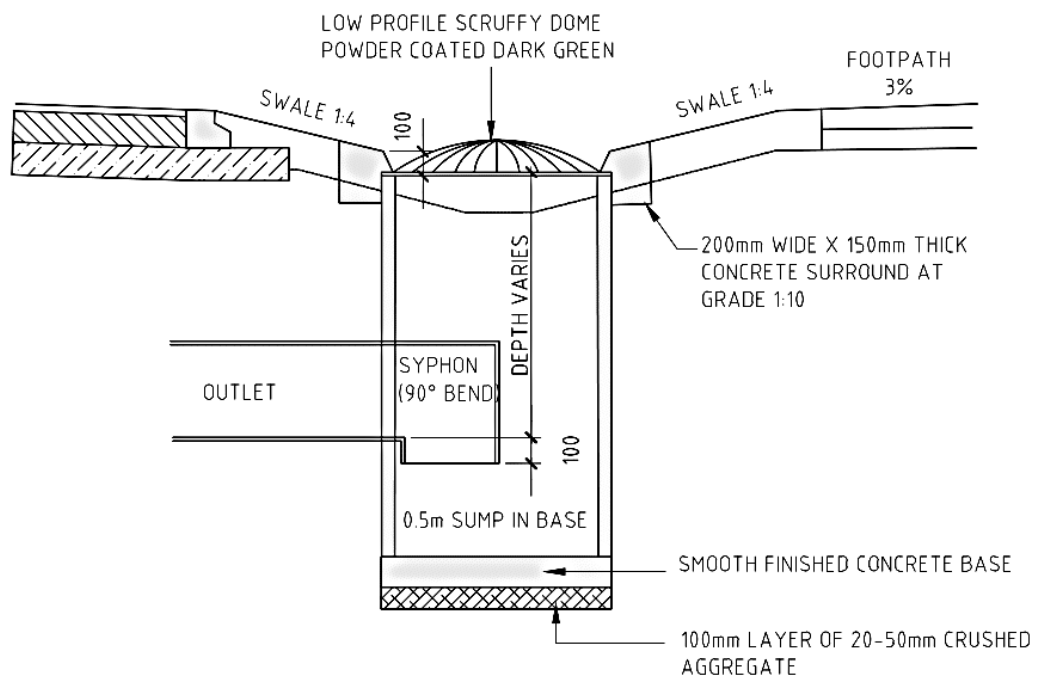
NOTE:
RIP RAP SWALES TO BE APPLIED TO
WATER DRAINAGE TABLES WITH
LONGITUDIANL GRADIENT OF > 10%



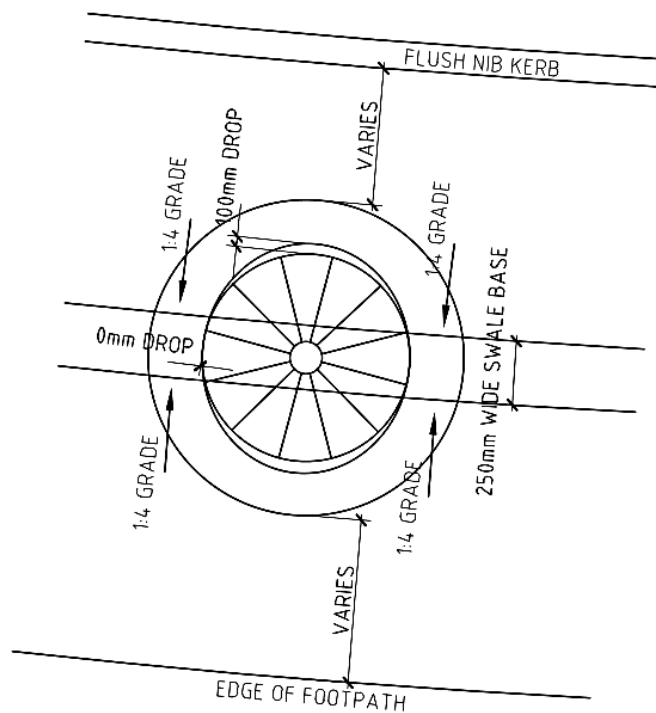
LONGITUDINAL SECTION



CROSS SECTION

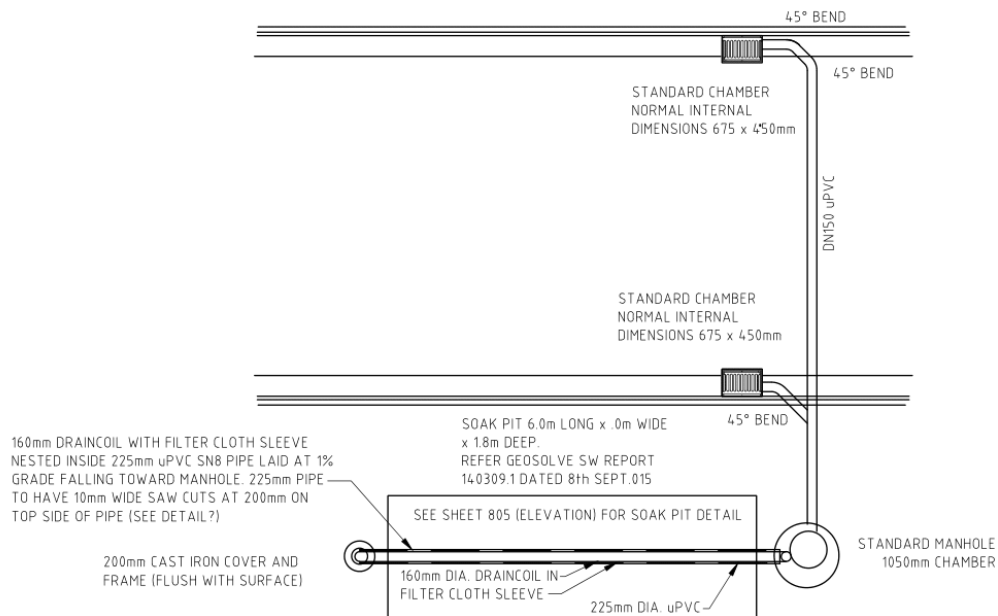


SIDE ELEVATION

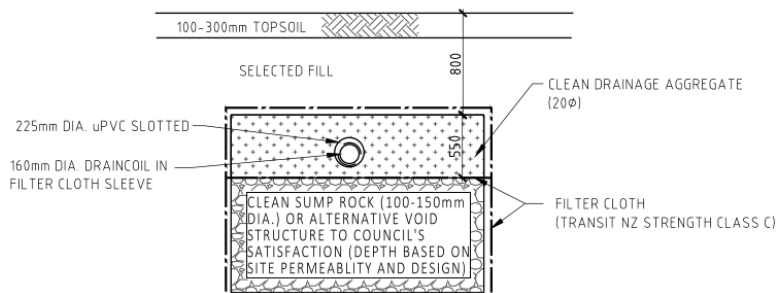


PLAN

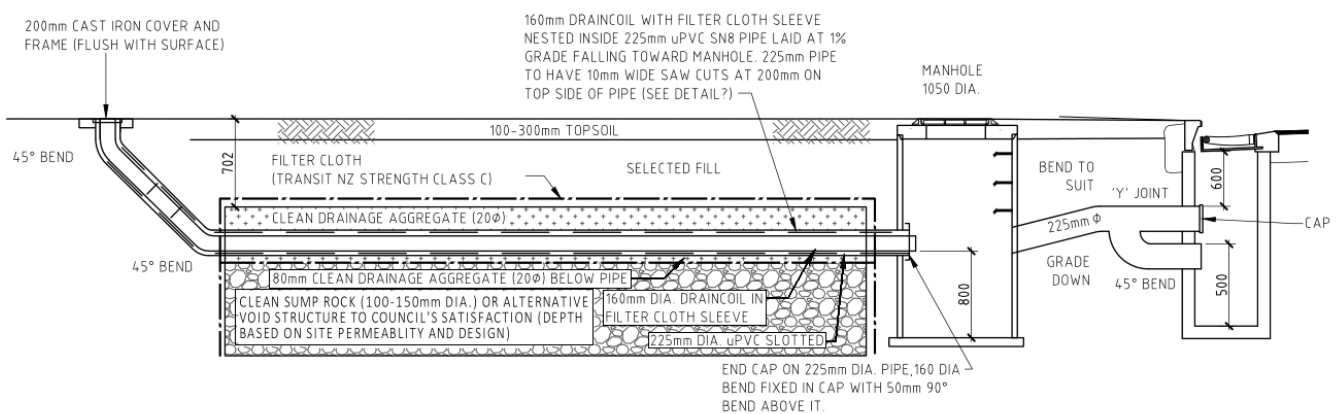
Drawing B4-5: Scruffy Dome Detail



STORMWATER SOAKAGE PIT TYPICAL DETAIL
PLAN VIEW



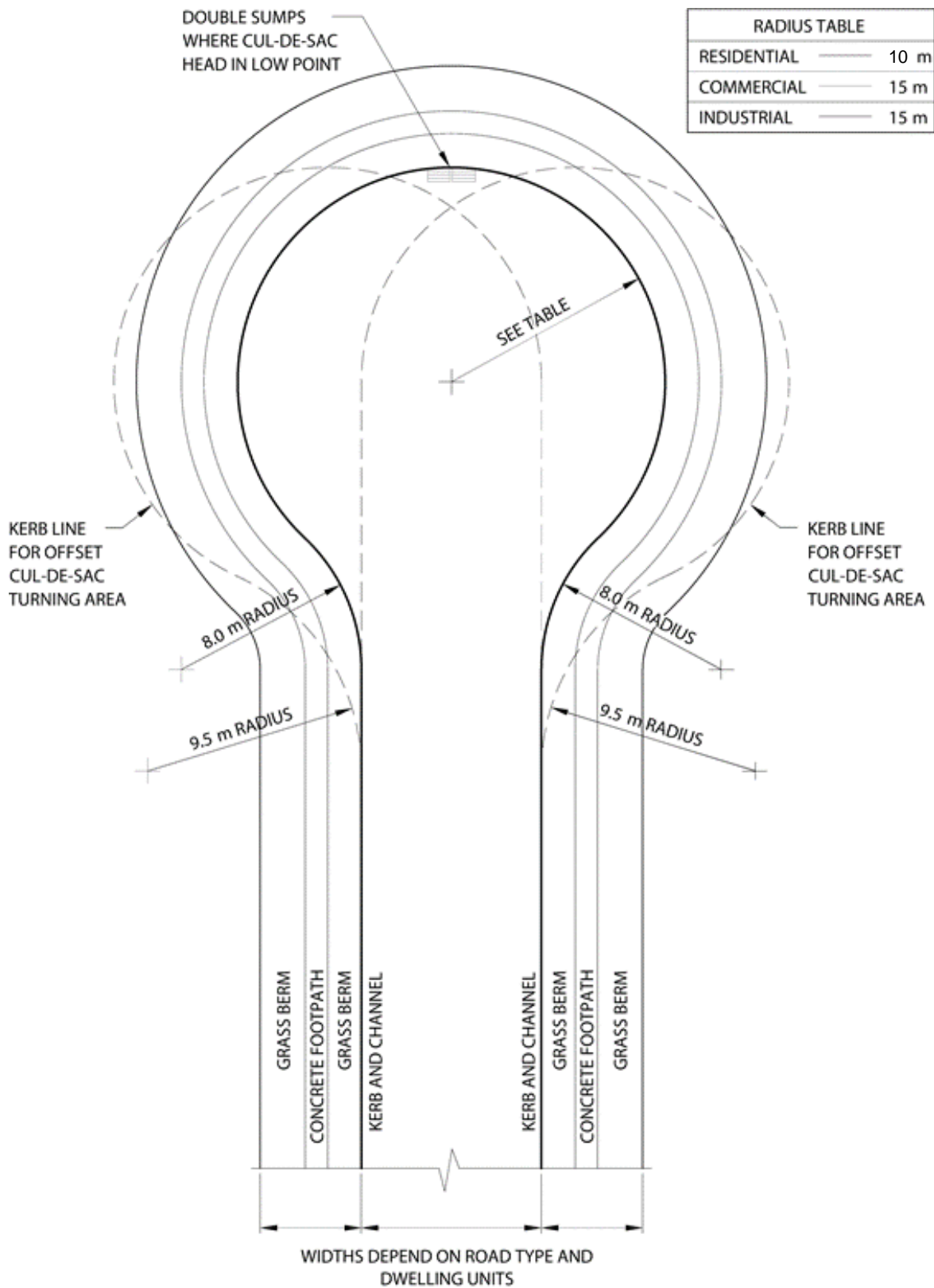
STORMWATER SOAKAGE PIT TYPICAL SECTION
END ELEVATION
(ROAD CONNECTIONS)



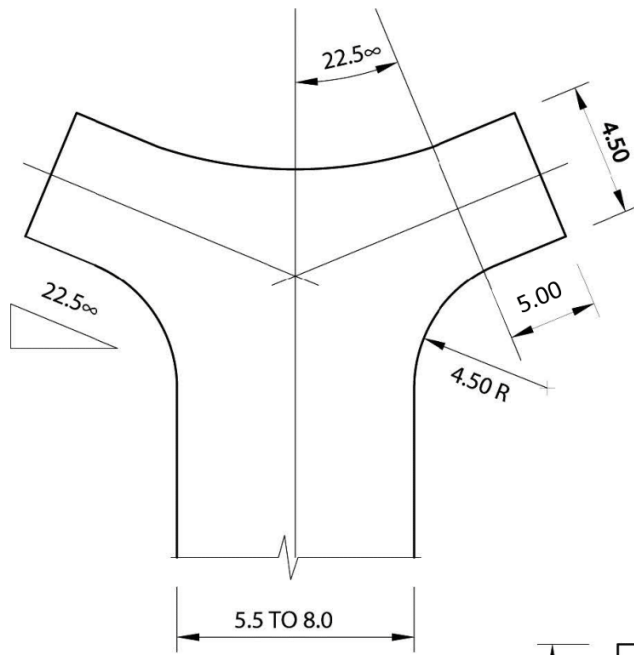
STORMWATER SOAKAGE PIT TYPICAL SECTION
SIDE ELEVATION
(ROAD CONNECTIONS)

NOTE
DRAINCOIL IS TO BE REMOVABLE FROM WITHIN THE 225mm PIPE, ENABLING
CLEANING/REPLACEMENT OF THE PIPE AND FILTER SLEEVE AS REQUIRED.
CLEANING EYE ALLOWS FOR FLUSHING FROM EITHER END OF THE SYSTEM

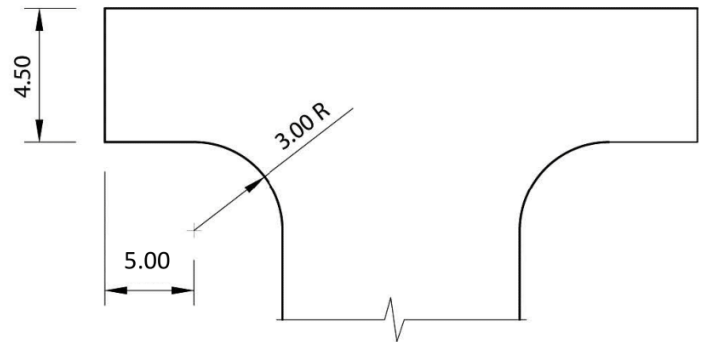
NOT TO SCALE



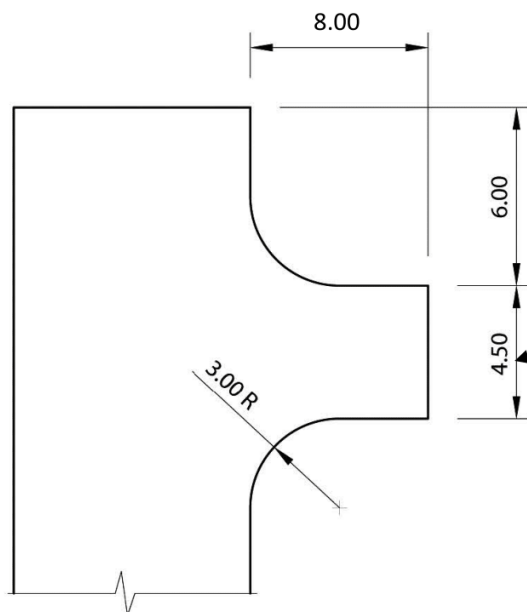
Drawing B5-1: Dimensions of No-Exit Road Turning Areas



Y TURNING



T TURNING

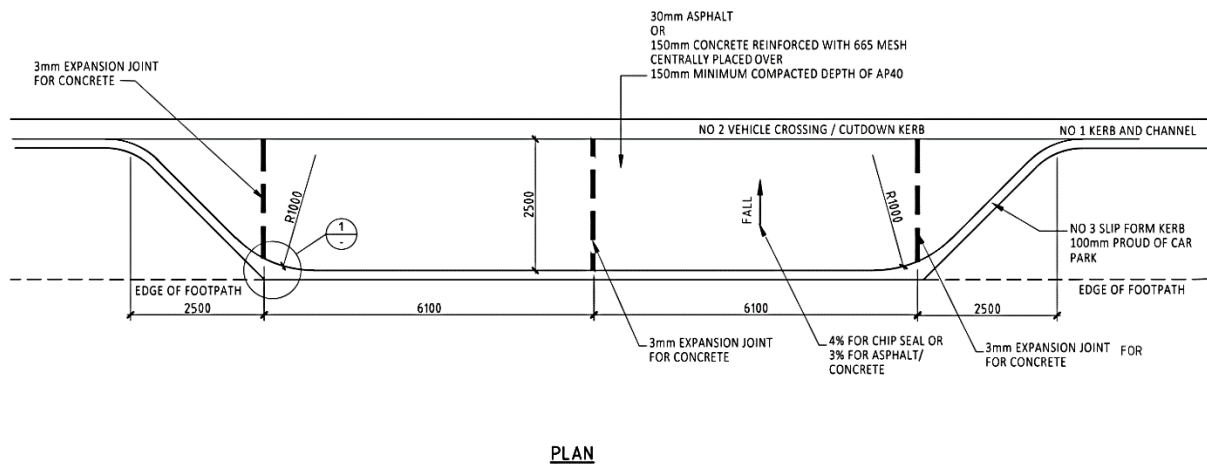
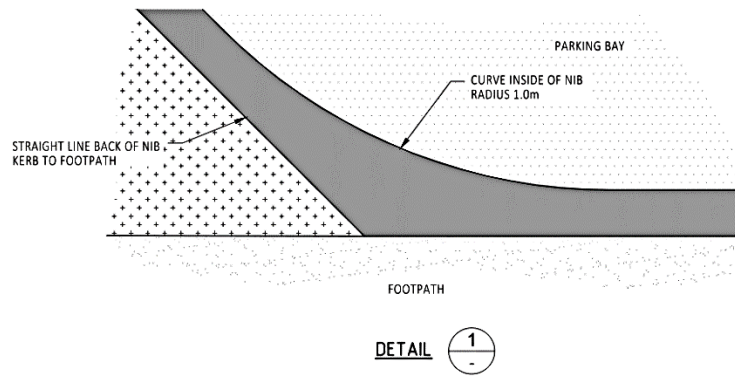


L TURNING

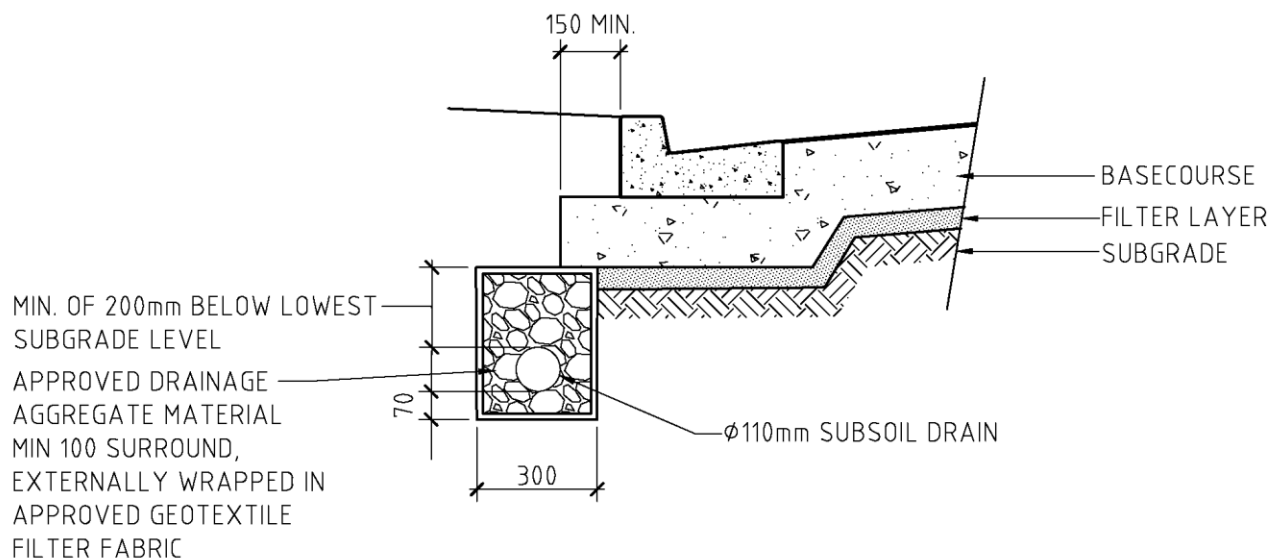
CANNOT BE ACCESS TO
ANOTHER PROPERTY

ONLY FOR USE WHERE THE
STANDARD CIRCULAR HEAD IS
UNSUITABLE OR WHERE
APPROVED BY COUNCIL

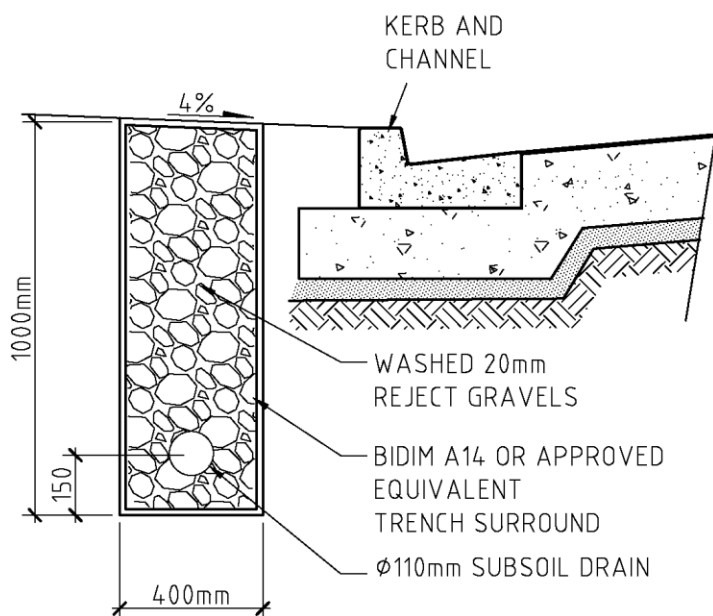
ALL DIMENTIONS ARE IN METERS



Drawing B5-3: Parking Bay



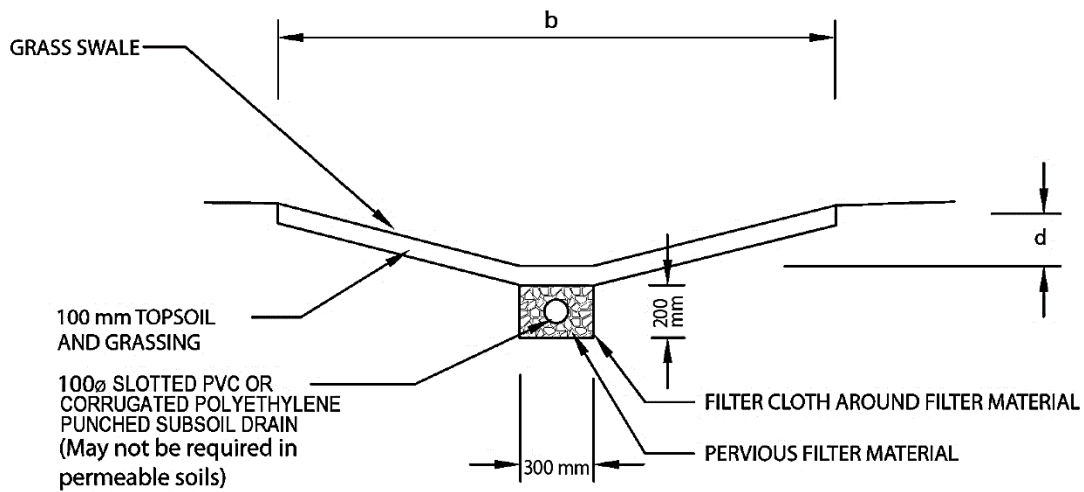
UNDER KERB DRAINAGE



SURFACE WATER CUT-OFF DRAIN

ALL DIMENSIONS ARE IN MILLIMETRES

Drawing B5-4: Subsoil drains - Roadside

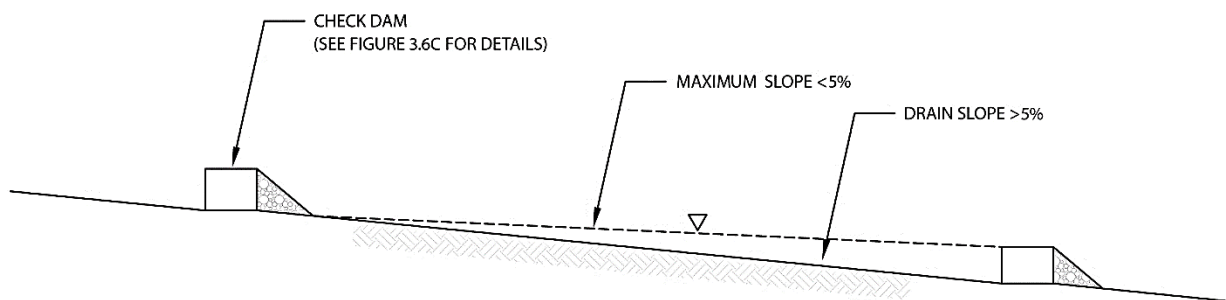


SWALE CROSS SECTION

NOTE –

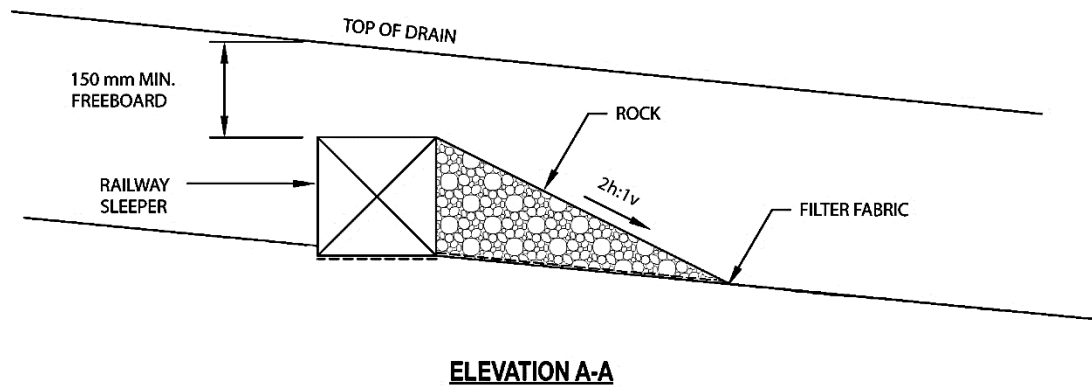
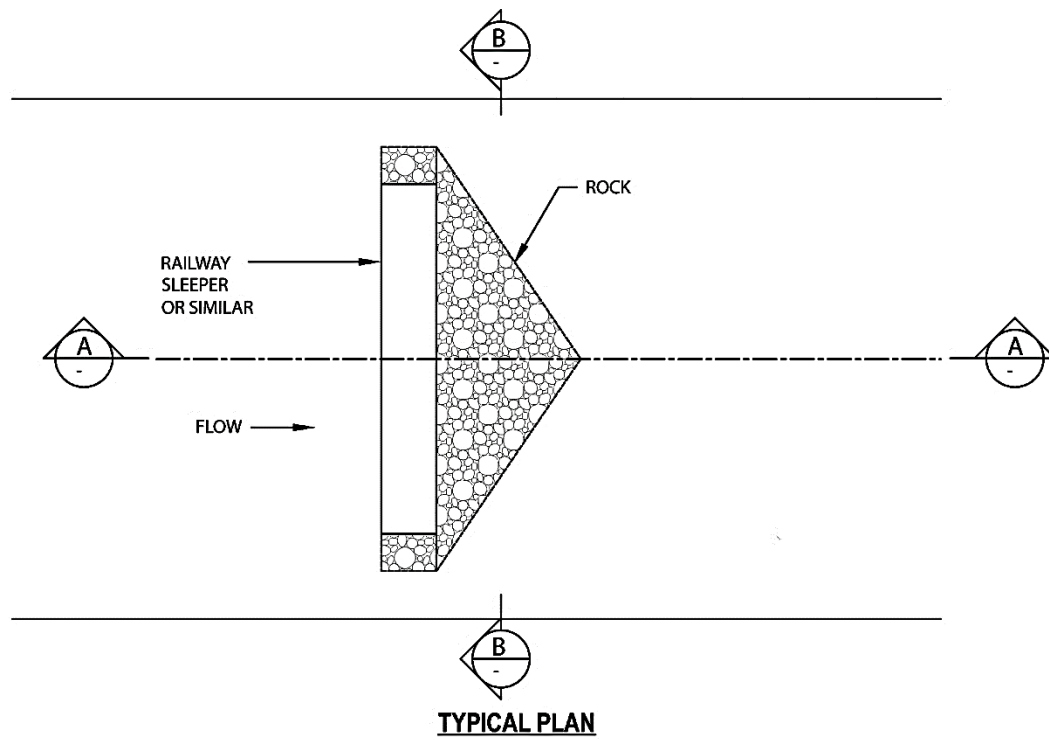
1. Effective catchment area drained = impervious area + 0.72 x pervious area.
2. Maximum swale slope up to 5%. Steeper swales require check dams (see figures 3.6(B) and 3.6(C)).
3. Dimensions 'b' and 'd' to be sized for conveyance of 10% AEP event.
4. Existing ground is regraded, compacted, topsoiled (100 mm depth), and grassed.
5. Side slopes no steeper than 1v:3h if planted (not mown).
6. Side slopes no steeper than 1v:5h if grassed (mown).

Drawing B5-5: Typical swale detail (1)

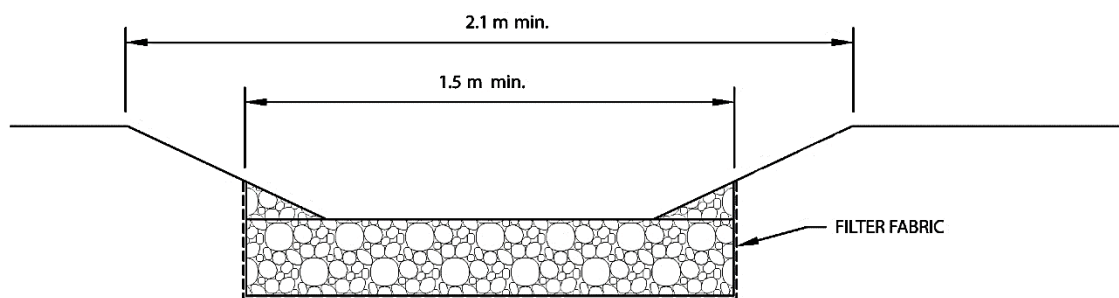


LOCATION OF CHECK DAMS IN SWALES

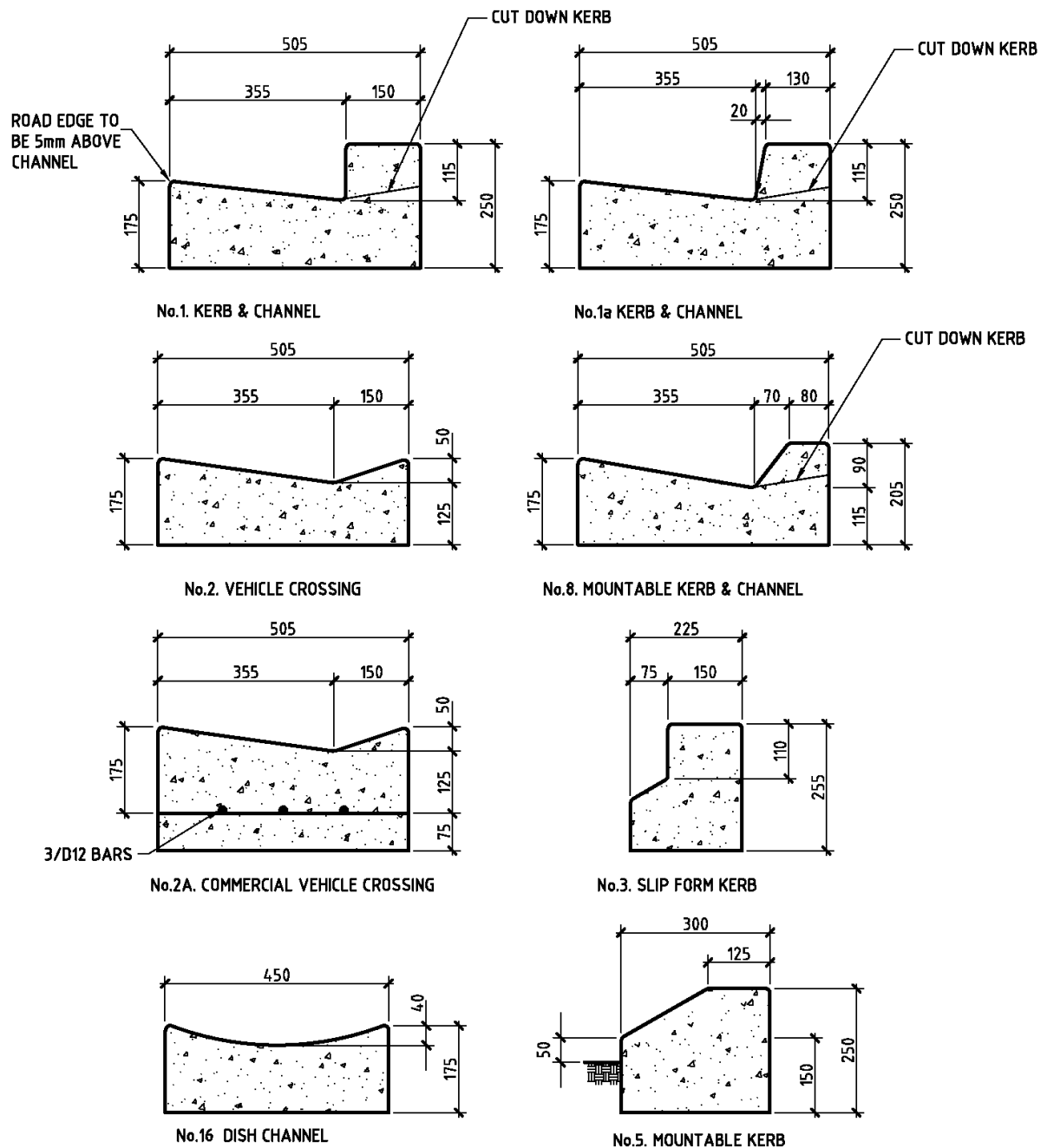
Drawing B5-6: Typical Swale Detail (2)



ROCK TO BE SCORIA GRADED CLEAN (SGC) 75-70 OR EQUIVALENT.
 FILTER FABRIC TO BE BIDIM A12 OR EQUIVALENT.

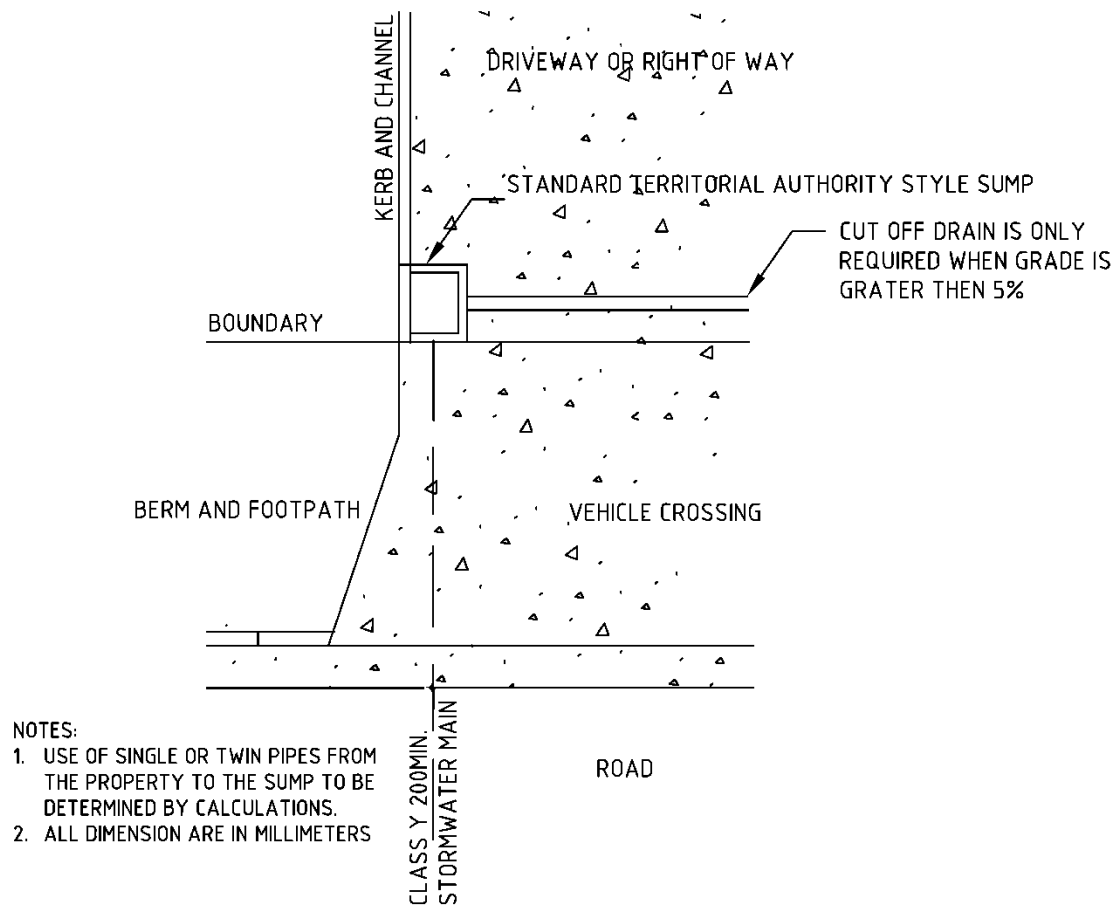


Drawing B5-7: Typical Check Dam Detail

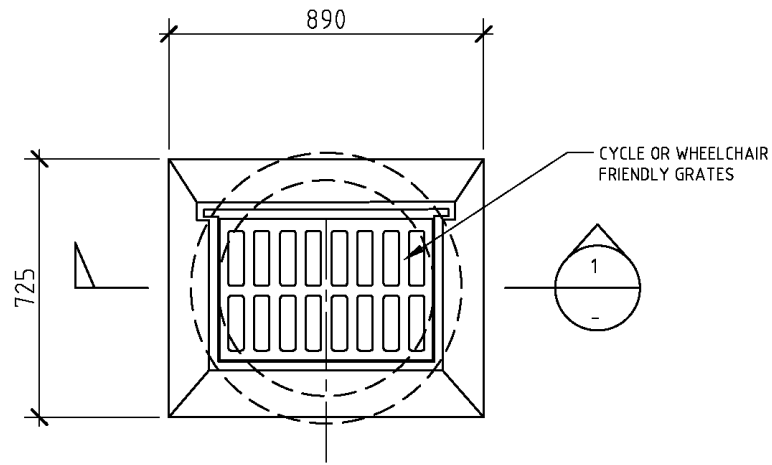


NOTE: KERB AND CHANNELS TO HAVE 200mm MIN. DEPTH OF COMPACTED AP40 BASECOURSE OR GAP65 SUBBASE UNDER THEM.

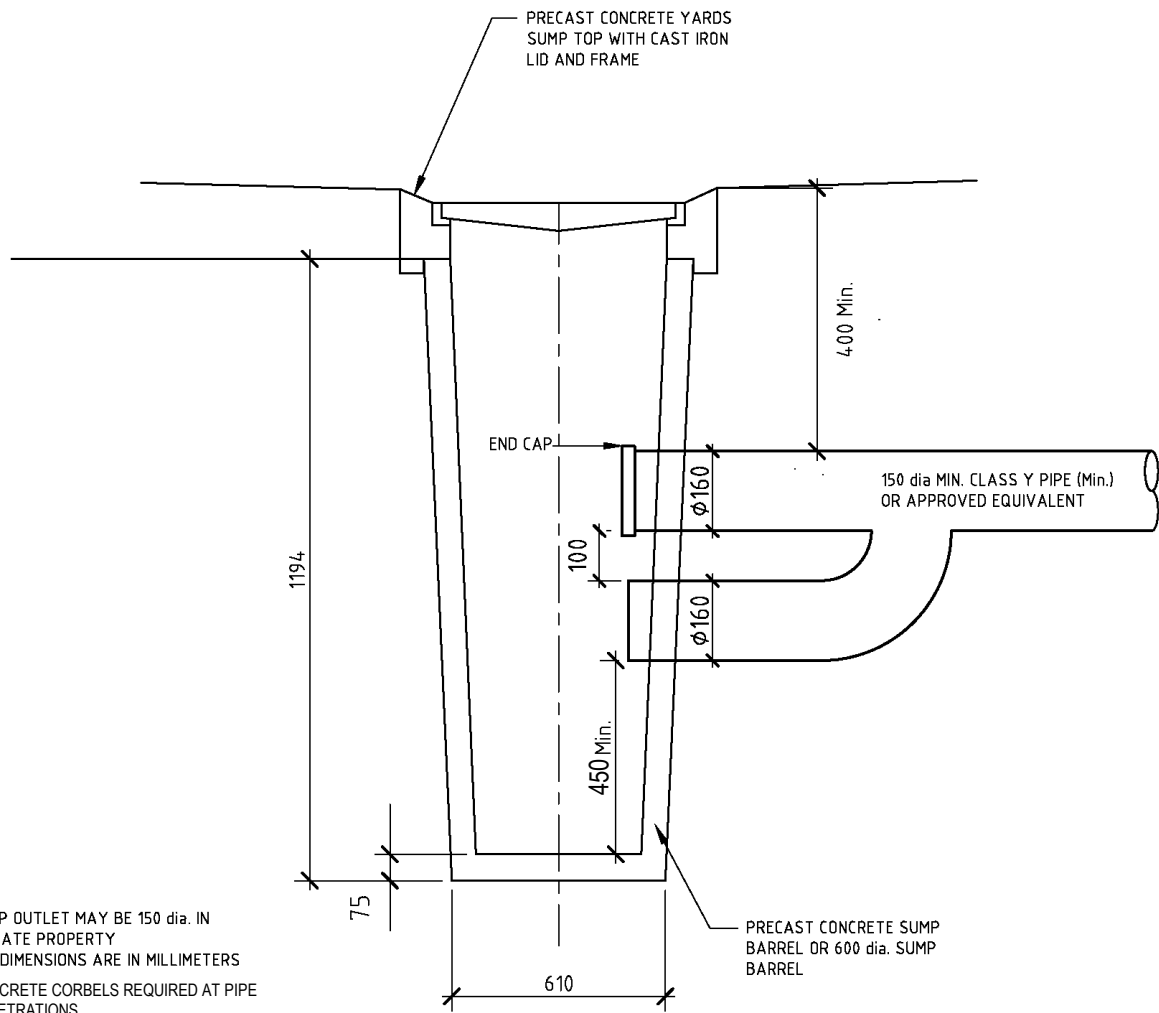
Drawing B5-8: Kerbs and Dished Channels



Drawing B5-9: Typical sump to driveway or right of way



PLAN

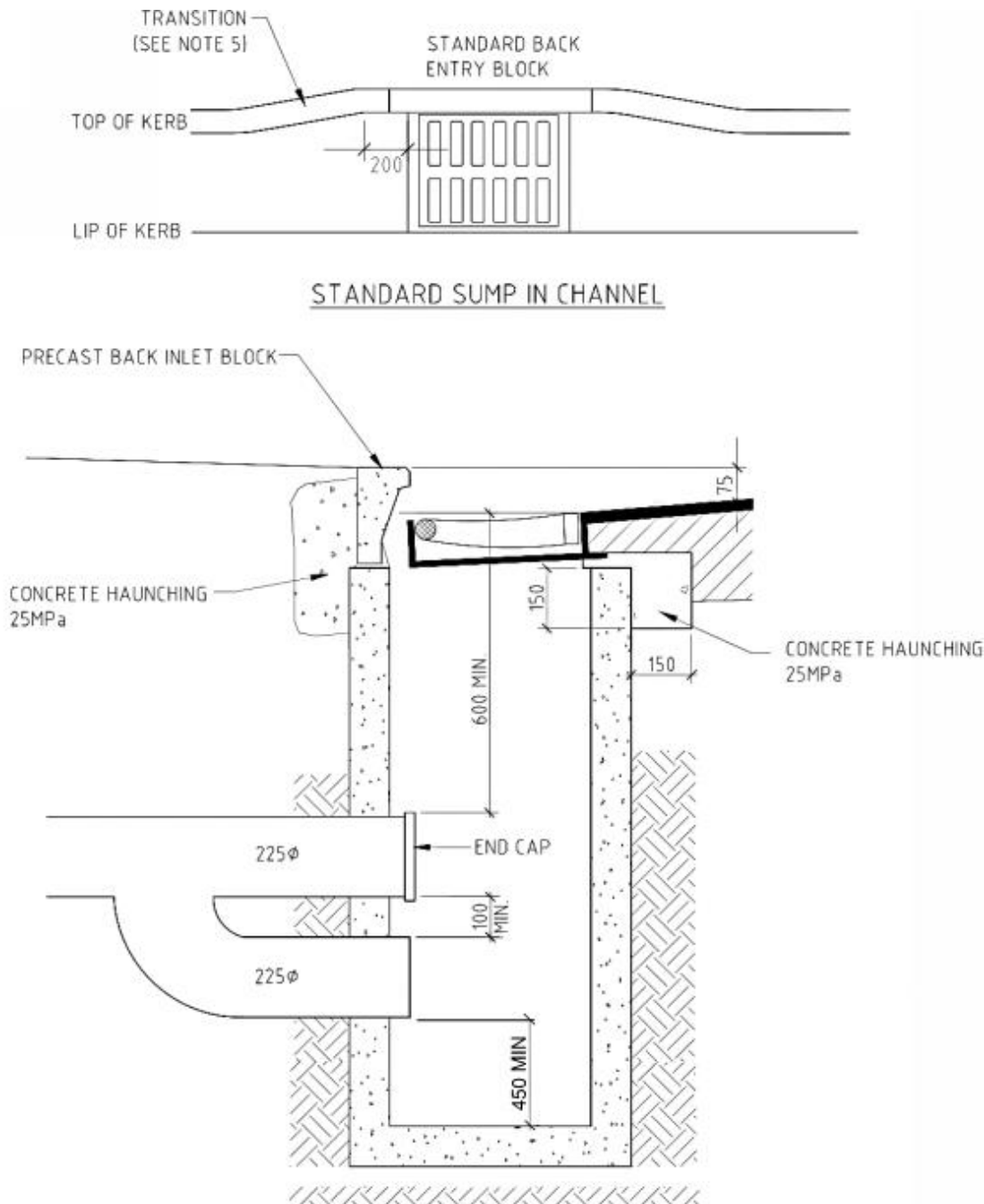


NOTE:

1. SUMP OUTLET MAY BE 150 dia. IN PRIVATE PROPERTY
2. ALL DIMENSIONS ARE IN MILLIMETERS
3. CONCRETE CORBELS REQUIRED AT PIPE PENETRATIONS

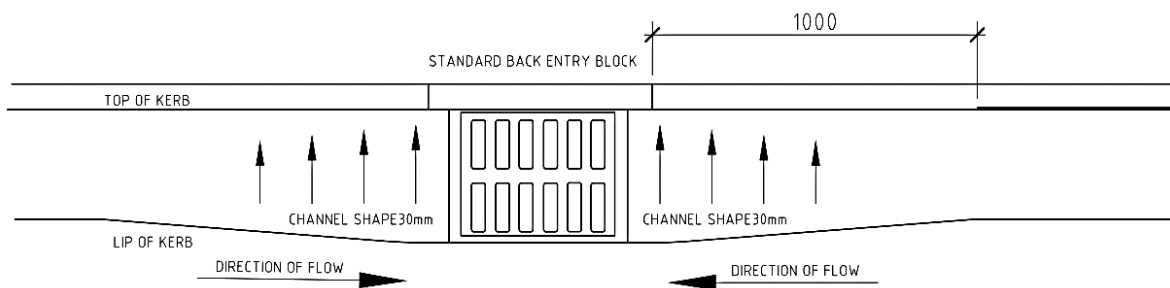
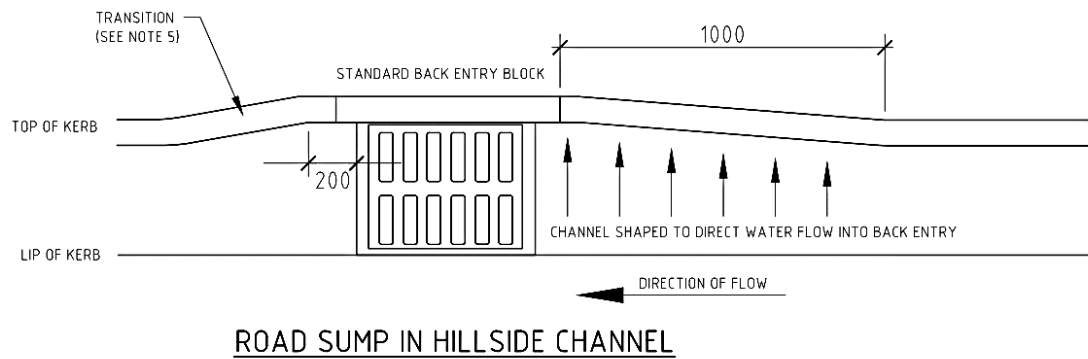
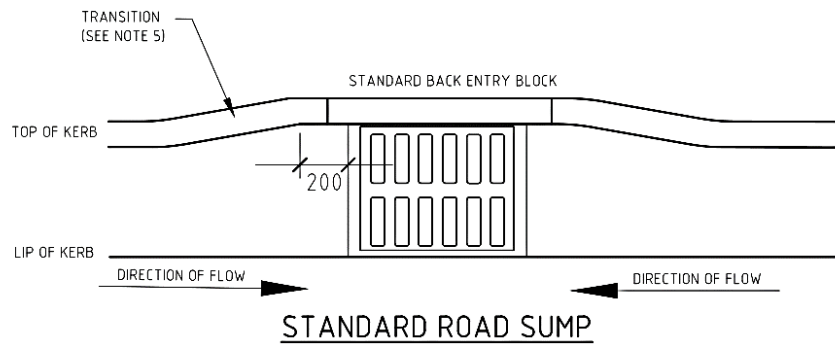
SECTION

Drawing B5-10: Flat channel or Yard Sump – Private Only

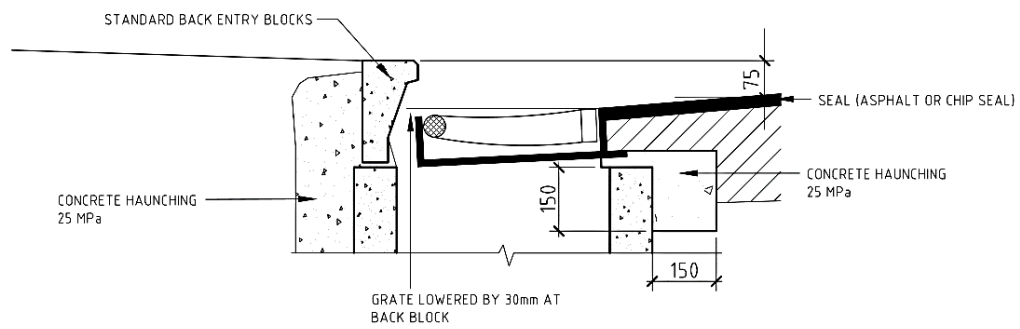


1. ROAD SUMPS TO BE PLACED AT 90m (MAX.) INTERVALS
2. DOUBLE SUMPS TO BE INSTALLED IN PLACE OF SINGLE SUMPS AT ALL:
 - A. UNDERVERTICAL CURVES IN ROADS
 - B. ON ALL ROADS WITH VERTICAL GRADIENTS EXCEEDING 10%
SPECIFIC DESIGN REQUIRED WHERE GRADIENT EXCEEDS 12%
3. SUMP LEADS TO INTERSECT SIDE OR BACKWALL OF SUMP BOX AT 90°
4. SITE-SPECIFIC DESIGN REQUIRED TO REDUCE SYPHON FROM 200 ϕ DOWN TO 150 ϕ
5. WHERE GRADIENTS EXCEED 10%, CHANNEL TRANSITION INTO DOUBLE MUDTANK TO BE 800mm AND CHANNEL TO BE FORMED DIRECTLY INTO BACK ENTRY
6. TO BE USED WHERE BACK OF KERB IS NOT DIRECTLY ADJACENT TO THE FOOTPATH
7. ALL SUMPS SHOULD BE 1800mm DEPTH
8. A MINIMUM SEDIMENT STORAGE DEPTH OF 450mm IS TO BE PROVIDED (TO INVERT OF PIPE)
9. REDUCED COVER WHERE THE LEADS LEAVE THE MUD SUMP IS ACCEPTABLE. THIS SHOULD NOT REDUCE BELOW A MINIMUM OF 600mm COVER TO PIPE
10. THE LENGTH OF PIPE WITH REDUCED COVER SHOULD BE MINIMISED AND AVOID EXTENDING INTO THE WHEEL TRACKS AS FAR AS POSSIBLE.
11. CONCRETE CORBALS ARE REQUIRED AT PIPE PENETRATIONS.

Drawing B5-11: Road Sump Detail



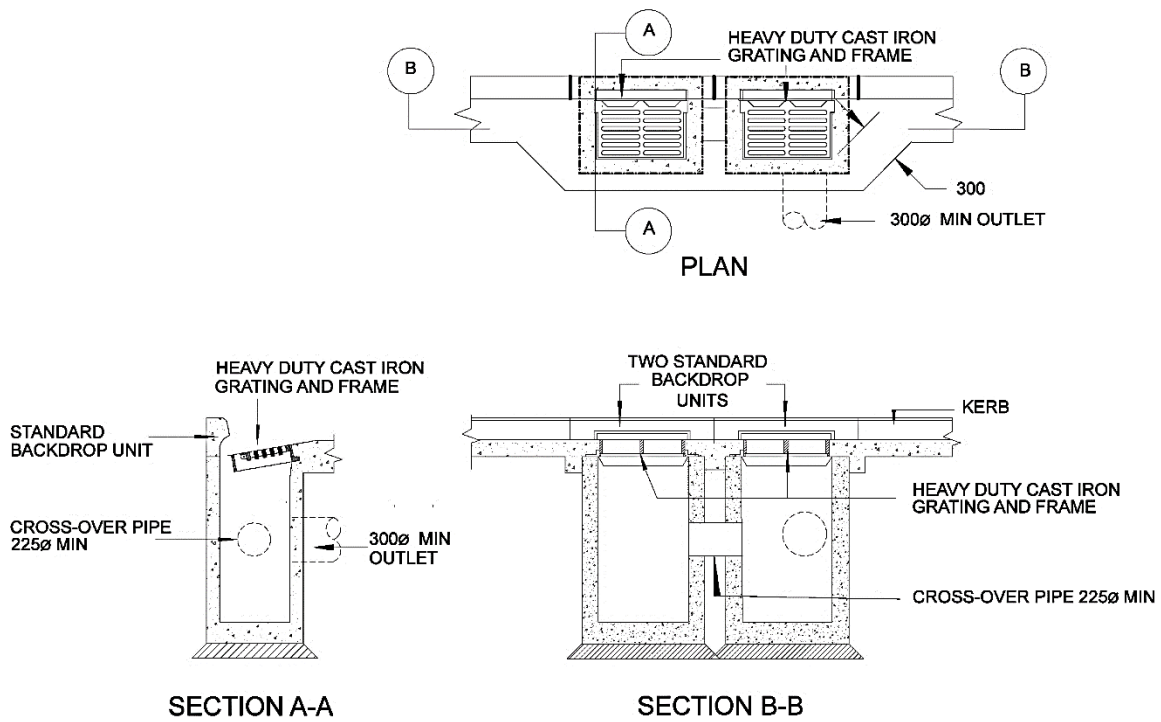
Drawing B5-12: Different Grate Layouts



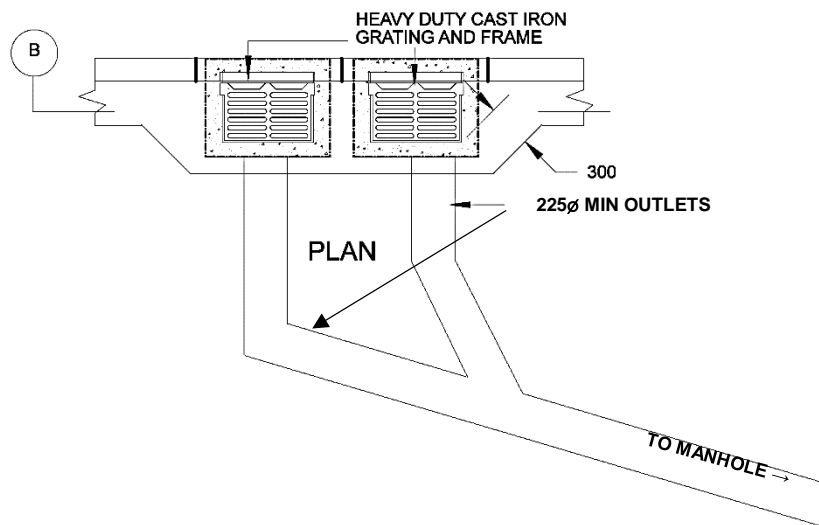
SECTION THROUGH GRATE

NOTE

Drawing B5-13: Standard Section Through Grate

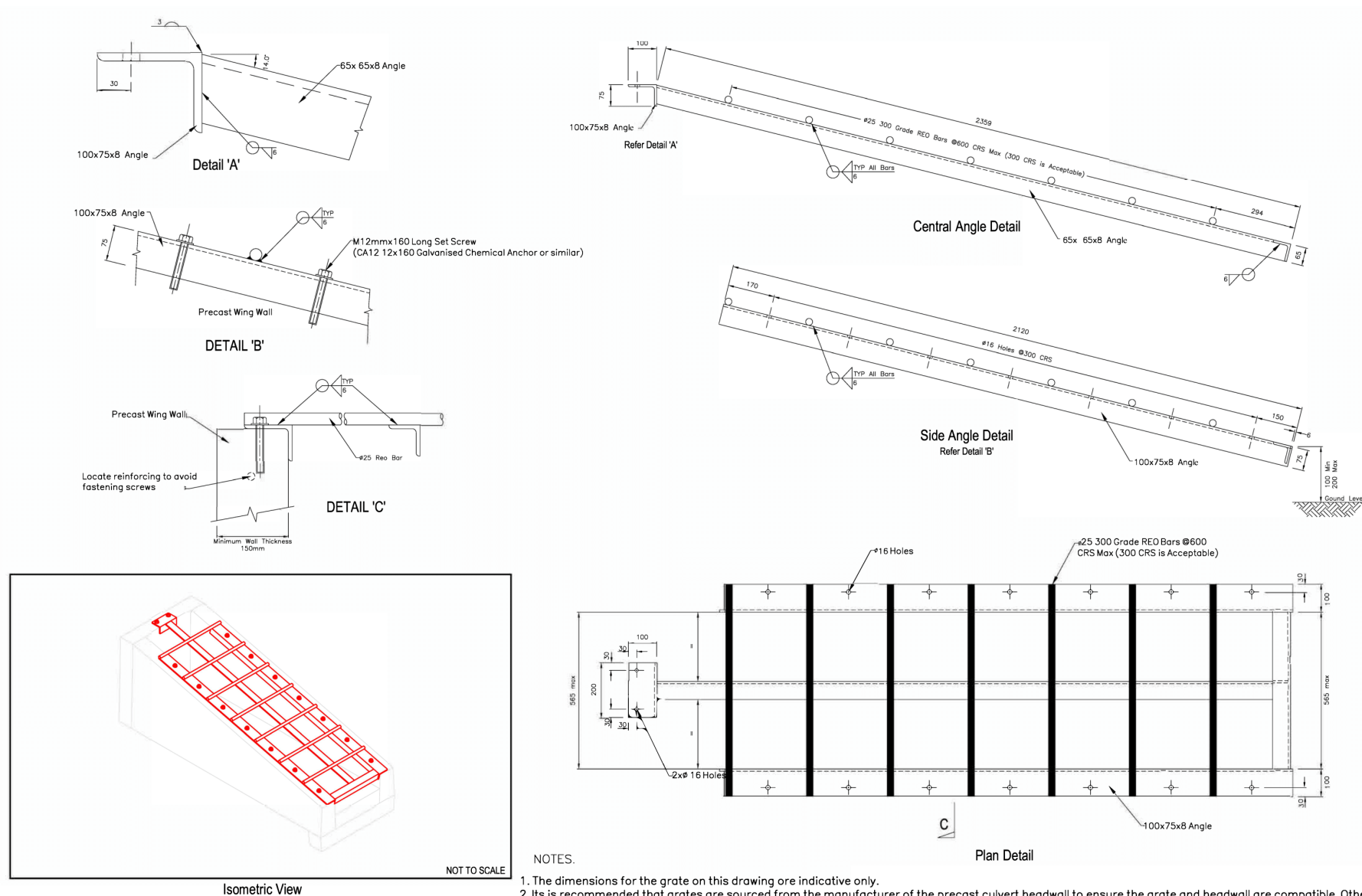


All dimensions are in millimetres



Alternative connection with outlets to main from both sumps

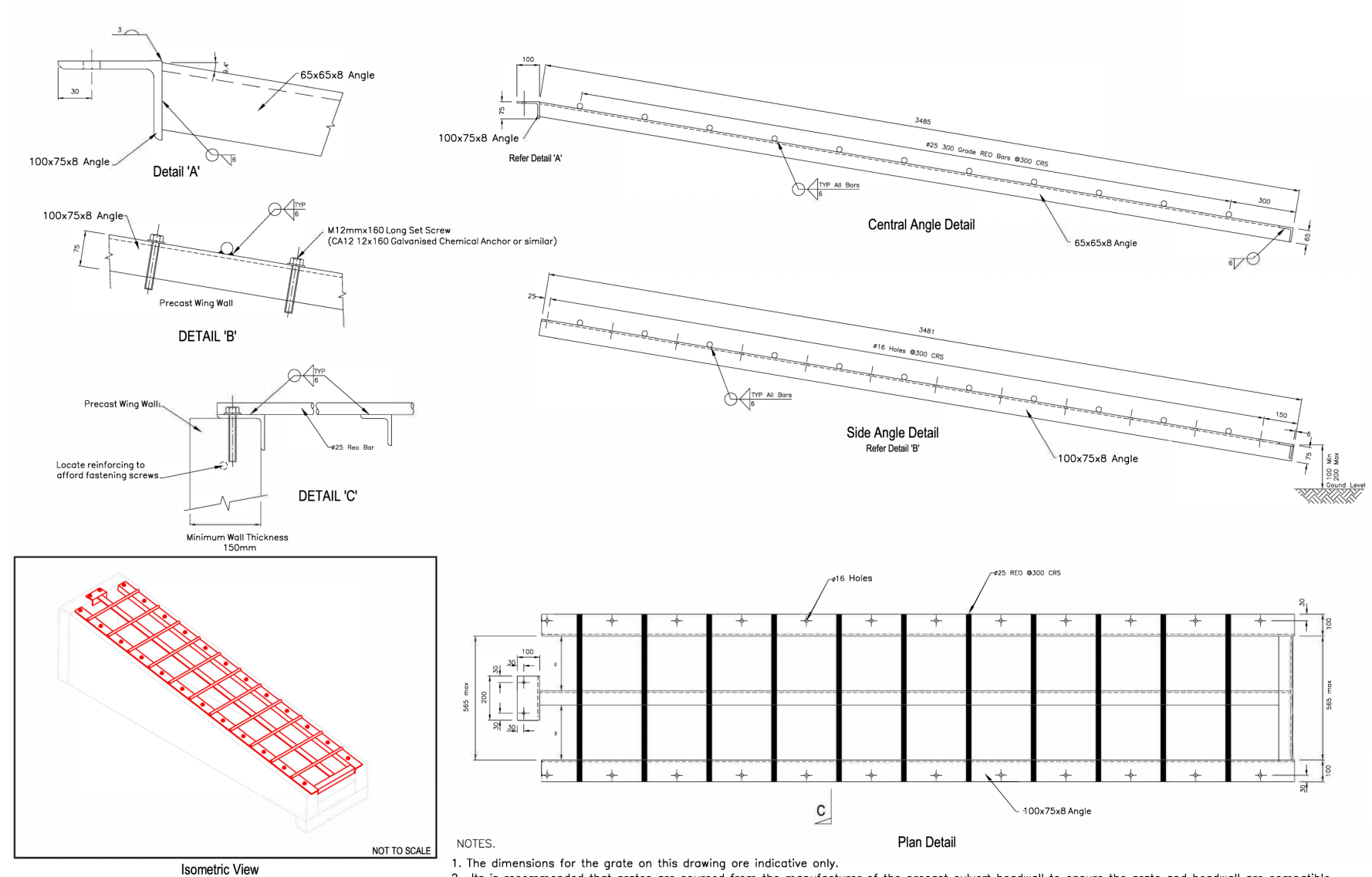
Drawing B5-15: Double back-entry sump for road low points and alternative



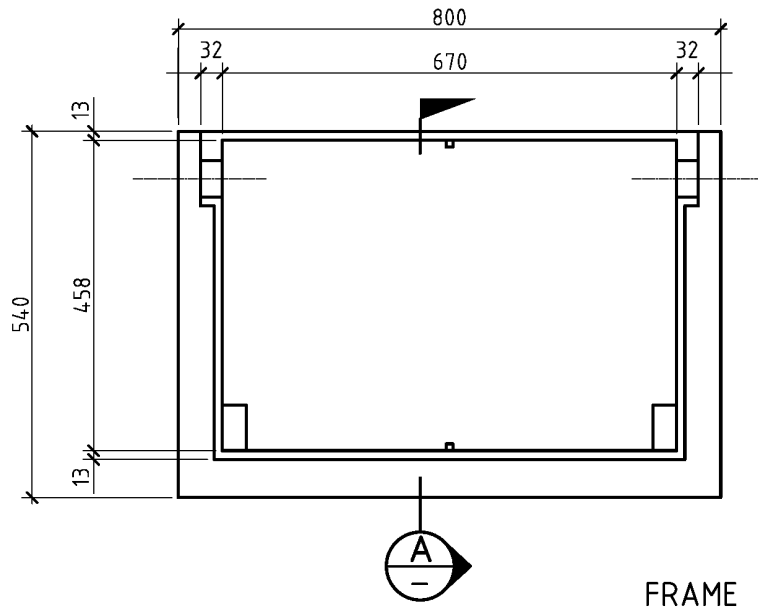
NOTES.

1. The dimensions for the grate on this drawing are indicative only.
2. Its is recommended that grates are sourced from the manufacturer of the precast culvert headwall to ensure the grate and headwall are compatible. Otherwi guidance should be sought from the manufacturer of the precast culvert headwall on the required dimensions for any grates not supplied by them.
3. The clear width between side walls of precast culvert headwall shall not exceed 600mm when using this grate.
4. Material Specifications for the following items;
Steel Angles – AS/NZS 3679.1:1996 Hot Rolled Bars and Sections
Reinforcing Bars – AS/NZS 4671 :2001 Steel Reinforcing Materials Galvanising – AS/NZS 4680:2006 Hot Dip Galvanising (Zinc) Coolings on Fabricated Ferrous Articles

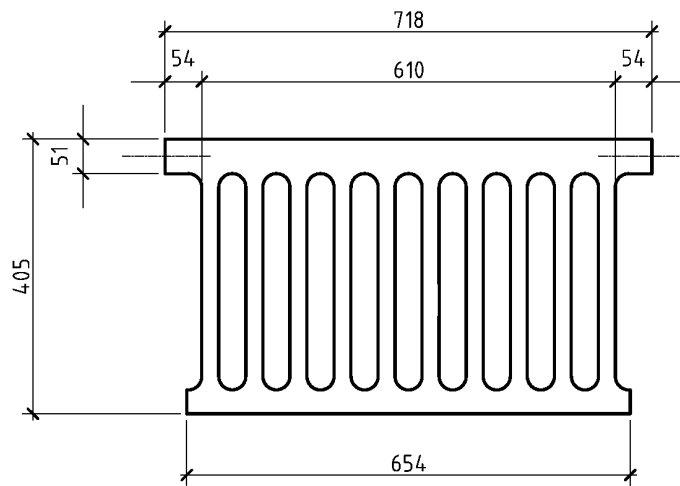
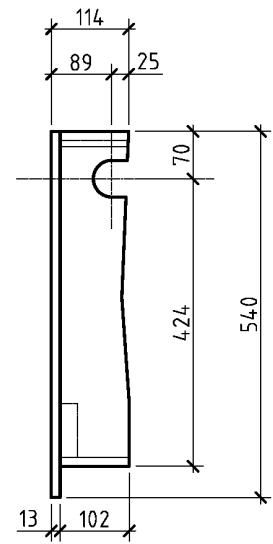
Drawing B5-16: Traversable Grates for Precast Headwalls 255mm to 450mm culverts



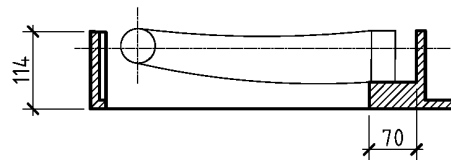
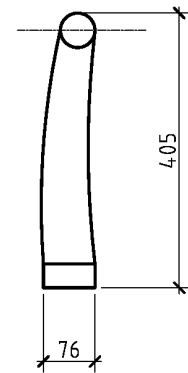
Drawing B5-17: Mountable Grates for Precast Headwalls 255mm to 450mm Culvert



FRAME



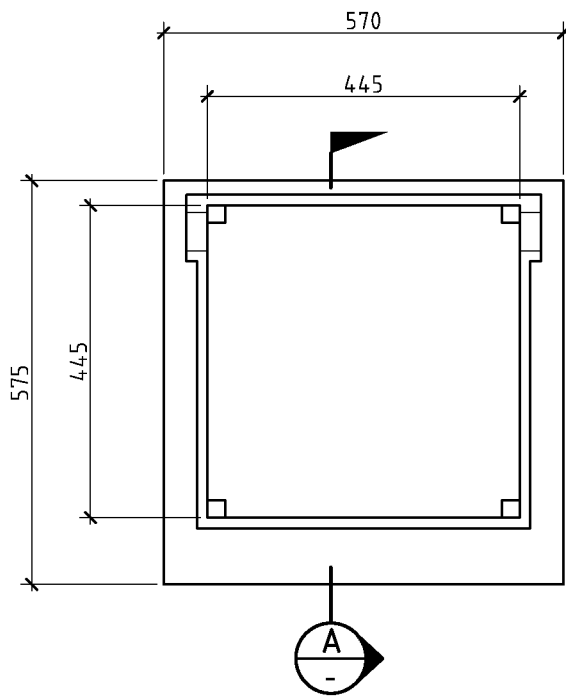
GRATE



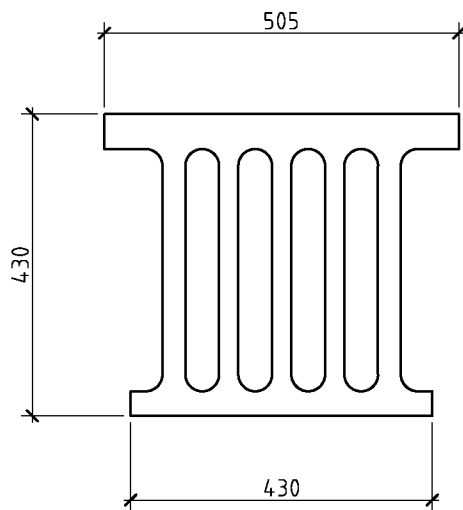
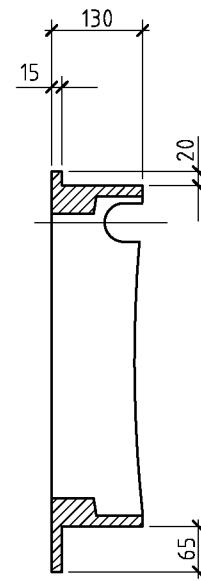
SECTION ON A

APPROXIMATE WEIGHTS
 GRATE: 75kg
 FRAME: 45kg

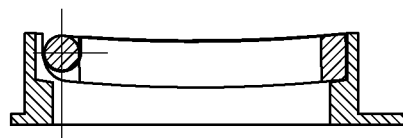
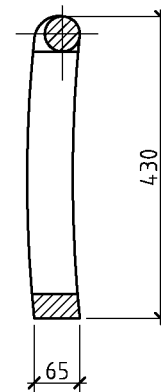
Drawing B5-18: Road Sump Detail: Heavy Duty Frame & Grate



FRAME



GRATE



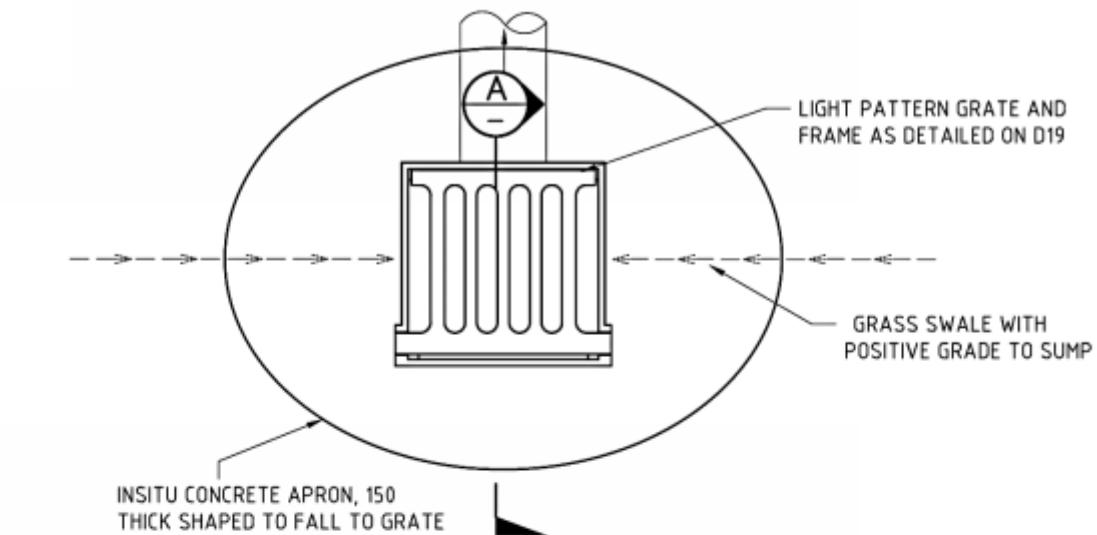
SECTION ON A

WEIGHTS

GRATE 60kg
FRAME 57kg

TOTAL 117kg

Drawing B5-16: Light Sump Frame & Grate



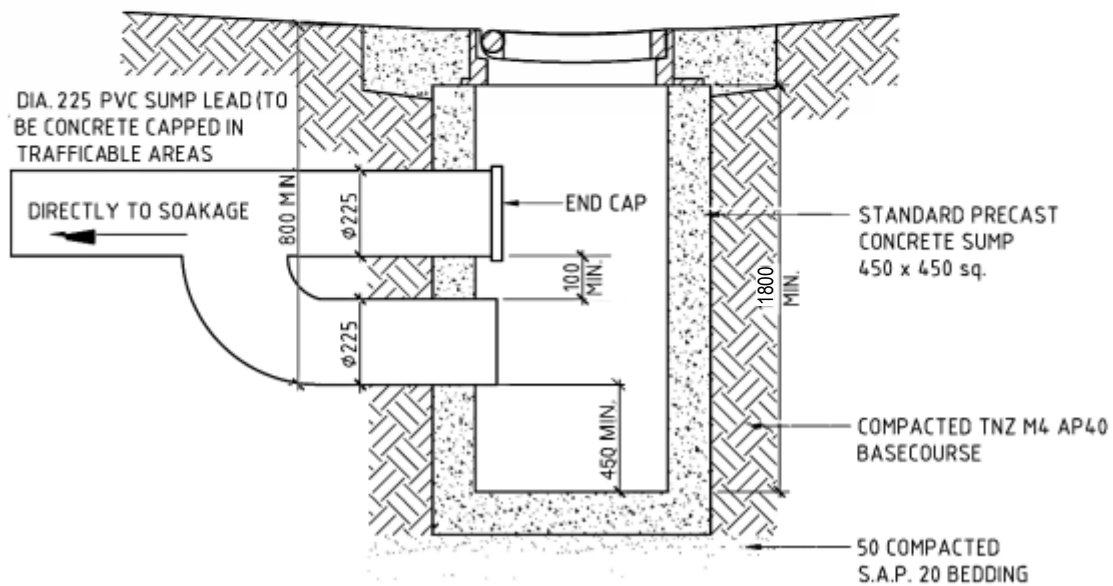
PLAN

STANDARD SUMP GRATING
AND FRAME (SEE D11).

NOTES

ALL CONCRETE TO BE ORDINARY GRADE
N.Z.S.S. 20MPa AT 28 DAYS.

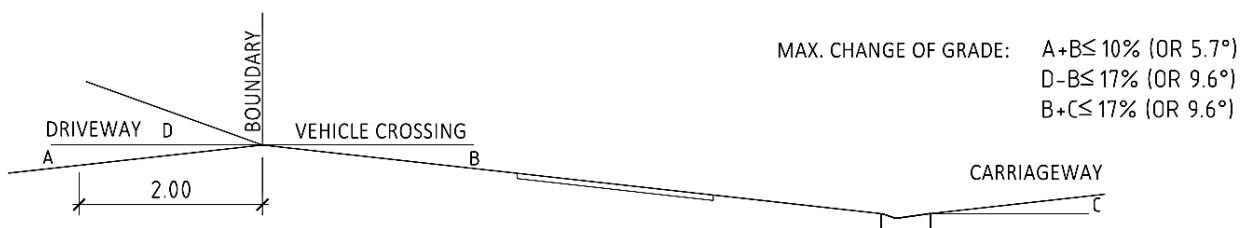
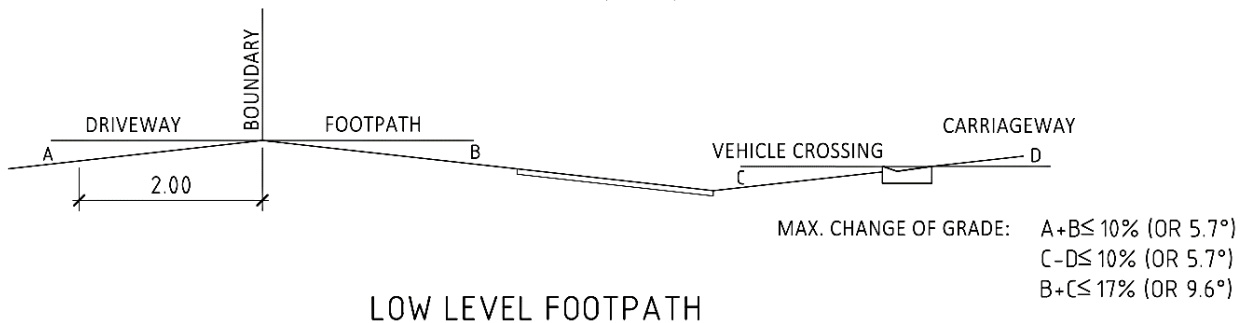
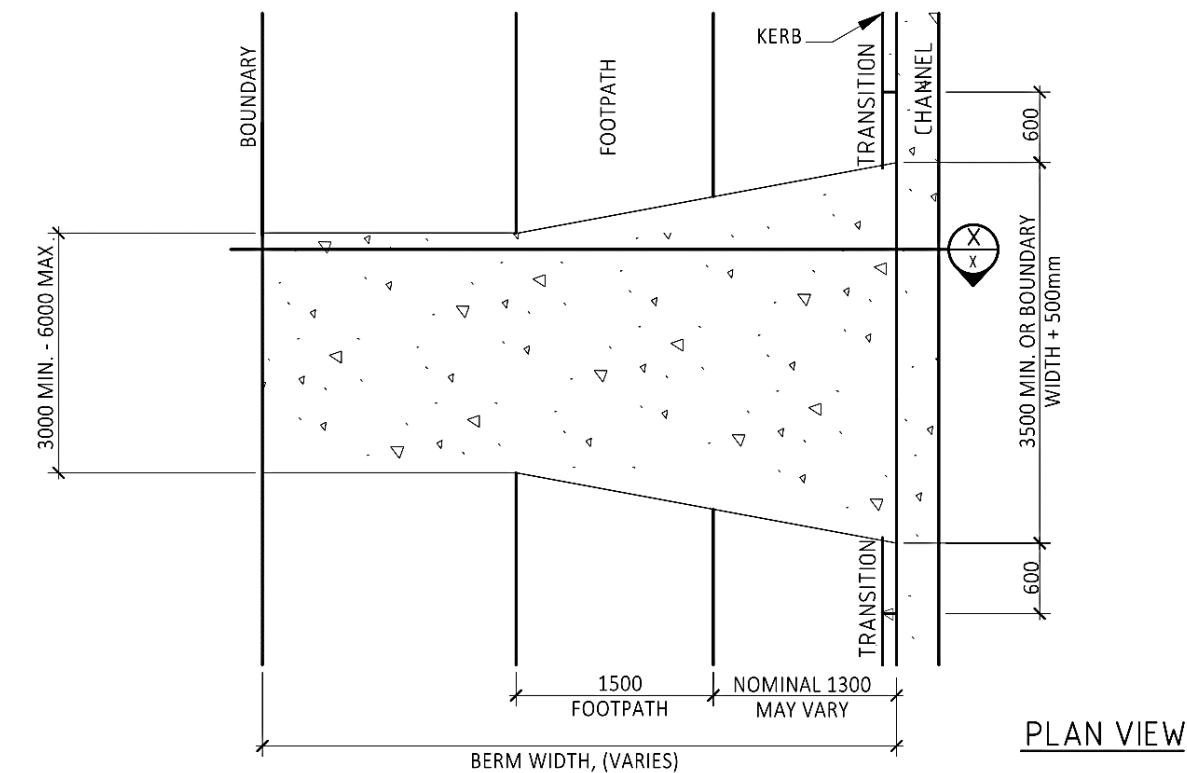
ALL PIPES TO BE FINISHED FLUSH WITH
INSIDE WALL OF SUMP.



SECTION A

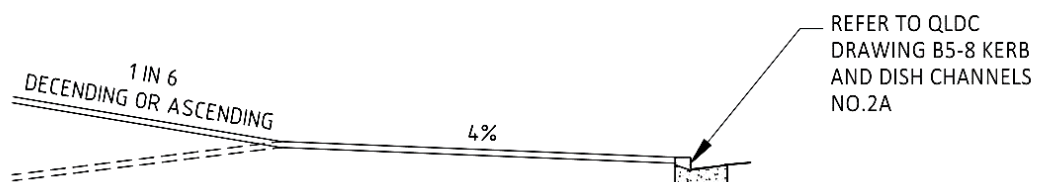
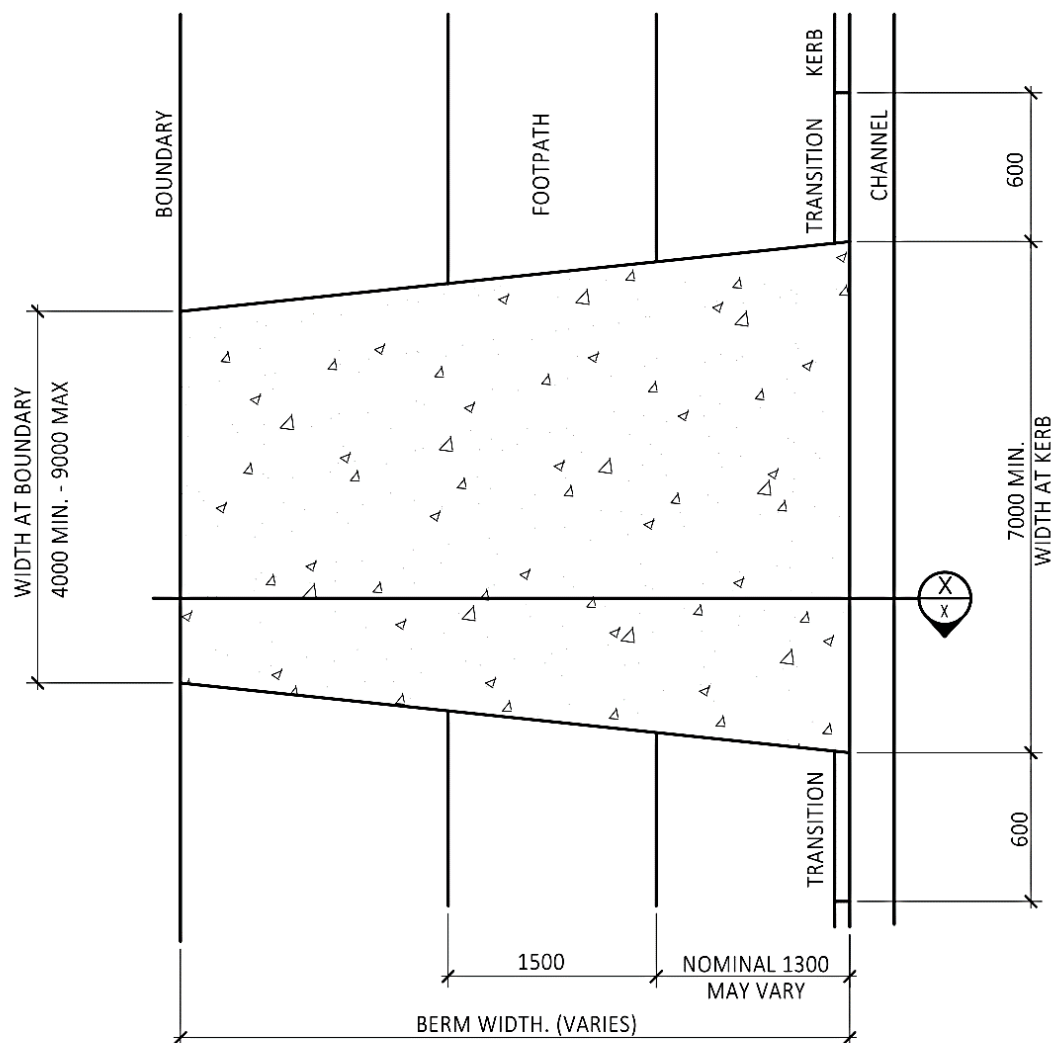
1. ALL SUMPS SHOULD BE 1800mm DEPTH
2. A MINIMUM SEDIMENT STORAGE DEPTH OF 450mm IS TO BE PROVIDED (TO INVERT OF PIPE)
3. CONCRETE CORBALS REQUIRED AT PIPE PENETRATIONS

Drawing B5-20: Berm Sump Detail



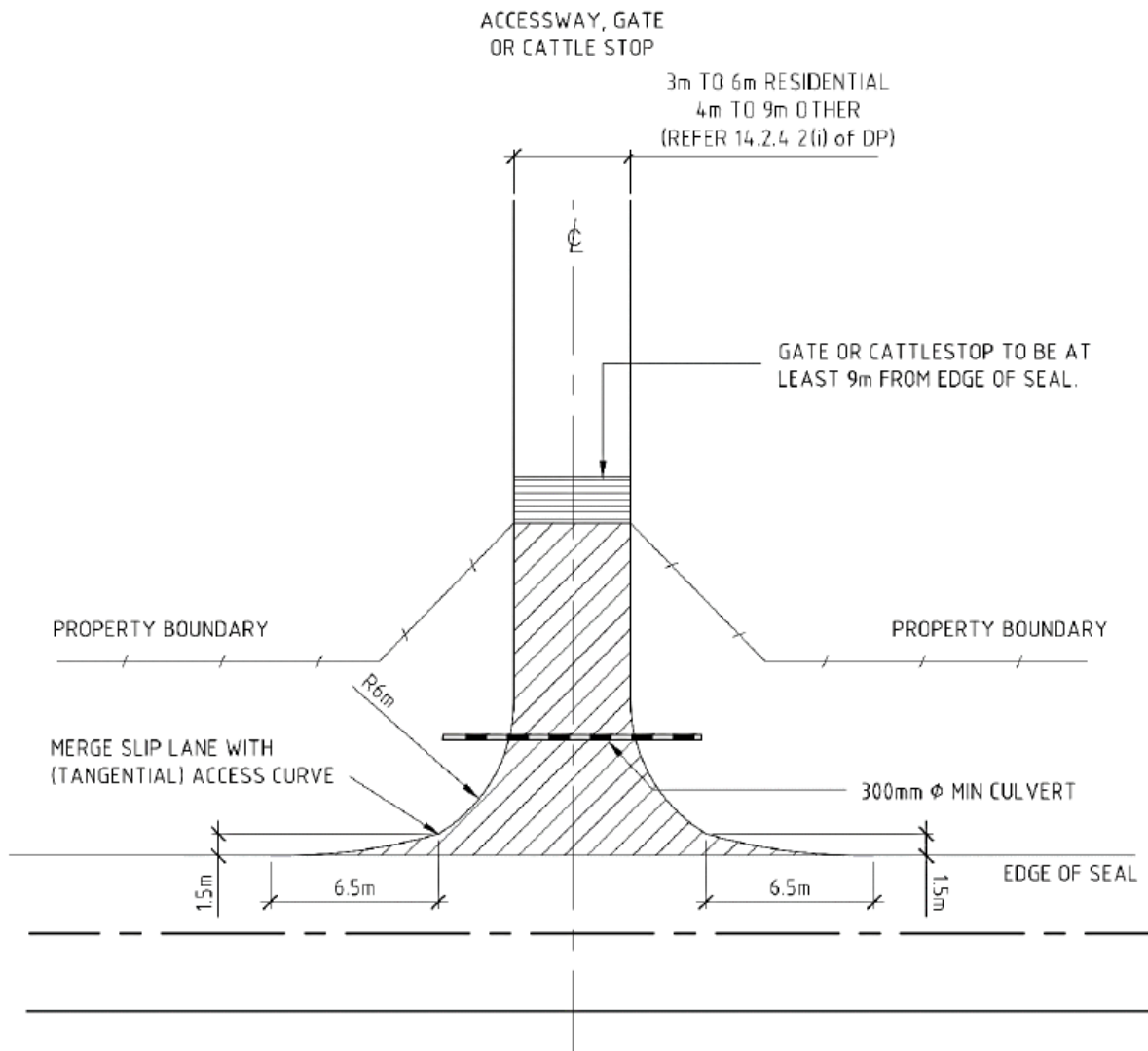
1. DESIGN OF ALL RESIDENTIAL CROSSINGS TO COMPLY WITH SECTION 14.2.4.2 OF THE DISTRICT PLAN.
2. CROSSING CONCRETE TO BE 125mm THICK REINFORCED WITH 665 MESH, CENTRALLY PLACED.
3. SURFACING TO BE CONCRETE WITH A MINIMUM **CRUSHING** STRENGTH OF 20 MPa AT 28 DAYS OR 30mm DG7 ASPHALT (NZTA M10 Notes TABLE N3.3), OR 2 COAT SEAL.
4. BASECOURSE TO BE A MINIMUM 100mm COMPACTED DEPTH OF M4 AP40 CRUSHED GRAVEL, OR 150mm M4 AP40 FOR 2 COAT SEAL
5. SUBGRADE TO BE TRIMMED AND COMPACTED TO ACHIEVE A MINIMUM CBR VALUE = 7.
6. MAXIMUM LONGITUDINAL GRADIENTS SHALL BE IN ACCORDANCE WITH SECTION 14.2.4.2 (iii) OF THE DISTRICT PLAN.
7. A, B, C, AND D REFER TO THE GRADIENTS EXPRESSED EITHER AS A PERCENT AGE OR IN DEGREES.
8. LOW SLUNG CARS WITH GROUND EFFECT FEATURES MAY NOT MEET THE CRITERIA ASSUMED IN THIS DESIGN GUIDE.
9. LTSA DOCUMENT LIGHT VEHICLE SIZES AND DIMENSIONS STREET SURVEY RESULTS AND PARKING SPACE REQUIREMENTS - ROAD AND TRAFFIC STANDARDS INFORMATION NO. 35 (JUNE 1994) CONTAINS MORE INFORMATION ABOUT THE 90TH AND 99TH PERCENTILE VEHICLES.
10. BUSES ARE PERMITTED LOWER CLEARANCE VALUE OF (A+B) OF 6% OR 3.4 DEGREES.

Drawing B5-21: Vehicle Crossing - Residential



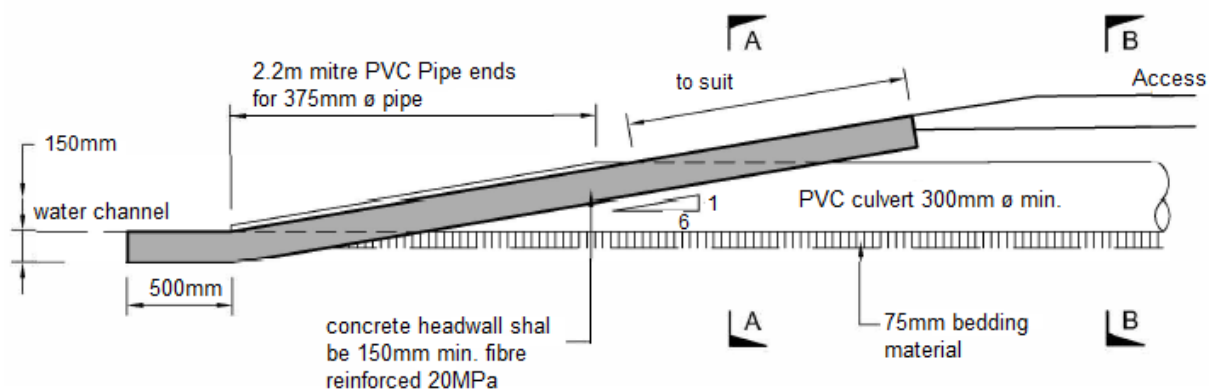
SECTION X-X

1. THE CONCRETE SHALL BE 150mm THICK AND REINFORCED WITH 665 MESH, CENTRALLY PLACED
2. THE CONCRETE SHALL HAVE A MINIMUM CRUSHING STRENGTH OF 20MPa AT 28 DAYS AND SHALL COMPLY WITH NZS 3124
3. CHANNEL CROSSING TO BE HEAVY DUTY REINFORCED WITH 3 D12 BARS
4. SUB-GRADE TO BE TRIMMED AND COMPACTED TO ACHIEVE A MIN. CBR VALUE OF >7
5. DESIGN OF ALL COMMERCIAL CROSSINGS TO COMPLY WITH SECTION 14.2.4.2 OF THE DISTRICT PLAN
6. MAXIMUM LONGITUDINAL GRADIENTS SHALL BE IN ACCORDANCE WITH SECTION 14.2.4.2 (iii) OF THE DISTRICT PLAN
7. ONLY CONCRETE IS PERMITTED (ASPHALT NOT PERMITTED)

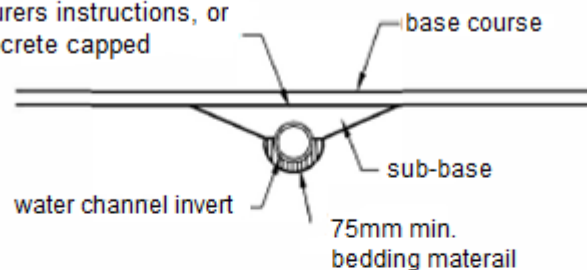


1. CROSSING TO BE MINIMUM 4.5M WIDE AT ENTRANCEWAY & INCORPORATE MIN.6M RADIUS
2. PAVEMENT CONSTRUCTION TO BE 100MM COMPACTED M4 AP40 BASECOURSE ON 150MM COMPACTED DEPTH OF AP65 SUBBASE ON COMPACTED SUB-GRADE WITH CBR > 7 (FOR ACCESSWAY INTERNAL TO SITE AS WELL AS LINKING SITE AND LEGAL ROAD)
3. WHERE THE CROSSING INTERCEPTS EXISTING SIDE DRAINAGE, A MIN. 300MM ϕ CULVERT IS TO BE INSTALLED.
4. IF THE APPLIED SURFACE IS CHIP SEAL A SECOND COAT SEAL IS REQUIRED TO BE PROGRAMMED AND CONSTRUCTED WITHIN 12 MONTHS FROM CONSTRUCTION OF THE FIRST COAT OR IN THE NEXT SUMMER SEASON, WHICHEVER COMES FIRST.
5. CULVERT TO BE FINISHED WITH CONCRETE HEADWALLS AS PER DRAWING B5-24: NON-PRECAST HEADWALL DETAIL OR DRAWING B5-16: TRAVERSABLE GRATES FOR PRECAST HEADWALLS 250MM TO 450MM CULVERTS

Drawing B5-23: Private Rural Access



Cover over culvert to be as per the manufacturers instructions, or otherwise concrete capped or encased



SECTION B-B: ACCESS PIPE BEDDING

Cover over culvert to be as per the manufacturers instructions, or otherwise concrete capped or encased

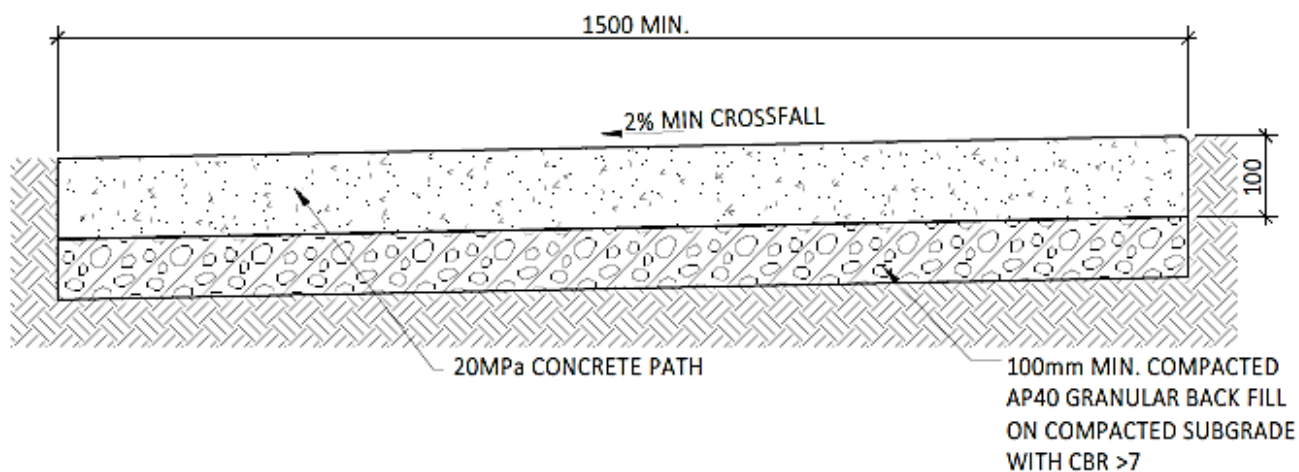


SECTION A-A: CONCRETE HEADWALL

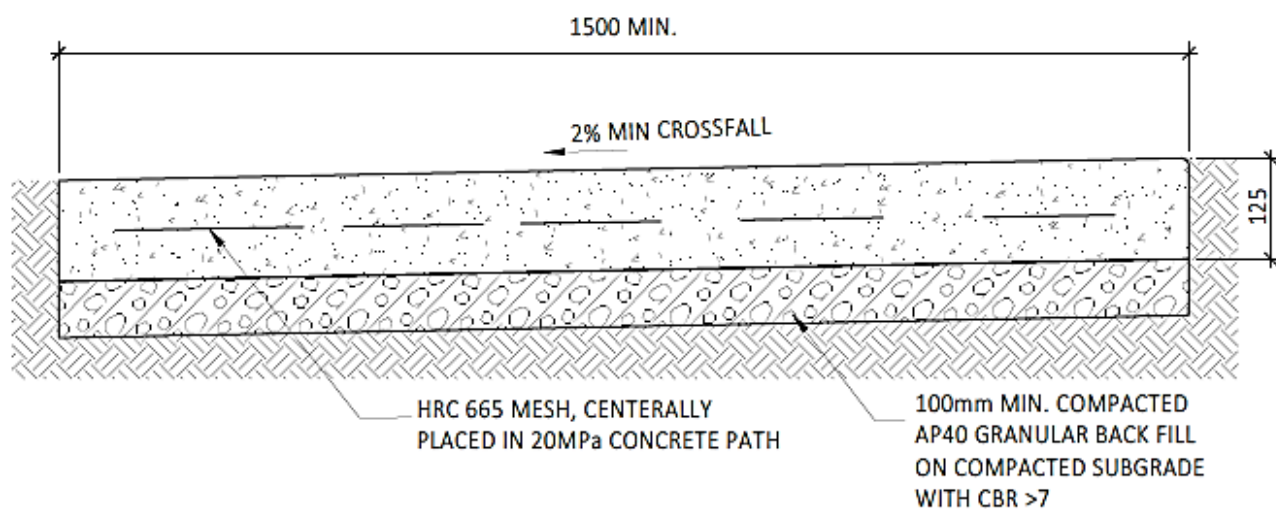
91

1. WHERE THE ACCESS INTERCEPTS EXISTING SIDE DRAINAGE / WATER TABLE, A 300MM MIN. DIAMETER (OR MIN. DIAMETER OF UPSTREAM CULVERT, WHICHEVER IS THE GREATER) CULVERT IS TO BE INSTALLED.
2. PIPE TO BE HEAVY PVC OR CONCRETE WITH APPROPRIATE BEDDING
3. COVER OVER CULVERT TO BE AS PER THE MANUFACTURERS INSTRUCTIONS, OR OTHERWISE CONCRETE CAPPED OR ENCASED.
4. CULVERT ENDS TO BE MITRED TO A GRADIENT OF 1V:6H.
5. CONSTRUCT CONCRETE HEADWALL AND APRON AROUND PIPE ENDS AND CHANNEL INVERT.

Drawing B5-24: Non-Precast Headwall Detail

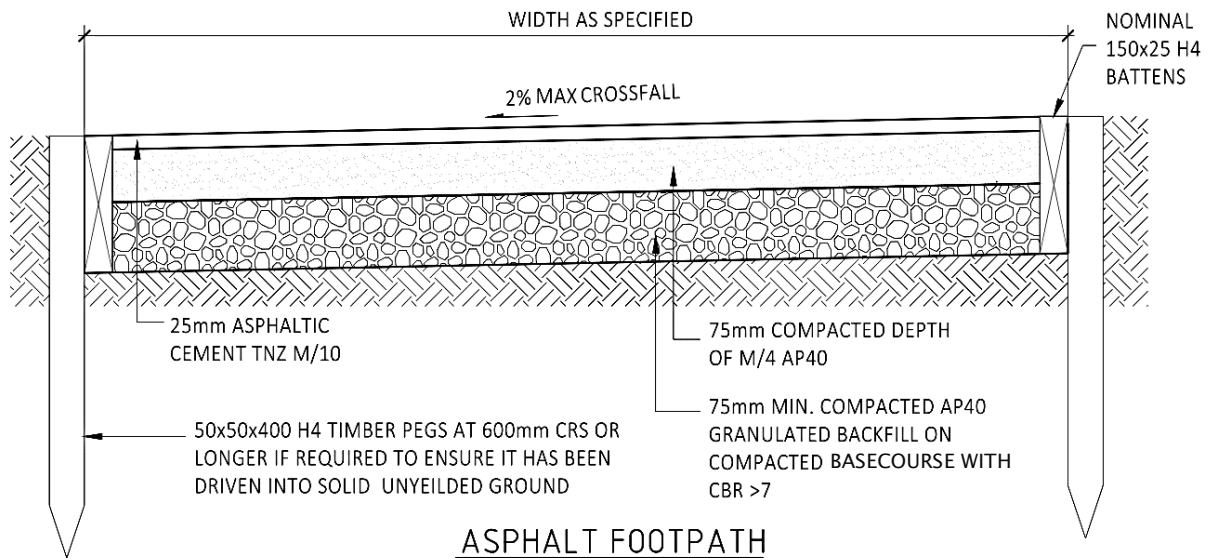


CONCRETE FOOTPATH

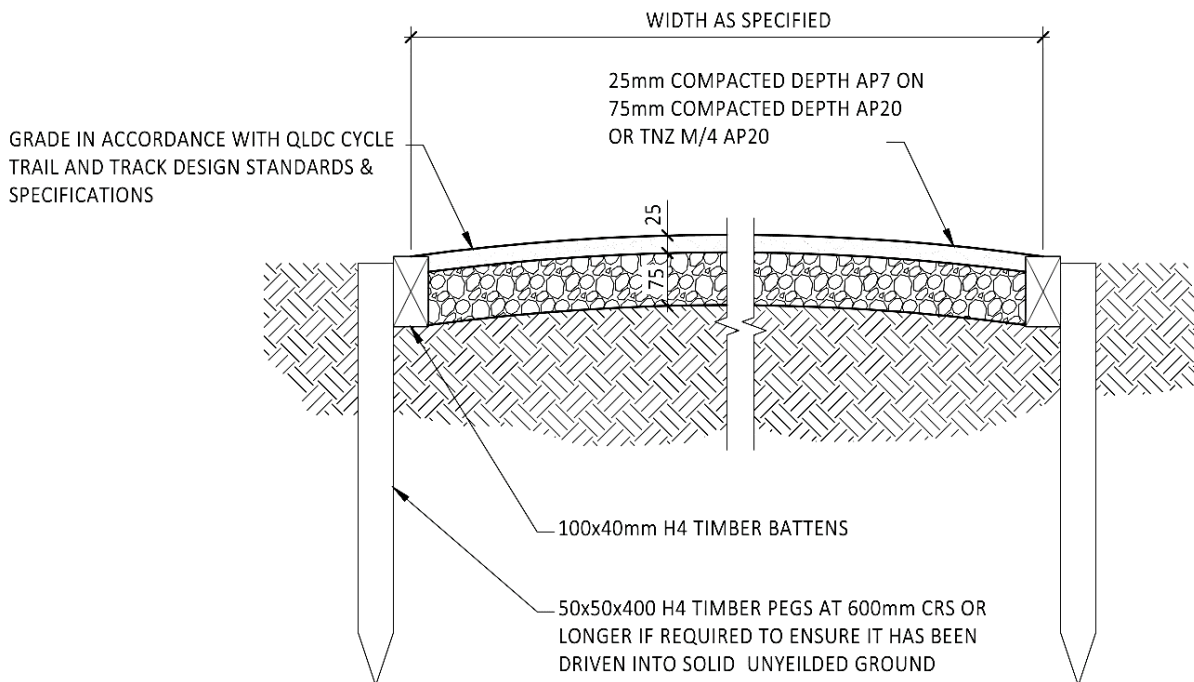


HEAVY DUTY CONCRETE FOOTPATH

Drawing B5-25: Heavy Duty Footpath



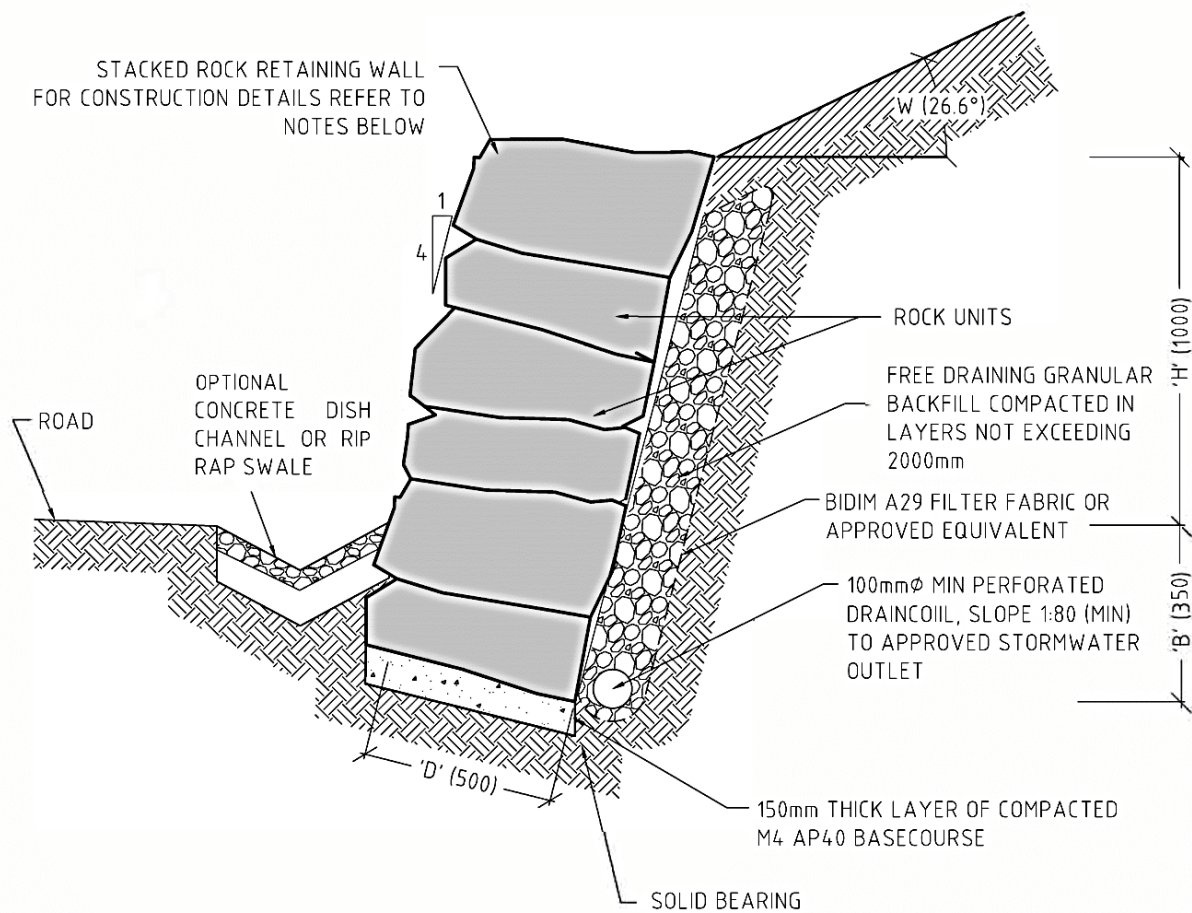
NOTE: RE. MIN CBR OF 7 REQUIRED AND SUB-BASE OF 75mm



NOTES:

1. CROSSFALLS TO BE NOMINALLY 3% (CROWNED OR CONTINUOUS CROSSFALLS AS SPECIFIED).
2. SUBGRADE & METALCOURSE TO BE TREATED WITH APPROVED SOIL STERILANT
3. PEGS TO BE AT LEAST 5mm BELOW BATTENS
4. PEGS CAN BE CUT OFF AT AN ANGLE, FLUSH WITH BOXING ON SIDE AND 5-10mm DOWN ON THE OTHER

Drawing B5-26: Footpath - Asphalt & Gritted Detail

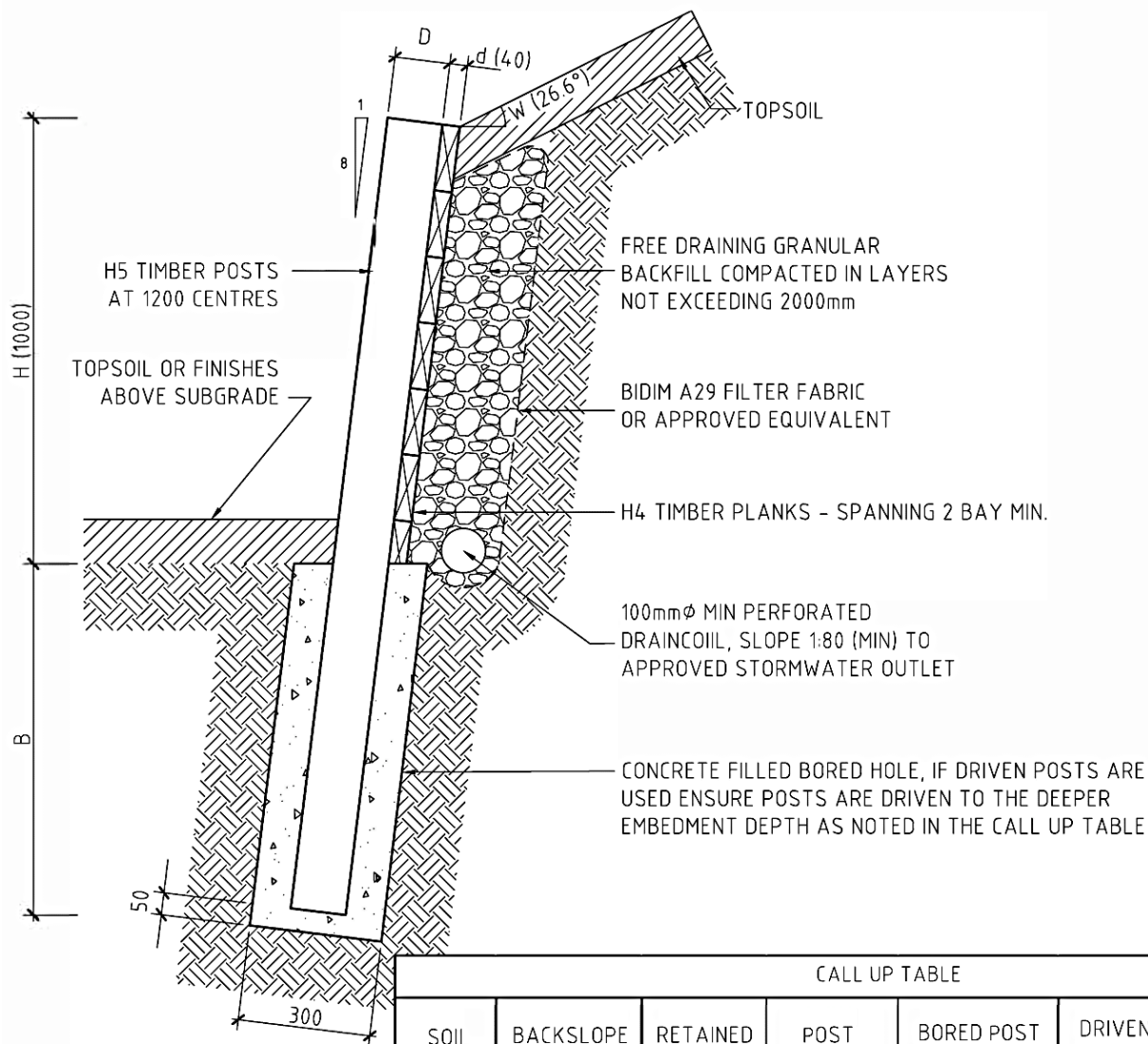


NOTES:

- EXCAVATE BASE OF WALL TO COMPETENT BEARING SURFACE (MINIMUM ALLOWABLE BEARING CAPACITY OF 100 kPa), NOTIFY THE ENGINEER AT THE COMPLETION OF THE EXCAVATION AND PRIOR TO PLACEMENT OF THE FIRST LAYER OF ROCK UNITS.
- ROCK UNITS ARE TO BE A MINIMUM SIZE 1000mm LONG AND 400mm HIGH TO THE MINIMUM WIDTH SPECIFIED IN THE CALL UP TABLE. ROCK UNITS FOR USE IN THE WALL ARE TO BE SELECTED FOR PLACEMENT BASED ON UNIFORMITY AND BEST FIT.
- ROCK UNITS SHALL NOT BE PLACED SUCH THAT THEIR BASE SLOPES BELOW THE HORIZONTAL AWAY FROM THE RETAINED SLOPE.
- THE MINIMUM WALL WIDTH SHOWN IN THE CALL UP TABLE AS THE MINIMUM BEARING WIDTH AND SHALL BE MAINTAINED AT ALL TIMES.
- ALL PROPRIETY PRODUCTS AND SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.
- NOTIFY THE ENGINEER FOR INSPECTION AT THE COMPLETION OF THE SECOND LAYER OF ROCK UNITS.
- CONFIRM ALL DIMENSIONS ON SITE. DO NOT SCALE FROM THE DRAWINGS OR SKETCHES.
- RETAINED SOIL CONDITIONS TO BE CONFIRMED BY ENGINEER PRIOR TO CONSTRUCTION.

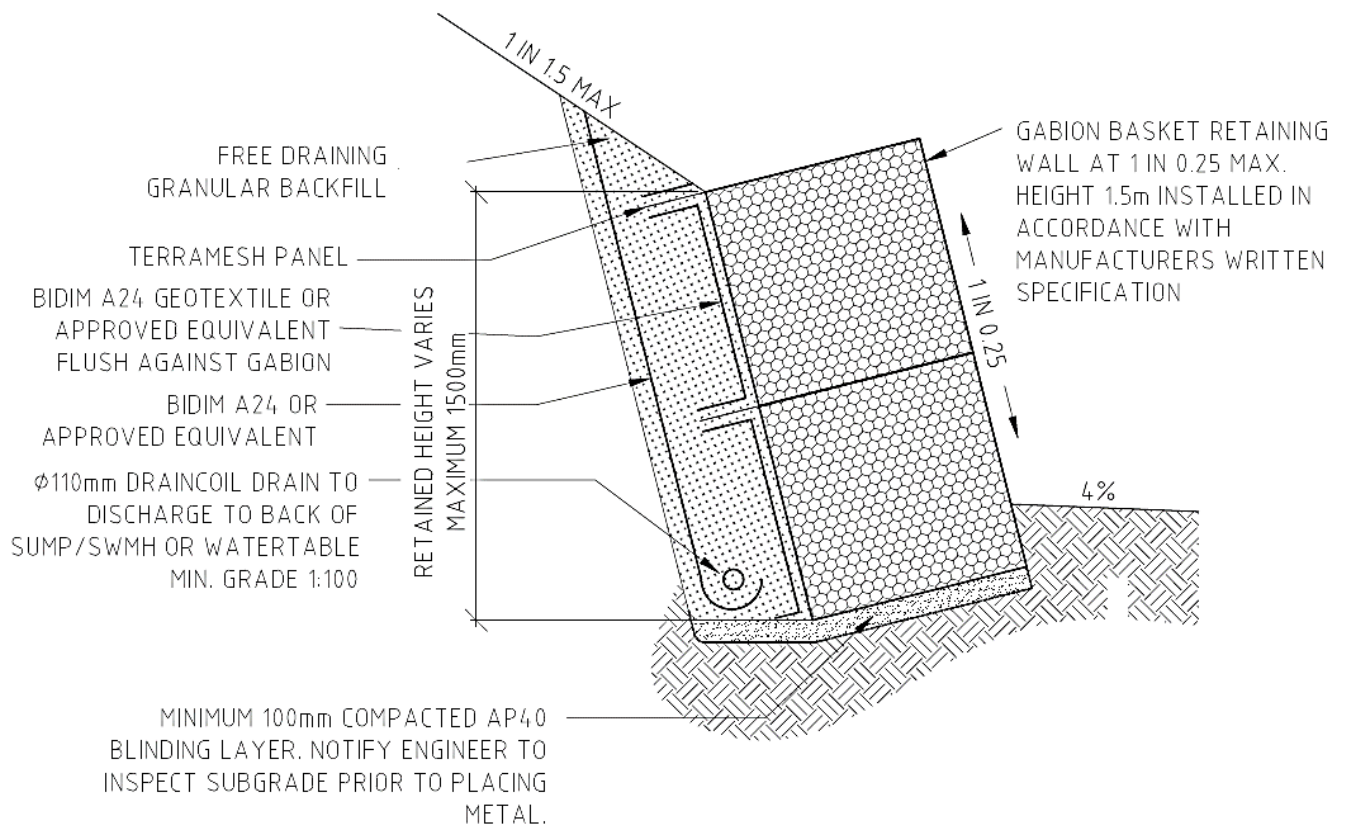
CALL UP TABLE				
SOIL TYPE	BACKSLOPE ANGLE (MAX)	RETAINED HEIGHT	ROCK UNIT DEPTH (MIN)	KEY EMBEDMENT
Φ	ω	H	D	B
(o)	(o)	(mm)	(mm)	(mm)
SILT $\Phi=25^\circ$	0°	1000	450	350
		1500	700	500
	$21.8^\circ (1:2.5)$	1000	600	450
		1500	1000	600
SAND $\Phi=30^\circ$	0°	1000	350	250
		1500	550	400
	$26.6^\circ (1:2.0)$	1000	500	350
		1500	850	450
GRAVEL $\Phi=35^\circ$	0°	1000	250	200
		1500	400	300
	$26.6^\circ (1:2.0)$	1000	350	250
		1500	600	300
	$33.7^\circ (1:1.5)$	1000	500	300
		1500	900	400

Drawing B5-28: Low Retaining Wall: Stacked Rock

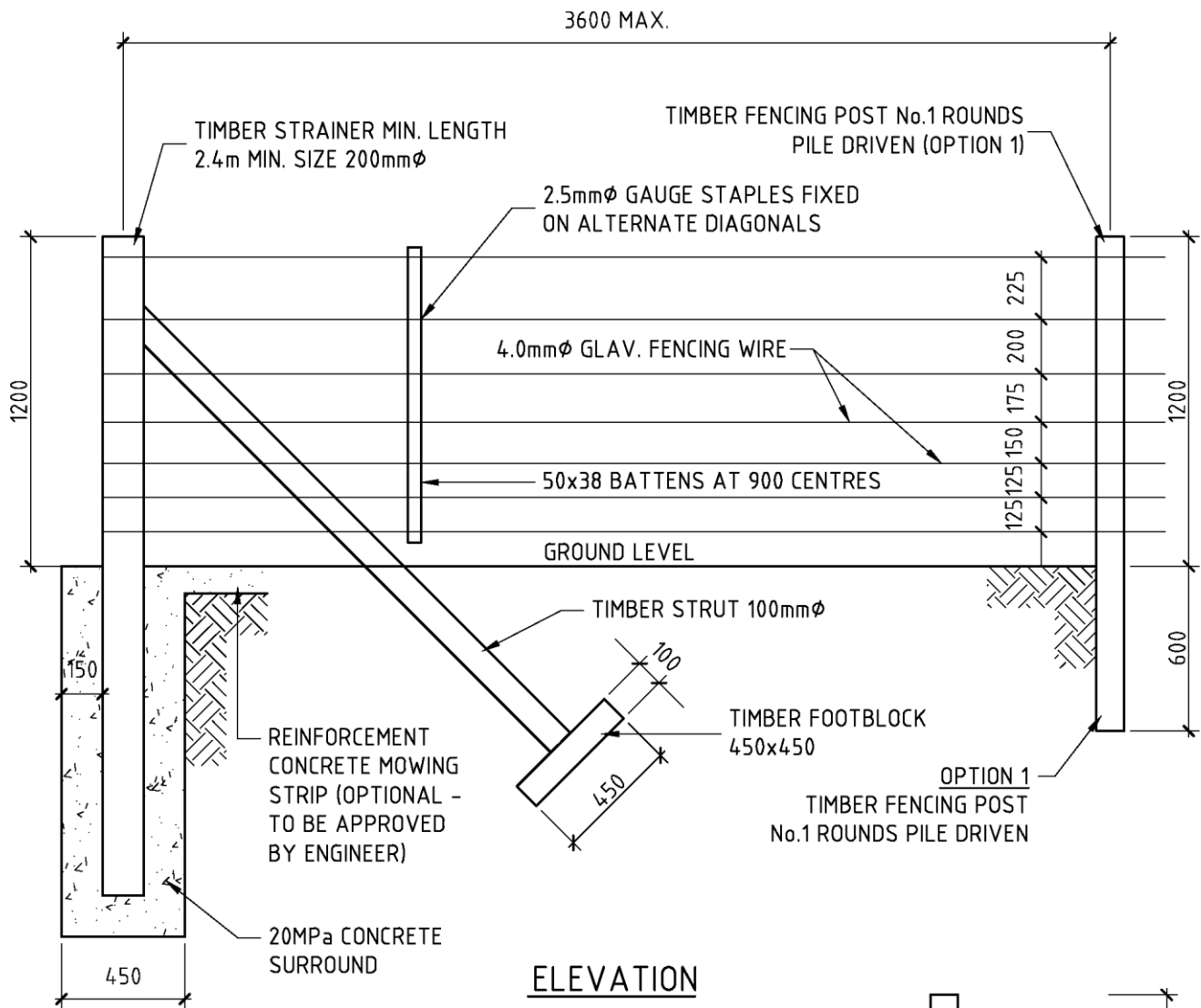


CALL UP TABLE						
SOIL TYPE	BACKSLOPE ANGLE (MAX)	RETAINED HEIGHT (MAX)	POST DIAMETER (SED)	BORED POST EMBEDMENT (MIN)	DRIVEN POST EMBEDMENT (MIN)	PLANK WIDTH (MIN)
Φ	ω	H	D	B	B	d
(o)	(o)	(mm)	(mm)	(mm)	(mm)	(mm)
SILT $\Phi=25^\circ$	0°	1000	125	900	1500	45
		1500	175	1500	2400	57
	$21.8^\circ (1:2.5)$	1000	125	1100	2000	57
		1500	200	2100	2800	57
SAND $\Phi=30^\circ$	0°	1000	125	800	1300	40
		1500	150	1400	2300	50
	$26.6^\circ (1:2.0)$	1000	125	1000	1800	50
		1500	175	1900	2800	57
GRAVEL $\Phi=35^\circ$	0°	1000	125	700	1100	40
		1500	150	1200	1900	45
	$26.6^\circ (1:2.0)$	1000	125	800	1400	40
		1500	175	1500	2200	50
	$33.7^\circ (1:1.5)$	1000	125	1100	1900	50
		1500	200	2000	2700	57

Drawing B5-29: Low Retaining Wall: Post & Plank



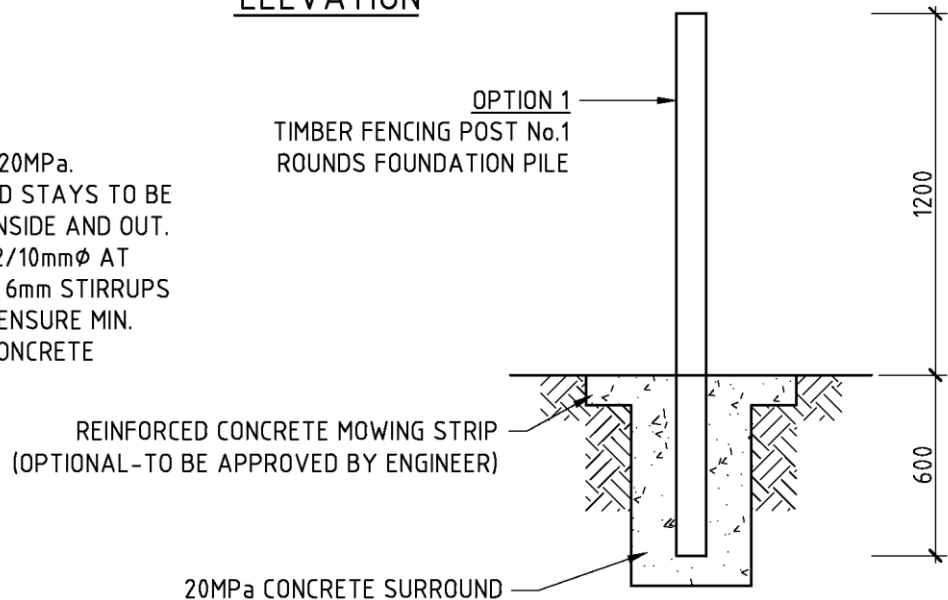
Drawing B5-30: Low Retaining Wall: Gabion



ELEVATION

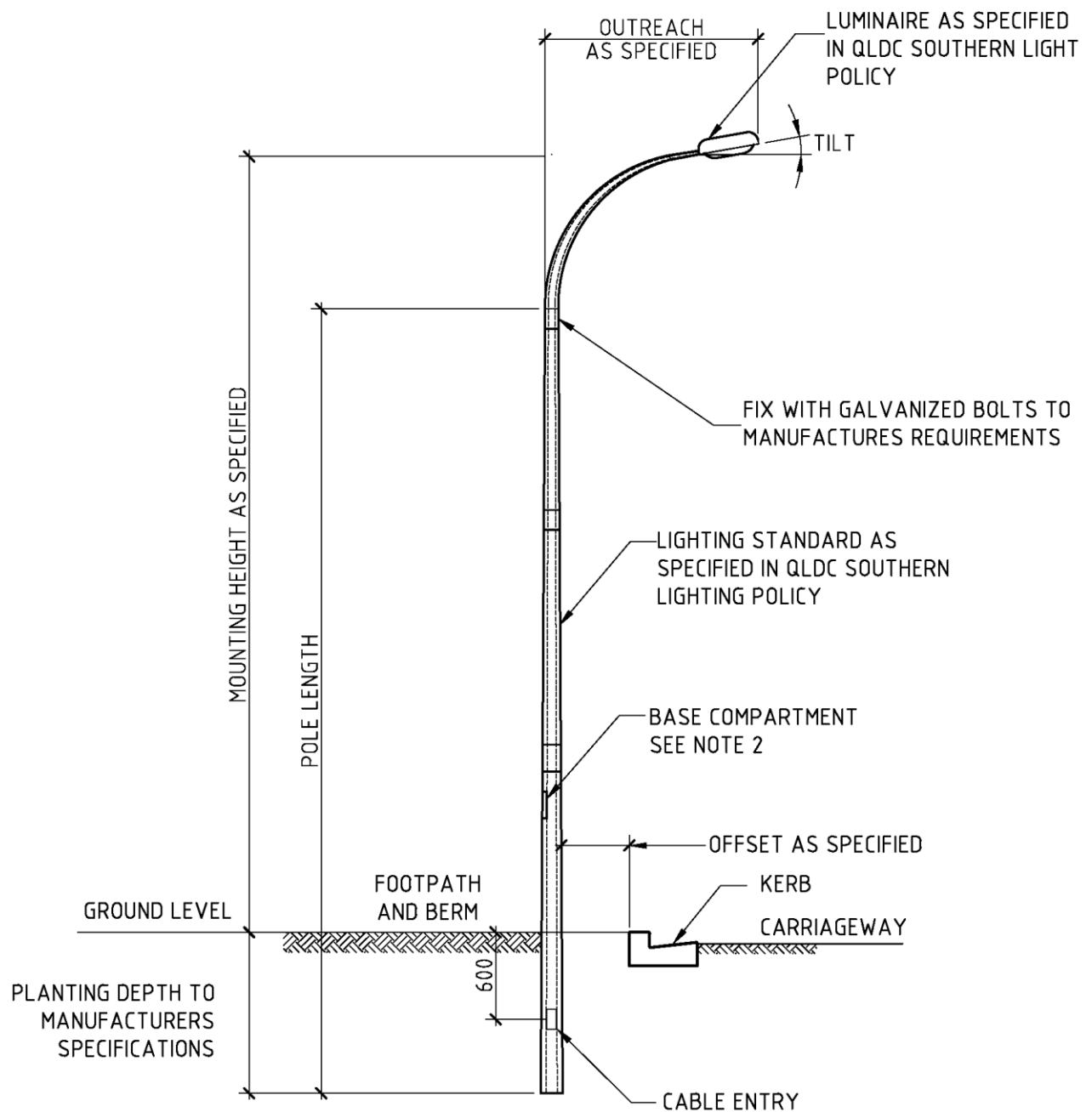
NOTES:

1. ALL CONCRETE TO BE 20MPa.
2. ALL POSTS, RAILS AND STAYS TO BE STEEL, GALVANISED INSIDE AND OUT.
3. REINFORCING BARS - 2/10mm ϕ AT 225mm CENTRES WITH 6mm STIRRUPS AT 1000mm CENTRES, ENSURE MIN. 50mm COVERAGE OF CONCRETE



OPTION 1

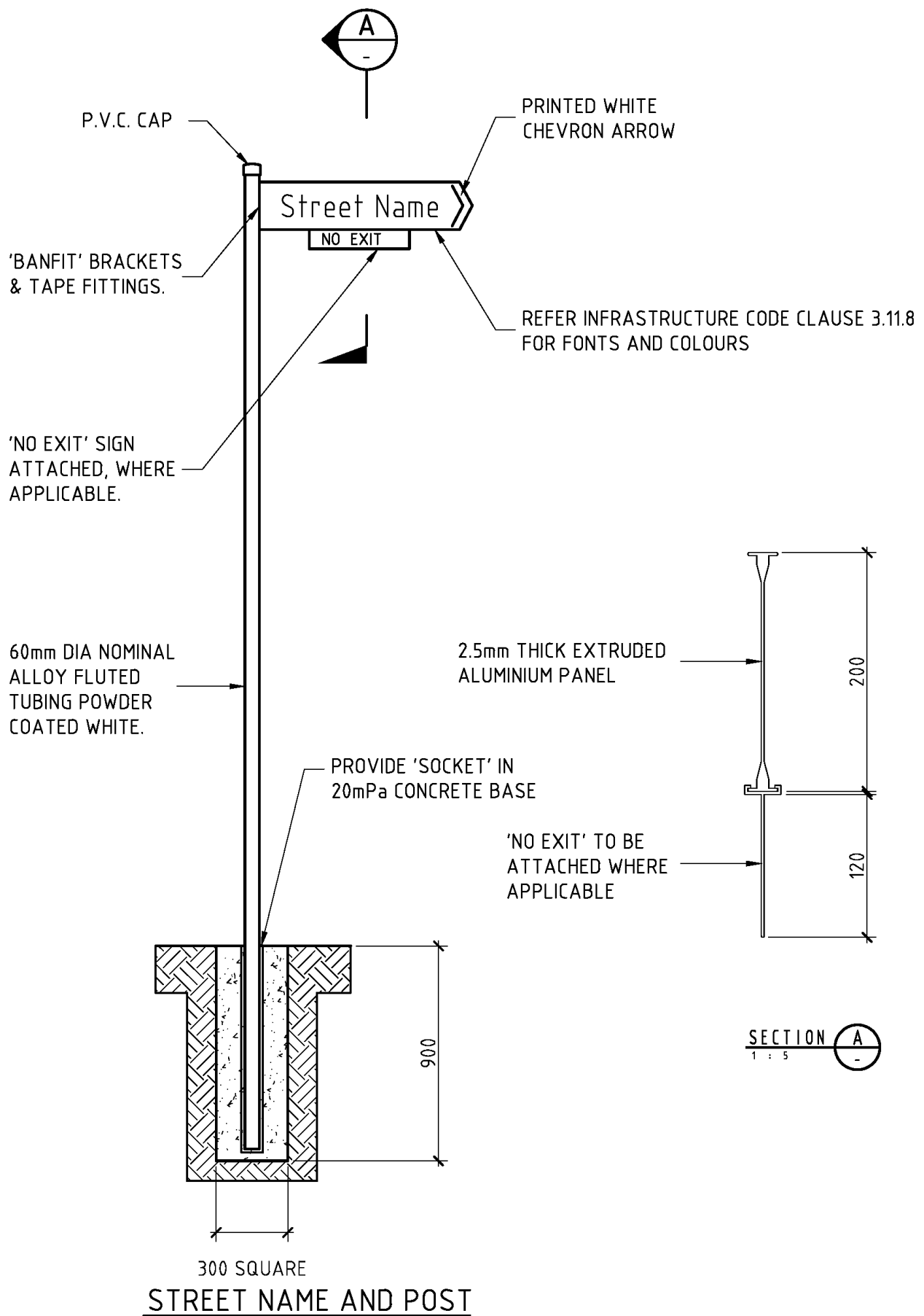
Drawing B6-1: 7 Wire Plain Fence



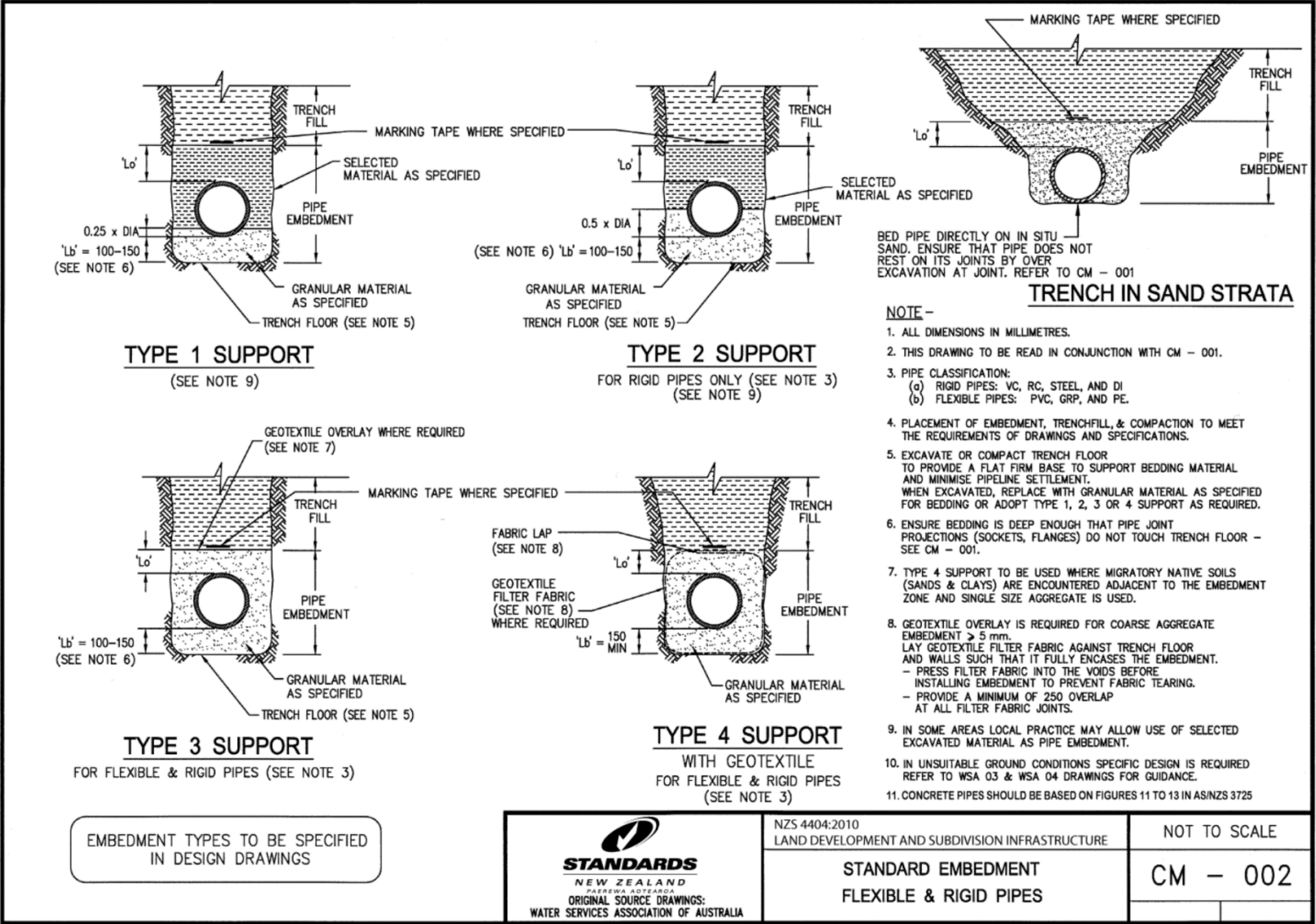
NOTES:

1. OFFSET FOR ROADWAYS WITHOUT KERB, IS TAKEN FROM THE WHITE EDGE LINE.
2. BASE COMPARTMENT DOOR IS TO FACE THE ADJECENT FOOTPATH. DOOR IS TO BE SECURED WITH 6mm (OR 8mm) ALLEN KEY SCREWS. SETSCREW THREADS TO BE COATED WITH LONGLIFE ANTICORROSIVE GREASE.

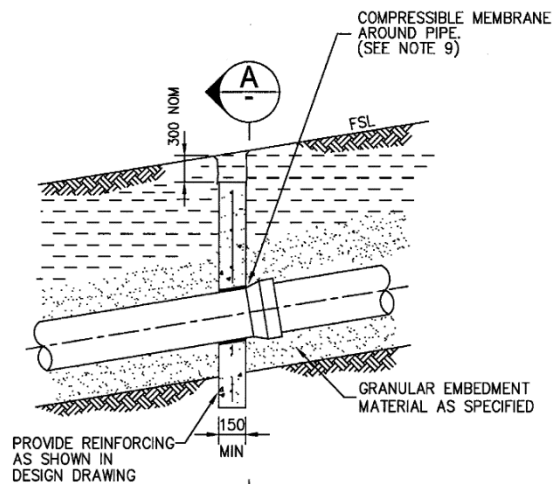
Drawing B6-2: Street Lighting: Ground Planted Columns



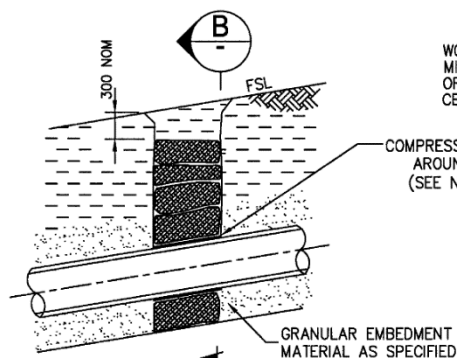
Drawing B6-3: Street Sign: Pole Mount



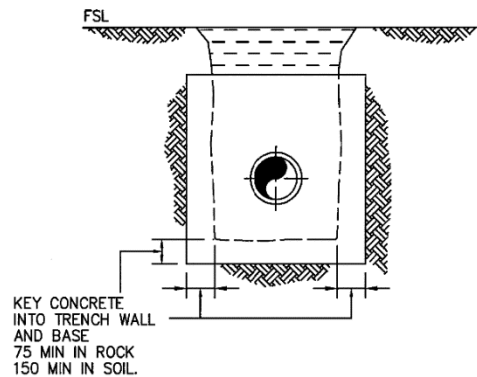
Drawing B7-1: CM - 001 Embedment & Trenchfill Arrangement



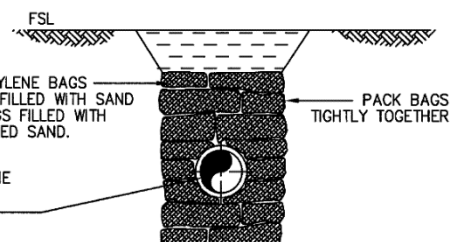
CONCRETE BULKHEAD DETAIL



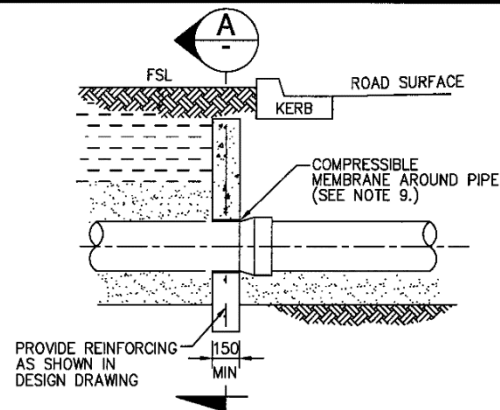
TRENCH STOP DETAIL



SECTION A-A



SECTION B-B



TYPICAL ROAD CROSSING BULKHEAD

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. CONSTRUCT CONCRETE BULKHEADS AND TRENCH STOPS AT LOCATIONS SPECIFIED IN DESIGN DRAWINGS.
3. CONSTRUCT BULKHEAD ADJACENT TO KERB AND GUTTER SHOULDER OF SEALED ROADS.
4. BULKHEAD AT A RETAINING WALL TO BE UNDER THE WALL.
5. KEY CONCRETE BULKHEADS INTO SIDES AND BOTTOM OF TRENCH AGAINST A BEARING SURFACE OF UNDISTURBED SOIL.
6. CONCRETE TO BE 17.5 MPa.
7. DO NOT DEFORM PIPES DURING PLACEMENT OF CONCRETE OR BAGS.
8. SEAL BAGS TO PREVENT LEAKAGE OF CONTAINED MATERIAL.
9. COMPRESSION MEMBRANE AROUND PIPE TO BE 10 THICK POLYSTYRENE FOR BULKHEADS ADJACENT TO KERBS AND 3 THICK RUBBER FOR BULKHEADS AND TRENCHSTOPS ON SLOPES.
10. FOR SLOPES >35 % REFER TO TERRITORIAL AUTHORITY FOR REQUIREMENTS.



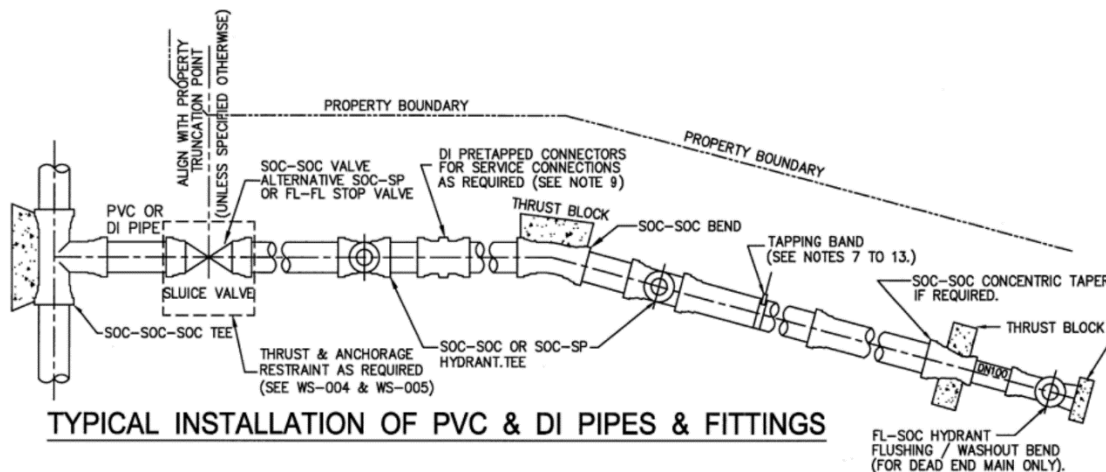
ORIGINAL SOURCE DRAWINGS:
WATER SERVICES ASSOCIATION OF AUSTRALIA

NZS 4404:2010
LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE

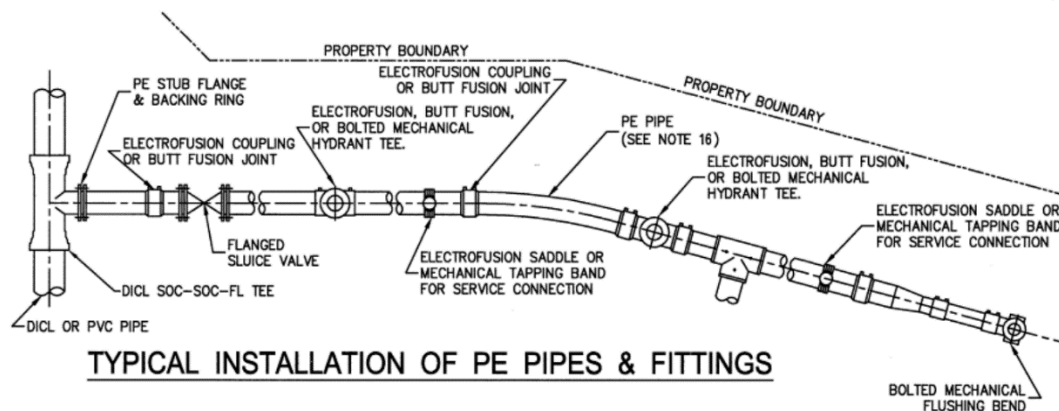
**BULKHEADS & TRENCHSTOP
STANDARD DETAILS**

NOT TO SCALE

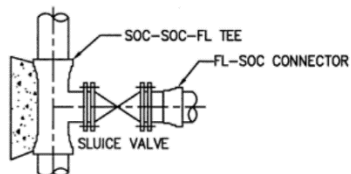
CM - 003



TYPICAL INSTALLATION OF PVC & DI PIPES & FITTINGS



TYPICAL INSTALLATION OF PE PIPES & FITTINGS



**TYPICAL VALVE CONNECTION
DIRECT TO NEW MAIN**

NOTE -

1. ALL DIMENSIONS IN MILLIMETRES.
2. INSTALL PIPEWORK PARALLEL TO PROPERTY BOUNDARIES.
3. STAINLESS STEEL AND NYLON COATED (TO AS/NZS 4158) TAPPING BANDS DO NOT REQUIRE ADDITIONAL CORROSION PROTECTION.
4. WRAP BOLTED CONNECTIONS USING OTHER THAN NYLON COATED FITTINGS AND STAINLESS STEEL BOLTS WITH A PETROLATUM TAPE SYSTEM.
5. WHERE MAINS ARE 300 OR LARGER BYPASSES SHOULD BE INSTALLED FOR ALL MANUAL SLUICE VALVES.
6. ALL VALVES AND FITTINGS SHALL BE COATED WITH A THERMAL BONDED POLYMERIC COATING APPLIED IN ACCORDANCE WITH AS/NZS 4158.

DI & PVC PIPE

7. DUCTILE IRON FITTINGS MAY BE USED WITH DI & PVC PIPE. FITTINGS SHALL BE NYLON COATED AND LINED OR CEMENT LINED WITH A BITUMINOUS EXTERNAL COATING. DO NOT USE PVC FITTINGS WITH DI PIPE.
8. PE SLEEVING REQUIRED ON ALL BITUMINOUS COATED DI PIPE AND FITTINGS APPLIED IN ACCORDANCE WITH AS 3681. TWO THICKNESSES REQUIRED BETWEEN FITTINGS AND THRUST BLOCK. REINSTATE ANY DAMAGED SLEEVING AS PER MANUFACTURER'S SPECIFICATIONS.
9. USE PRE TAPPED CONNECTORS ON DN 100 & DN 150 NEW MAIN INSTALLATIONS (UNLESS SPECIFIED OTHERWISE BY THE TERRITORIAL AUTHORITY).
10. USE TAPPING BANDS FOR CONNECTIONS TO EXISTING MAINS AND NEW MAINS >DN 150.
11. ELECTRICALLY ISOLATE COPPER SERVICES FROM DI CL PIPE.

PVC PIPE

12. TAPPING BANDS ON PVC PIPE TO BE FULL CIRCLE CLAMPING.
13. WHERE PVC FITTINGS ARE USED, A PROTECTIVE MEMBRANE IS REQUIRED BETWEEN FITTING AND THRUST BLOCK. PVC FITTINGS TO BE USED ONLY ON PVC PIPE. DI SPIGOTS NOT TO BE INSERTED INTO PVC SOCKETS.
14. MAXIMUM SIZE OF DRILLED HOLES FOR SERVICE CONNECTIONS IN PVC PIPE TO BE 30 % DN OR 50 (LOWER VALUE TO BE USED) LARGER HOLES CAN BE USED FOR UNDER PRESSURE TAPPING.

DI PIPE

15. DIRECT TAPPING OF >DN 200 DI CL MAY BE AUTHORISED BY TERRITORIAL AUTHORITY.

PE PIPE

16. PE PIPE MAY BE COLD BENT TO MINIMUM RADIUS OF $25 \times (OD)$. STAKES OR OTHER SOURCES OF POINT LOADS SHALL NOT BE USED TO ASSIST IN BENDING THE PIPE.
17. MAKE ALLOWANCE DURING CONSTRUCTION FOR EXPANSION AND CONTRACTION OF PE PIPE DUE TO TEMPERATURE CHANGES.
18. BUTT WELDING IN ACCORDANCE WITH WSA-01 (POLYETHYLENE CODE). BUTT WELDING IN TRENCHES IS NOT PERMITTED.
19. ALL MECHANICAL COUPLINGS TO BE SELF-RESTRAINING.



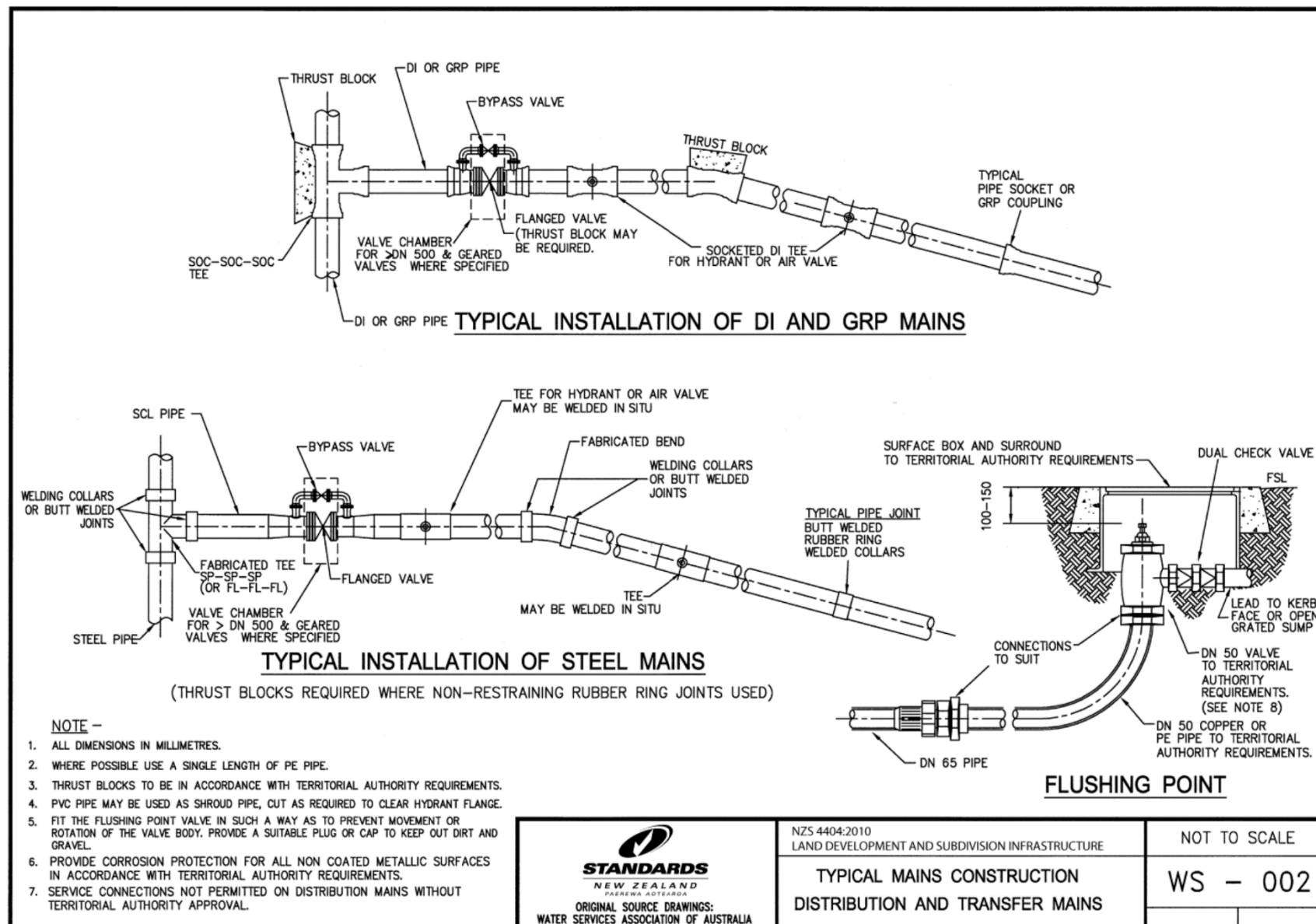
ORIGINAL SOURCE DRAWINGS:
WATER SERVICES ASSOCIATION OF AUSTRALIA

NZS 4404:2010
LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE

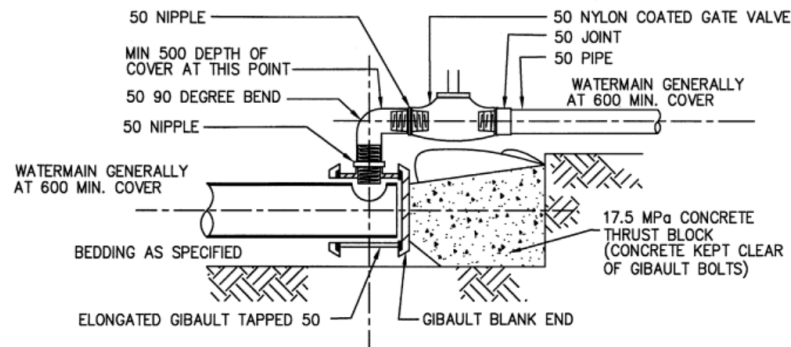
TYPICAL MAINS CONSTRUCTION
RETICULATION MAIN ARRANGEMENTS

NOT TO SCALE

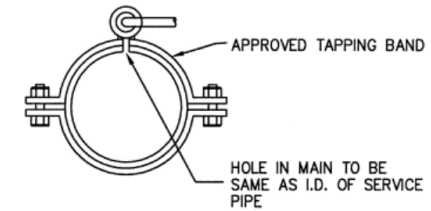
WS - 001



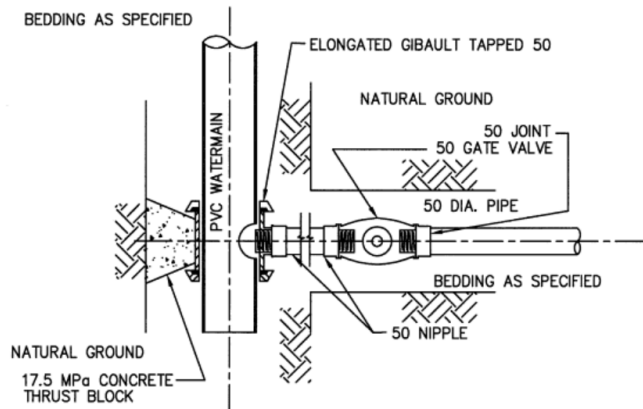
Drawing B7-4: WS - 002 Typical Mains Construction - Distribution And Transfer Mains



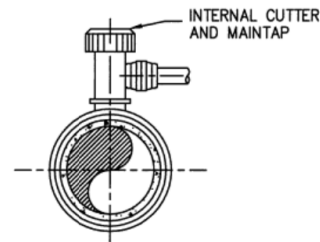
STRAIGHT LINE CONNECTION - METHOD 1- ELEVATION



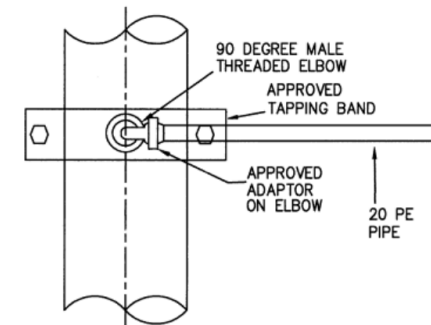
SECTION



**90° CONNECTION - PLAN
RIDER MAIN CONNECTIONS**



**ELECTROFUSION TAPPING SADDLE
(PE PIPE)**



PLAN

STANDARD TAPPING METHODS

NOTE -

- (1) ALL DIMENSIONS IN MILLIMETRES, UNLESS OTHERWISE SPECIFIED.
- (2) USE METAL GATE VALVE ON 20 CONNECTIONS WHERE REQUIRED BY T.A. OR WHERE SHUTTING DOWN MAIN TO REPAIR SERVICE WOULD CAUSE SIGNIFICANT INTERRUPTION TO SUPPLY
- (3) USE PROPRIETARY IN LINE METAL VALVES APPROVED BY T.A. WHEN MAIN IS TAPPED UNDER PRESSURE.
- (4) WHERE POSSIBLE, LAY SERVICE CONNECTIONS AND RIDER CONNECTIONS TO PRINCIPAL MAIN. WHERE NOT POSSIBLE INSTALL METALIC TAPE ON TOP OF CONNECTION.
- (5) RIDER MAINS AND SERVICE CONNECTIONS TO PRINCIPAL MAIN USE ELONGATED GIBAULT, PROPRIETARY TEE (RIDER MAIN ONLY) OR APPROVED PROPRIETARY TAPPING BANDS.

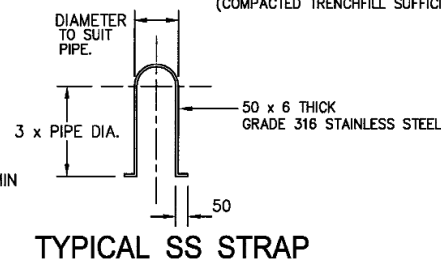
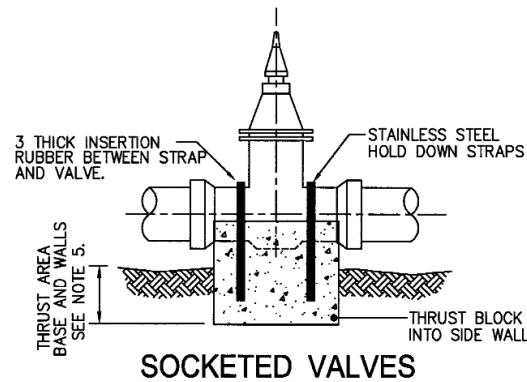
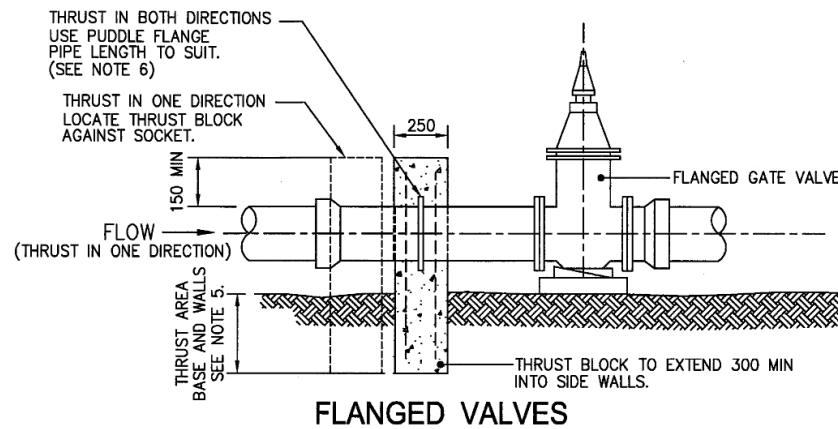


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LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE

PROPERTY SERVICES
CONNECTION TO MAIN

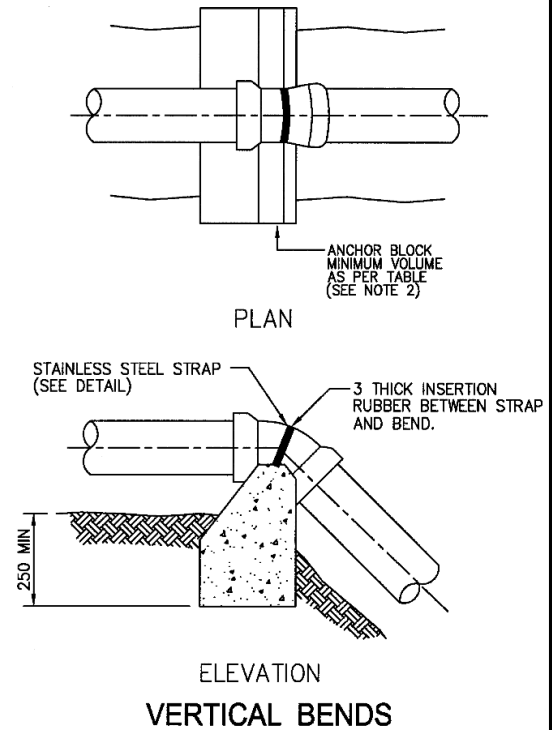
NOT TO SCALE

WS - 003



MINIMUM BLOCK VOLUME FOR ANCHORAGE			
VERTICAL BENDS			
FOR TEST PRESSURE OF 1000 kPa (SEE NOTE 2)			
PIPE DN	CONCRETE VOLUME m ³		
	11.25° BEND	22.5° BEND	45° BEND
100	N	N	0.3
150	N	0.3	0.6
200	0.2	0.5	1.1
225	0.3	0.6	1.4
250	0.3	0.7	2.5
300	0.4	1.1	3.8
375	0.7	1.8	5.8
450	DETAILED DESIGN REQUIRED (ALTERNATIVE METHODS TO BE CONSIDERED)		
500			
600			
750			

'N'—NO ADDITIONAL RESTRAINT REQUIRED
(COMPACTED TRENCHFILL SUFFICIENT)



ANCHOR BLOCK CONSTRUCTION NOTES:

- LOCATE ANCHOR BLOCK CENTRALLY AROUND BEND.
- KEY ANCHOR BLOCK INTO BASE OF TRENCH A MINIMUM DEPTH OF 250.
- POUR CONCRETE AGAINST A SOLID EXCAVATION FACE.
- USE GRADE 17.5 MPa CONCRETE.
- KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS, AND PIPE JOINTS.

NOTE —

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.
2. ANCHOR BLOCKS IN THE TABLE ARE DESIGNED FOR A TEST PRESSURE OF 1000 kPa (100 m HEAD). ADJUST CONCRETE VOLUME TO SUIT ACTUAL TEST PRESSURE.
3. WHERE DI PIPES AND FITTINGS WITH RESTRAINED JOINTS ARE USED THRUST BLOCKS ARE NOT REQUIRED.
4. THRUST BLOCK REINFORCEMENT AS SPECIFIED IN DESIGN DRAWINGS.
5. WHERE SPECIFIED PROVIDE CONCRETE THRUST BLOCKS FOR SOC-SOC VALVES. THRUST AREA TO BE AS FOR DEAD ENDS AS SHOWN IN WS-004
6. INSTALL PUDDLE FLANGES ON CLASS K12 DIOL PIPE.



ORIGINAL SOURCE DRAWINGS:
WATER SERVICES ASSOCIATION OF AUSTRALIA

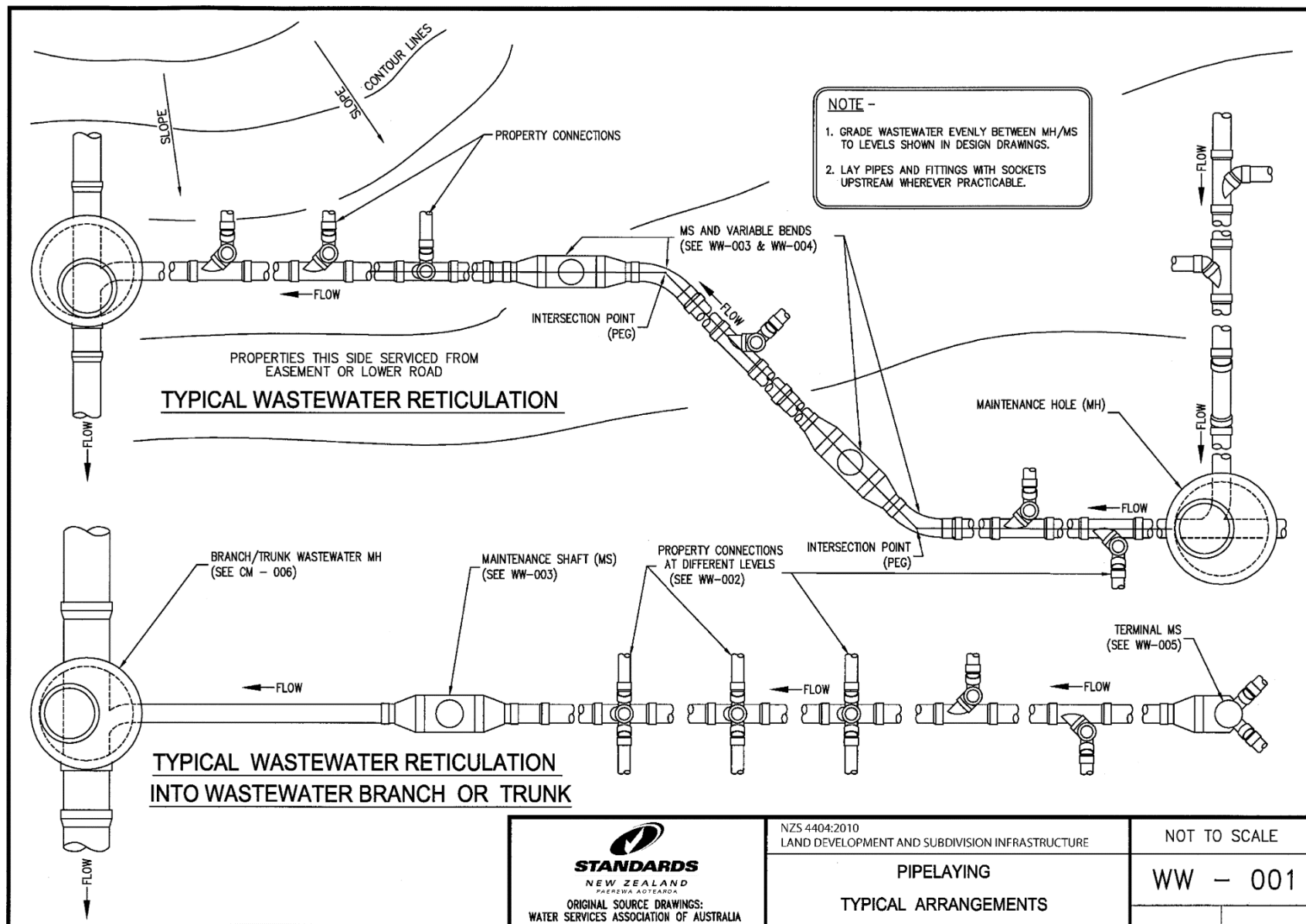
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LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE

THRUST AND ANCHOR BLOCKS
GATE VALVES AND VERTICAL BENDS

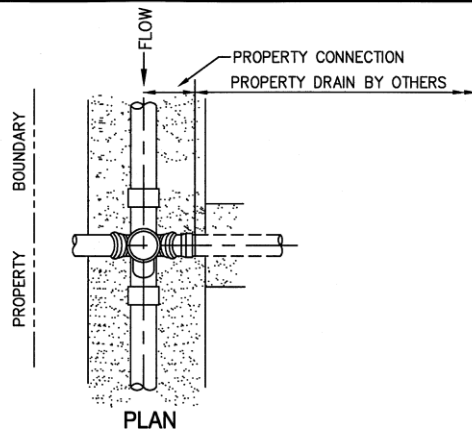
NOT TO SCALE

WS — 005

Drawing B7-3: WS - 005 Thrust and anchor blocks - Gate valves and vertical bends if required

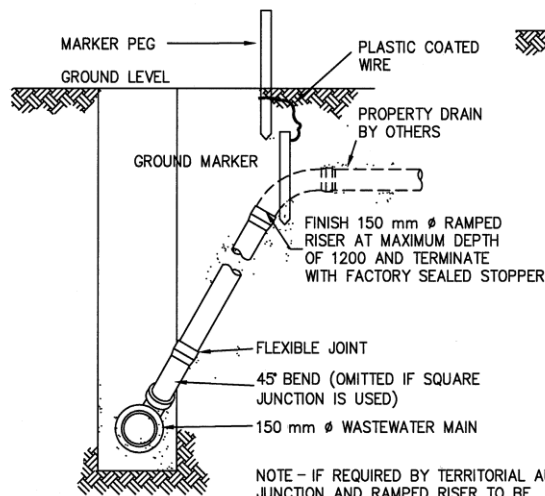


Drawing B7-7: WW - 001 Pipelaying - Typical Arrangements



PLAN

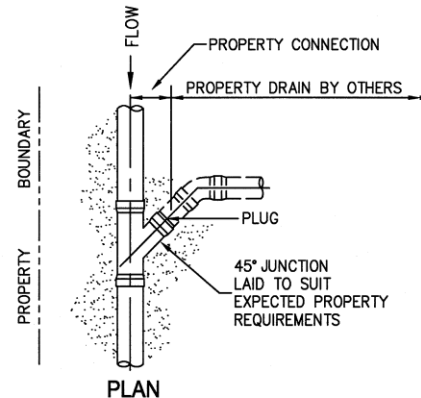
WASTEWATER WITHIN PROPERTY



NOTE - IF REQUIRED BY TERRITORIAL AUTHORITY JUNCTION AND RAMPED RISER TO BE SURROUNDED BY MIN 150 mm THICKNESS OF 17.5 MPa CONCRETE DISCONTINUOUS AT PIPE JOINTS.

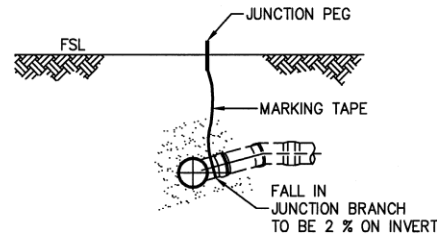
ELEVATION

Y JUNCTION RAMPED RISERS

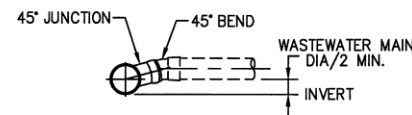


PLAN

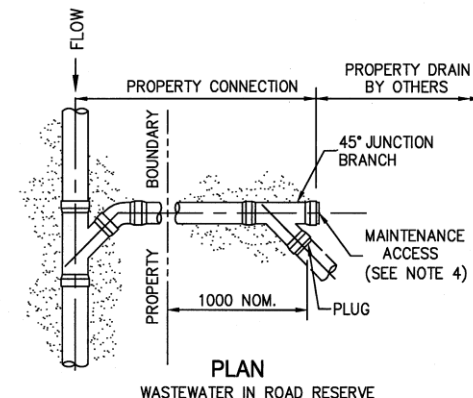
WASTEWATER WITHIN PROPERTY



ELEVATION
STANDARD CONNECTION

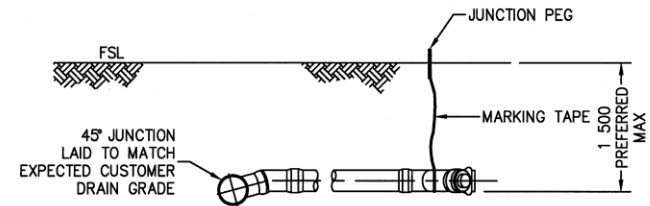


MINIMUM LEVEL
CONNECTION DETAIL



PLAN

WASTEWATER IN ROAD RESERVE



ELEVATION

EXTENDED CONNECTION

(MAY ALSO BE INSTALLED AS A SLOPED CONNECTION)

- NOTE -
1. ALL DIMENSIONS IN MILLIMETRES.
 2. ALL CONNECTION TYPES SHOWN IN THIS DRAWING ARE APPLICABLE TO VC, PVC.
 3. LAY PROPERTY DRAIN CONNECTION AT DEPTH AS SHOWN IN DESIGN DRAWINGS.
 4. PROVIDE RODDING POINTS WHERE REQUIRED BY TERRITORIAL AUTHORITY.
 5. GRADE OF PROPERTY CONNECTION WASTEWATER PIPE TO BE NOT LESS THAN: DN 100 1.65 %
DN 150 1.2 %.



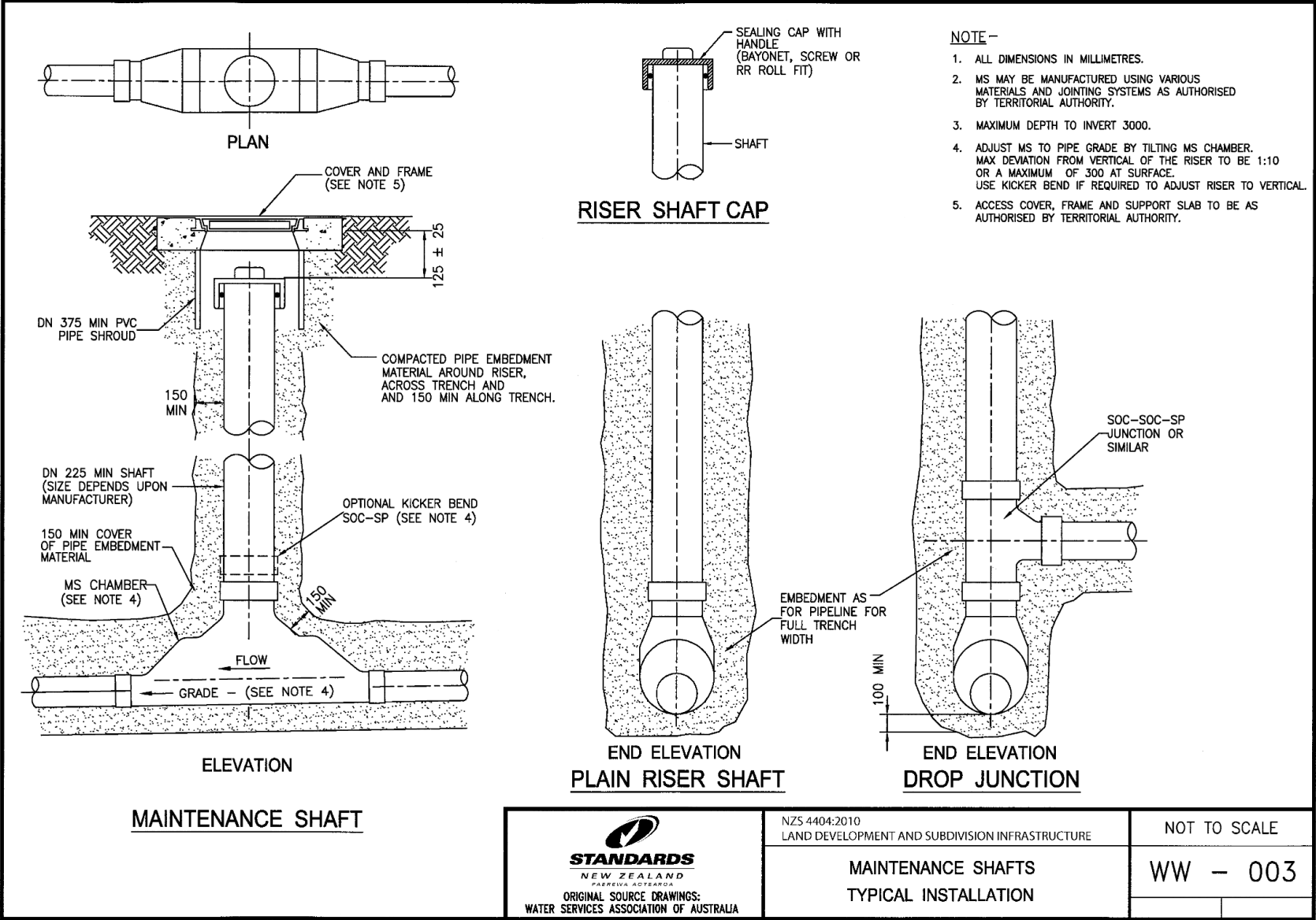
ORIGINAL SOURCE DRAWINGS:
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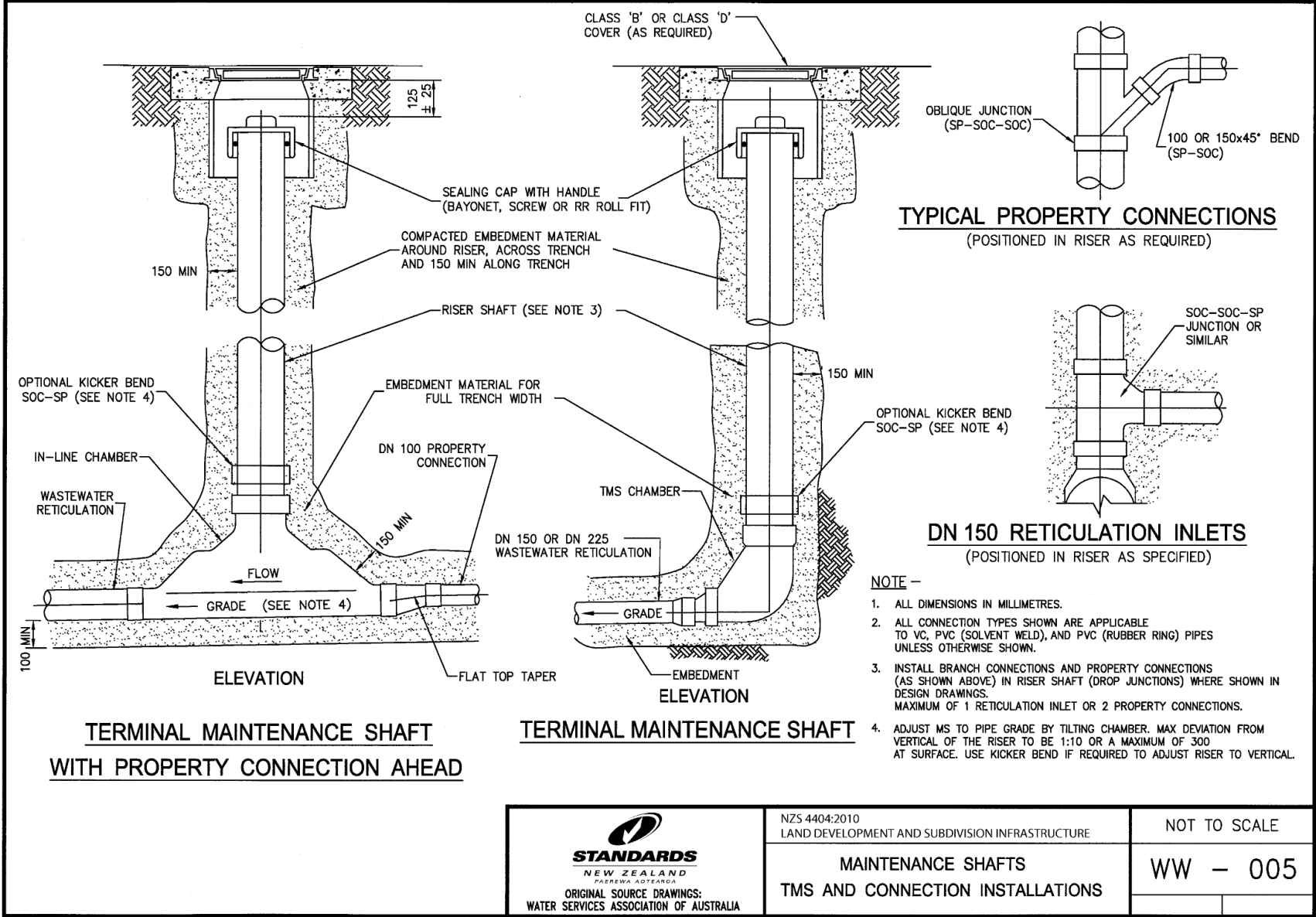
NZS 4404:2010
LAND DEVELOPMENT AND SUBDIVISION INFRASTRUCTURE

PROPERTY CONNECTIONS
BURIED INTERFACE METHOD

NOT TO SCALE

WW - 002





Drawing B7-7: WW – 005 Maintenance shafts – TMS and connection installation

