ENGINEERING GUIDELINES

PART 3

STANDARD DRAWINGS 2026 VOLUME B

TRAFFIC FENCING, TRAFFIC MANAGEMENT, LANDSCAPING, WATER AND SEWER DESIGN & CONSTRUCTION

HILLTOPS COUNCIL

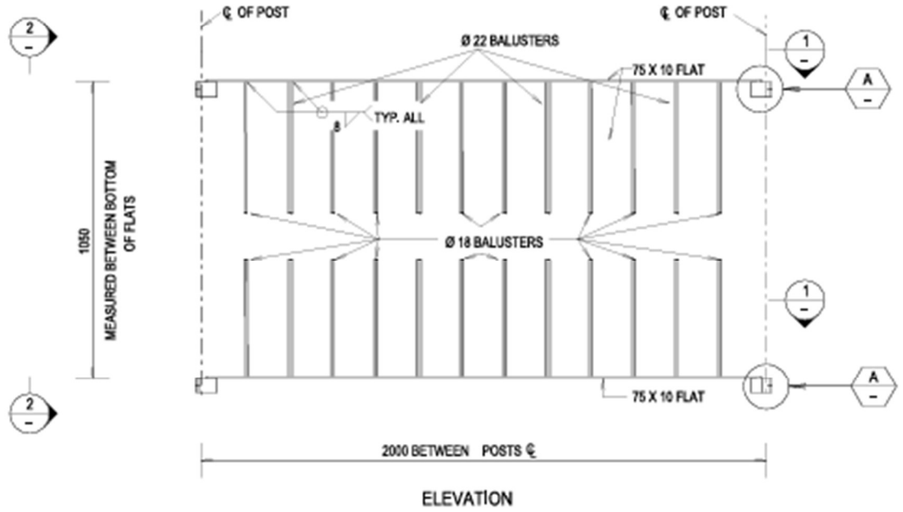
VOLUME B STANDARD DRAWING INDEX

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SD 0701	**FENCE SERIES**	-
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SD 0703	POST AND RAIL FENCE AND TIMBER BOLLARD	-
SD 0704	STEEL BOLLARD	-
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SD 0706	FIRE TRAIL (SLIP RAIL) GATE	-
SD 0707	FIRE TRAIL (SWING) ACCESS GATE	-
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SD 0801	TRANSVERSE PAVEMENT TRENCH AND PIT RESTORATION	-
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SD 0900	TRAFFIC MANAGEMENT SERIES	-
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SD 0902	TYPICAL ALLOCATION OF SERVICES	1
SD 0905	RECONFIGURATION OF 4-WAY INTERSECTION	-
SD 0906	T-INTERSECTION LAYOUT	-
SD 0908	ROAD HUMPS	-
SD 0909	TWO-LANE SLOW POINT	-
SD 0910	POLICE ENFORCEMENT BAY	-
SD 0911	PAVEMENT MARKING SCHEDULE	-
SD 0912	STANDARD STREET NAME SIGN CONFIGURATION	-
SD 0913	ROAD AND TRAFFIC SIGN MOUNTING DETAILS	-
SD 0914	ROAD DEFECTION PATHS	-
SD 0915	OFF-ROAD PARKING SPACES ON NARROW ROADS	-
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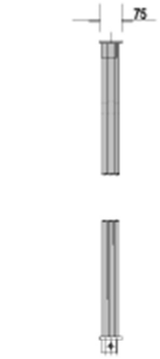
DWG No.	DRAWING TITLE	REV
		-
SD 1000	LANDSCAPE SERIES	-
SD 1001	TREE PLANTING GENERAL NOTES FOR UPDATE AND REPLACEMENT	-
SD1002	STREET TREES IN CENTRAL MEDIAN STRIPS WITH INNER KERB	-
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SD1005	STREET TREES IN ROAD FLUSH WITH ROAD LEVEL	-
SD 1006	STREET TREES IN ROAD BLISTERS	-
SD 1007	STREET TREES IN ROAD MEDIAN	-
SD 1008	TREES IN CAR PARK	-
SD 1009	TREES IN PAVEMENT – STRUCTURAL CELL	-
SD 1010	TREES IN PAVEMENT – STRUCTURAL SOIL	-
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SD 1012	TIMBER TREE GUARD	-
SD 1013	TREE GRATE	-
SD 1014	TUBESTOCK PLANTING	-
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SD 1016	TURF	-
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SD 1020	SOFTFALL EDGE	-
SD 1021	CHILD SAFETY FENCE	-
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SD 1000	WATER MAIN SERIES	-
SD 1101	MAINS AND CONNECTION - LAYOUTS	-
SD 1102	SERVICE DETAILS – ALL DIAMETERS	-
SD 1103	TRENCH / EMBEDMENT – FILL AND THRUST BLOCK DETAILS	-
SD 1104	FITTINGS – KERB MARKER, POST, VALVES , HYDRANT, GATE, AV PRV, SCOUR, FLANGE JOINT DETAILS	-
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DWG No.	DRAWING TITLE	REV
		-
SD1200	SEWER SERIES	-
SD 1201	RISING MAINS – STOP VALVE, AV. DISCHARGE CHAMBER FOR SEWER RISING MAIN, PUMP OUT FOR SCOUR	-
SD 1202	PROPERTY – PROPERTY CONNECTION DETAILS	-
SD 1203	TRENCH / EMBEDMENT – EMBEDMENT AND TRENCH FILL, BULKHEADS TRENCH STOPS, PIERS.	-
SD 1204	MAINTENANCE HOLES – MANHOLES DETAILS	-
SD 1205	PRESSURE SEWER – TYPICAL SYSTEM DETAILS	-
SD 1206	VENTILATION – VENTILATION SHAFT DETAILS Sheet 1 of 8	-
SD 1207	TYPICAL SEWER PUMP STATION DETAILS	-
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DWG No.	DRAWING TITLE	REV
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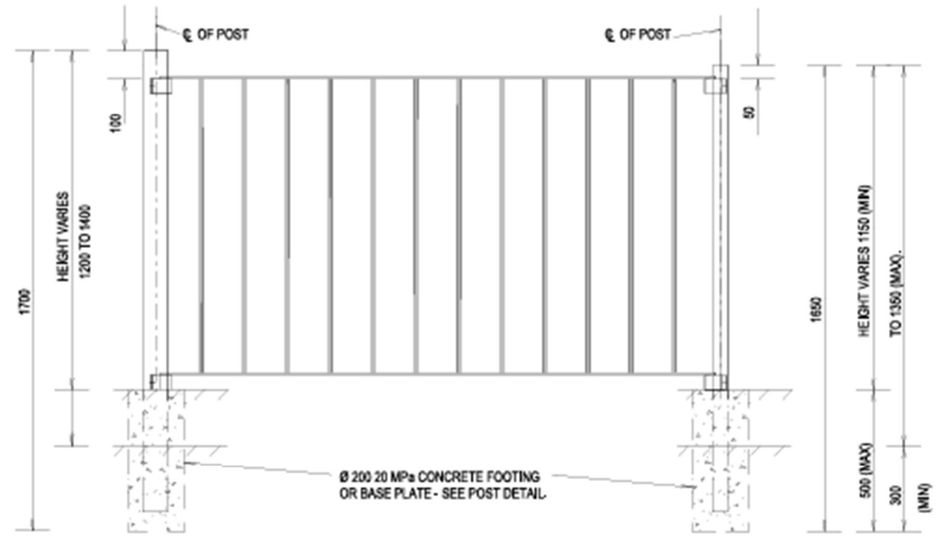


ELEVATION



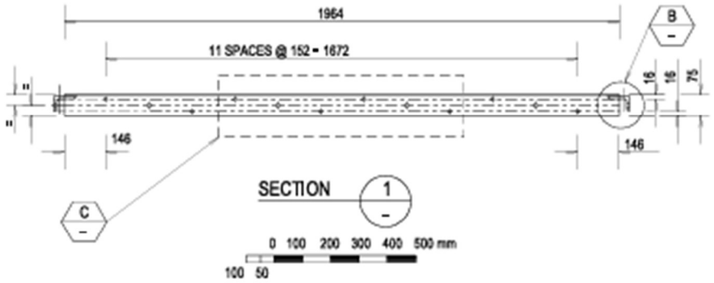
VIEW 2

0 100 200 300 400 500 mm
100 50



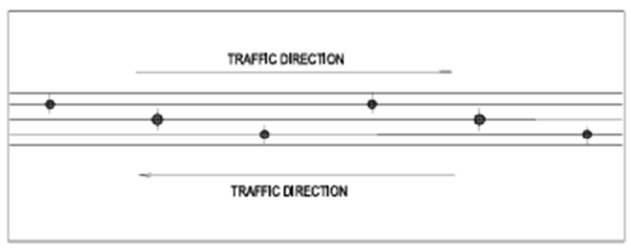
END POST

INTERMEDIATE POST

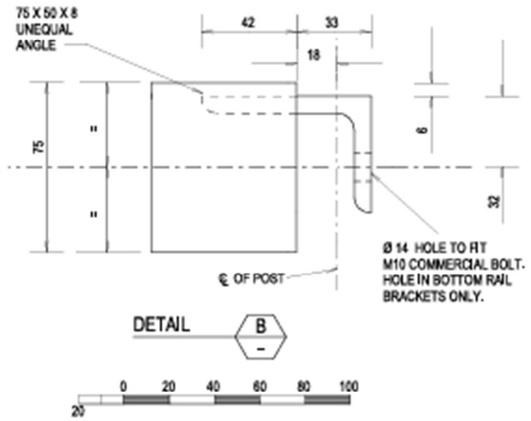


SECTION 1

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100 50

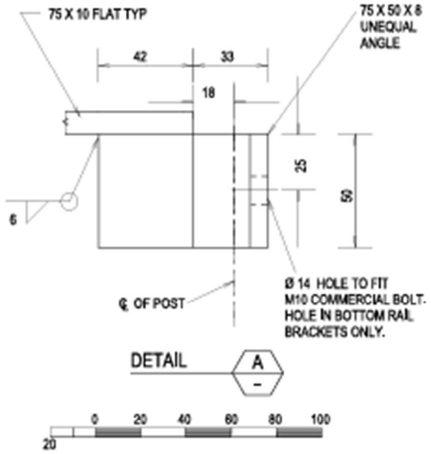


DETAIL C



DETAIL B

0 20 40 60 80 100
20

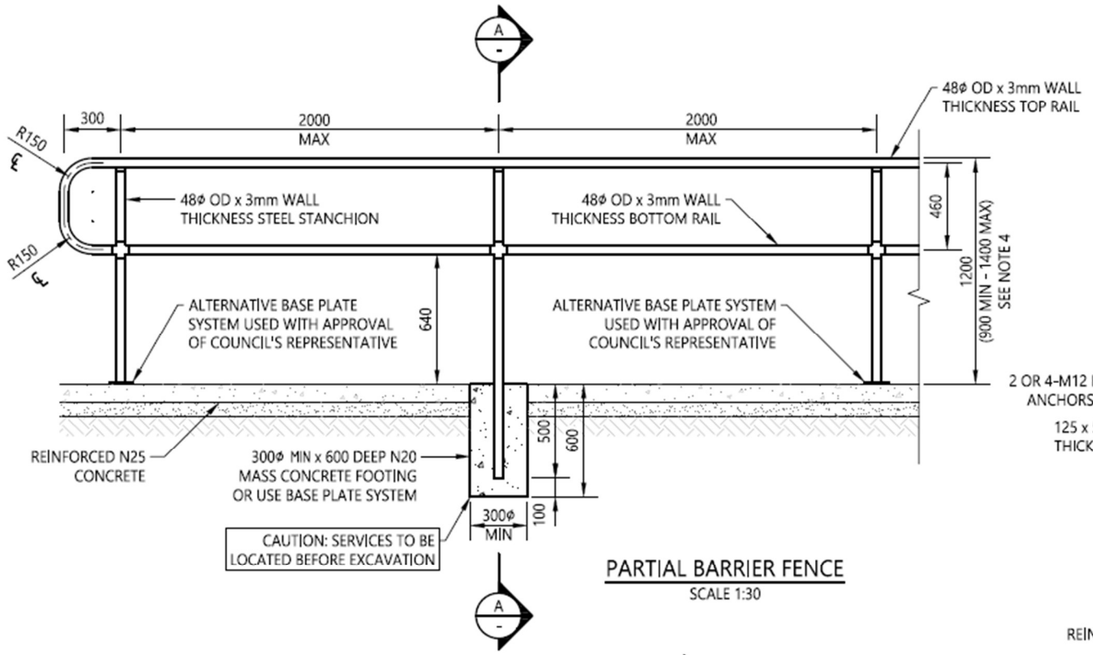


DETAIL A

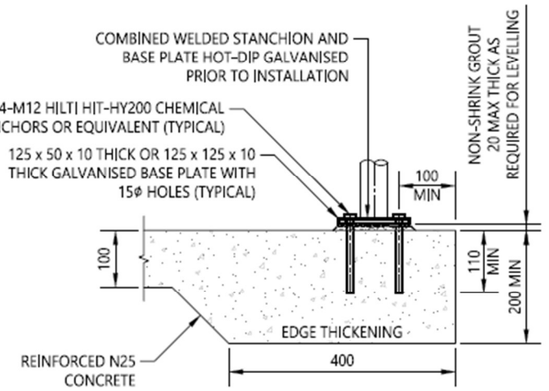
0 20 40 60 80 100
20

ANGLE BRACKETS

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: FENCE SERIES ROAD PEDESTRIAN FENCE TYPE 1	SHEET No. SD 0701 REVISION: - SHEET Sheet 1 of 2



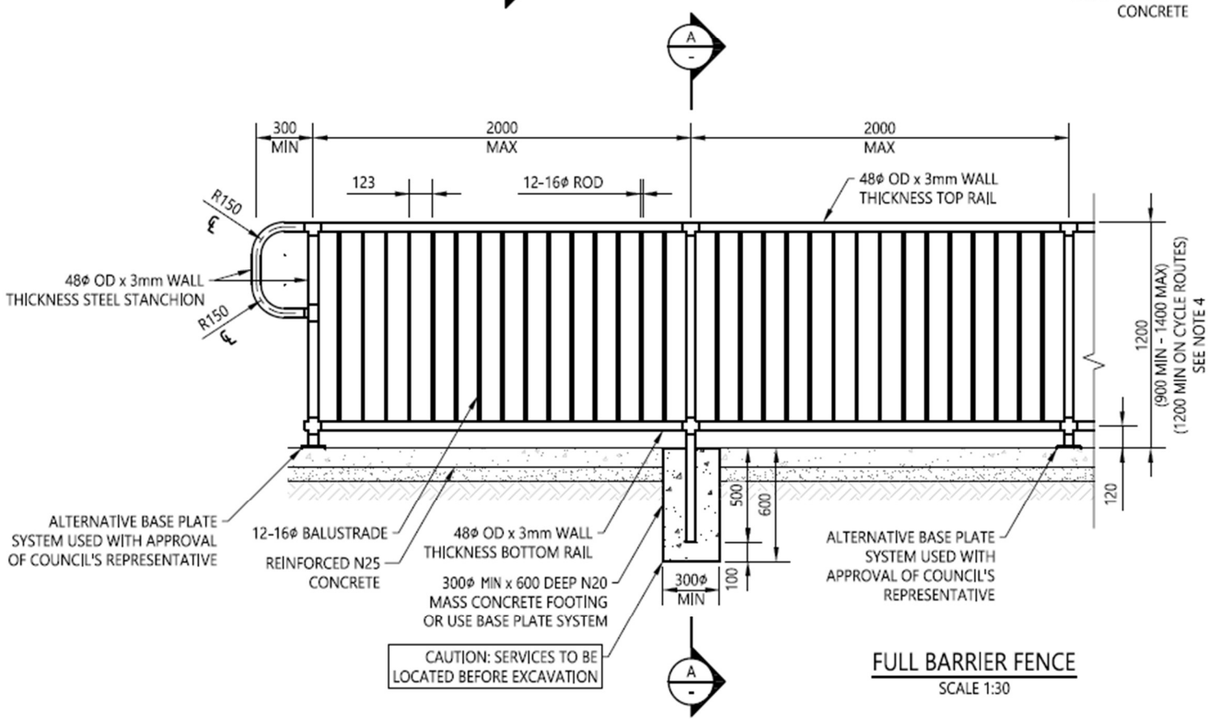
PARTIAL BARRIER FENCE
SCALE 1:30



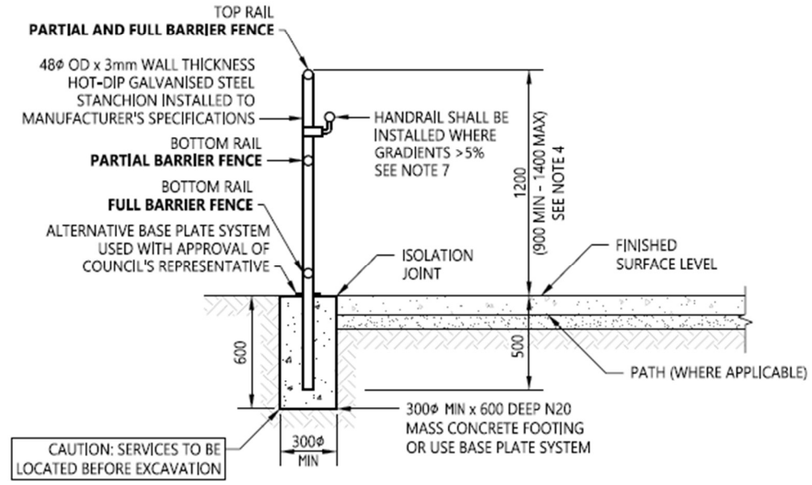
BASE PLATE DETAIL
SCALE 1:10

NOTES:

1. REFER TO THE RELEVANT AUSTROADS GUIDELINES AND AUSTRALIAN STANDARDS FOR DESIGN REQUIREMENTS OF BARRIER FENCES.
2. BARRIER FENCE TYPE SELECTION TO BE DETERMINED BY HAZARD RISK ASSESSMENT METHODOLOGY. REFER TO COUNCIL'S BARRIER SELECTION GUIDELINES AND THE MANUFACTURER'S SPECIFICATIONS.
3. REFER TO COUNCIL'S STANDARD DRAWING SD0601 FOR SHARED PATH REQUIREMENTS FOR BARRIER FENCES AT BATTERS AND VERTICAL DROPS.
4. WHERE THE FENCE IS PROTECTING PATH USERS FROM A VERY SEVERE HAZARD, THE FENCE HEIGHT SHALL BE INCREASED TO 1.4m OR HIGHER.
5. BARRIER FENCES PLACED WITHIN CLEAR ZONES IN ROAD RELATED AREAS SHOULD BE ASSESSED FOR ROADSIDE SUITABILITY.
6. TfNSW ROADSIDE AND MEDIAN PEDESTRIAN FENCES SHALL BE PROVIDED ON CLASSIFIED ROADS AND ON OTHER ROADS WHERE CONSIDERED BY COUNCIL'S REPRESENTATIVE TO BE APPROPRIATE FOR ROAD USER SAFETY REASONS.
7. PEDESTRIAN ASSIST DISABILITY HANDRAILS (865mm MIN 1000mm MAX HIGH) SHALL BE PROVIDED ON RAMPS IN ACCORDANCE WITH AS 1428.1, OR WHERE OTHERWISE REQUIRED BY COUNCIL'S REPRESENTATIVE.
8. TERMINAL TREATMENTS SHALL BE PROVIDED SO THAT THE BARRIER FENCE IS NOT HAZARDOUS TO CYCLISTS.
9. ALL STEEL COMPONENTS SHALL BE HOT-DIP GALVANISED TO AS/NZS 1214, AS/NZS 4680 AND AS/NZS 4792 AS REQUIRED. CONSIDER USING STAINLESS STEEL COMPONENTS IN A MARINE ENVIRONMENT.
10. COLOUR POWDER-COATING MAY BE APPLIED TO THE BARRIER FENCE WITH THE APPROVAL OF COUNCIL'S REPRESENTATIVE.
11. DIMENSIONS OF BARRIER FENCES MAY VARY BETWEEN MANUFACTURERS.



FULL BARRIER FENCE
SCALE 1:30

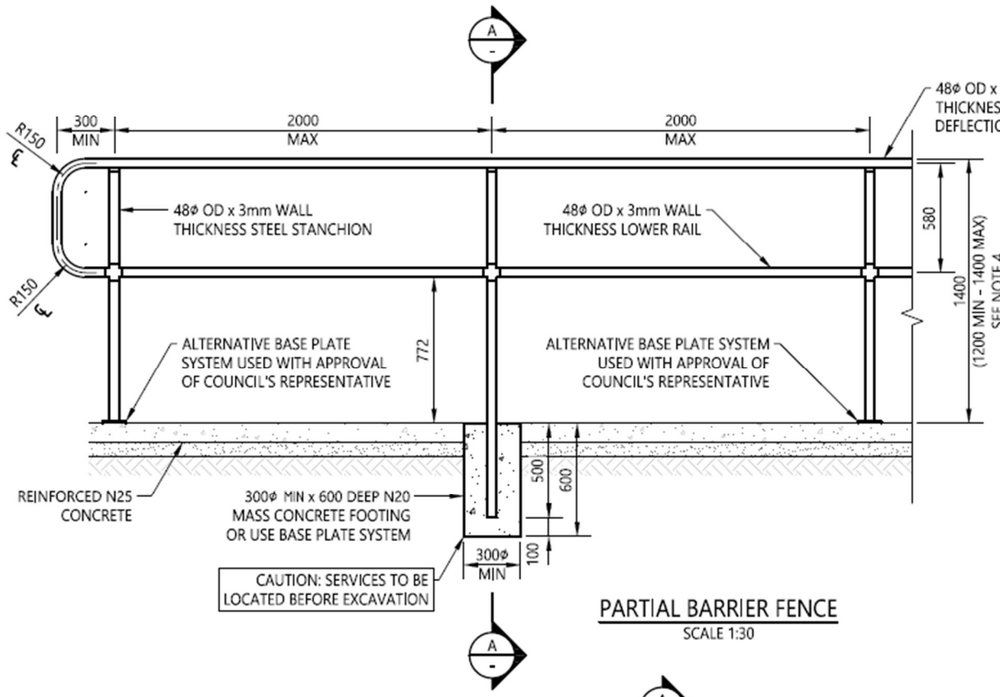


CONCRETE FOOTING DETAIL

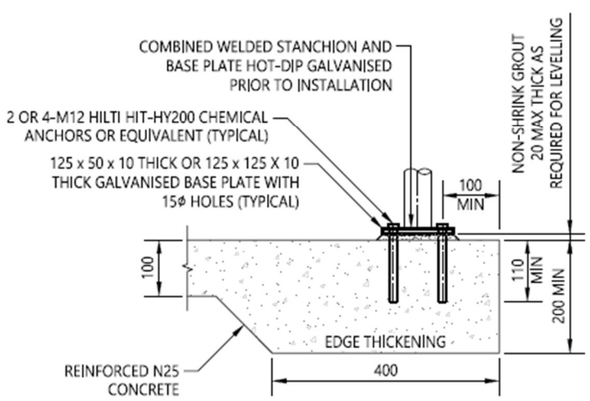
SECTION A
SCALE 1:30

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0 300 600 900 1200 1500 1:30

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: FENCE SERIES FULL AND PARTIAL BARRIER PEDESTRIAN FENCE	SHEET No. SD 0701 REVISION: - SHEET Sheet 2 of 2



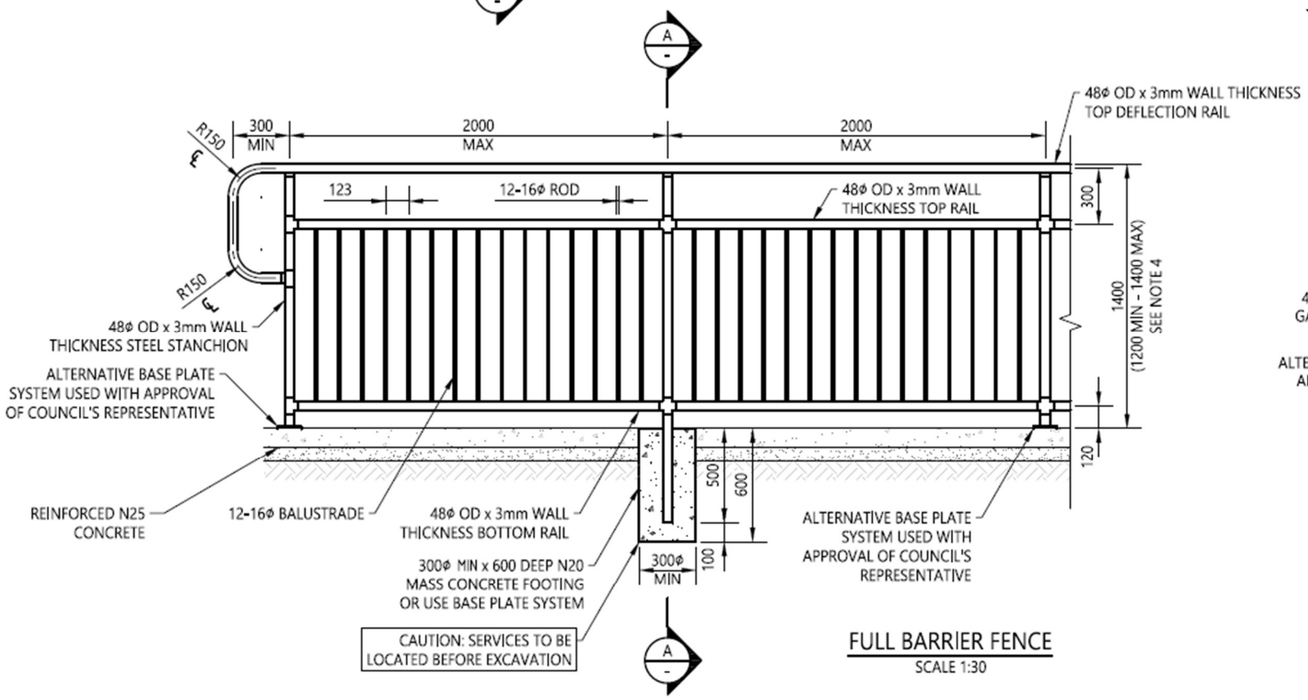
PARTIAL BARRIER FENCE
SCALE 1:30



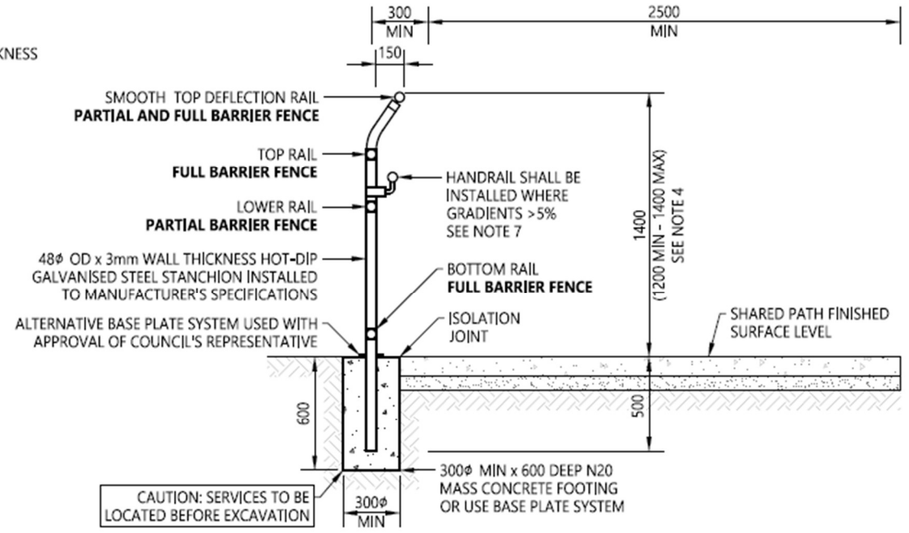
BASE PLATE DETAIL
SCALE 1:10

NOTES:

1. REFER TO THE RELEVANT AUSTROADS GUIDELINES AND AUSTRALIAN STANDARDS FOR DESIGN REQUIREMENTS OF BARRIER FENCES.
2. BARRIER FENCE TYPE SELECTION TO BE DETERMINED BY HAZARD RISK ASSESSMENT METHODOLOGY. REFER TO COUNCIL'S BARRIER SELECTION GUIDELINES AND THE MANUFACTURER'S SPECIFICATIONS.
3. REFER TO COUNCIL'S STANDARD DRAWING SD0601 FOR SHARED PATH REQUIREMENTS FOR BARRIER FENCES AT BATTERS AND VERTICAL DROPS.
4. WHERE THE FENCE IS PROTECTING PATH USERS FROM A VERY SEVERE HAZARD, THE FENCE HEIGHT SHALL BE INCREASED TO 1.4m OR HIGHER.
5. BARRIER FENCES PLACED WITHIN CLEAR ZONES IN ROAD RELATED AREAS SHOULD BE ASSESSED FOR ROADSIDE SUITABILITY.
6. TfNSW ROADSIDE AND MEDIAN PEDESTRIAN FENCES SHALL BE PROVIDED ON CLASSIFIED ROADS AND ON OTHER ROADS WHERE CONSIDERED BY COUNCIL'S REPRESENTATIVE TO BE APPROPRIATE FOR ROAD USER SAFETY REASONS.
7. PEDESTRIAN ASSIST DISABILITY HANDRAILS (865mm MIN 1000mm MAX HIGH) SHALL BE PROVIDED ON RAMPS IN ACCORDANCE WITH AS 1428.1, OR WHERE OTHERWISE REQUIRED BY COUNCIL'S REPRESENTATIVE.
8. TERMINAL TREATMENTS SHALL BE PROVIDED SO THAT THE BARRIER FENCE IS NOT HAZARDOUS TO CYCLISTS.
9. ALL STEEL COMPONENTS SHALL BE HOT-DIP GALVANISED TO AS/NZS 1214, AS/NZS 4680 AND AS/NZS 4792 AS REQUIRED. CONSIDER USING STAINLESS STEEL COMPONENTS IN A MARINE ENVIRONMENT.
10. COLOUR POWDER-COATING MAY BE APPLIED TO THE BARRIER FENCE WITH THE APPROVAL OF COUNCIL'S REPRESENTATIVE.
11. DIMENSIONS OF BARRIER FENCES MAY VARY BETWEEN MANUFACTURERS.



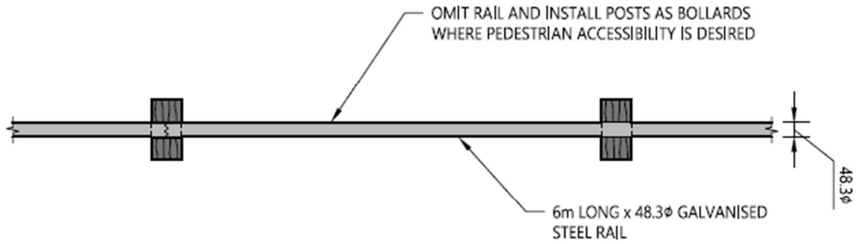
FULL BARRIER FENCE
SCALE 1:30



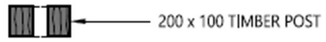
CONCRETE FOOTING DETAIL
SECTION A
SCALE 1:30

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0 300 600 900 1200 1500 1:30

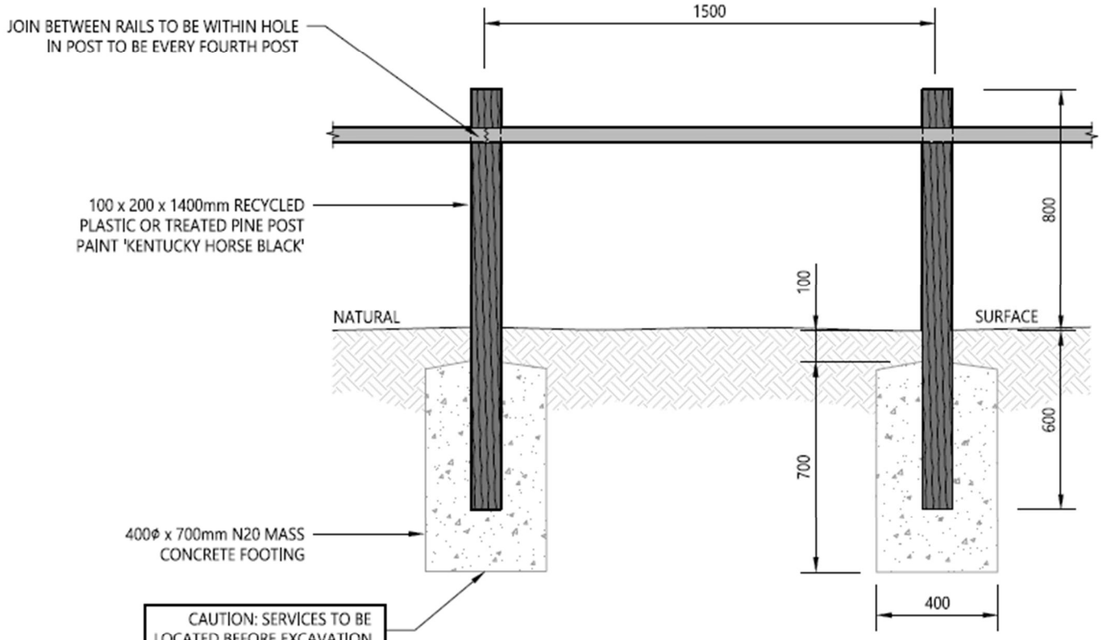
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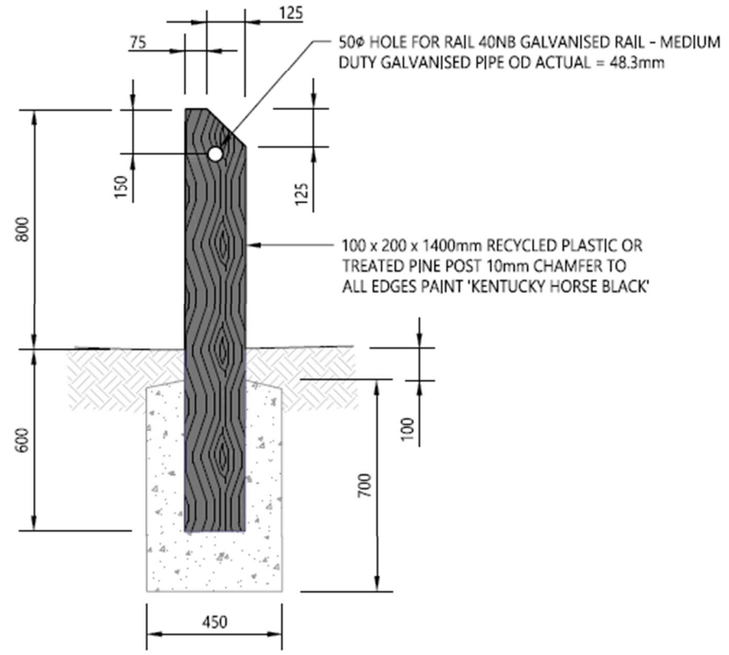
PLAN VIEW
SCALE 1:20



PLAN VIEW
SCALE 1:20



POST AND RAIL DETAILS
SCALE 1:20

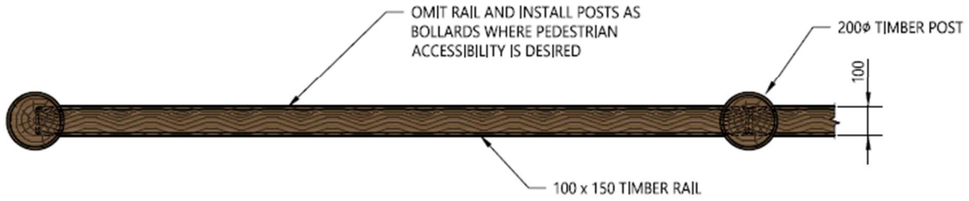


POST DETAILS
SCALE 1:20

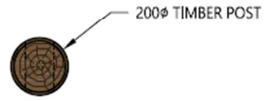
POST AND RAIL FENCE AND TIMBER BOLLARD - TYPE 1

0 200 400 600 800 1000
1:20

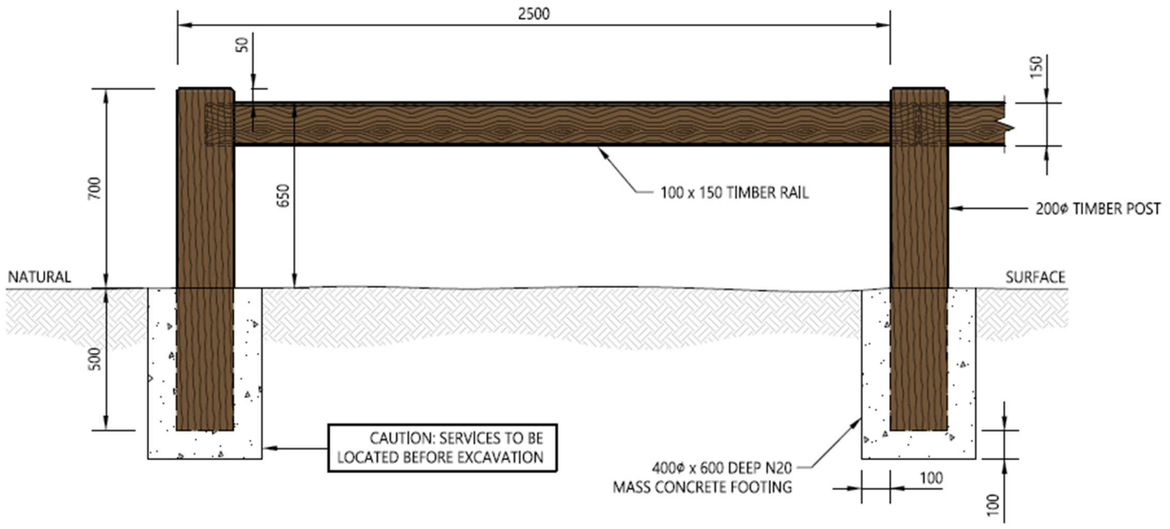
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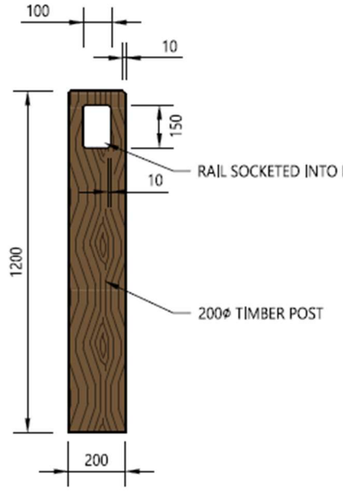
PLAN VIEW
SCALE 1:20



PLAN VIEW
SCALE 1:20

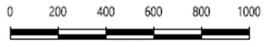


POST AND RAIL DETAILS
SCALE 1:20

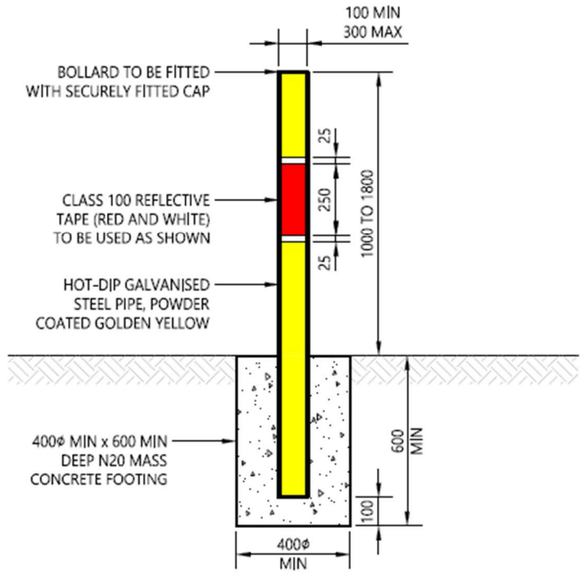


POST DETAILS
SCALE 1:20

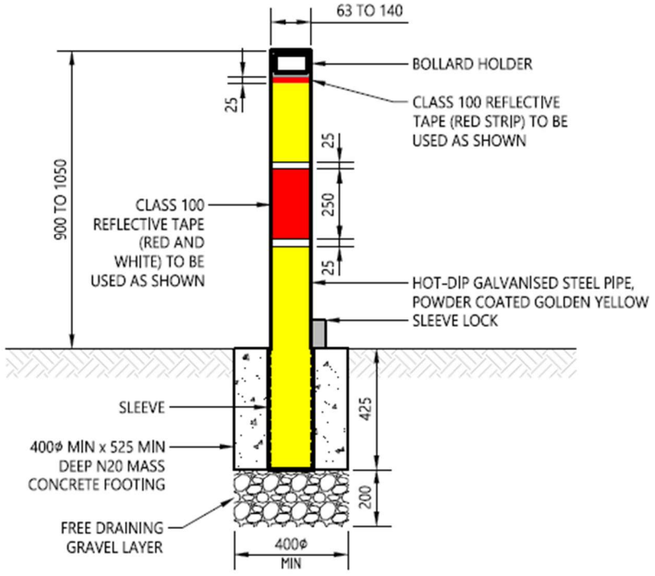
POST AND RAIL FENCE AND TIMBER BOLLARD - TYPE 2



SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: FENCE SERIES POST AND RAIL FENCE AND TIMBER BOLLARD	SHEET No. REVISION: SD 0703 - SHEET Sheet 2 of 2



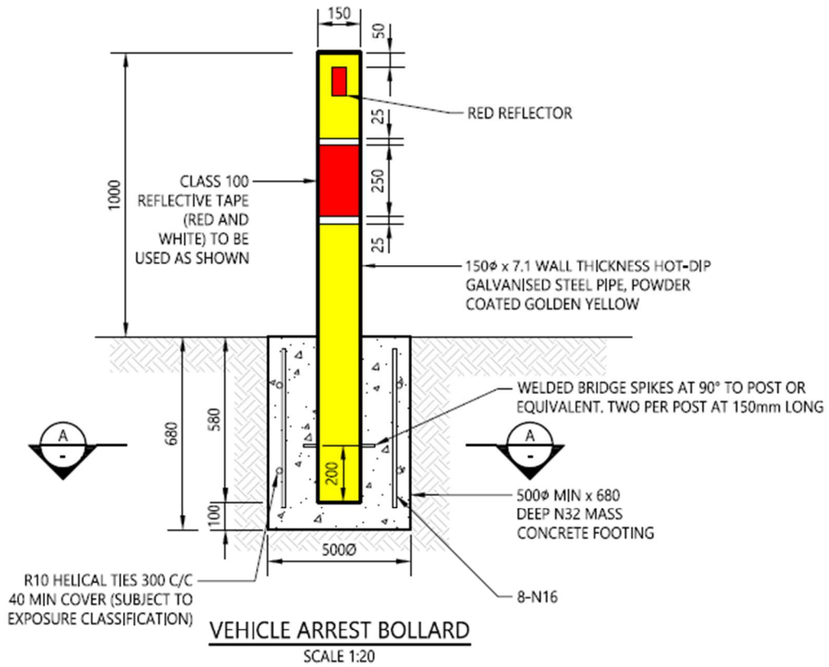
STEEL BOLLARD
SCALE 1:20



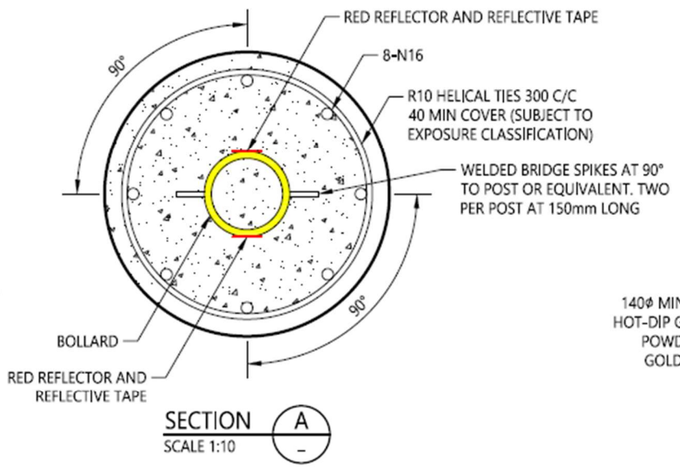
REMOVABLE BOLLARD
SCALE 1:20

NOTES:

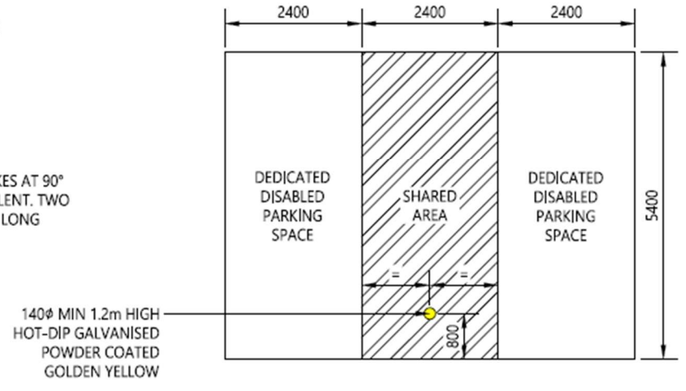
1. CONCRETE STRENGTH GRADE TO BE N20, UNLESS OTHERWISE SPECIFIED.
2. BOLLARDS SHALL BE HOT-DIP GALVANISED AND POWDER COATED GOLDEN YELLOW, UNLESS OTHERWISE SPECIFIED.
3. CONSIDER USE OF STAINLESS STEEL BOLLARDS FOR INSTALLATIONS IN A MARINE ENVIRONMENT.
4. BOLLARDS AND FIXINGS SHALL BE INSTALLED TO THE MANUFACTURER'S SPECIFICATIONS.
5. VEHICLE ARREST BOLLARDS SHALL BE INSTALLED IN A SERIES TO PREVENT VEHICLE PENETRATION.
6. DIMENSIONS OF BOLLARDS MAY VARY BETWEEN MANUFACTURERS.



VEHICLE ARREST BOLLARD
SCALE 1:20



SECTION A-A
SCALE 1:10



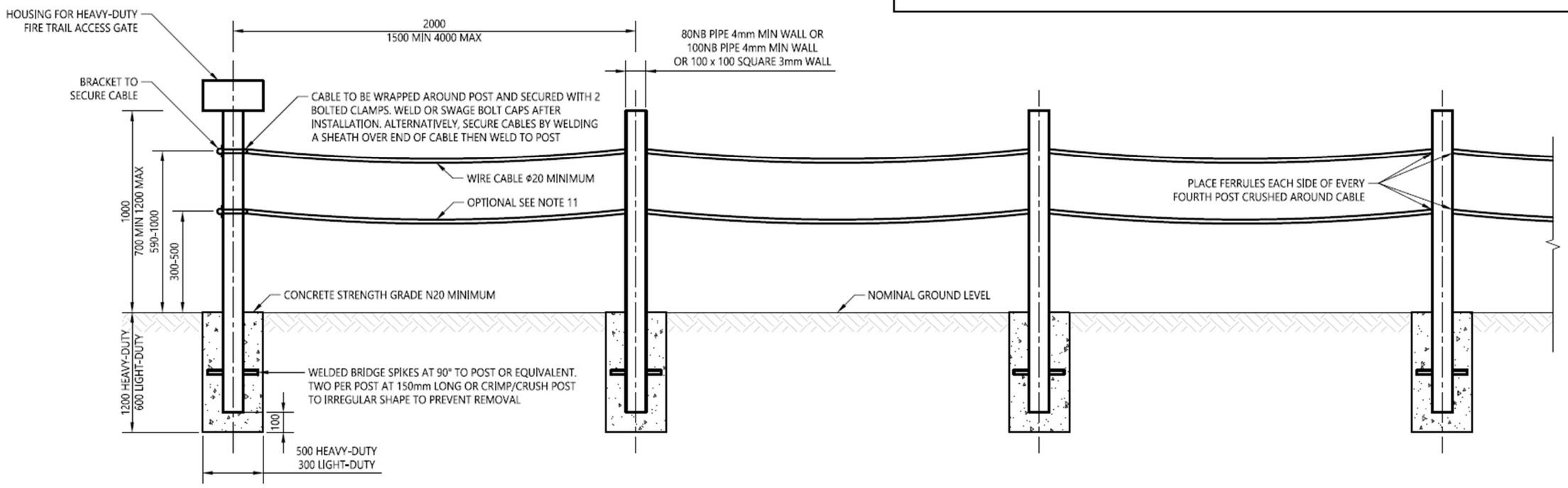
DISABLED PARKING SPACE BOLLARD
SCALE 1:100

0 200 400 600 800 1000 1:20
0 1000 2000 3000 4000 5000 1:100

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: FENCE SERIES STEEL BOLLARD – PRIVATE DEVELOPMENTS	SHEET No. SD 0704 REVISION: - SHEET Sheet 1 of 1

NOTES:

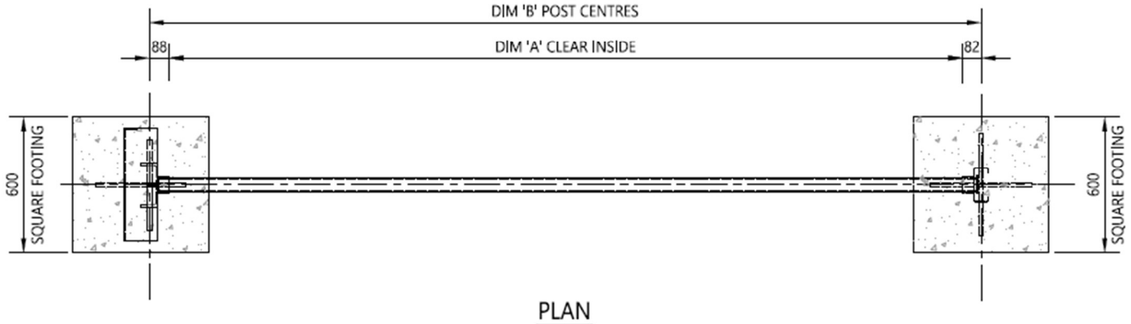
1. THIS STANDARD DRAWING IS BASED ON DRAWING 1065WM050 BY iINVENT PTY LTD DATED 6/9/2017.
2. USE 80NB OR 100NB (4mm MINIMUM WALL) PIPE POSTS AS BOLLARDS OR CONCRETE OR SANDSTONE BLOCKS.
3. ALL STEELWORK TO BE HOT-DIP GALVANISED AFTER FABRICATION.
4. NOMINAL SPACE BETWEEN BOLLARDS 1500mm OR AS SHOWN IN THIS DRAWING.
5. CONCRETE STRENGTH GRADE TO BE N20 MINIMUM.
6. HEAVY-DUTY FOOTINGS 1200×500×500mm.
7. LIGHT-DUTY FOOTINGS 600×300×300mm.
8. ALTERNATIVE LIGHT-DUTY FOOTING Ø300×600.
9. BOLLARDS TO BE CAPPED AND FITTED WITH ANTI-TAMPER SCREWS.
10. GATE INSTALLATION (WHERE REQUIRED) TO BE SUPPORTED BY PLACEMENT OF BOLLARDS CABLED TOGETHER TO PREVENT ALTERNATIVE PATHS BEING FORMED AS DETAILED IN THIS DRAWING.
11. 60NB x 4mm WALL THICKNESS STAYS MAY BE REQUIRED AT TERMINAL ENDS OF THE FENCE AND AT CHANGES OF DIRECTION.
12. FOOTING DEPTH OF STAYS TO BE 500mm MINIMUM AND FOOTING WIDTH OF STAYS TO BE 400Ø.
13. OPTIONAL DOUBLE CABLE TO BE USED FOR ADDITIONAL SECURITY IN AREAS WHERE SPECIFIED BY COUNCIL'S REPRESENTATIVE.
14. WHERE A PEDESTRIAN GAP IS REQUIRED, A GAP OF 400mm MAXIMUM SHOULD BE PROVIDED TO PREVENT ENTRY OF MOTORCYCLES.



FIRE TRAIL STEEL POST AND CABLE FENCE
SCALE 1:20

0 200 400 600 800 1000
1:20

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: FENCE SERIES FIRE TRAIL POST AND CABLE FENCE	SHEET No. SD 0705 REVISION: - SHEET Sheet 1 of 1



PLAN
1 REQUIRED AS DRAWN

PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	VENDOR
1	1	1065WM055	FIXED POST WELDMENT	
2	1	1065WM057	SLIP RAIL WELDMENT	
3	1	1065WM058	END POST WELDMENT	

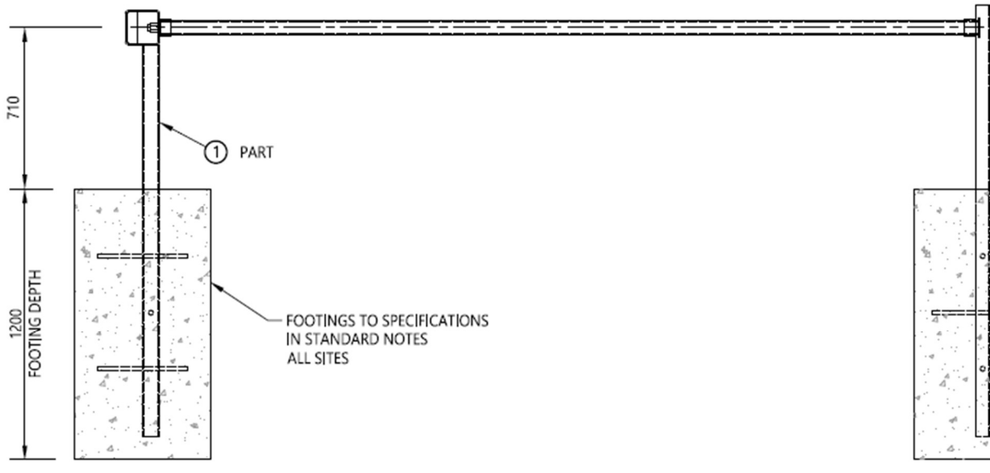
DIMENSION TABLE		
DIMENSION	LENGTH	COMENTS
DIM 'A'	3500	NOMINAL CLEAR OPENING
DIM 'B'	DIM 'A' + 170	POST CENTRES
DIM 'C'	DIM 'A' + 107	SLIP RAIL LENGTH SEE SHEET 4

STANDARD NOTES:

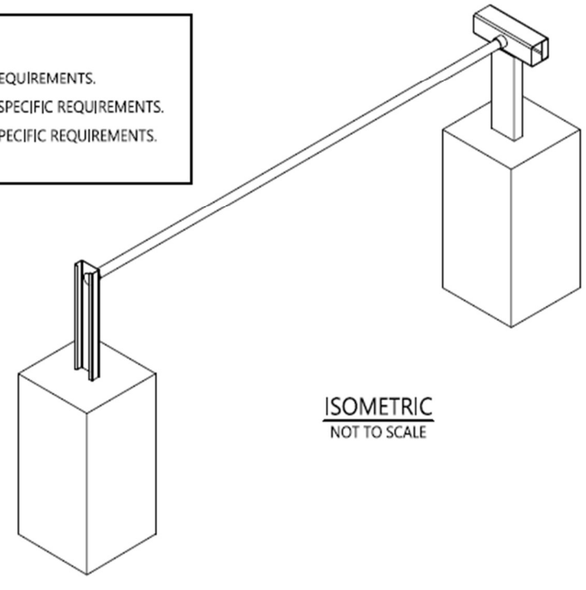
1. THIS STANDARD DRAWING IS BASED ON DRAWING 1065GA003 BY iINVENT PTY LTD DATED 6/5/2014.
2. UNLESS OTHERWISE SPECIFIED THE FOLLOWING STANDARDS APPLY. THIS DOES HOWEVER ALLOW FOR SITE SPECIFIC ALTERATIONS AS NECESSARY WHERE AGREED PRIOR TO PROCUREMENT.
3. ALL CONCRETE MUST BE PROCURED IN READY MIX STATE AND DOCUMENTATION ON STRENGTH GRADE (N20) AND VOLUMES PROVIDED TO COUNCIL UPON REQUEST.
4. ALL SPOIL FROM EXCAVATIONS MUST BE EITHER SPREAD ON SITE (TAKING CARE TO MINIMISE EROSION AN SEDIMENTATION AND IMPACT ON VEGETATION) OR DISPOSED OF AT COUNCIL'S WASTE MANAGEMENT FACILITY (RECEIPT TO BE PROVIDED ON REQUEST). THIS IS TO BE AGREED WITH COUNCIL'S REPRESENTATIVE PRIOR TO COMMENCEMENT OF WORKS.
5. FIRE TRAIL GATES AND BOLLARDS SHALL BE FABRICATED TO STANDARDS DETAILED ON COUNCIL'S STANDARD DRAWING.
6. FIRE TRAIL GATES ARE TO OPEN INWARDS TO THE RESERVE (ASSIST PREVENTION OF ILLEGAL OPENING).
7. BOLLARDS ARE TO BE SPACED AS REGULARLY AS POSSIBLE TAKING INTO ACCOUNT TERRAIN, ACCESS FOR INSTALLATION AND SUBSURFACE CONDITIONS. THIS WILL MEAN CENTRES AT DISTANCES OF NO LESS THAN 1200mm AND NO MORE THAN 2200mm EXCEPT IN EXCEPTIONAL CIRCUMSTANCES.
8. GATES AND BOLLARDS TO BE PLACED TO COMPLETELY SHUT DOWN THE ACCESS WIDTH AS FAR AS REASONABLY POSSIBLE. ATTACH CABLES DIRECTLY TO GATE POSTS AND LOCATE TERMINAL BOLLARDS AS CLOSE AS POSSIBLE TO EXISTING FENCE LINES OR LANDSCAPE FEATURES. A KEY FOCUS IS TO REDUCE ENTRY OF MOTORCYCLES TO PUBLIC RESERVES.
9. GATES AND BOLLARDS ARE TO BE PLACED TO ACCOMMODATE SERVICES, INCLUDING (BUT NOT LIMITED TO) TELECOMMUNICATION, WATER, SEWER, DRAINAGE, ELECTRICITY AND GAS INFRASTRUCTURE.
10. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO UNDERTAKE 'DIAL BEFORE YOU DIG' ASSESSMENT OF THE SITE BEFORE COMMENCEMENT OF CONSTRUCTION TO ENSURE THERE IS NO DAMAGE TO INFRASTRUCTURE.
11. GATES AND BOLLARDS ARE TO BE LOCATED TO USE NATURAL OR MAN-MADE FEATURES TO CLOSE DOWN ACCESS. FOR EXAMPLE, STEEP SLOPES, THICK VEGETATION AND DRAINAGE INFRASTRUCTURE. COUNCIL STAFF WILL PROVIDE CLARIFICATION ON INDIVIDUAL SITES ON REQUEST, OR AT SITE MEETINGS WHERE ARRANGED.
12. OPEN EARTHWORKS MUST BE MADE SAFE OR SUITABLE AND/OR BARRICADES USED AS NECESSARY WHILST AWAITING INSPECTION BY COUNCIL'S REPRESENTATIVE.
13. ONE STANDARD SIGN POST TO BE INSTALLED ADJACENT TO EACH GATE OR SLIP RAIL.
14. HOLD POINTS WILL BE INCLUDED AT COMPLETION OF THE EARTHWORKS, PRIOR TO THE CONCRETE POUR FOR EACH SITE.
15. WHERE REQUESTED, EXISTING LOG FENCING IS TO BE REMOVED AND DISPOSED OF APPROPRIATELY (TIP RECEIPTS TO BE PROVIDED TO COUNCIL'S REPRESENTATIVE).

GENERAL NOTES:

1. DETERMINE SITE SPECIFIC CLEAR INSIDE REQUIREMENTS.
2. FABRICATE SLIP RAIL WELDMENT TO SITE SPECIFIC REQUIREMENTS.
3. SET FIXED POST AND END POST TO SITE SPECIFIC REQUIREMENTS.
4. TEST FIT SLIP RAIL.



ELEVATION



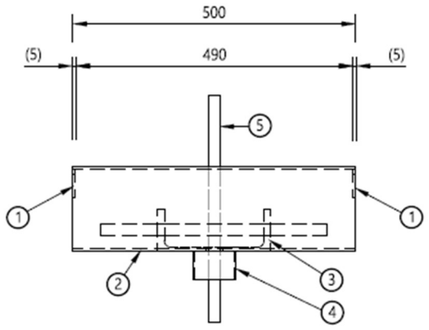
ISOMETRIC
NOT TO SCALE

FIRE TRAIL (SLIP RAIL) ACCESS GATE - GENERAL ARRANGEMENT AND STANDARD NOTES

0 250 500 750 1000 1250

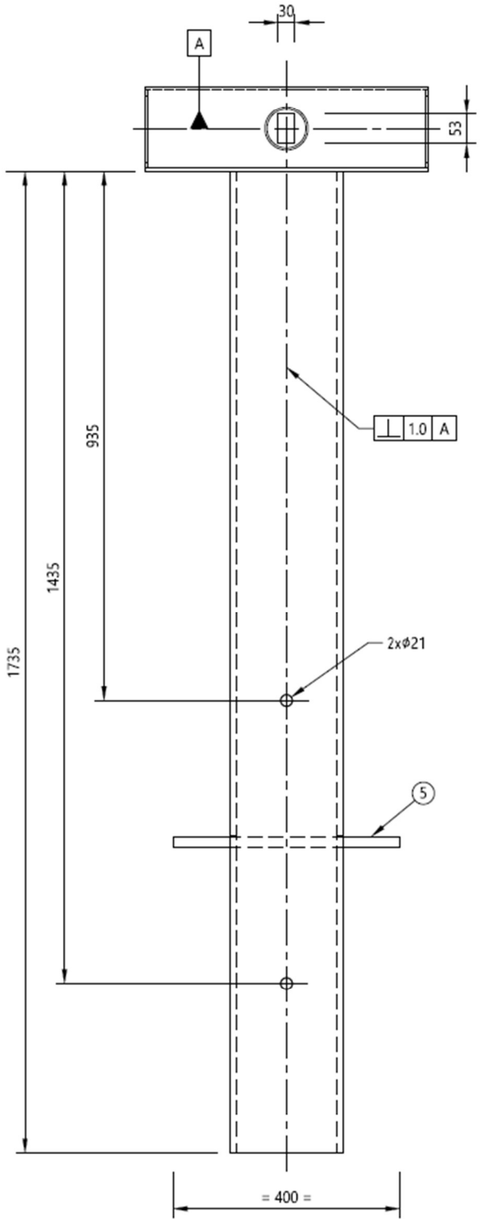
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SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: FENCE SERIES FIRE TRAIL (SLIP RAIL) GATE	SHEET No. SD 0706 REVISION: - SHEET Sheet 1 of 4

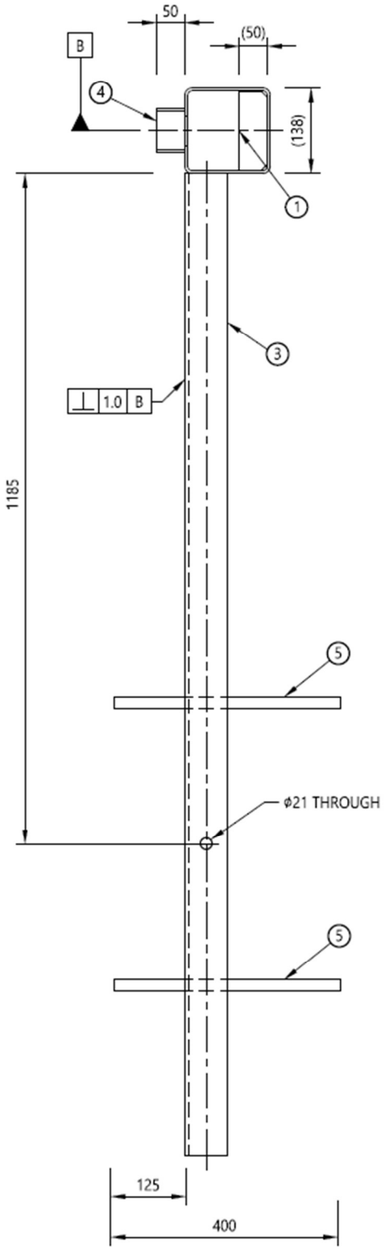


PLAN
1 REQUIRED AS DRAWN

LEGEND
Part number ①



ELEVATION

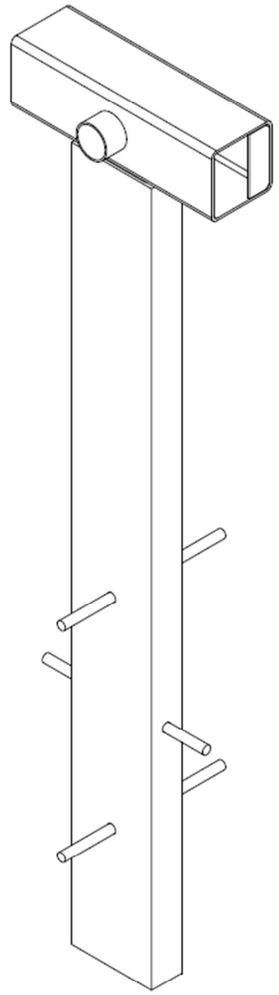


END ELEVATION

FIXED POST WELDMENT

NOTES:

1. THE STANDARD DRAWING IS BASED ON DRAWING 1065WM055 BY iINVENT PTY LTD DATED 21/5/2014.
2. ALL WELDS 5mm FILLET UNLESS OTHERWISE NOTED.
3. BREAK ALL CORNERS AND SHARPS.
4. FINISH FRAMES WITH HOT-DIP GALVANISING.
5. MAKE NECESSARY MODIFICATIONS FOR HOT-DIP GALVANISING.



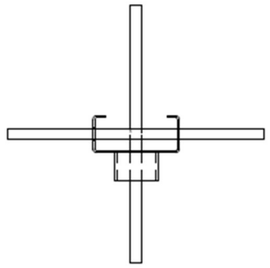
ISOMETRIC
NOT TO SCALE

ALTERNATIVE SPIKE DETAILS (PART 5):
DRILL 12Φ HOLE THROUGH POST PRIOR TO GALVANISING AND INSERT 10Φ x 400mm LONG ROUND BAR AT TIME OF INSTALLATION.

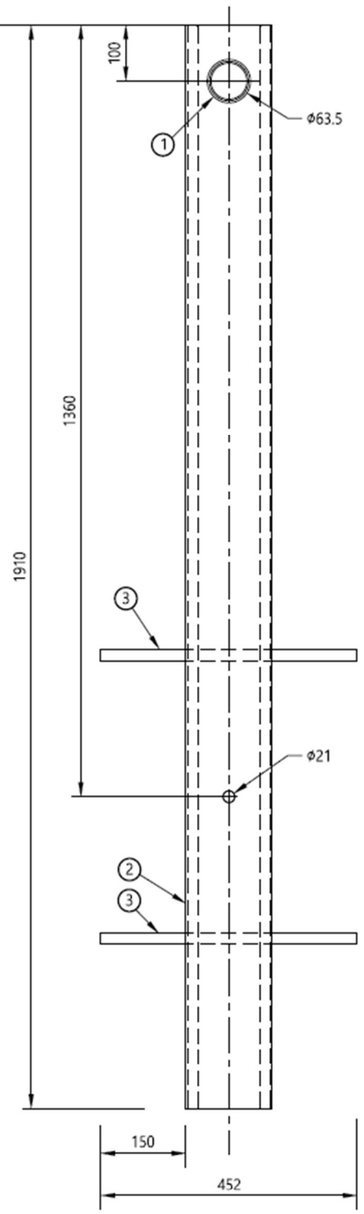
PARTS LIST

ITEM	QTY	MATERIAL	LENGTH
1	2	138x50x5mm PLATE AS 3678 – 250	
2	1	150x150x5mm SHS AS 1163-C350L0/C450L0	500mm
3	1	200 PFC AS 3679.1–250/300 PLUS	1735mm
4	1	90NB AS 1074/1163 MEDIUM	50mm
5	3	Φ20 ROD AS 3678 - 250	400mm

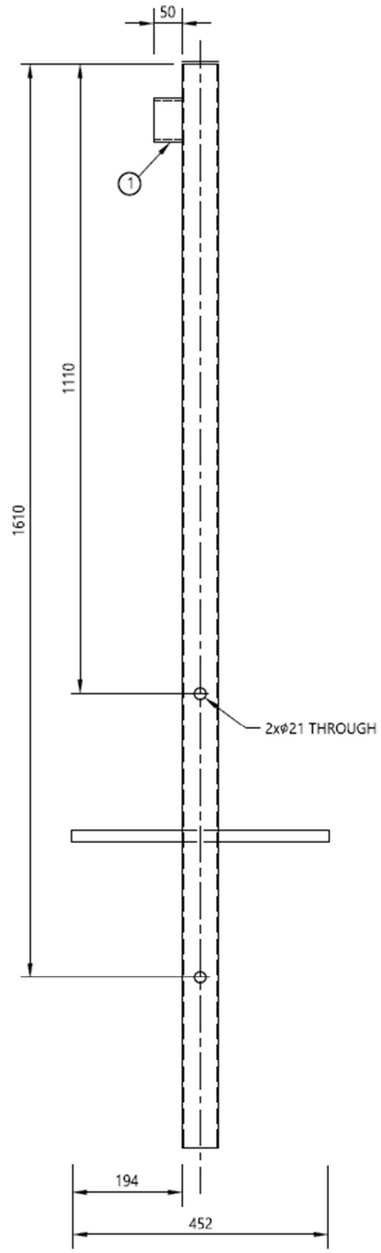
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PLAN
1 REQUIRED AS DRAWN



ELEVATION

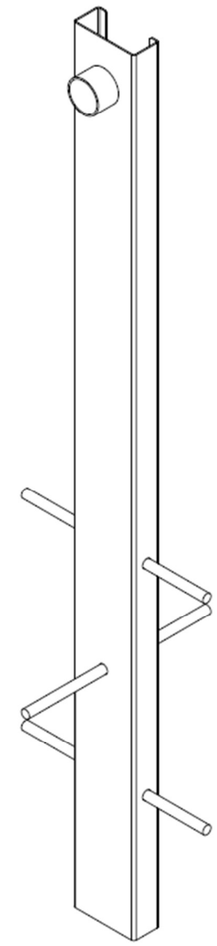


END ELEVATION

END POST WELDMENT

NOTES:

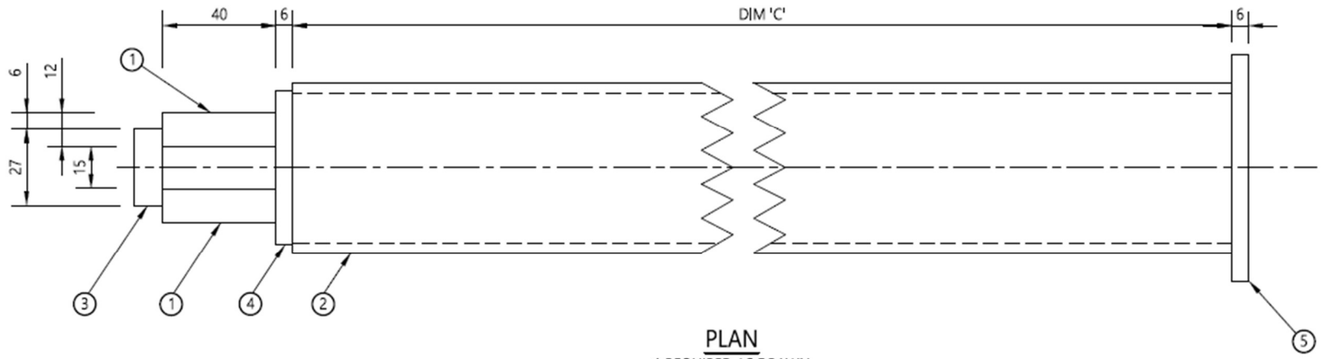
1. THIS STANDARD DRAWING IS BASED ON DRAWING 1065WM058 BY iINVENT PTY LTD DATED 26/5/2014.
2. ALL WELDS 5mm FILLET UNLESS OTHERWISE NOTED.
3. BREAK ALL CORNERS AND SHARPS.
4. FINISH FRAMES WITH HOT-DIP GALVANISING.
5. MAKE NECESSARY MODIFICATIONS FOR HOT-DIP GALVANISING.



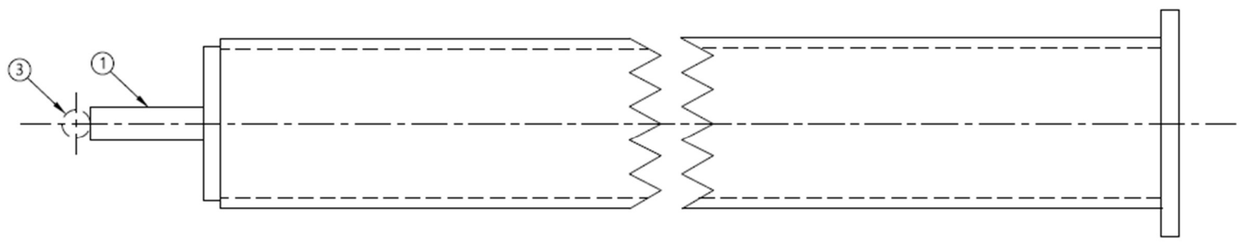
ISOMETRIC
NOT TO SCALE

PARTS LIST			
ITEM	QTY	MATERIAL	LENGTH
1	1	90NB AS 1074/1163 MEDIUM	50mm
2	1	LL15230 AS 3678 - 250	1910mm
3	3	Φ20 ROD AS 3678 - 250	452mm

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: FENCE SERIES FIRE TRAIL (SLIP RAIL) GATE	SHEET No. SD 0706 REVISION: - SHEET Sheet 3 of 4



PLAN
1 REQUIRED AS DRAWN



ELEVATION

NOTES:

1. THIS STANDARD DRAWING IS BASED ON DRAWING 1065WM057, 1065PT501 AND 1065PT502 BY iINVENT PTY LTD DATED 26/5/2014.
2. ALL WELDS 5mm FILLET UNLESS OTHERWISE NOTED.
3. BREAK ALL CORNERS AND SHARPS.
4. FINISH FRAMES WITH HOT-DIP GALVANISING.
5. MAKE NECESSARY MODIFICTAIONS FOR HOT-DIP GALVANISING.
6. FOR DETAILS ON DIM 'C' SEE SHEET 1.

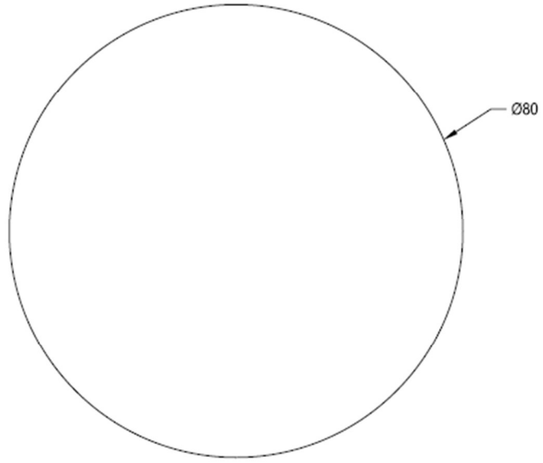


PLATE CUTTING
1 REQUIRED AS DRAWN
SCALE 1:1

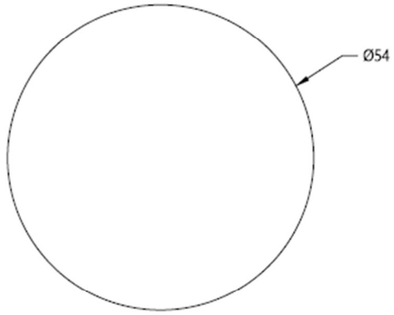
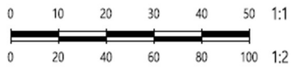


PLATE CUTTING
1 REQUIRED AS DRAWN
SCALE 1:1

PARTS LIST					
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	LENGTH
1	2			12 SQUARE AS 3678-250	40mm
2	1			50N8 AS 1074/1163 MEDIUM AS 1163-C350L0/C450L0	DIM 'C'
3	1			ø10 ROD AS 3678 - 250	27mm
4	1	1065PT501	SMALL END PLATE		
5	1	1065PT502	LARGE END PLATE		

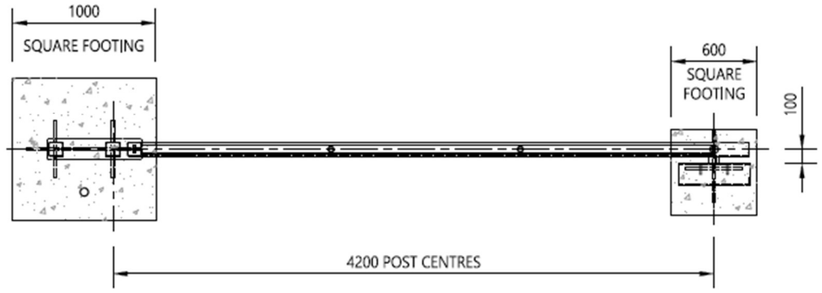
PARTS LIST		
MATERIAL	LENGTH	WIDTH
80 x 80 x 6 PLATE AS 3678 - 250	80.0	80.0
54 x 54 x 6 PLATE AS 3678 - 250	54.0	54.0

SLIP RAIL WELDMENT
SCALE 1:2



SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: FENCE SERIES FIRE TRAIL (SLIP RAIL) GATE

SHEET No. SD 0706 REVISION: -
SHEET Sheet 4 of 4



PLAN

1 REQUIRED AS DRAWN

GENERAL NOTES:

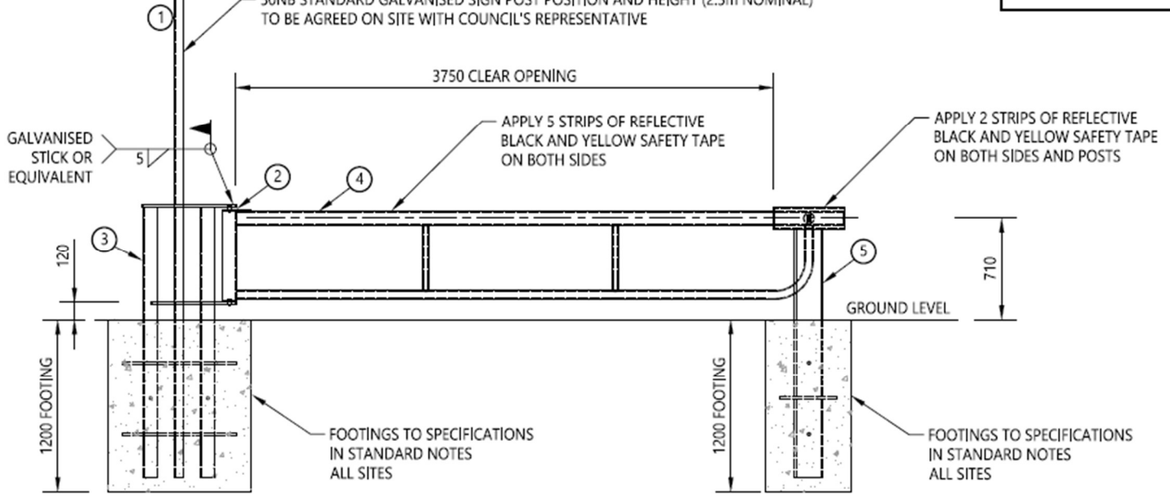
1. SET AND LEVEL GATE POST IN FOOTING.
2. SET AND LEVEL FIXED POST RELATIVE TO GATE POST.
3. AFTER CONCRETE SETS, ASSEMBLE GATE TO LOWER PIN IN GATE POST.
4. LOCATE TOP PIN AND CHECK GATE OPERATION.
5. WELD TOP PIN TO GATE POST AND APPLY SUITABLE GALVANISING PROTECTION.

LEGEND

Part number ①

STANDARD NOTES:

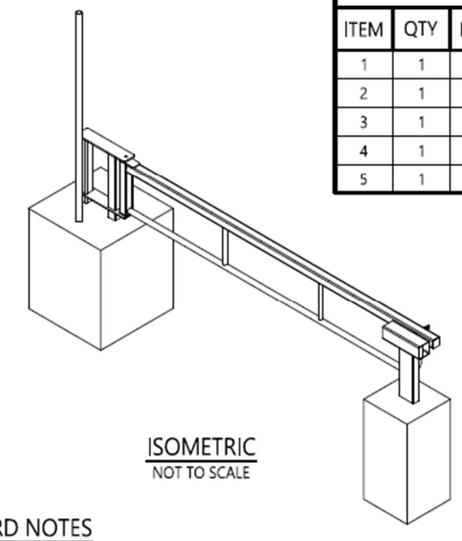
1. THIS STANDARD DRAWING IS BASED ON DRAWING 1065GA001 BY iINVENT PTY LTD DATED 21/5/2014.
2. UNLESS OTHERWISE SPECIFIED THE FOLLOWING STANDARDS APPLY. THIS DOES HOWEVER ALLOW FOR SITE SPECIFIC ALTERATIONS AS NECESSARY WHERE AGREED PRIOR TO PROCUREMENT.
3. ALL CONCRETE MUST BE PROCURED IN READY MIX STATE AND DOCUMENTATION ON STRENGTH GRADE (N20) AND VOLUMES PROVIDED TO COUNCIL UPON REQUEST.
4. ALL SPOIL FROM EXCAVATIONS MUST BE EITHER SPREAD ON SITE (TAKING CARE TO MINIMISE EROSION AN SEDIMENTATION AND IMPACT ON VEGETATION) OR DISPOSED OF AT COUNCIL'S WASTE MANAGEMENT FACILITY (RECEIPT TO BE PROVIDED ON REQUEST). THIS IS TO BE AGREED WITH COUNCIL'S REPRESENTATIVE PRIOR TO COMMENCEMENT OF WORKS.
5. FIRE TRAIL GATES AND BOLLARDS SHALL BE FABRICATED TO STANDARDS DETAILED ON COUNCIL'S STANDARD DRAWINGS.
6. FIRE TRAIL GATES ARE TO OPEN INWARDS TO THE RESERVE (ASSIST PREVENTION OF ILLEGAL OPENING).
7. BOLLARDS ARE TO BE SPACED AS REGULARLY AS POSSIBLE TAKING INTO ACCOUNT TERRAIN, ACCESS FOR INSTALLATION AND SUBSURFACE CONDITIONS. THIS WILL MEAN CENTRES AT DISTANCES OF NO LESS THAN 1200mm AND NO MORE THAN 2200mm EXCEPT IN EXCEPTIONAL CIRCUMSTANCES.
8. GATES AND BOLLARDS TO BE PLACED TO COMPLETELY SHUT DOWN THE ACCESS WIDTH AS FAR AS REASONABLY POSSIBLE. ATTACH CABLES DIRECTLY TO GATE POSTS AND LOCATE TERMINAL BOLLARDS AS CLOSE AS POSSIBLE TO EXISTING FENCE LINES OR LANDSCAPE FEATURES. A KEY FOCUS IS TO REDUCE ENTRY OF MOTORCYCLES TO PUBLIC RESERVES.
9. GATES AND BOLLARDS ARE TO BE PLACED TO ACCOMMODATE SERVICES, INCLUDING (BUT NOT LIMITED TO) TELECOMMUNICATION, WATER, SEWER, DRAINAGE, ELECTRICITY AND GAS INFRASTRUCTURE.
10. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO UNDERTAKE 'DIAL BEFORE YOU DIG' ASSESSMENT OF THE SITE BEFORE COMMENCEMENT OF CONSTRUCTION TO ENSURE THERE IS NO DAMAGE TO INFRASTRUCTURE.
11. GATES AND BOLLARDS ARE TO BE LOCATED TO USE NATURAL OR MAN-MADE FEATURES TO CLOSE DOWN ACCESS. FOR EXAMPLE, STEEP SLOPES, THICK VEGETATION AND DRAINAGE INFRASTRUCTURE. COUNCIL STAFF WILL PROVIDE CLARIFICATION ON INDIVIDUAL SITES ON REQUEST, OR AT SITE MEETINGS WHERE ARRANGED.
12. OPEN EARTHWORKS MUST BE MADE SAFE OR SUITABLE AND/OR BARRICADES USED AS NECESSARY WHILST AWAITING INSPECTION BY COUNCIL'S REPRESENTATIVE.
13. ONE STANDARD SIGN POST TO BE INSTALLED ADJACENT TO EACH GATE OR SLIP RAIL.
14. HOLD POINTS WILL BE INCLUDED AT COMPLETION OF THE EARTHWORKS, PRIOR TO THE CONCRETE POUR FOR EACH SITE.
15. WHERE REQUESTED, EXISTING LOG FENCING IS TO BE REMOVED AND DISPOSED OF APPROPRIATELY (TIP RECEIPTS TO BE PROVIDED TO COUNCIL'S REPRESENTATIVE).



ELEVATION

PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION	VENDOR
1	1		50NB STANDARD GAL SIGN POST	
2	1	1065PT102	TOP PIN	
3	1	1065WM053	GATE POST WELDMENT	
4	1	1065WM054	GATE WELDMENT	
5	1	1065WM055	FIXED POST WELDMENT	

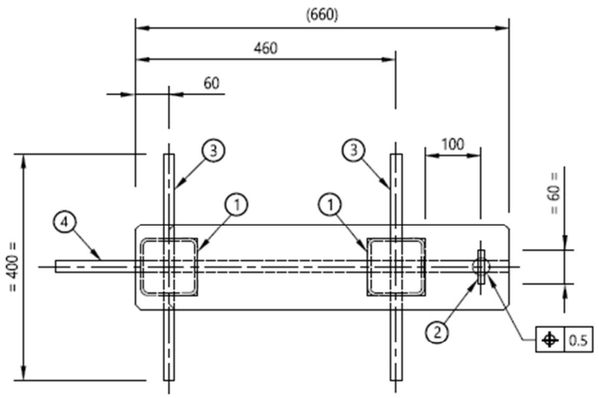


ISOMETRIC

NOT TO SCALE

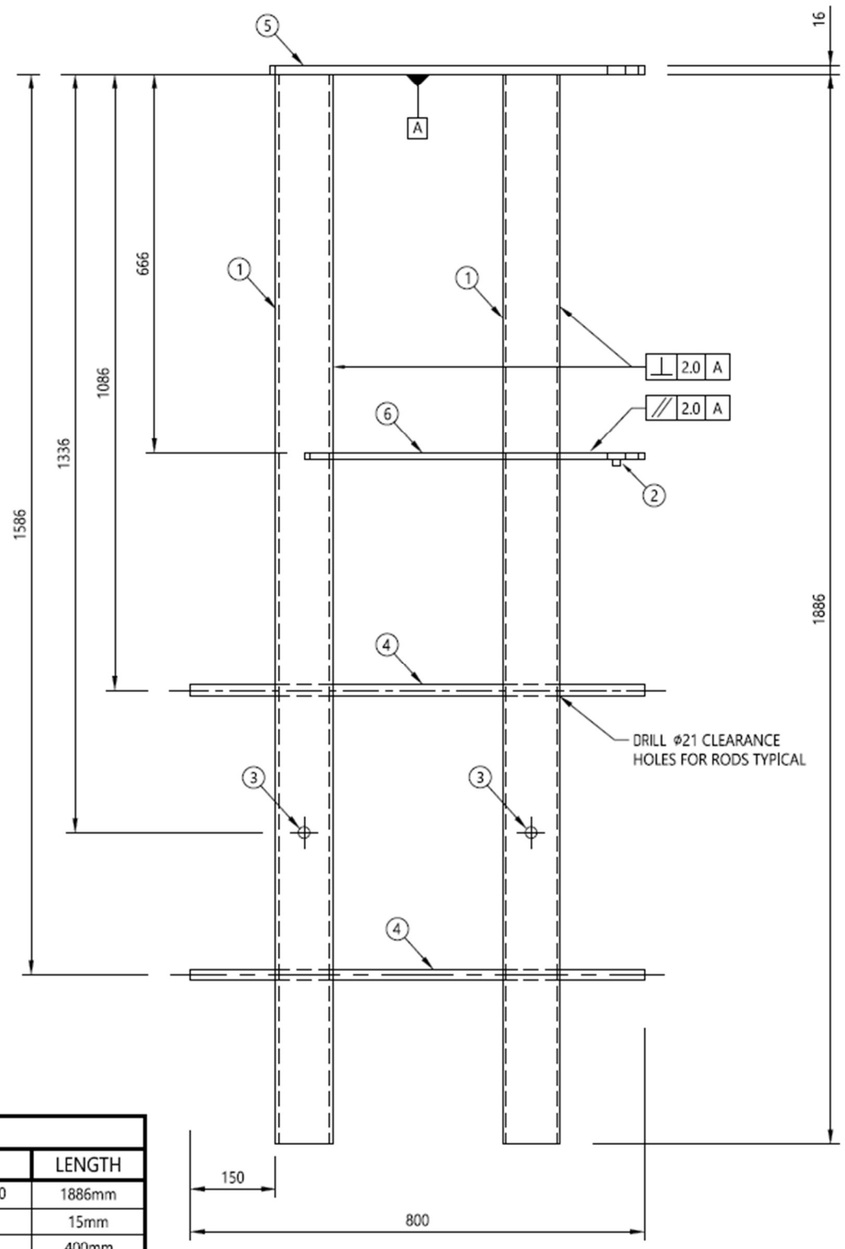
GENERAL ARRANGEMENT AND STANDARD NOTES

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: FENCE SERIES FIRE TRAIL (SWING) ACCESS GATE	SHEET No. SD 0707 REVISION: - SHEET Sheet 1 of 4



PLAN
1 REQUIRED AS DRAWN

LEGEND
Part number ①

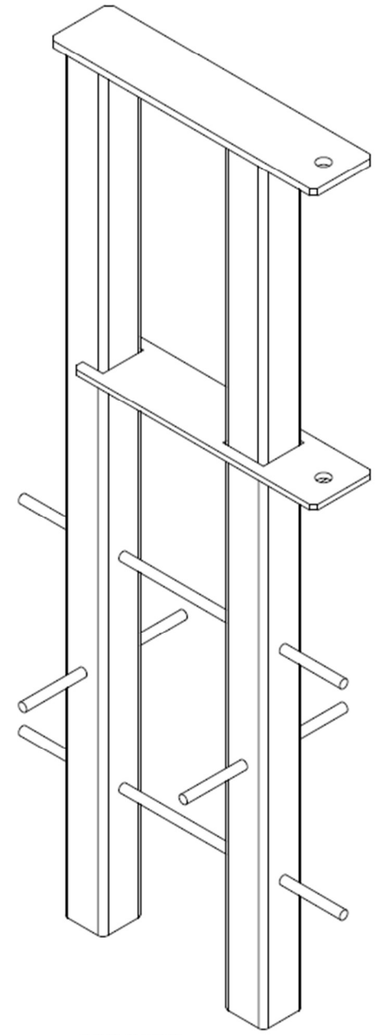


ELEVATION

GATE POST WELDMENT

NOTES:

1. THIS STANDARD DRAWING IS BASED ON DRAWING 1065WM053 BY iINVENT PTY LTD DATED 21/05/2014.
2. ALL WELDS TO BE 5mm FILLET UNLESS OTHERWISE NOTED.
3. BREAK ALL CORNERS AND SHARPS.
4. FINISH FRAMES WITH HOT-DIP GALVANISING.
5. MAKE NECESSARY MODIFICATIONS FOR HOT-DIP GALVANISING.

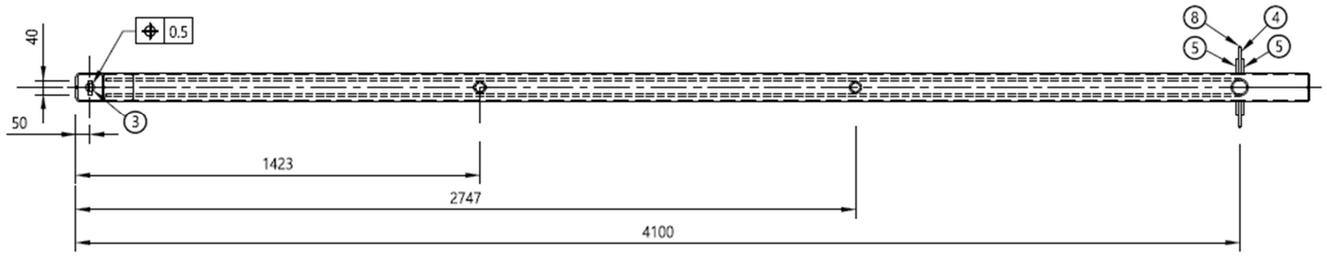


ISOMETRIC
NOT TO SCALE

PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	LENGTH
1	2			100x100x5mm SHS AS 1163-C350L0/C450L0	1886mm
2	1			12 SQUARE AS 3678 - 250	15mm
3	2			Φ20 ROD AS 3678 - 250	400mm
4	2			Φ20 ROD AS 3678 - 250	800mm
5	1	1065PT207	TOP HINGE PLATE		
6	1	1065PT208	BOTTOM HINGE PLATE		

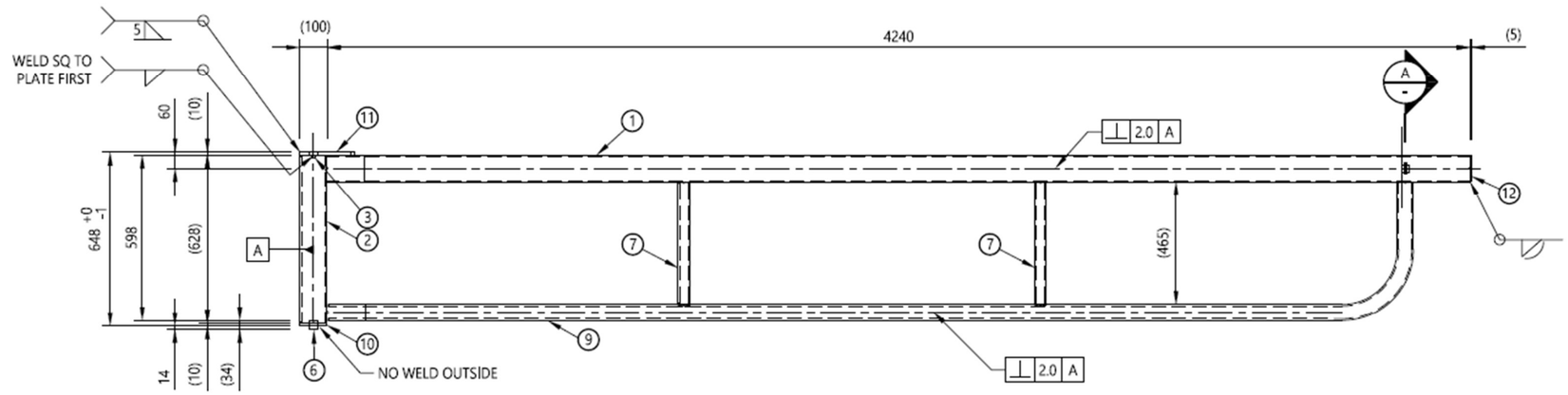
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						SHEET No. SD 0707 REVISION: - SHEET Sheet 2 of 4



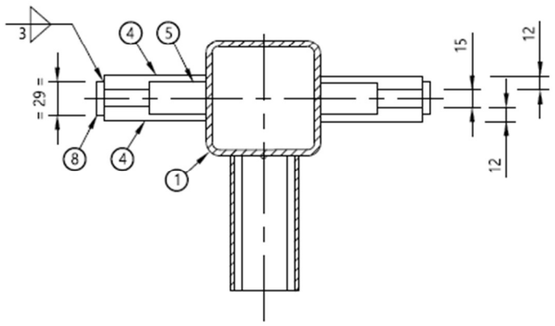
PLAN
SCALE 1:20
1 REQUIRED AS DRAWN

NOTES:

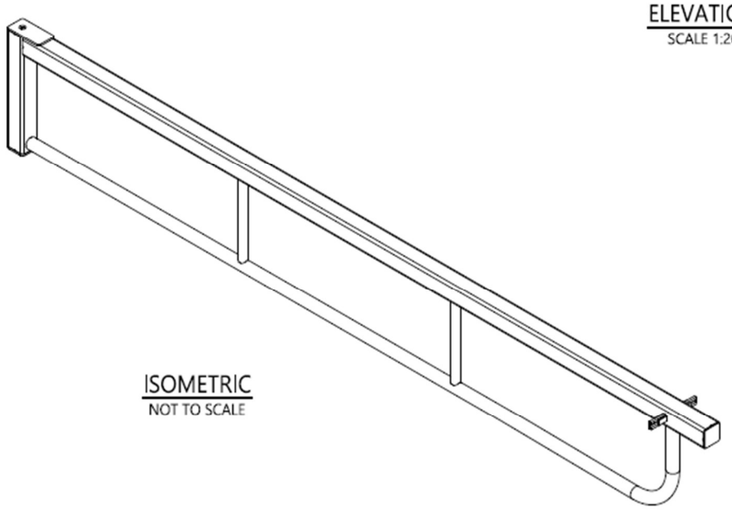
1. THIS STANDARD DRAWING IS BASED ON DRAWING 1065WM054 BY iINVENT PTY LTD DATED 21/05/2014.
2. ALL WELDS TO BE 5mm FILLET UNLESS OTHERWISE NOTED.
3. BREAK ALL CORNERS AND SHARPS.
4. FINISH FRAMES WITH HOT-DIP GALVANISING.
5. MAKE NECESSARY MODIFICATIONS FOR HOT-DIP GALVANISING.



ELEVATION
SCALE 1:20



SECTION A-A
SCALE 1:5



ISOMETRIC
NOT TO SCALE

LEGEND

Part number ①

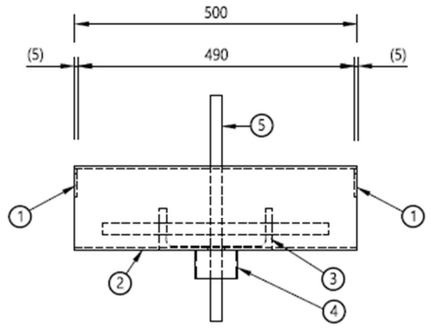
PARTS LIST					
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	LENGTH
1	1			100x100x5 SHS AS 1163 - C350L0/C40L0	4240mm
2	1			100x100x5 SHS AS 1163 - C350L0/C40L0	628mm
3	1			12 SQUARE AS 3678 - 250	40mm
4	4			12 SQUARE AS 3678 - 250	90mm
5	4			50x27x8mm PLATE AS 3678 - 250	
6	1			ϕ30 BMS M1020	34mm
7	2			ϕ42.4x4.9 CHS AS 1163 - C350L0/C450L0	465mm
8	2			ϕ6 ROD AS 3678 - 250	29mm
9	1			ϕ60.3x5.54 CHS AS 1163 - C350L0/C450L0	4202mm
10	1	1065PT301	END CAPS		
11	1	1065PT308	END PLATE		
12	1	1065PT309	END CAPS		

GATE WELDMENT

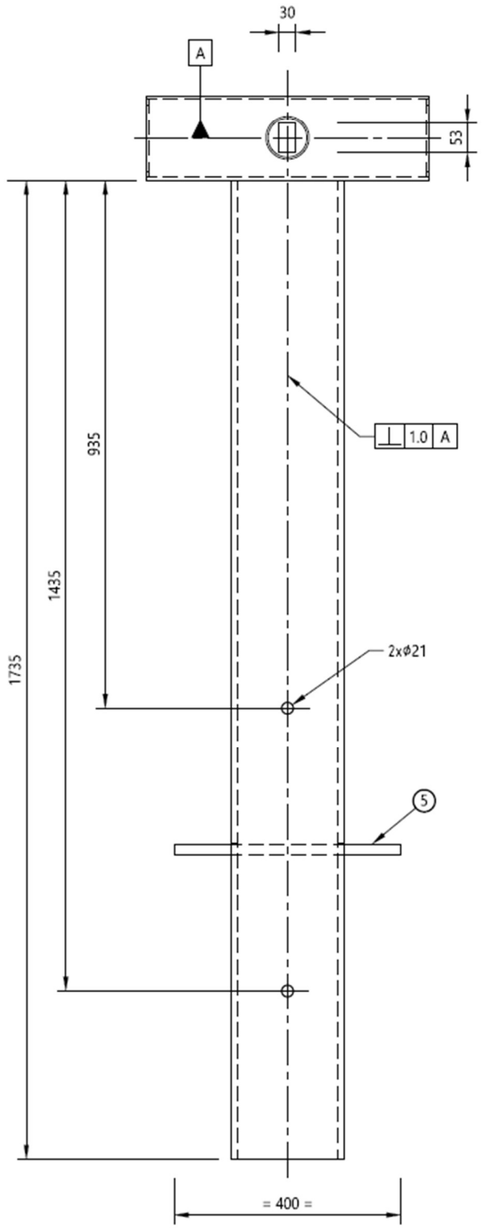
0 50 100 150 200 250 1:5
0 200 400 600 800 1000 1:20

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: FENCE SERIES FIRE TRAIL (SWING) ACCESS GATE

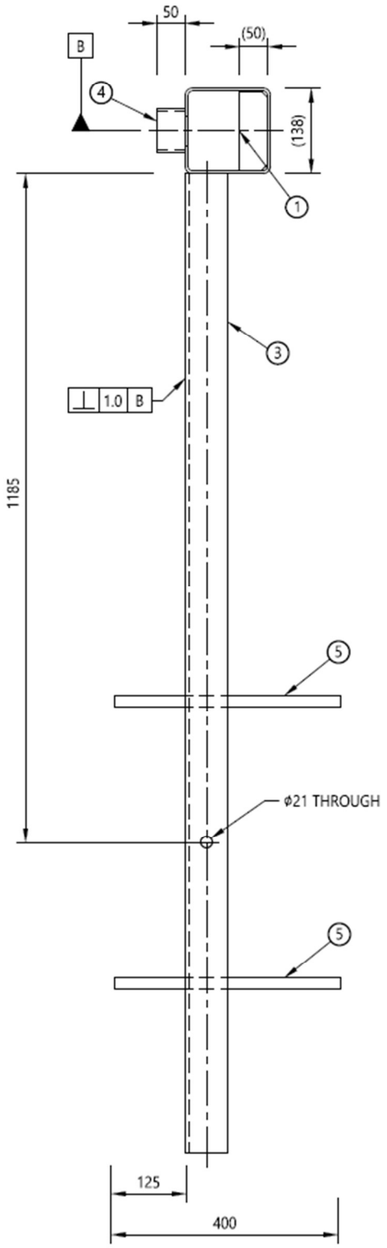
SHEET No. SD 0707 REVISION: -
SHEET Sheet 3 of 4



PLAN
1 REQUIRED AS DRAWN



ELEVATION



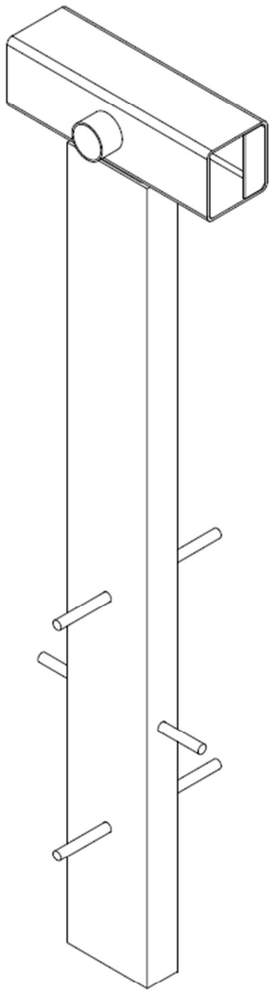
END ELEVATION

FIXED POST WELDMENT

0 100 200 300 400 500
1:10

NOTES:

1. THIS STANDARD DRAWING IS BASED ON DRAWING 1065WM055 BY iINVENT PTY LTD DATED 21/05/2014.
2. ALL WELDS TO BE 5mm FILLET UNLESS OTHERWISE NOTED.
3. BREAK ALL CORNERS AND SHARPS.
4. FINISH FRAMES WITH HOT-DIP GALVANISING.
5. MAKE NECESSARY MODIFICATIONS FOR HOT-DIP GALVANISING.



ISOMETRIC
NOT TO SCALE

LEGEND
Part number (1)

ALTERNATIVE SPIKE DETAILS (PART 5):
DRILL 12⌀ HOLE THROUGH POST PRIOR TO GALVANISING AND INSERT 10⌀ x 400mm LONG ROUND BAR AT TIME OF INSTALLATION.

PARTS LIST

ITEM	QTY	MATERIAL	LENGTH
1	2	138x50x5mm PLATE AS 3678 – 250	
2	1	150x150x5mm SHS AS 1163-C350L0/C450L0	500mm
3	1	200 PFC AS 3679.1–250/300 PLUS	1735mm
4	1	90NB AS 1074/1163 MEDIUM	50mm
5	3	⌀20 ROD AS 3678 - 250	400mm

SCALE: AS SHOWN ORIGINAL A3
DATUM:
PROJECTION:
SURVEYED BY:

REV. | DESCRIPTION | DATE
STANDARD DRAWING

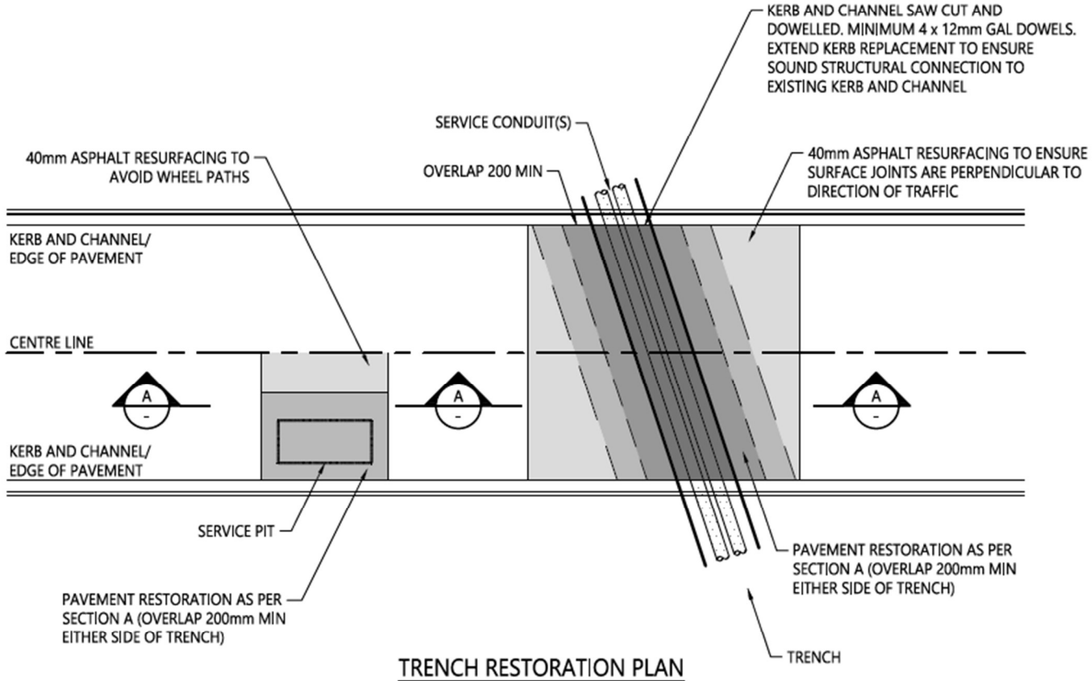
Hilltops COUNCIL

PROJECT:

SHEET TITLE:
FENCE SERIES
FIRE TRAIL (SWING) ACCESS GATE

SHEET No. SD 0707 REVISION: -

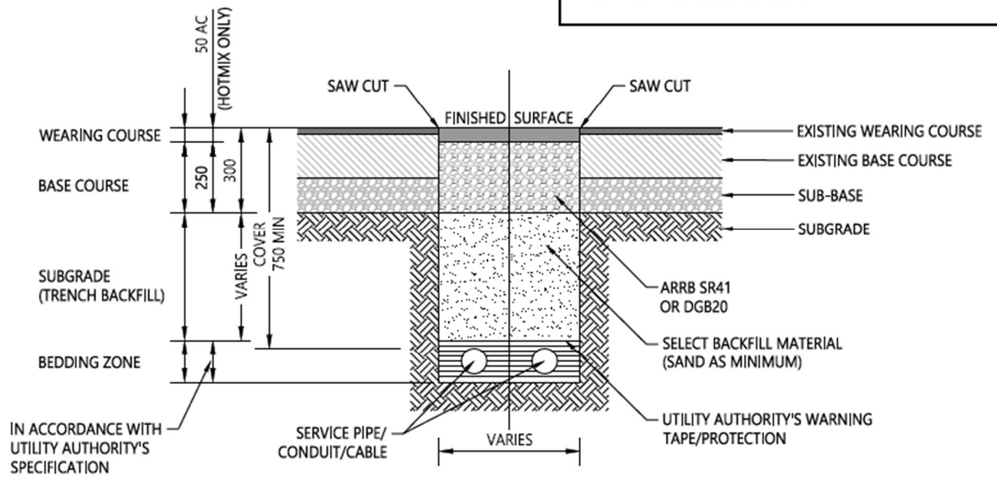
SHEET Sheet 4 of 4



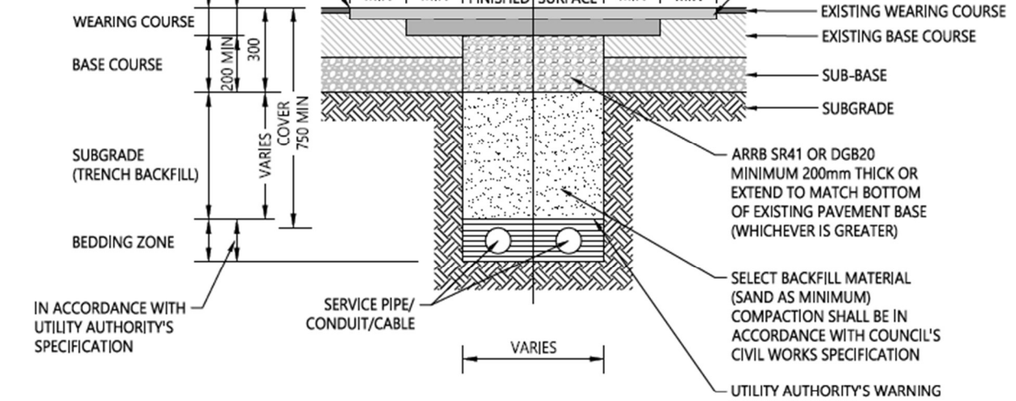
TRENCH RESTORATION PLAN
NOT TO SCALE

NOTE:

AT ALL LOCATIONS WHERE LONGITUDINAL TRENCHING TERMINATES, ADEQUATE SUBSURFACE DRAINAGE SHALL BE INSTALLED TO DISCHARGE ANY ACCUMULATED GROUND WATER INTO THE STORMWATER SYSTEM.



TEMPORARY RESTORATION
SECTION A
SCALE 1:20

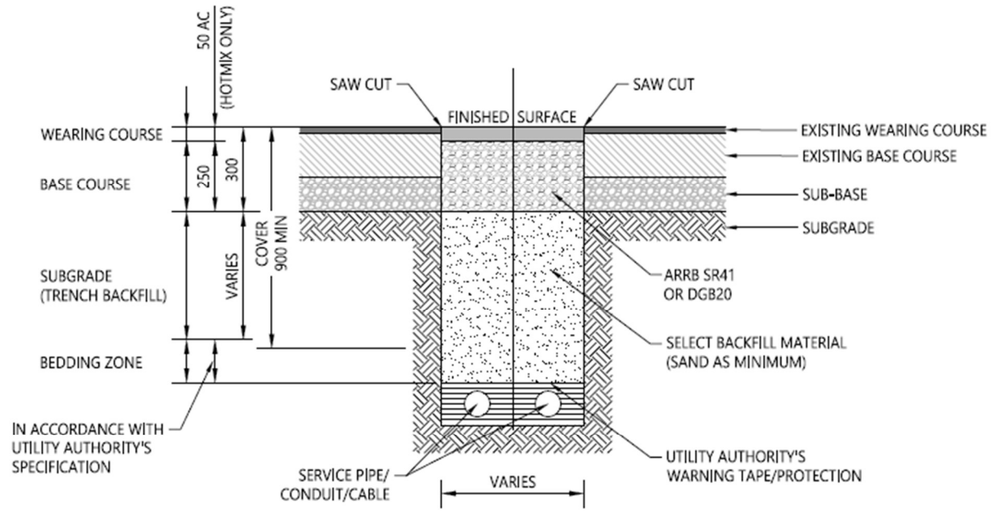


PERMANENT RESTORATION
SECTION A
SCALE 1:20

0 200 400 600 800 1000

1:20

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: PAVEMENT RESTORATION SERIES TRANSVERSE PAVEMENT TRENCH AND PIT RESTORATION	SHEET No. SD 0802 REVISION: - SHEET Sheet 1 of 2



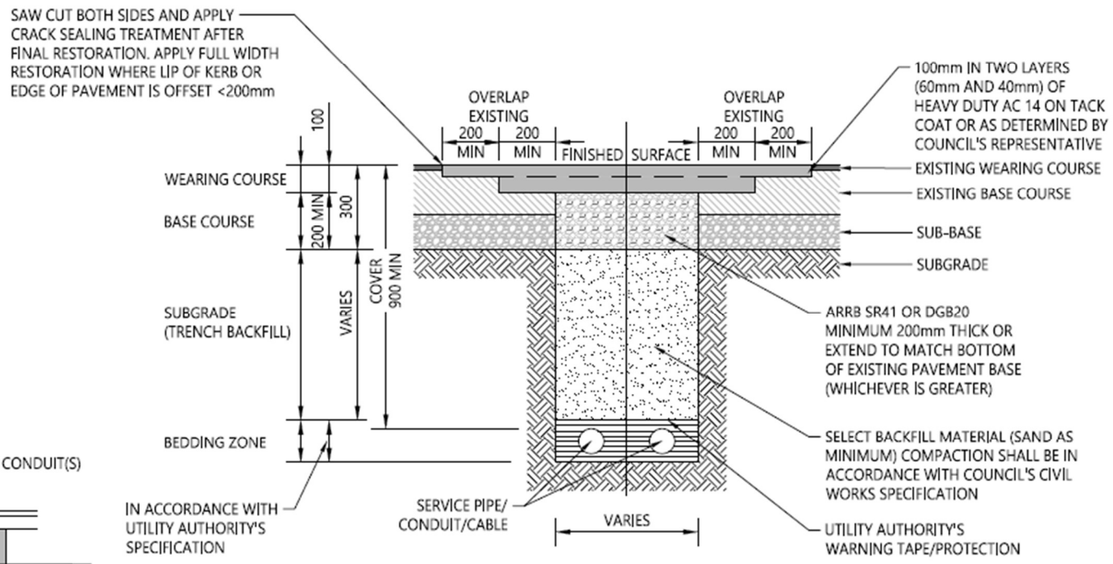
TEMPORARY RESTORATION

SECTION A

SCALE 1:20

NOTES:

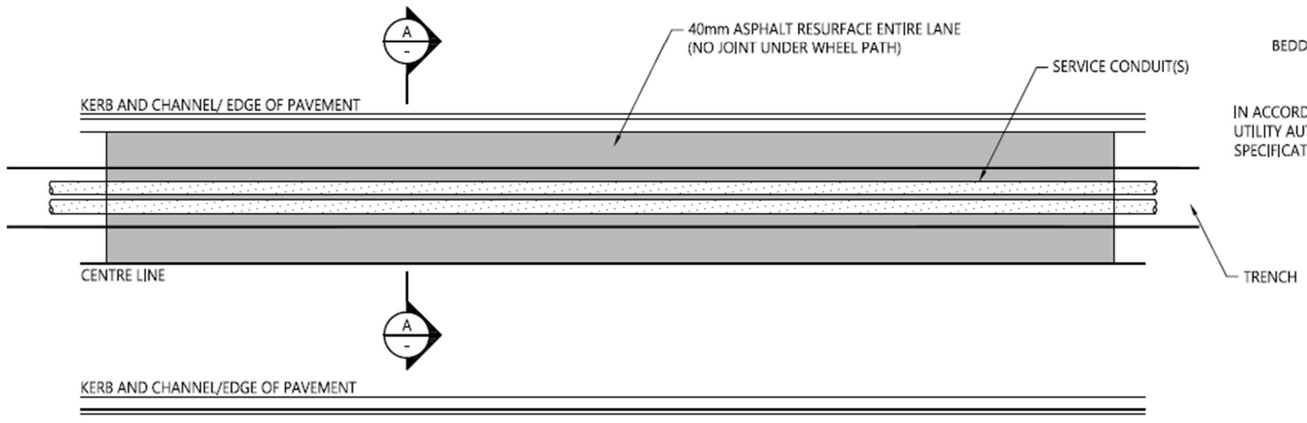
1. ALL TRAFFIC CONTROL OPERATIONS SHALL COMPLY WITH AS 1742.3 AND COUNCIL'S TRAFFIC CONTROL AT WORK SITES MANUAL.
2. NO UTILITY ALLOCATIONS EXIST IN OR UNDER CARRIAGEWAY PAVEMENTS.
3. ALL PROPOSED LONGITUDINAL INSTALLATIONS IN THE CARRIAGEWAY ARE CONSIDERED NON-CONFORMING AND REQUIRE COUNCIL APPROVAL.
4. AT ALL LOCATIONS WHERE LONGITUDINAL TRENCHING TERMINATES, ADEQUATE SUBSURFACE DRAINAGE SHALL BE INSTALLED TO DISCHARGE ANY ACCUMULATED GROUND WATER INTO THE STORMWATER SYSTEM.



PERMANENT RESTORATION

SECTION A

SCALE 1:20



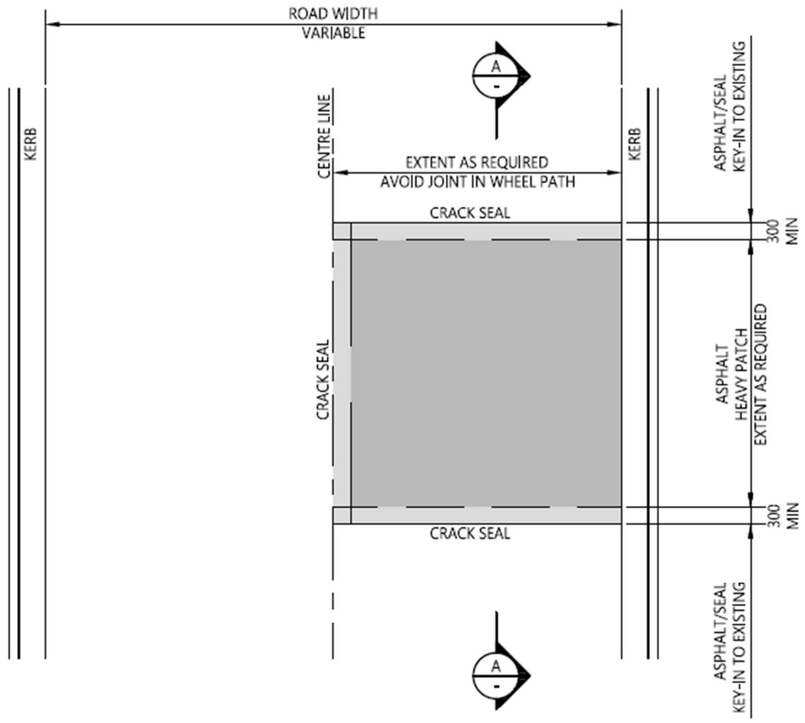
TRENCH RESTORATION PLAN

NOT TO SCALE

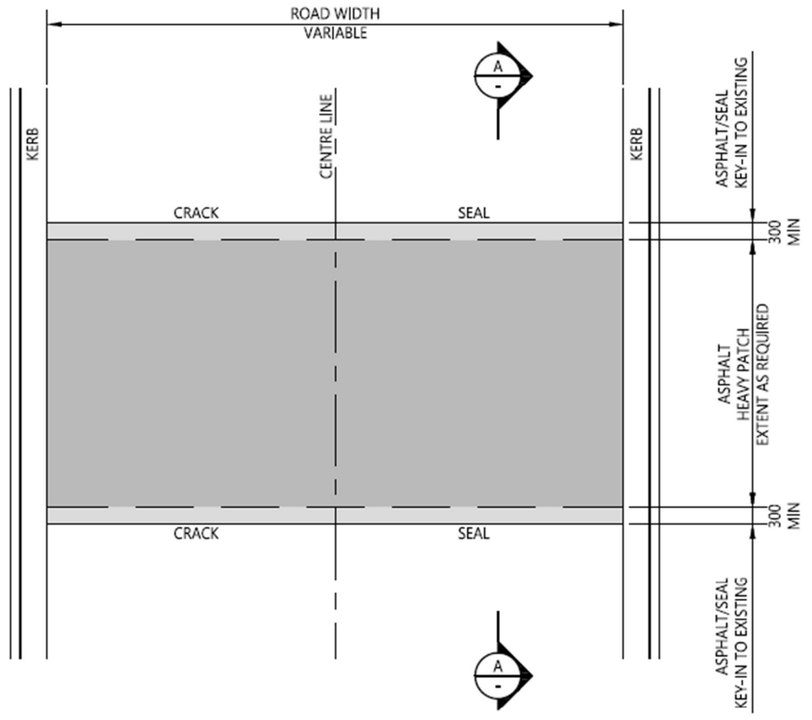
0 200 400 600 800 1000

1:20

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: PAVEMENT RESTORATION SERIES TRANSVERSE PAVEMENT TRENCH AND PIT RESTORATION	SHEET No. SD 0802 REVISION: - SHEET Sheet 2 of 2



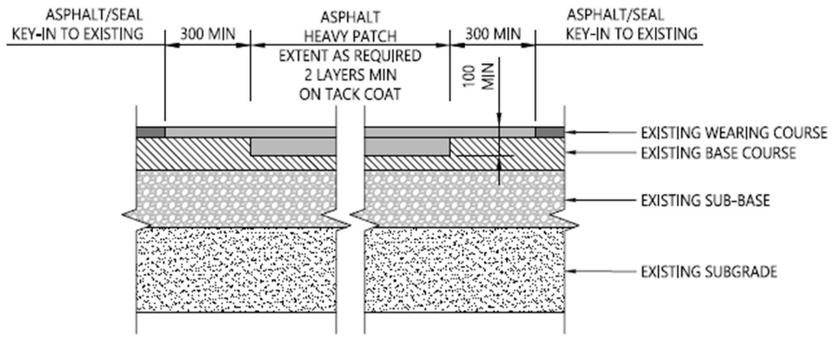
TYPICAL HEAVY PATCH
SCALE 1:100



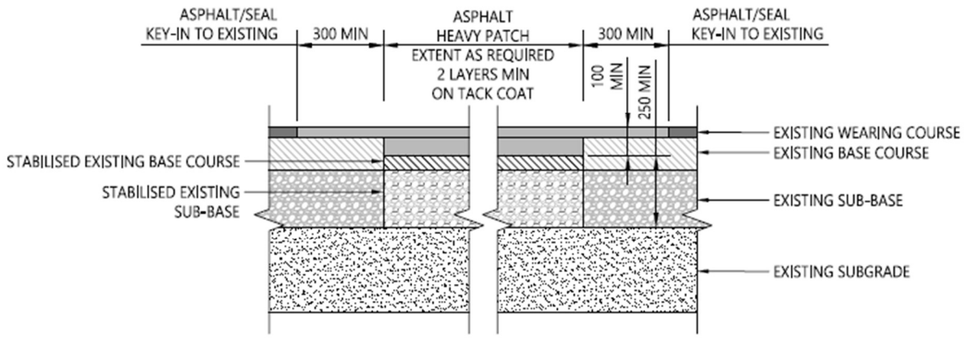
FULL WIDTH HEAVY PATCH
SCALE 1:100

NOTES:

1. ALL TRAFFIC CONTROL OPERATIONS SHALL COMPLY WITH AS 1742.3 AND COUNCIL'S TRAFFIC CONTROL AT WORK SITES MANUAL.
2. EXTENT, TYPE AND DEPTH OF HEAVY PATCH SHALL BE DETERMINED BY GEOTECHNICAL ANALYSIS AS REQUIRED.
3. ASPHALT TO BE COMPACTED IN LAYERS NO GREATER THAN 5 TIMES AGGREGATE SIZE.
4. ALL ASPHALT PATCHES TO FINISH FLUSH +/-2.5mm WITH CRACK SEAL AT ALL JOINTS (EMULSION AND SAND OR EQUIVALENT).
5. TACK COAT TO BE PROVIDED ON ALL EXCAVATIONS.
6. ALL PATCHES SHALL HAVE A WELL COMPACTED NON-BONY FINISH.
7. ALL PATCHES SHALL BE COMPLETED TO THE SIZE MARKED OUT BY COUNCIL'S REPRESENTATIVE.
8. ENLARGEMENT OF PATCHES MAY BE CARRIED OUT ONLY AFTER CONSULTATION WITH AND APPROVAL FROM COUNCIL'S REPRESENTATIVE.
9. AREAS DAMAGED OUTSIDE MARKED EXCAVATION CAUSED BY ASPHALT CONTRACTOR ARE TO BE BOXED OUT AND REINSTATED AT SERVICE PROVIDER'S EXPENSE.
10. AT ALL LOCATIONS WHERE LONGITUDINAL TRENCHING TERMINATES, ADEQUATE SUBSURFACE DRAINAGE SHALL BE INSTALLED TO DISCHARGE ANY ACCUMULATED GROUND WATER INTO THE STORMWATER SYSTEM.



ASPHALT HEAVY PATCH - GRANULAR OPTION
SECTION A –
SCALE 1:20

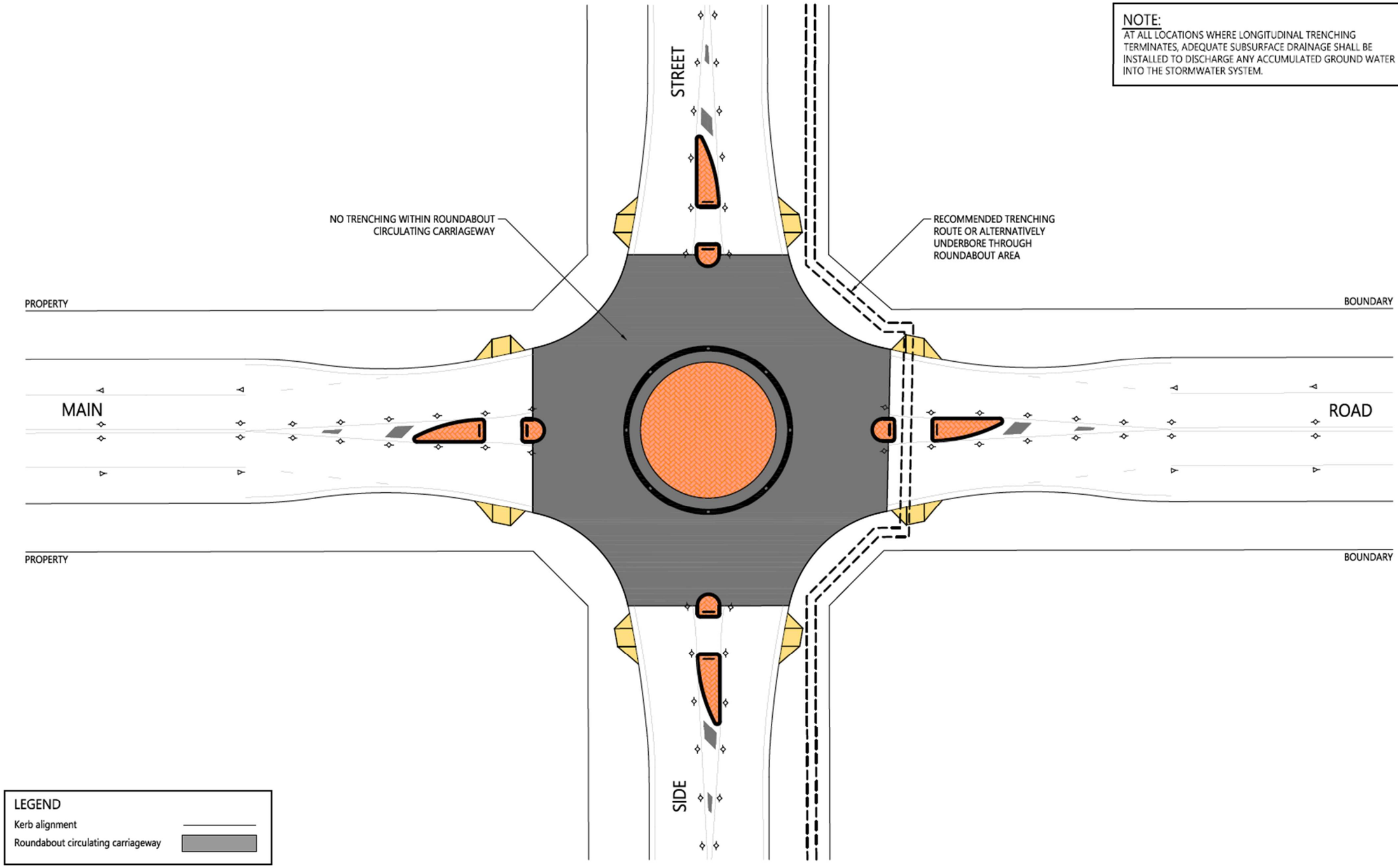


ASPHALT HEAVY PATCH - STABILISED OPTION
SECTION A –
SCALE 1:20

0 200 400 600 800 1000 1:20
0 1000 2000 3000 4000 5000 1:100

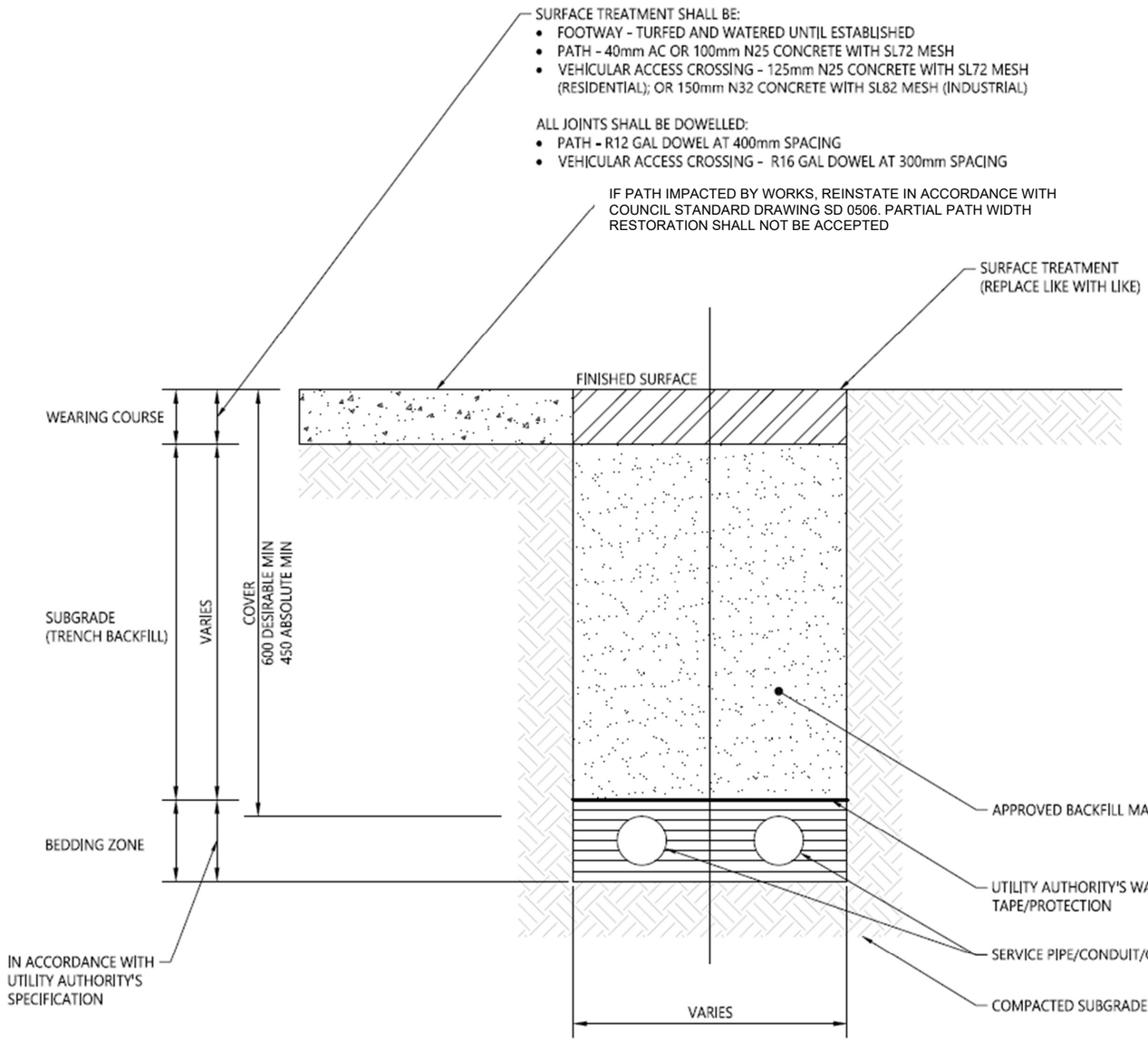
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NOTE:
AT ALL LOCATIONS WHERE LONGITUDINAL TRENCHING TERMINATES, ADEQUATE SUBSURFACE DRAINAGE SHALL BE INSTALLED TO DISCHARGE ANY ACCUMULATED GROUND WATER INTO THE STORMWATER SYSTEM.



NOT TO SCALE

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: PAVEMENT RESTORATION SERIES INFRASTRUCTURE INSTALLATIONS AT ROUNDABOUTS	SHEET No. SD 0804 REVISION: - SHEET Sheet 1 of 1



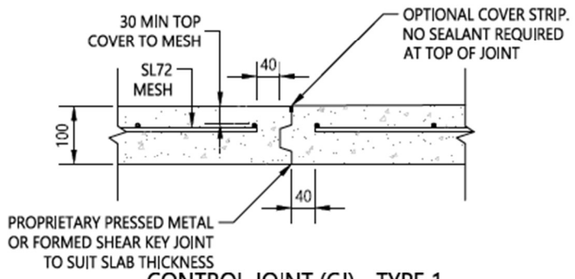
PIT, TRENCH CROSSING OR TRENCH LONGITUDINAL WITHIN FOOTWAYS

SCALE 1:10

0 100 200 300 400 500

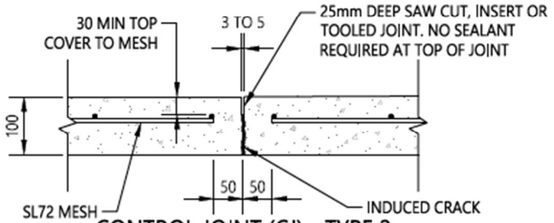
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SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: PAVEMENT RESTORATION SERIES FOOTWAY TRENCH AND PIT RESTORATION	SHEET No. SD 0805 REVISION: - SHEET Sheet 1 of 1



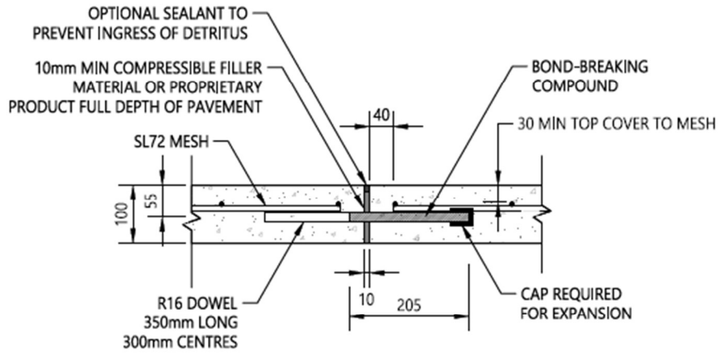
CONTROL JOINT (CJ) - TYPE 1

SCALE 1:10



CONTROL JOINT (CJ) - TYPE 2

SCALE 1:10

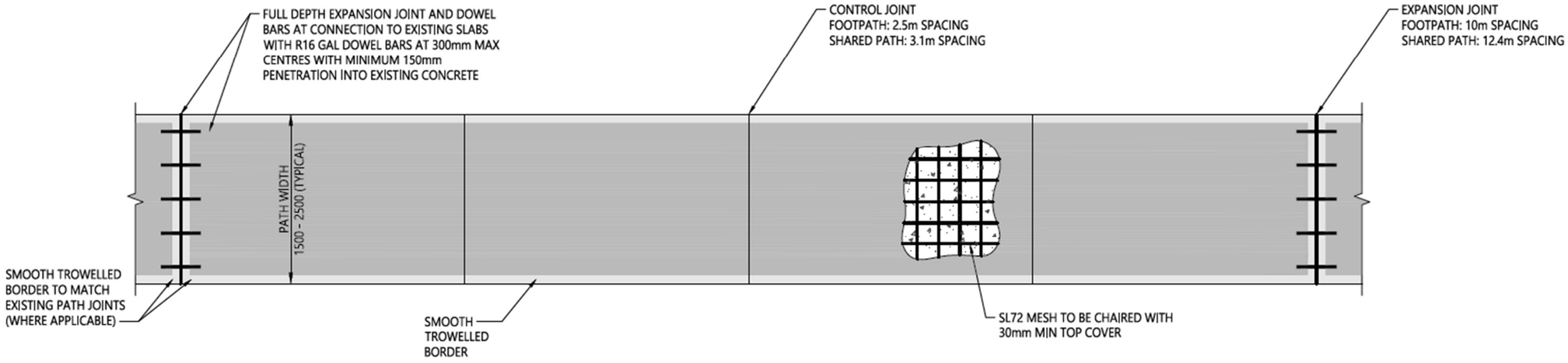


EXPANSION JOINT 100mm TO 100mm
PATH TO PATH

SCALE 1:10

NOTES:

1. ALL TRAFFIC CONTROL OPERATIONS SHALL COMPLY WITH AS 1742.3 AND COUNCIL'S TRAFFIC CONTROL AT WORK SITES MANUAL.
2. PARTIAL PATH WIDTH RECONSTRUCTION SHALL NOT BE ACCEPTED.
3. PATH SHALL BE 100mm MIN THICK WITH SL72 REINFORCEMENT MESH.
4. WHERE APPLICABLE, PATHS THROUGH RESIDENTIAL VEHICLE ACCESS CROSSINGS SHALL BE 125mm THICK N25 CONCRETE WITH SL72 MESH 30mm MIN TOP COVER WITH 16mm DOWELS AT 300 MAX SPACING.
5. PATHS SHALL BE COVE FINISHED TO PROVIDE A SLIP-RESISTANT SURFACE TEXTURE.
6. EDGING PROFILE SHALL MATCH EXISTING.
7. ALL SAW CUTS SHALL BE SQUARE TO PATH EDGE.
8. NO CHIPPED EDGES ON SAW CUTS SHALL BE ACCEPTED.
9. ALL DISTURBED AREAS SHALL BE BACKFILLED AND TURFED AFTER STRIPPING FORMWORK.



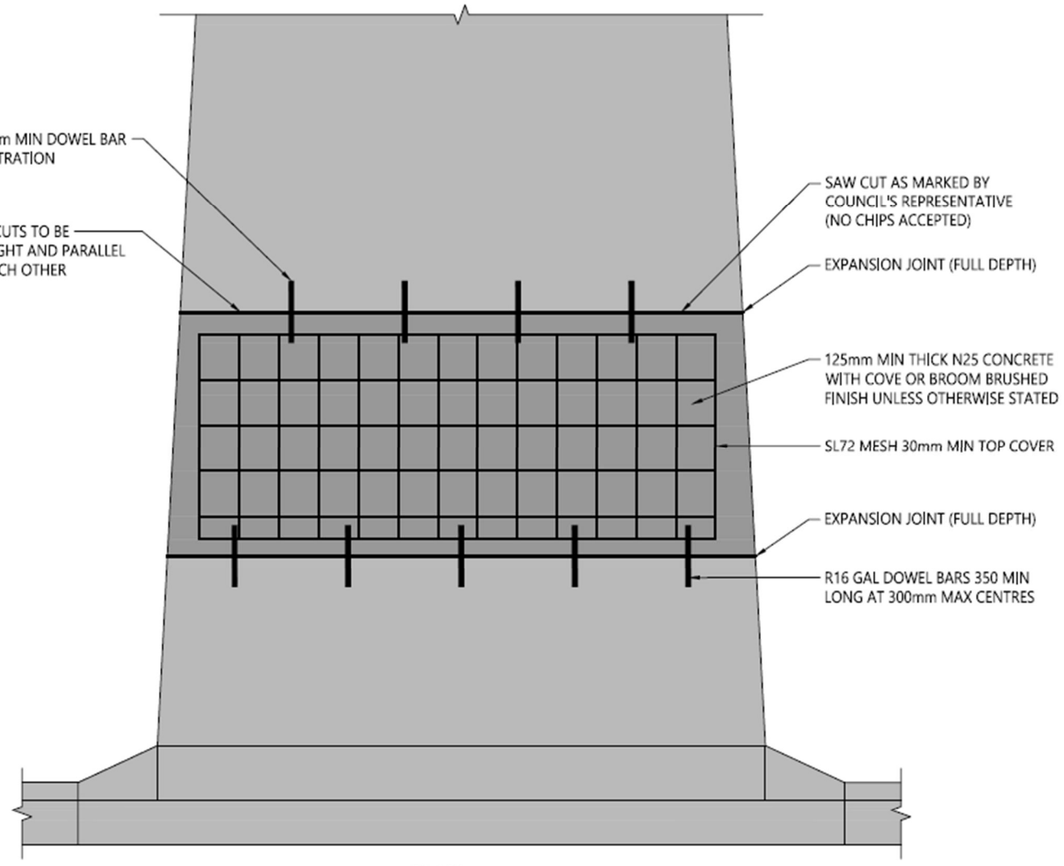
PLAN

SCALE 1:40

0 100 200 300 400 500 1:10

0 400 800 1200 1600 2000 1:40

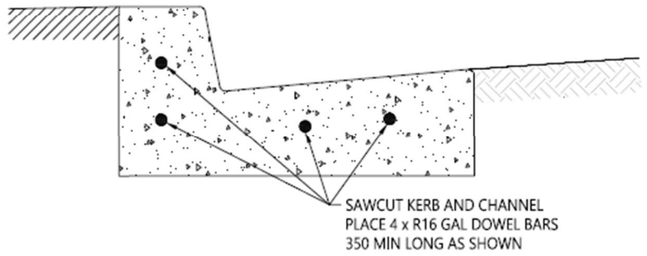
SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: PAVEMENT RESTORATION SERIES RESIDENTIAL VEHICLE ACCESS CROSSING RESTORATION	SHEET No. SD 0806 REVISION: 1 SHEET Sheet 1 of 1



PLAN
SCALE 1:50

NOTES:

1. ALL TRAFFIC CONTROL OPERATIONS SHALL COMPLY WITH AS 1742.3 AND COUNCIL'S TRAFFIC CONTROL AT WORK SITES MANUAL.
2. ALL DISTURBED AREAS TO BE BACKFILLED DIRECTLY AFTER STRIPPING FORMWORK AND TURFED.
3. RESIDENTIAL VEHICLE ACCESS CROSSINGS 125mm MIN THICK N25 CONCRETE WITH SL72 MESH 30mm MIN TOP COVER WITH R16 DOWELS AT 300 MAX SPACING.
4. ADJACENT DAMAGED KERB AND CHANNEL DESTABILISED BY REMOVAL OF KERB AND EXCAVATION OF TRENCH SHALL BE INCLUDED IN RESTORATION AND DOWELLED AS SHOWN BELOW.



INTEGRAL KERB AND CHANNEL SECTION
SCALE 1:10

0 100 200 300 400 500 1:10
0 500 1000 1500 2000 2500 1:50

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: PAVEMENT RESTORATION SERIES RESIDENTIAL VEHICLE ACCESS CROSSING RESTORATION	SHEET No. SD 0807 REVISION: 1 SHEET Sheet 1 of 1

Table 6: Road Hierarchy - Standard Road Widths

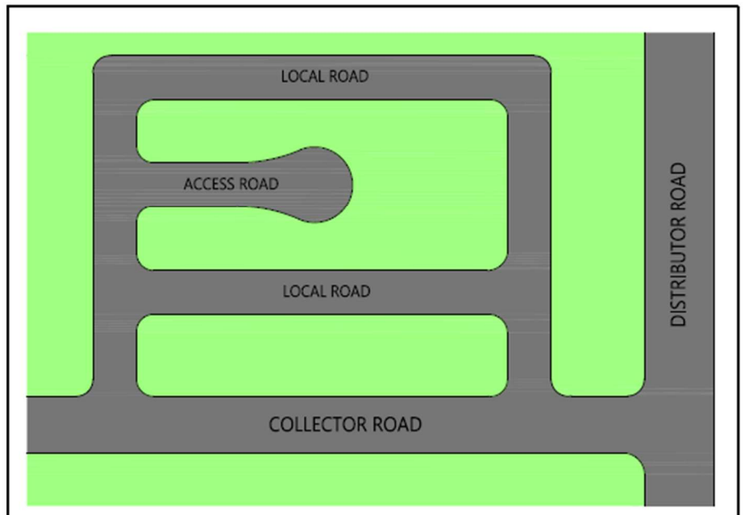
Class of Road	Width of Road Reserve (m)	Footway /verge Width (m)	Carriageway Width[16] (m)	Traffic Lanes (m)	Parking Lanes (m)	Seal Width (m)	Formation Width min. (m)	Shoulder Width (m)
Urban								
Service Lane	6	0.5	5.0	1	0	5.5	5.5	NA
Access (Cul-de-sac) [17]	21	2 x 5.0	11.0	2 x 3.0	2 x 2.5	11.0	12.0	NA
Local	21	2 x 5.0	11.0	2 x 3.0	2 x 2.5	11.0	12.0	NA
Collector	22	2 x 5.0	12.0	2 x 3.5	2 x 2.5	12.0	13.0	NA
Distributor	22 min	2 x 5.0	12.0	2 x 3.5	2 x 2.5	12.0	13.0	NA
Industrial								
Access (Cul-de-sac) – light industry	21	2 x 5.0	11.0	2 x 3.0	2 x 2.5	11.0	12.0	NA
Access (Cul-de-sac) Heavy industry	21	2 x 5.0	13.0	2 x 3.5	2 x 3.0	13.0	14.0	NA
Local (Through) Road Light Industry	23	2 x 5.0	13.0	2 x 3.5	2 x 3.0	13.0	14.0	NA
Local (Through) Road Heavy Industrial	23	2 x 5.0	13.0	2 x 3.5	2 x 3.0	11.0	12.5	NA
Rural[18]								
Access Road (Cul-de-sac)	Variable	2 x 5.0	9.0	2 x 3.5	NA	8.0	16.0	2 x 1.5
Local Access	20 min [19]	2 x 5.5 min.	10.0	2 x 3.5	NA	8.0	16.0	2 x 1.5
Collector	22 min [20]	2 x 6.0 min	10.0	2 x 3.5	NA	8.0	16.0	2 x 1.5
Pedestrian Facilities								
Pathway		1.5						
Cycleway		2.5						
Shared Path		3.0						

16 Carriageway widths for each road type shall be based on the applicable road function and traffic volume in achieving the required road hierarchy. Urban road centre and edge line markings shall only be installed on roads ≥11m wide, unless specifically required. Traffic lane widths on higher volume collector/distributor roads (say ADT >4,000), which are bus routes, shall be 3.5m min, resulting in greater road reserve widths. Both bus service and school bus routes shall be defined as bus routes for road design, pavement design and road width requirements.
17 For long Cul-de-sac an emergency exit connecting to an alternative trafficable road shall be provided, this may be by way of a Right of Access

18 Not applicable to a proclaimed TfNSW Controlled Road
19 Variable due to cut and fill batter extents. The width of the road reserve may vary in excess of the widths shown in the table due to the extent of the road formation. In rural locations there should be an area of natural topography between the toe of the cut or fill batter to the proposed boundary line
20 Function of TfNSW determination. shown as a minimum guide.

NOTES:

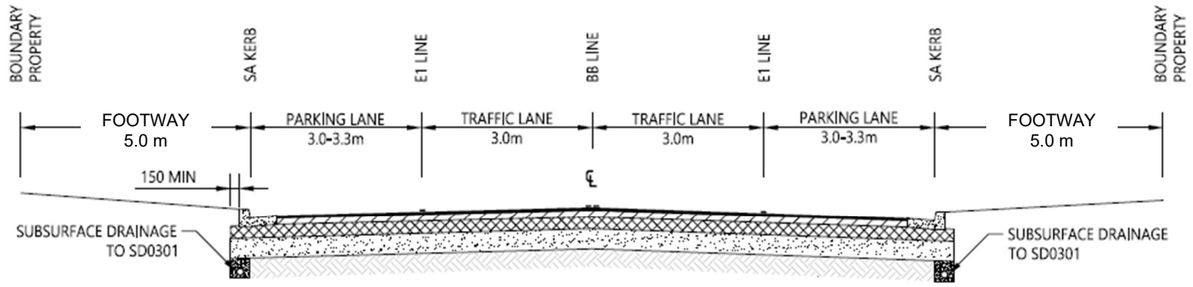
1. PAVEMENT WIDTHS (EXCEPT RURAL ROADS) APPLY TO EXISTING ESTABLISHED AREAS WITH A 20m ROAD RESERVE, ON-STREET PARKING AND BARRIER (SA) KERB.
2. WIDENING MAY BE REQUIRED ON CURVED RURAL ROAD ALIGNMENTS. URBAN ROAD WIDTHS SHOWN ARE MEASURED BETWEEN INVERTS OF KERB.
3. RURAL ROAD WIDTHS ARE BETWEEN EDGES OF BITUMEN.
4. EDGE LINES AND CENTRE LINES TO BE INCLUDED ON ALL URBAN ROADS ≥ 11m WIDE TO DEFINE PARKING LANES/TRAFFIC LANES, IRRESPECTIVE OF TRAFFIC VOLUME.
5. ON-ROAD ADVISORY TREATMENT FOR CYCLISTS ON DISTRIBUTOR/COLLECTOR ROADS ONLY, USING EDGE LINES AND BICYCLE SYMBOLS. LOCAL ROAD CYCLISTS CAN BE EXPECTED TO SHARE THE ROAD SPACE WITH MOTORISTS. CYCLISTS ON RURAL ROADS TO USE 1.5 TO 3m WIDE ROAD SHOULDERS WITH BICYCLE SYMBOL MARKINGS (ADVISORY TREATMENT).
6. BICYCLE/CAR PARKING LANES AND EXCLUSIVE BICYCLE LANES REQUIRE GREATER PAVEMENT WIDTHS AND BICYCLE LANE SIGNS TO GIVE THE LANES LEGAL STATUS.
7. CONSIDER INCREASING PAVEMENT WIDTH TO 12.6m, OR PROVIDING AN ALTERNATIVE TREATMENT, SUCH AS BICYCLE/CAR PARKING LANES, WHERE THE ADT VOLUME IS SIGNIFICANTLY GREATER THAN 5,000 VEHICLES/DAY.
8. CONSIDER 8m URBAN ROAD WIDTH ONLY FOR VERY SHORT LENGTHS OF ACCESS ROAD (< 100m) DUE TO POTENTIAL ADVERSE IMPACT ON AVAILABILITY OF ON-STREET PARKING ON BOTH SIDES OF ROAD; OR WHERE ROAD RESERVE IS < 20m.
9. TRAFFIC LANE WIDTHS ON HIGHER VOLUME AND SPEED COLLECTOR/DISTRIBUTOR ROADS WHICH ARE BUS ROUTES SHALL BE 3.5m MINIMUM WIDE.
10. REFER TO SHEETS 2 AND 3 FOR TYPICAL SECTIONS SHOWING THE MOST COMMONLY USED ROAD WIDTHS IN EXISTING ESTABLISHED AREAS.



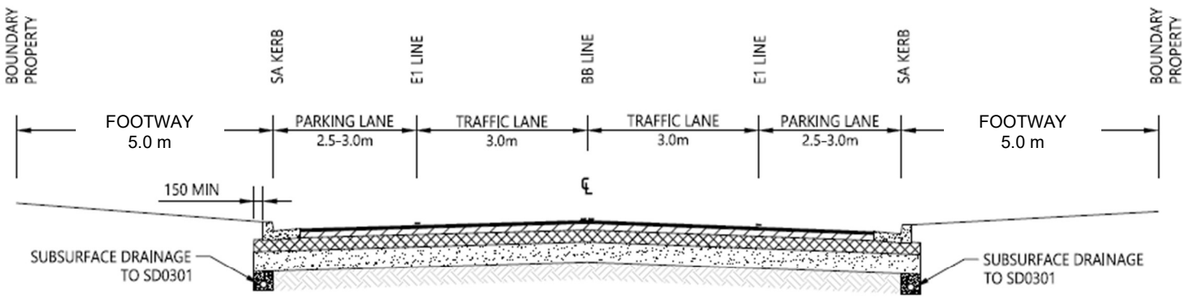
FUNCTIONAL RESIDENTIAL ROAD HIERARCHY

NOTES:
TABLE 6 ROAD HIERARCHY STANDARD ROAD WIDTHS REPLICATED FROM HILLTOPS ENGINEERING GUIDELINE PART 1 DESIGN.

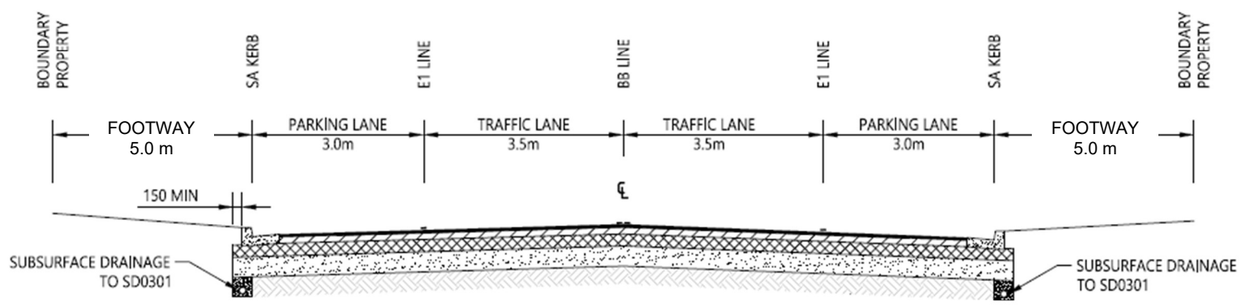
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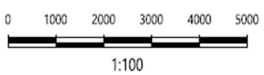
DISTRIBUTOR ROAD CROSS SECTION - 12-12.6m WIDE CARRIAGEWAY
TYPICAL ADT VOLUME 3,000 - 5,000+ VEHICLES
SCALE 1:100



COLLECTOR ROAD CROSS SECTION - 11-12m WIDE CARRIAGEWAY TYPICAL ADT VOLUME 1,000 - 5,000 VEHICLES
SCALE 1:100



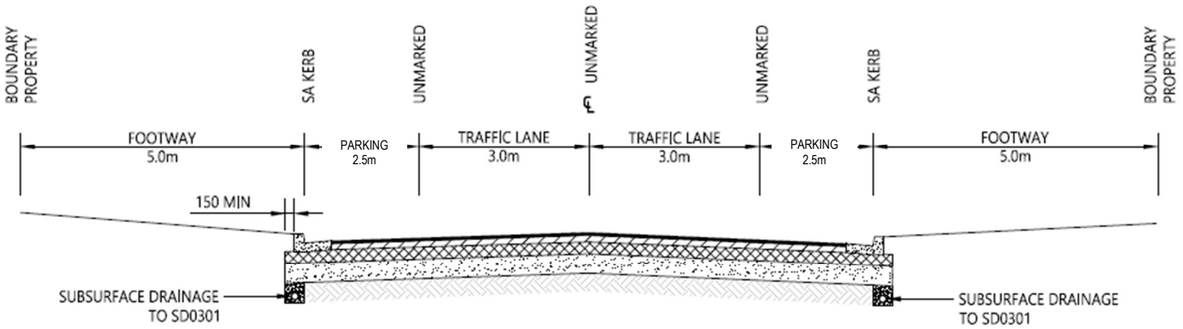
INDUSTRIAL AREA ROAD CROSS SECTION - 13m WIDE CARRIAGEWAY TYPICAL ADT VOLUME 400+ VEHICLES
SCALE 1:100



SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES PAVEMENT WIDTH SCHEDULE	SHEET No. SD 0901 REVISION: - SHEET Sheet 2 of 4

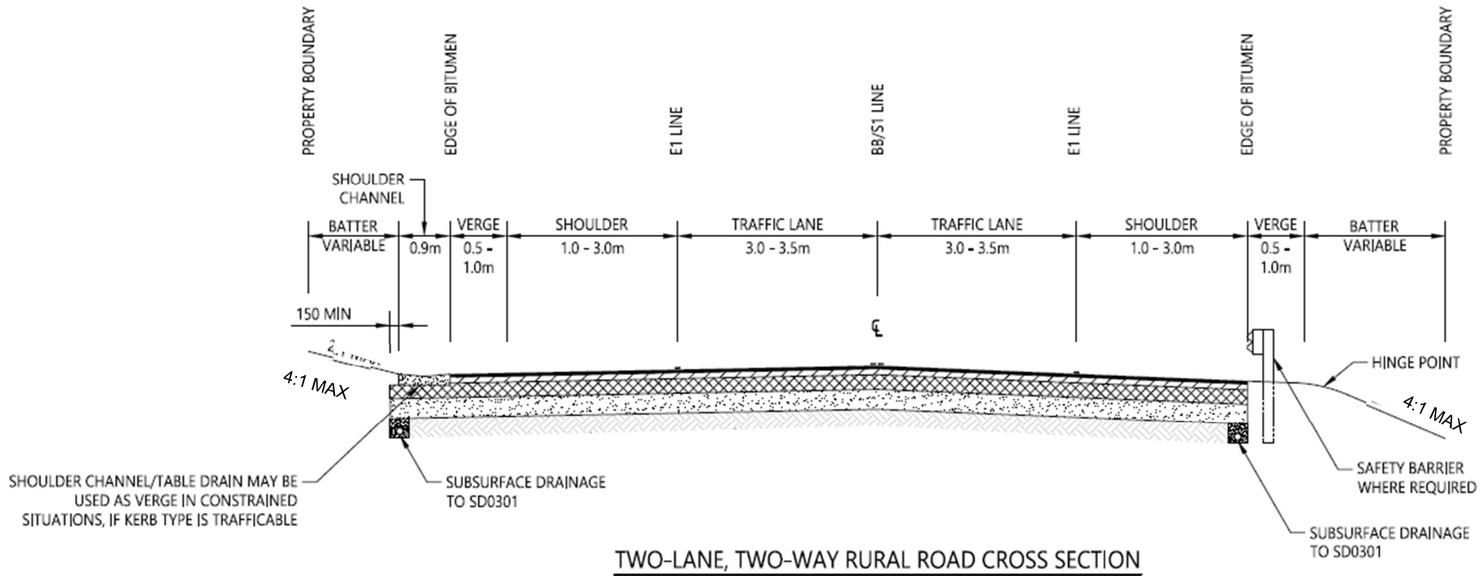
NOTES:

1. GUIDE POSTS AND SAFETY BARRIER TO BE INSTALLED AS REQUIRED.
2. BICYCLE SYMBOLS TO BE MARKED ON ROAD SHOULDERS AS AN ADVISORY TREATMENT WHERE WARRANTED, OR ON DESIGNATED CYCLE ROUTES.



LOCAL ROAD CROSS SECTION - 10m WIDE CARRIAGEWAY TYPICAL ADT VOLUME 150 - 1,000 VEHICLES

SCALE 1:100



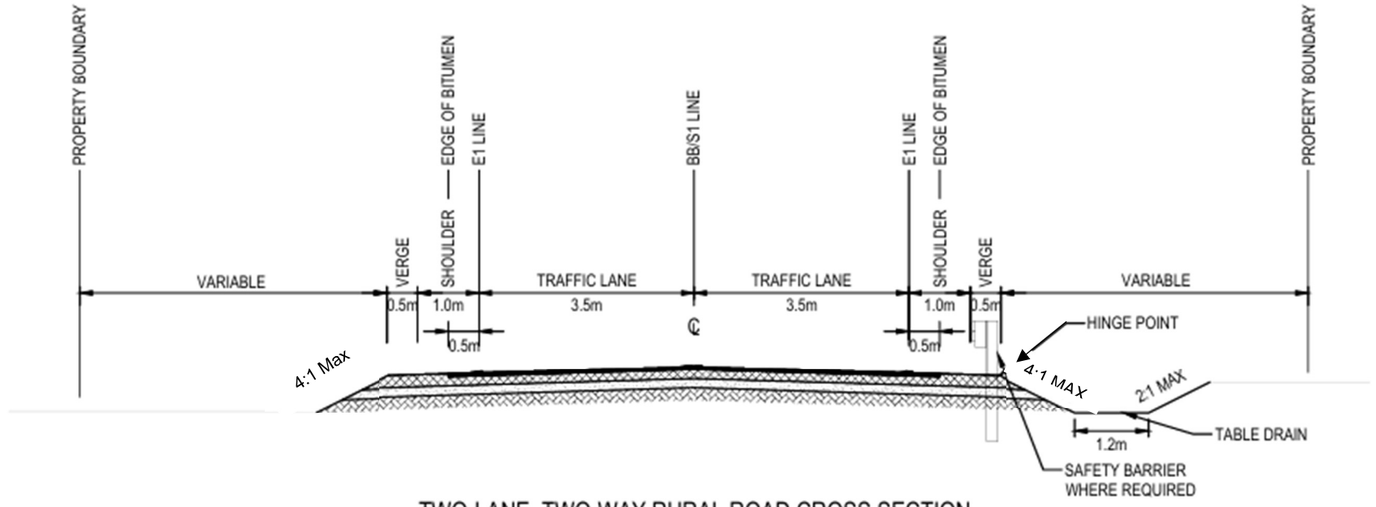
TWO-LANE, TWO-WAY RURAL ROAD CROSS SECTION
8-13m WIDE CARRIAGEWAY
TYPICAL ADT VOLUME 150 - 10,000+ VEHICLES

SCALE 1:100

0 1000 2000 3000 4000 5000

1:100

	REV.	DESCRIPTION	DATE		PROJECT:	SHEET TITLE:	SHEET No. / REVISION:
SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:		STANDARD DRAWING		Hilltops COUNCIL		TRAFFIC MANAGEMENT SERIES PAVEMENT WIDTH SCHEDULE	SD 0901 -
							SHEET Sheet 3 of 4



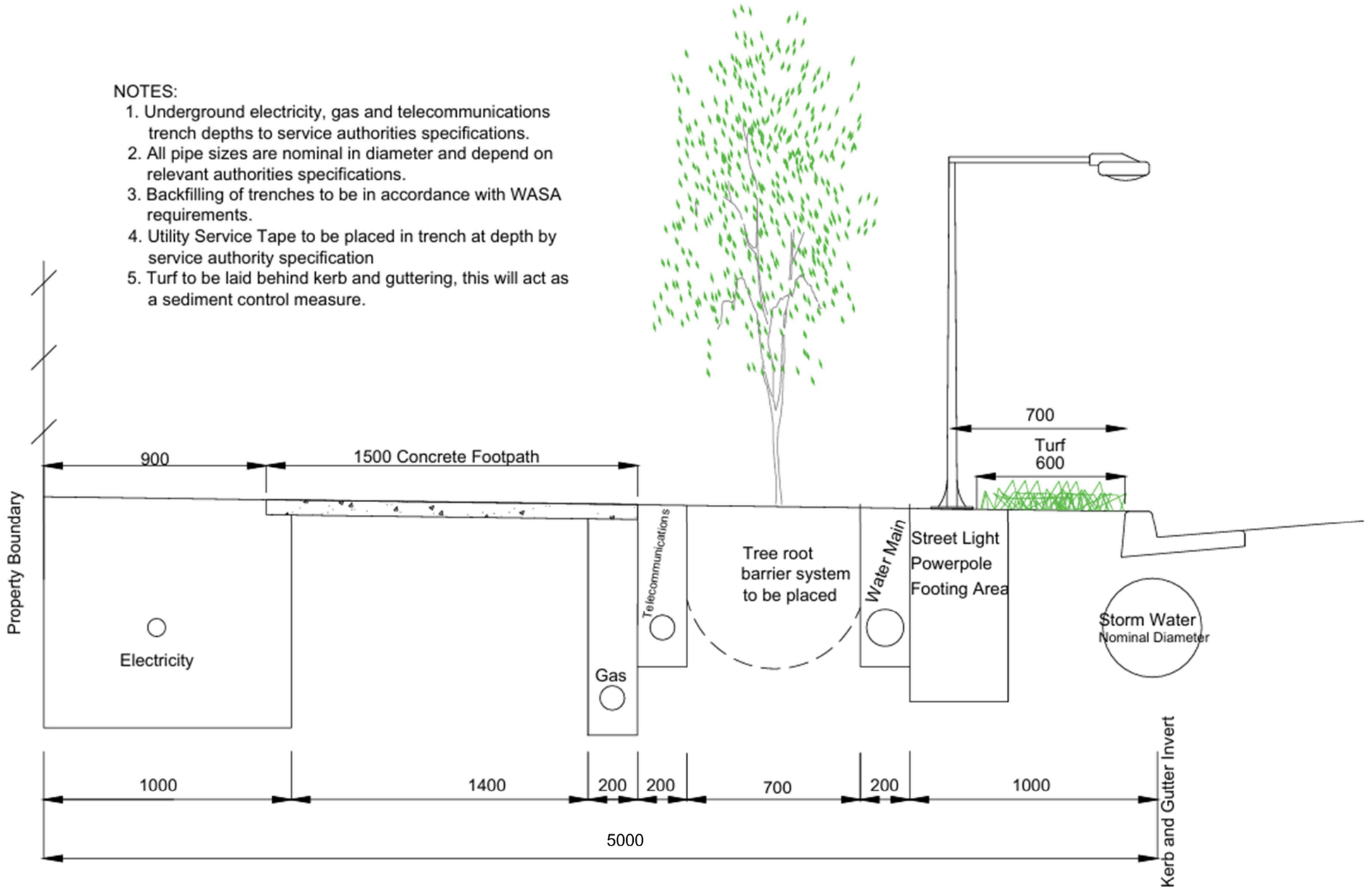
TWO-LANE, TWO-WAY RURAL ROAD CROSS SECTION
10m WIDE CARRIAGEWAY
TYPICAL ADT VOLUME 150 - 10,000+ VEHICLES
SCALE 1:100

0 1000 2000 3000 4000 5000
1:100

	REV.	DESCRIPTION	DATE		PROJECT:	SHEET TITLE:	SHEET No. / REVISION:
SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:		STANDARD DRAWING		Hilltops COUNCIL		TRAFFIC MANAGEMENT SERIES PAVEMENT WIDTH SCHEDULE	SD 0901 - SHEET Sheet 4 of 4

NOTES:

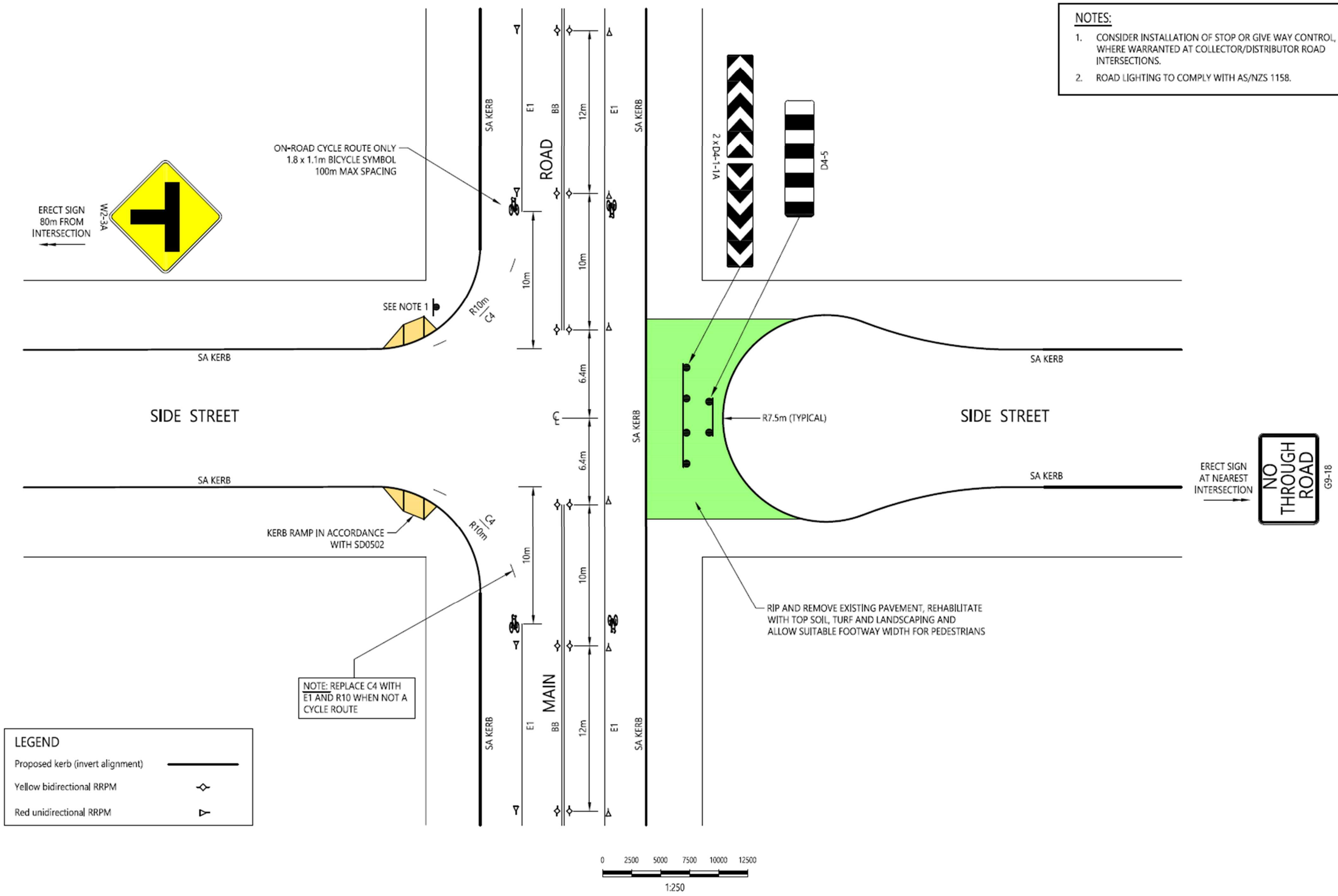
1. Underground electricity, gas and telecommunications trench depths to service authorities specifications.
2. All pipe sizes are nominal in diameter and depend on relevant authorities specifications.
3. Backfilling of trenches to be in accordance with WASA requirements.
4. Utility Service Tape to be placed in trench at depth by service authority specification
5. Turf to be laid behind kerb and guttering, this will act as a sediment control measure.



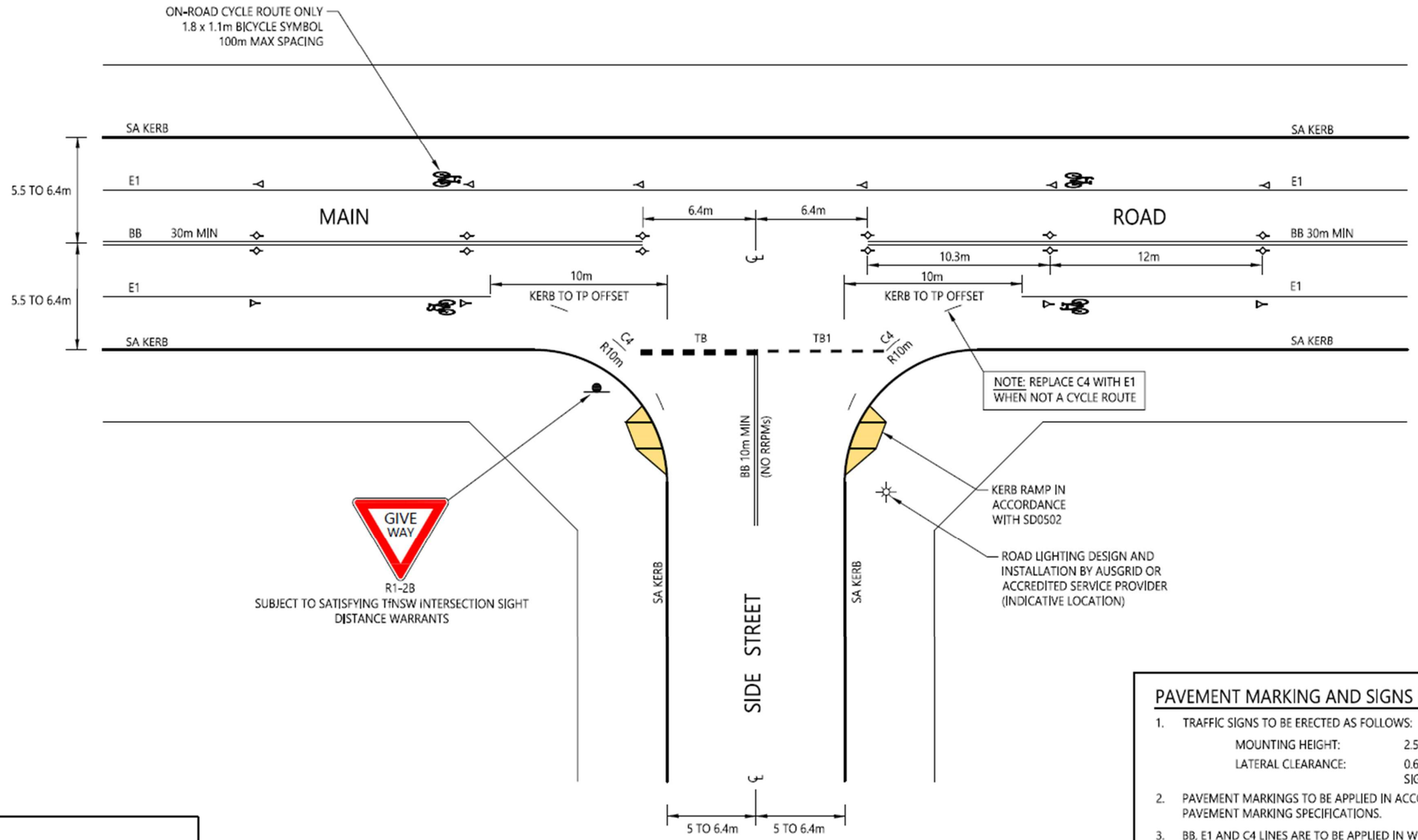
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NOTES:

1. CONSIDER INSTALLATION OF STOP OR GIVE WAY CONTROL, WHERE WARRANTED AT COLLECTOR/DISTRIBUTOR ROAD INTERSECTIONS.
2. ROAD LIGHTING TO COMPLY WITH AS/NZS 1158.



SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES T-INTERSECTION LAYOUT	SHEET No. SD 0905 REVISION: - SHEET Sheet 1 of 1



LEGEND

- Proposed kerb (invert alignment)
- Yellow bidirectional RRPM
- Red unidirectional RRPM
- Road light (indicative location)
- Bicycle symbol (advisory treatment)

TYPICAL URBAN T-INTERSECTION LAYOUT
GIVE WAY CONTROL OPTION

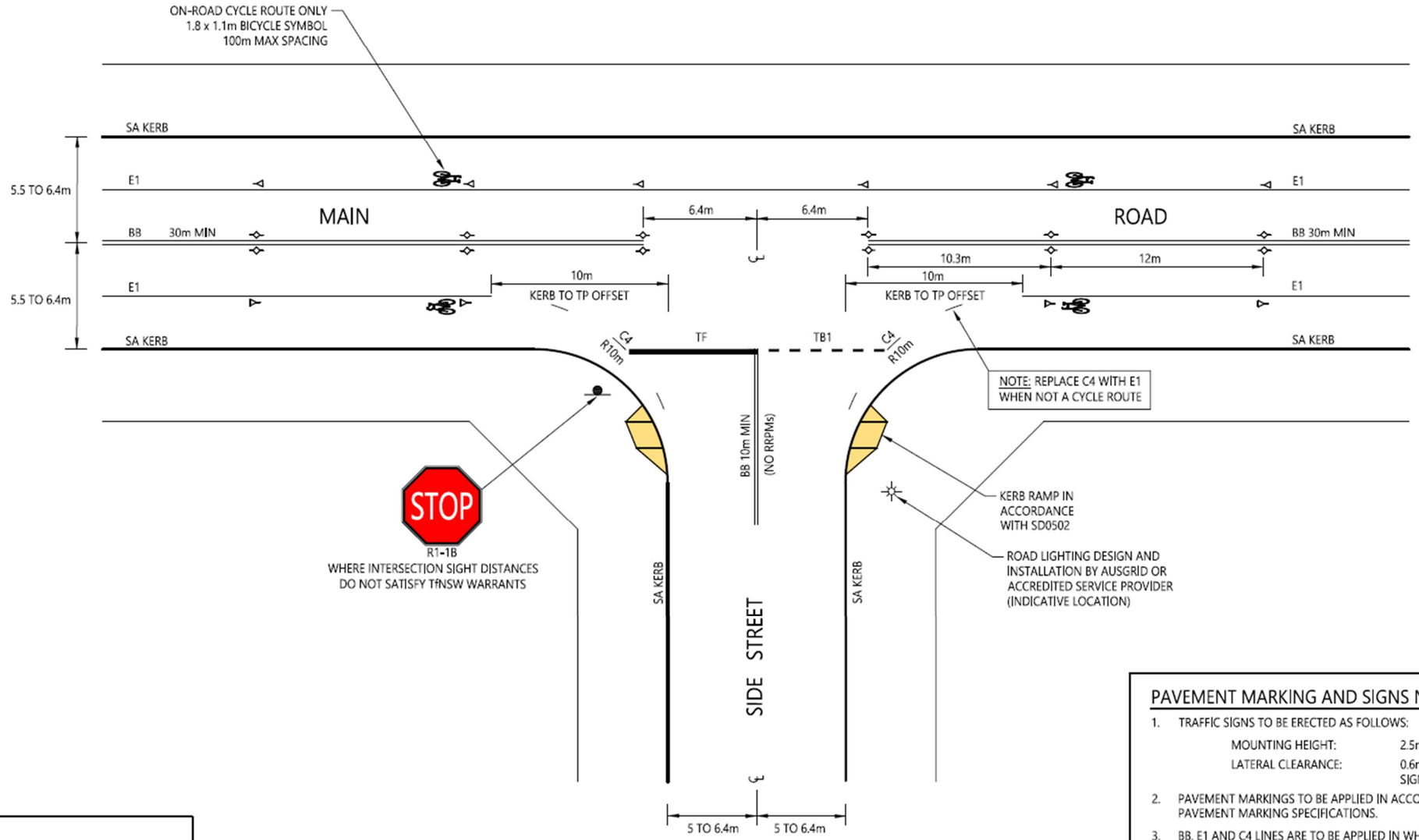
0 2500 5000 7500 10000 12500

1:250

PAVEMENT MARKING AND SIGNS NOTES:

1. TRAFFIC SIGNS TO BE ERECTED AS FOLLOWS:
   - MOUNTING HEIGHT: 2.5m (UNLESS OTHERWISE SHOWN)
   - LATERAL CLEARANCE: 0.6m (0.3m MIN) FROM EDGE OF SIGN TO KERB/EDGE OF BITUMEN
2. PAVEMENT MARKINGS TO BE APPLIED IN ACCORDANCE WITH COUNCIL'S PAVEMENT MARKING SPECIFICATIONS.
3. BB, E1 AND C4 LINES ARE TO BE APPLIED IN WHITE REFLECTORISED THERMOPLASTIC PAINT. TB, TB1 LINES AND SYMBOLS ARE TO BE APPLIED IN WHITE REFLECTORISED PREFORMED THERMOPLASTIC MATERIAL.
4. CONSIDER INSTALLING NO STOPPING SIGNS AND YELLOW C3 LINES WHERE STANDARD ROAD RULES NEED REINFORCEMENT.
5. APPLY SAME TRAFFIC SIGN AND PAVEMENT MARKINGS ON OPPOSITE SIDE OF ROAD FOR 4-WAY INTERSECTIONS.
6. CONSIDER INSTALLING DUPLICATE CONTROL SIGN ON OPPOSITE SIDE OF SIDE STREET TO REINFORCE CONTROL, WHERE WARRANTED BY SITE SPECIFIC REQUIREMENTS.

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES T-INTERSECTION LAYOUT	SHEET No. SD 0906 REVISION: - SHEET Sheet 1 of 4



TYPICAL URBAN T-INTERSECTION LAYOUT
STOP CONTROL OPTION

0 2500 5000 7500 10000 12500

1:250

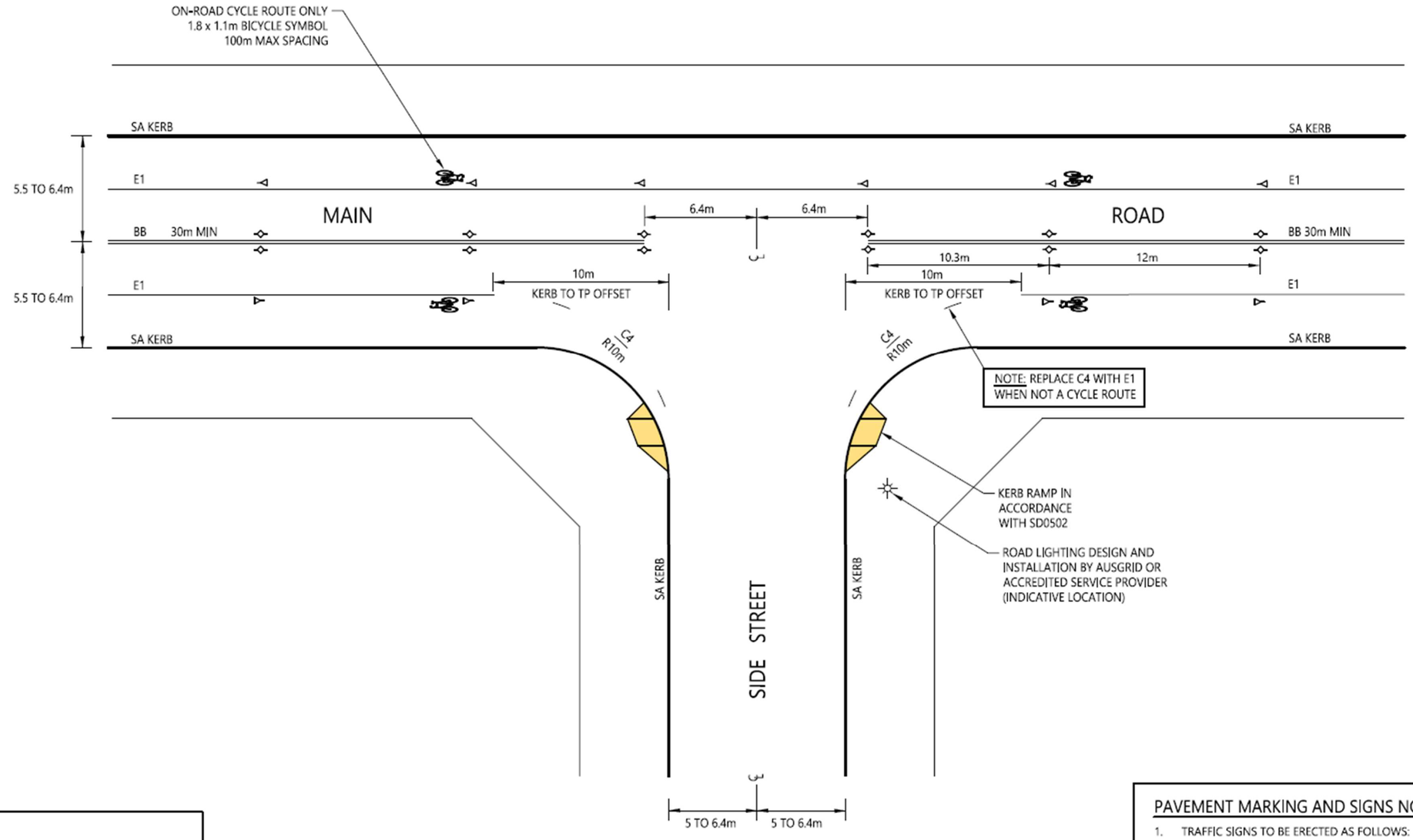
LEGEND

- Proposed kerb (invert alignment)
- Yellow bidirectional RRPM
- Red unidirectional RRPM
- Road light (indicative location)
- Bicycle symbol (advisory treatment)

PAVEMENT MARKING AND SIGNS NOTES:

1. TRAFFIC SIGNS TO BE ERECTED AS FOLLOWS:
   - MOUNTING HEIGHT: 2.5m (UNLESS OTHERWISE SHOWN)
   - LATERAL CLEARANCE: 0.6m (0.3m MIN) FROM EDGE OF SIGN TO KERB/EDGE OF BITUMEN
2. PAVEMENT MARKINGS TO BE APPLIED IN ACCORDANCE WITH COUNCIL'S PAVEMENT MARKING SPECIFICATIONS.
3. BB, E1 AND C4 LINES ARE TO BE APPLIED IN WHITE REFLECTORISED THERMOPLASTIC PAINT. TB, TB1 LINES AND SYMBOLS ARE TO BE APPLIED IN WHITE REFLECTORISED PREFORMED THERMOPLASTIC MATERIAL.
4. CONSIDER INSTALLING NO STOPPING SIGNS AND YELLOW C3 LINES WHERE STANDARD ROAD RULES NEED REINFORCEMENT.
5. APPLY SAME TRAFFIC SIGN AND PAVEMENT MARKINGS ON OPPOSITE SIDE OF ROAD FOR 4-WAY INTERSECTIONS.
6. CONSIDER INSTALLING DUPLICATE CONTROL SIGN ON OPPOSITE SIDE OF SIDE STREET TO REINFORCE CONTROL, WHERE WARRANTED BY SITE SPECIFIC REQUIREMENTS.

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES T-INTERSECTION LAYOUT	SHEET No. SD 0906 REVISION: - SHEET Sheet 2 of 4



LEGEND

- Proposed kerb (invert alignment)
- Yellow bidirectional RRPM
- Red unidirectional RRPM
- Road light (indicative location)
- Bicycle symbol (advisory treatment)

TYPICAL URBAN T-INTERSECTION LAYOUT
STANDARD ROAD RULES OPTION (NO CONTROL SIGNS)

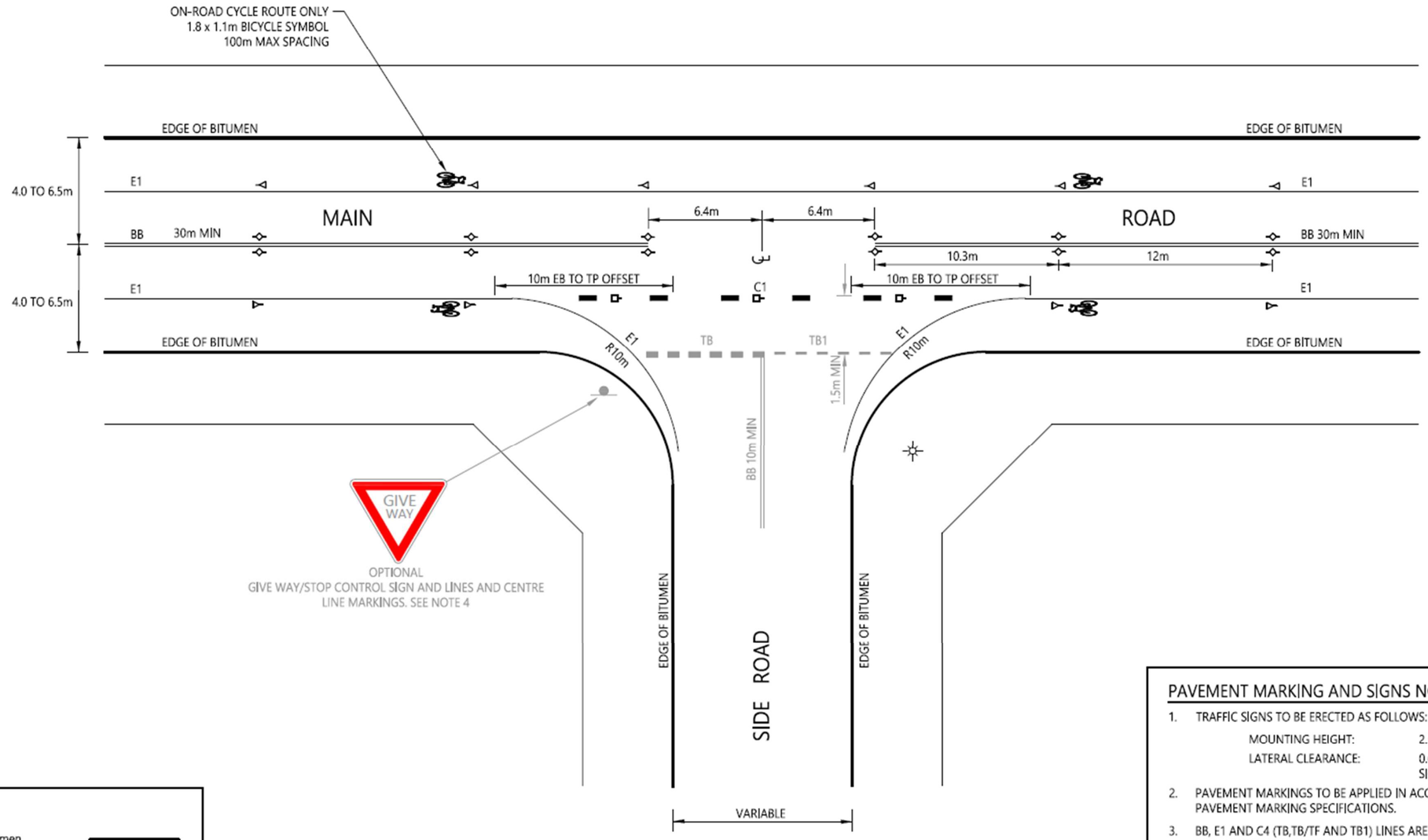
0 2500 5000 7500 10000 12500

1:250

PAVEMENT MARKING AND SIGNS NOTES:

1. TRAFFIC SIGNS TO BE ERECTED AS FOLLOWS:
   - MOUNTING HEIGHT: 2.5m (UNLESS OTHERWISE SHOWN)
   - LATERAL CLEARANCE: 0.6m (0.3m MIN) FROM EDGE OF SIGN TO KERB/EDGE OF BITUMEN
2. PAVEMENT MARKINGS TO BE APPLIED IN ACCORDANCE WITH COUNCIL'S PAVEMENT MARKING SPECIFICATIONS.
3. BB, E1 AND C4 LINES ARE TO BE APPLIED IN WHITE REFLECTORISED THERMOPLASTIC PAINT.
4. CONSIDER INSTALLING A 10m LONG BB LINE AT CENTRE LINE OF SIDE STREET WHERE WARRANTED BY SITE SPECIFIC REQUIREMENTS.

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES T-INTERSECTION LAYOUT	SHEET No. SD 0906 REVISION: - SHEET Sheet 3 of 4



LEGEND

- Proposed edge of bitumen
- Yellow bidirectional RRPM
- Red unidirectional RRPM
- White unidirectional RRPM
- Road light (indicative location)
- Bicycle symbol (advisory treatment)

TYPICAL RURAL T-INTERSECTION LAYOUT
STANDARD ROAD RULES AND OPTIONAL CONTROL SIGNS

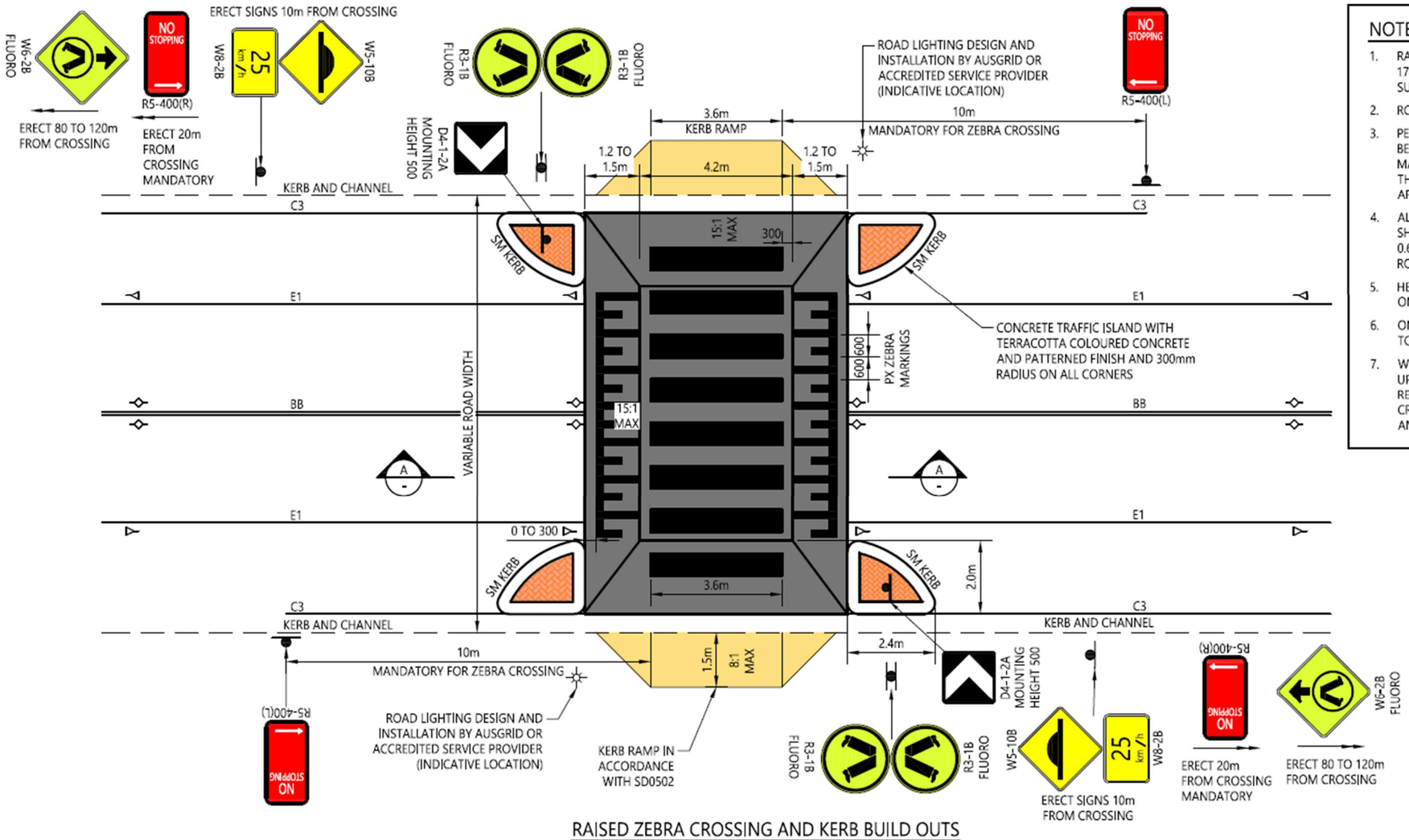
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1:250

PAVEMENT MARKING AND SIGNS NOTES:

1. TRAFFIC SIGNS TO BE ERECTED AS FOLLOWS:
   - MOUNTING HEIGHT: 2.5m (UNLESS OTHERWISE SHOWN)
   - LATERAL CLEARANCE: 0.6m (0.3m MIN) FROM EDGE OF SIGN TO KERB/EDGE OF BITUMEN
2. PAVEMENT MARKINGS TO BE APPLIED IN ACCORDANCE WITH COUNCIL'S PAVEMENT MARKING SPECIFICATIONS.
3. BB, E1 AND C4 (TB,TB/TF AND TB1) LINES ARE TO BE APPLIED IN WHITE REFLECTORISED THERMOPLASTIC ROAD MARKING PAINT.
4. CONSIDER INSTALLING STOP OR GIVE WAY CONTROL SIGN AND LINES AND A 10m LONG BB LINE AT CENTRE LINE OF SIDE ROAD WHERE WARRANTED BY SITE SPECIFIC REQUIREMENTS. TYPE OF CONTROL TO BE DICTATED BY SIGHT DISTANCE REQUIREMENTS .
5. APPLY SAME TRAFFIC SIGN AND PAVEMENT MARKINGS ON OPPOSITE SIDE OF ROAD FOR 4-WAY INTERSECTIONS.
6. CONSIDER INSTALLING DUPLICATE CONTROL SIGN ON OPPOSITE SIDE OF SIDE ROAD TO REINFORCE CONTROL, WHERE WARRANTED BY SITE SPECIFIC REQUIREMENTS.

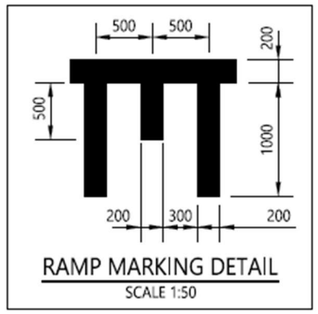
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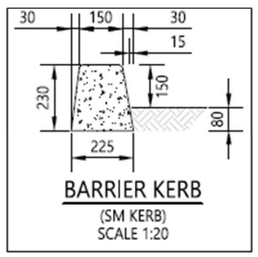
RAISED ZEBRA CROSSING AND KERB BUILD OUTS
SCALE 1:125

NOTES:

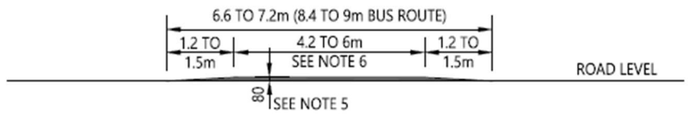
1. RAISED PEDESTRIAN (ZEBRA) CROSSINGS SHALL COMPLY WITH AS 1742.10 AND THE RELEVANT AUSTROADS GUIDELINES AND TfNSW SUPPLEMENTS.
2. ROAD LIGHTING TO BE PROVIDED IN ACCORDANCE WITH AS/NZS 1158.
3. PEDESTRIAN (ZEBRA) CROSSING AND RAMP PAVEMENT MARKINGS TO BE APPLIED IN WHITE REFLECTORISED PREFORMED THERMOPLASTIC MATERIAL. C3 LINES ARE TO BE APPLIED IN YELLOW REFLECTORISED THERMOPLASTIC PAINT. ALL OTHER PAVEMENT MARKINGS ARE TO BE APPLIED IN WHITE REFLECTORISED THERMOPLASTIC PAINT.
4. ALL SIGNS TO HAVE A MOUNTING HEIGHT OF 2.5m UNLESS OTHERWISE SHOWN. LATERAL CLEARANCE FROM EDGE OF SIGN TO KERBLINE TO BE 0.6m (0.3m MIN). CONSIDER INSTALLING A-SIZE SIGNS IN NARROW ROAD RESERVES OR LOW SPEED ENVIRONMENTS (V_{85} < 60km/h).
5. HEIGHT OF RAISED ZEBRA CROSSING MAY BE INCREASED TO 100mm ON ROADS NOT USED BY BUSES.
6. ON BUS ROUTES, LENGTHEN THE RAISED PLATFORM AREA FROM 4.2m TO 6m.
7. WHERE RAISED PEDESTRIAN CROSSINGS ARE INCLUDED IN ROAD UPGRADE PROJECTS, KERB BUILD OUTS SHOULD BE CREATED BY REALIGNING THE KERB, CREATING AN AT-GRADE FOOTWAY/RAISED CROSSING INTERFACE AND INCLUSION OF A DRAINAGE SYSTEM AT ANY SUBSEQUENT TRAPPED LOW POINTS IN THE KERB.



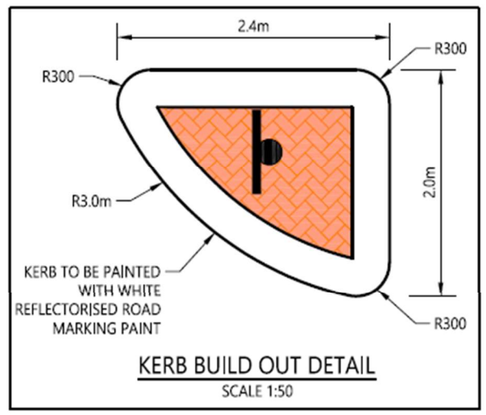
RAMP MARKING DETAIL
SCALE 1:50



BARRIER KERB
(SM KERB)
SCALE 1:20



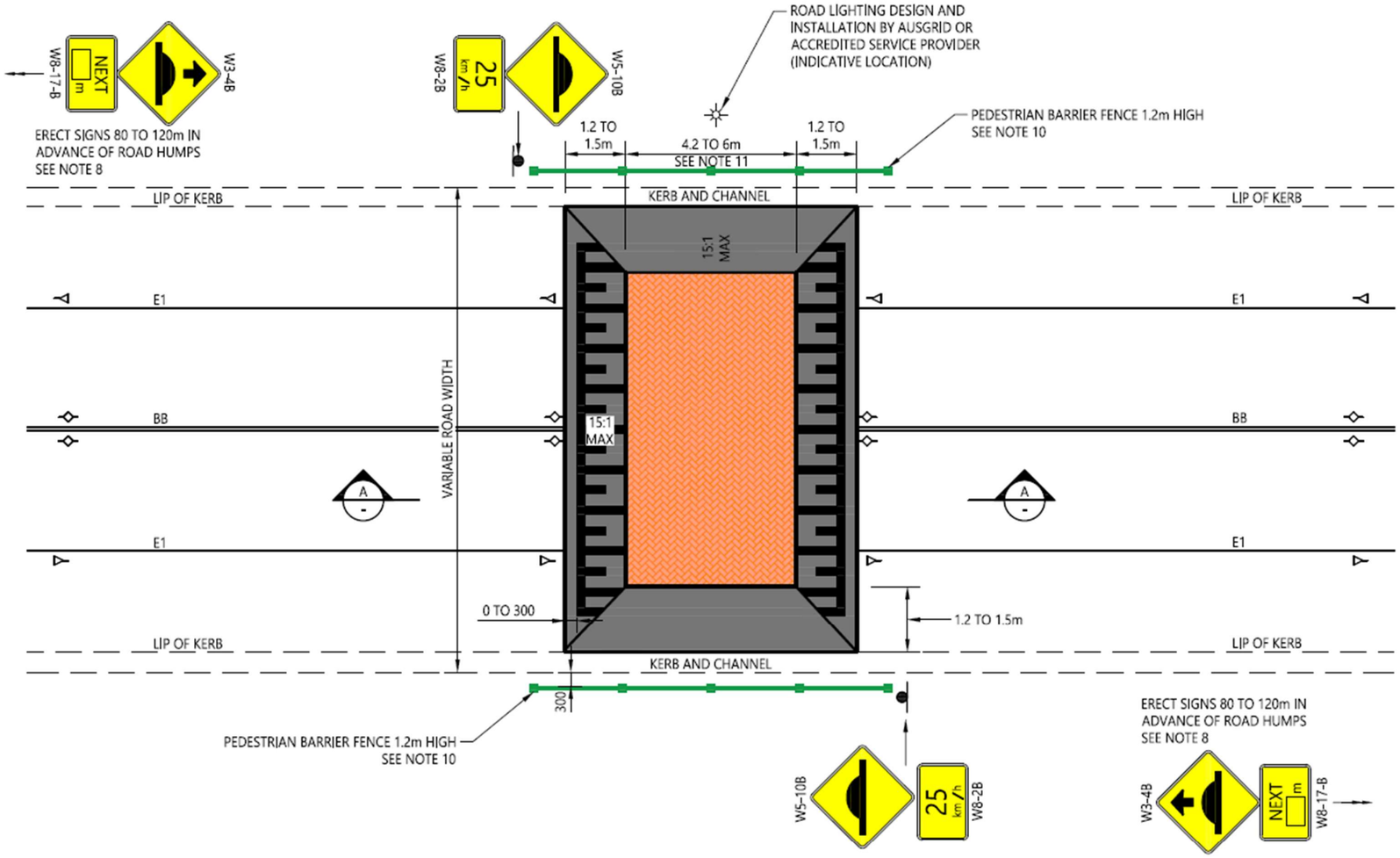
SECTION A
SCALE 1:125



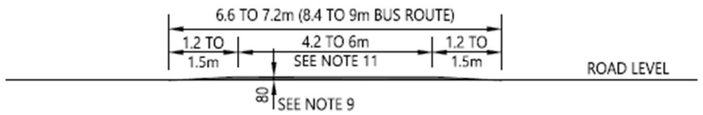
KERB BUILD OUT DETAIL
SCALE 1:50

AS SHOWN

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES ROAD HUMPS	SHEET No. SD 0908 REVISION: - SHEET Sheet 1 of 5



ASPHALT FLAT-TOP ROAD HUMP
SCALE 1:125



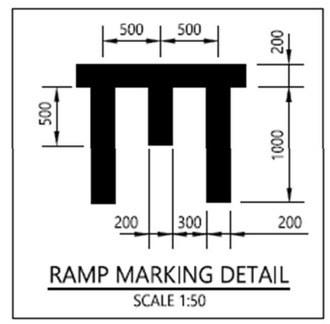
SECTION A
SCALE 1:125

0 500 1000 1500 2000 2500 1:50

0 1250 2500 3750 5000 6250 1:125

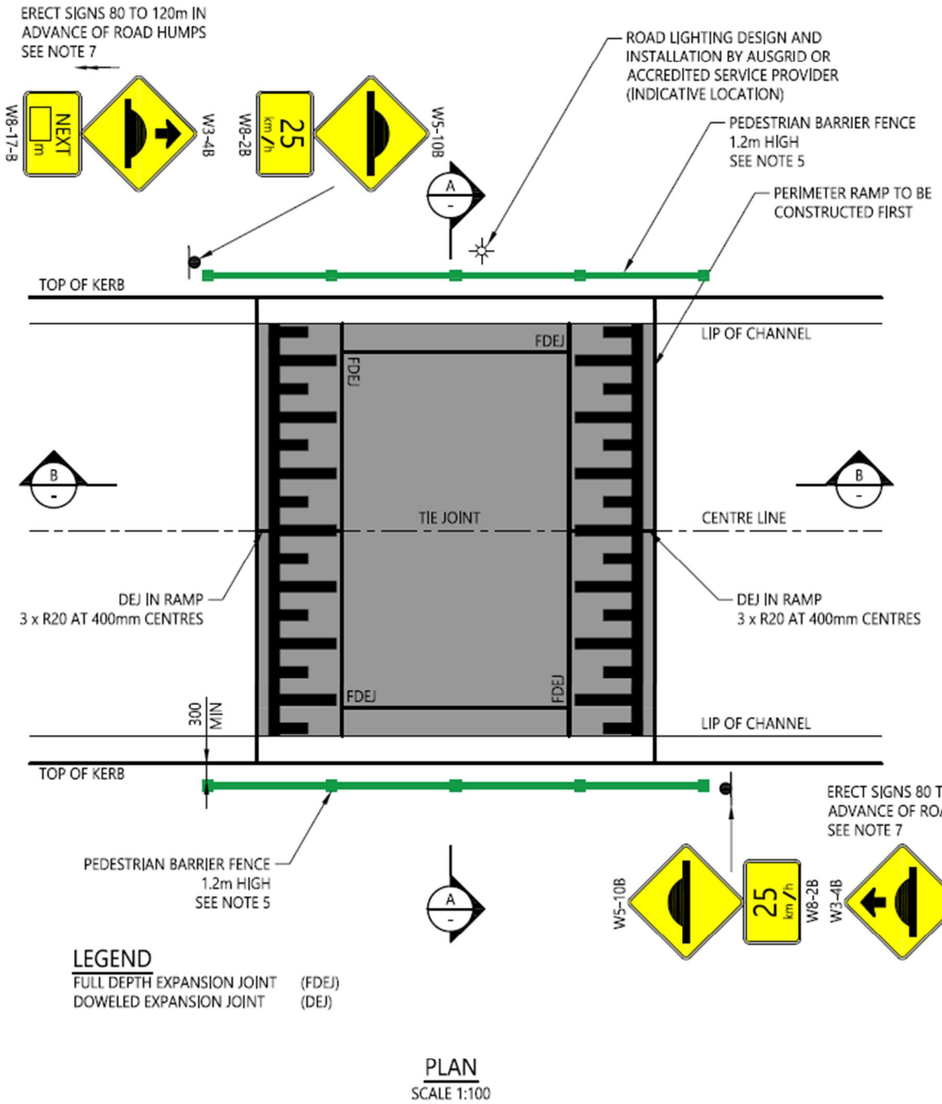
NOTES:

1. FLAT-TOP ROAD HUMPS SHALL COMPLY WITH AS1742.13 AND USED ONLY ON ROADS WHERE A SPEED LIMIT OF 50km/h OR LESS APPLIES.
2. ROAD HUMPS TO BE POSITIONED ADJACENT TO EXISTING ROAD LIGHTING, WHERE PRACTICABLE.
3. ROAD LIGHTING TO BE PROVIDED IN ACCORDANCE WITH AS/NZS 1158.
4. REFER TO COUNCIL'S STANDARD DRAWING SD0803 FOR ASPHALT HEAVY PATCHING DETAILS IF ROAD PAVEMENT AND SUBGRADE IS NOT SUITABLE FOR ROAD HUMP INSTALLATION. GEOTECHNICAL TESTING REQUIRED TO DETERMINE IF THIS IS REQUIRED.
5. CONSIDER USE OF ASPHALT ROAD CUSHIONS AS A LESS HARSH TRAFFIC CALMING TREATMENT ON COUNCIL ROADS. REFER TO SD0907 FOR DETAILS.
6. RAMP MARKINGS TO BE APPLIED IN WHITE REFLECTORISED PREFORMED THERMOPLASTIC MATERIAL.
7. ALL SIGNS TO HAVE A MOUNTING HEIGHT OF 2.5m. LATERAL CLEARANCE FROM EDGE OF SIGN TO KERB LINE TO BE 0.6m (0.3m MIN). CONSIDER INSTALLING A-SIZE SIGNS IN NARROW ROAD RESERVES OR LOW SPEED ENVIRONMENTS (V_{85} < 60km/h).
8. ADVANCE WARNING SIGNS (W3-4B AND W8-17-2) ARE TO BE INSTALLED 80 TO 120m FROM THE FIRST HUMP IN A SERIES. W3-4B AND W8-17-2 ADVANCE WARNING SIGNS (OTHER THAN AT FIRST AND LAST DEVICES) ARE NOT REQUIRED IF ROAD HUMPS ARE PART OF A SERIES WITH A SPACING OF 80 TO 120m.
9. HEIGHT OF FLAT-TOP ROAD HUMP MAY BE INCREASED TO 100mm ON ROADS NOT USED BY BUSES.
10. PEDESTRIAN BARRIER FENCE TO BE INSTALLED ON EACH KERB SIDE OF ROAD HUMPS TO DETER PEDESTRIAN CROSSING MOVEMENTS. REFER TO COUNCIL'S STANDARD DRAWINGS SD0701 AND SD0702.
11. ON BUS ROUTES, LENGTHEN THE RAISED PLATFORM AREA FROM 4.2m TO 6m.

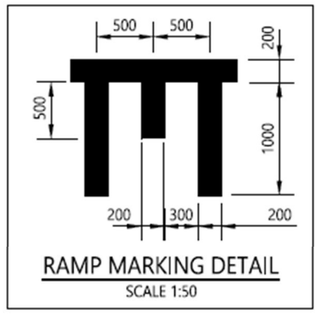


RAMP MARKING DETAIL
SCALE 1:50

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES ROAD HUMPS	SHEET No. SD 0908 REVISION: - SHEET Sheet 2 of 5



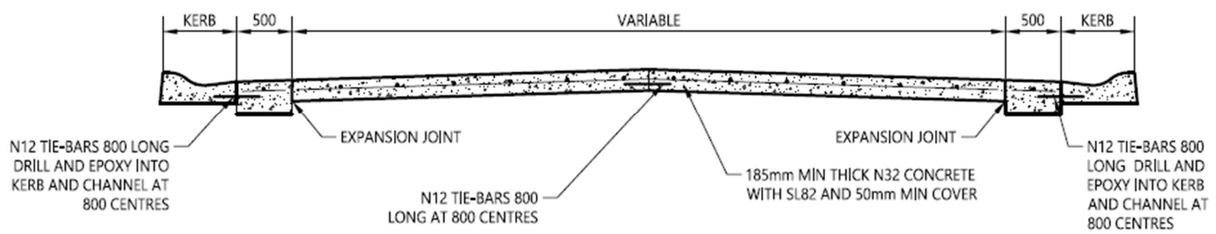
PLAN
SCALE 1:100



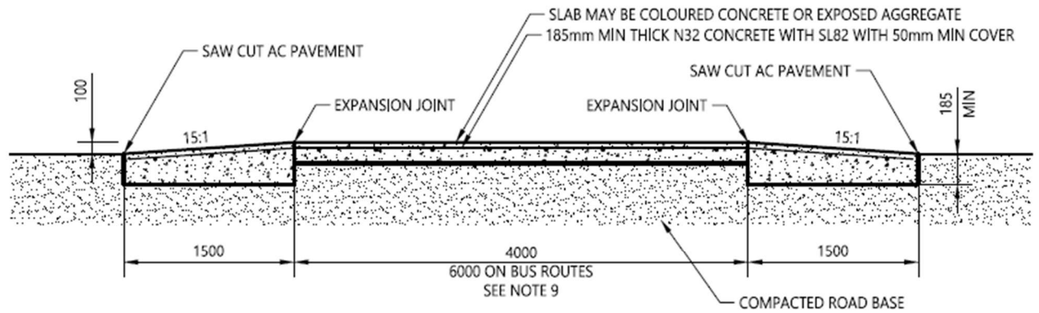
RAMP MARKING DETAIL
SCALE 1:50

NOTES:

1. CONCRETE STRENGTH GRADE TO BE N32 UNLESS OTHERWISE SPECIFIED.
2. ASPHALTIC CONCRETE (AC) TO BE PLACED PRIOR TO CONSTRUCTION OF RAISED DEVICE.
3. AN ALTERNATIVE ASPHALT STRUCTURE MAY BE CONSTRUCTED, SUBJECT TO COUNCIL APPROVAL.
4. ALL SIGNS TO HAVE A MOUNTING HEIGHT OF 2.5m. LATERAL CLEARANCE FROM EDGE OF SIGN TO KERB LINE TO BE 0.6m (0.3m MIN). CONSIDER INSTALLING A-SIZE SIGNS IN NARROW ROAD RESERVES OR LOW SPEED ENVIRONMENTS (V_{85} < 60km/h).
5. PEDESTRIAN BARRIER FENCE TO BE INSTALLED ON EACH KERB SIDE OF ROAD HUMPS TO DETER PEDESTRIAN CROSSING MOVEMENTS. REFER TO COUNCIL'S STANDARD DRAWINGS SD0701 AND SD0702.
6. ROAD LIGHTING TO BE PROVIDED IN ACCORDANCE WITH AS/NZS 1158.
7. ERECT SIGNS W3-4B AND W8-17-2 80 TO 120m IN ADVANCE OF ROAD HUMP AS REQUIRED BY AS 1742.13.
8. PAVEMENT MARKINGS TO BE PROVIDED AS REQUIRED. STANDARD ROAD HUMP PAVEMENT MARKINGS ON APPROACH AND DEPARTURE RAMPS SHOULD BE APPLIED WITH WHITE REFLECTORISED ROAD MARKING PAINT. IF THERMOPLASTIC PAINT IS APPLIED TO THE RAMPS, THE CONCRETE SURFACE SHALL BE PRIMED PRIOR TO APPLICATION OF PAVEMENT MARKINGS.
9. ON BUS ROUTES, LENGTHEN THE RAISED PLATFORM AREA FROM 4m TO 6m.



SECTION A
SCALE 1:50

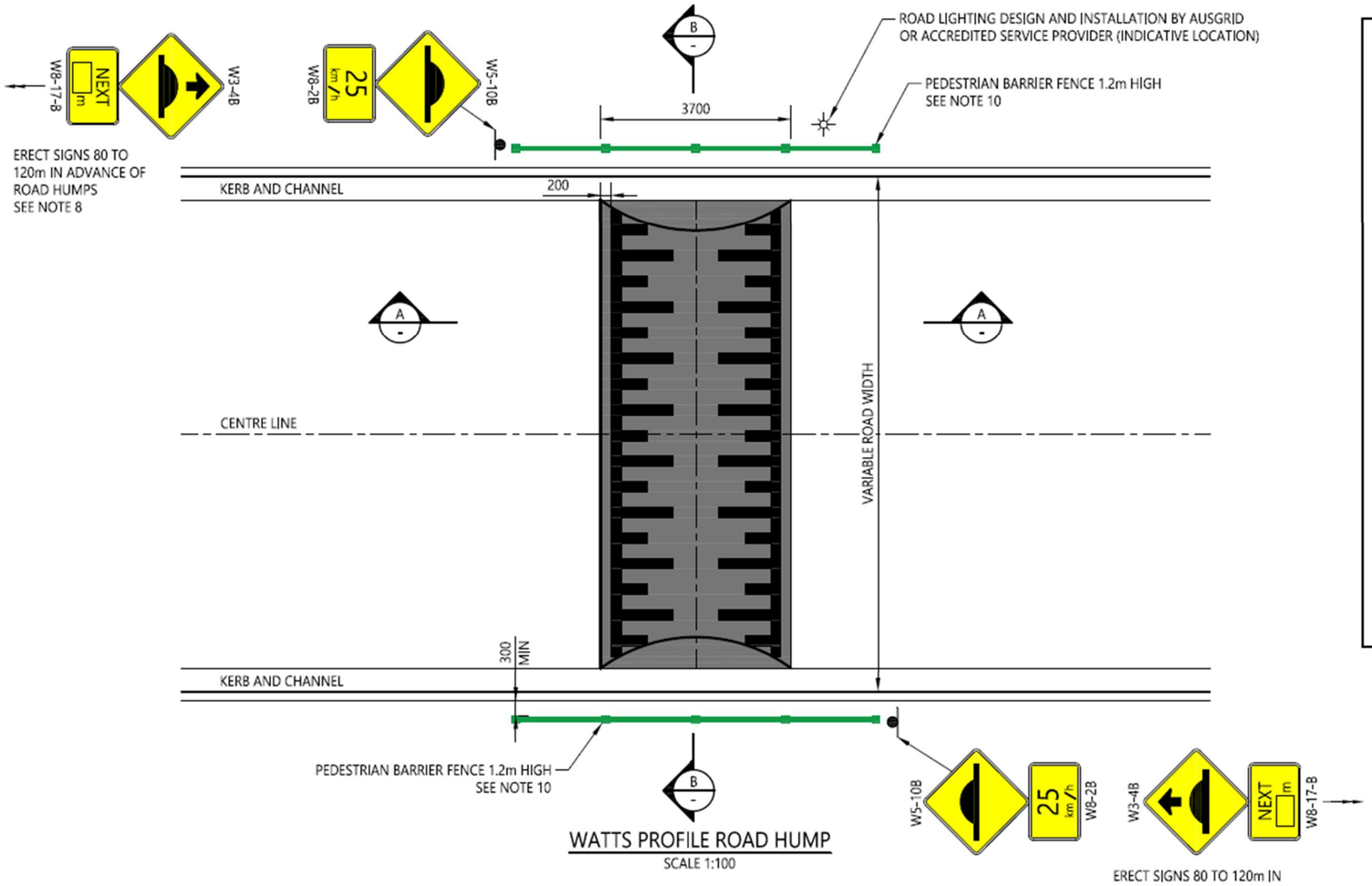


SECTION B
SCALE 1:50

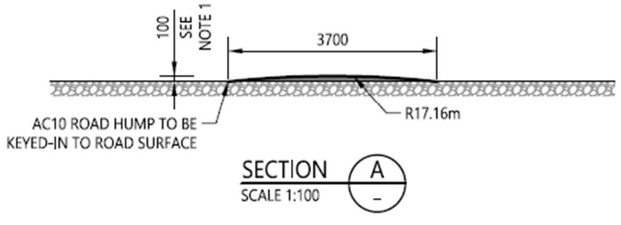
CONCRETE FLAT TOP ROAD HUMP

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0 1000 2000 3000 4000 5000 1:100

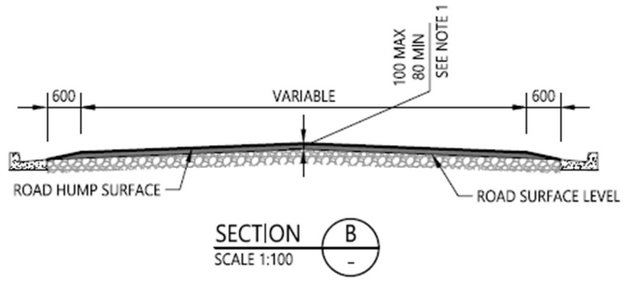
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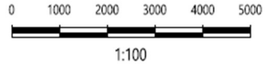
WATTS PROFILE ROAD HUMP
SCALE 1:100

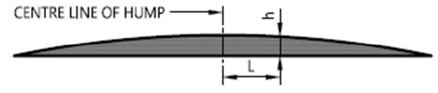


SECTION A
SCALE 1:100



SECTION B
SCALE 1:100





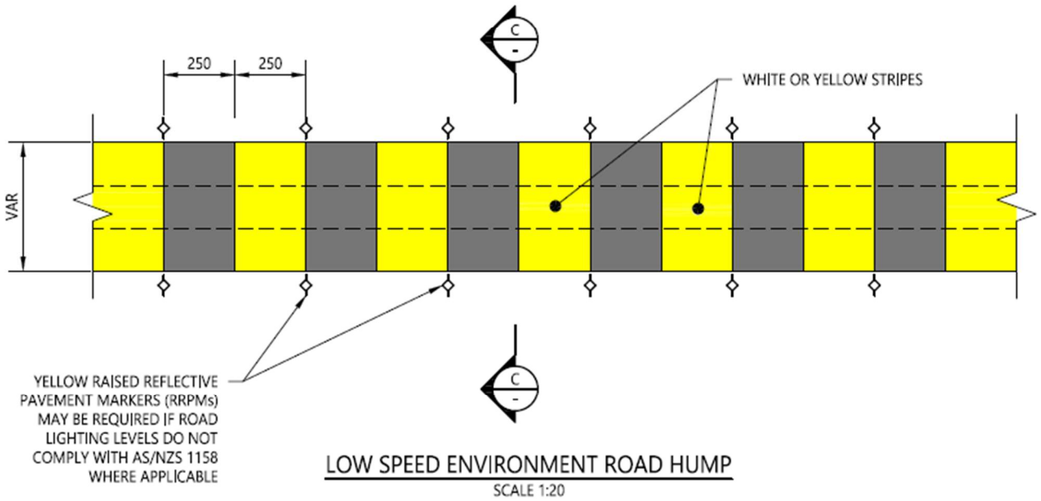
L (m)	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.85
h (mm)	100	100	99	97	95	93	90	86	81	76	71	65	58	51	43	34	25	16	5	0

100mm HIGH WATTS PROFILE ROAD HUMP SETOUT
NOT TO SCALE

NOTES:

1. WATTS PROFILE ROAD HUMPS SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH AS 1742.13 ONLY ON ROADS WHERE A SPEED LIMIT OF 50km/h OR LESS APPLIES. ROAD HUMP TO BE 100mm MAX HIGH AND SHALL NOT BE USED ON BUS ROUTES.
2. ROAD HUMPS TO BE POSITIONED ADJACENT TO EXISTING ROAD LIGHTING, WHERE PRACTICABLE.
3. ROAD LIGHTING TO BE PROVIDED IN ACCORDANCE WITH AS/NZS 1158.
4. REFER TO COUNCIL'S STANDARD DRAWING SD0803 FOR ASPHALT HEAVY PATCHING DETAILS IF ROAD PAVEMENT AND SUBGRADE IS NOT SUITABLE FOR ROAD HUMP INSTALLATION. GEOTECHNICAL TESTING REQUIRED TO DETERMINE IF THIS IS REQUIRED.
5. CONSIDER USE OF ASPHALT ROAD CUSHIONS AS A LESS HARSH TRAFFIC CALMING TREATMENT ON COUNCIL ROADS. REFER TO SD0907 FOR DETAILS.
6. RAMP MARKINGS TO BE APPLIED IN WHITE REFLECTORISED PREFORMED THERMOPLASTIC MATERIAL.
7. ALL SIGNS TO HAVE A MOUNTING HEIGHT OF 2.5m. LATERAL CLEARANCE FROM EDGE OF SIGN TO KERB LINE TO BE 0.6m (0.3m MIN). CONSIDER INSTALLING A-SIZE SIGNS IN NARROW ROAD RESERVES OR LOW SPEED ENVIRONMENTS (V_{85} < 60km/h).
8. ADVANCE WARNING SIGNS (W3-4B AND W8-17-2) ARE TO BE INSTALLED 80 TO 120m FROM THE FIRST HUMP IN A SERIES. W3-4B AND W8-17-2 ADVANCE WARNING SIGNS (OTHER THAN AT FIRST AND LAST DEVICES) ARE NOT REQUIRED IF ROAD HUMPS ARE PART OF A SERIES WITH A SPACING OF 80 TO 120m.
9. KERB BUILDOUTS SHOULD BE INCLUDED ON ROADS ≥ 11m WIDE, WITH APPROPRIATE PAVEMENT MARKINGS AND HAZARD SIGN DELINEATION.
10. PEDESTRIAN BARRIER FENCE TO BE INSTALLED ON EACH KERB SIDE OF ROAD HUMPS TO DETER PEDESTRIAN CROSSING MOVEMENTS. REFER TO COUNCIL'S STANDARD DRAWINGS SD0701 AND SD0702.
11. FIRST ROAD HUMP IN A SERIES OR AN ISOLATED ROAD HUMP SHOULD BE BETWEEN 50m AND 100m FROM THE START OF A STREET.
12. ROAD HUMP SPACING SHOULD BE BETWEEN 80m AND 120m.

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES ROAD HUMPS	SHEET No. SD 0908 REVISION: - SHEET Sheet 4 of 5



LOW SPEED ENVIRONMENT ROAD HUMP

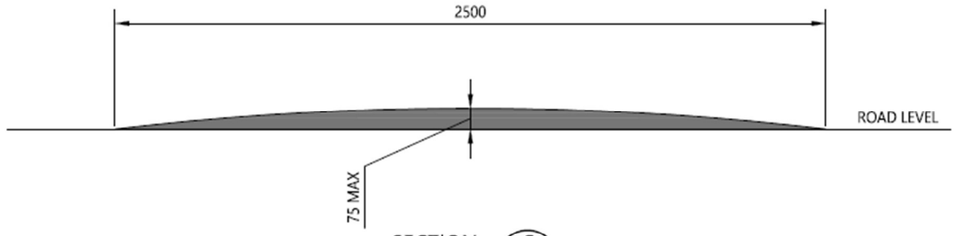
SCALE 1:20

NOTES:

1. LOW SPEED ENVIRONMENT ROAD HUMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH AS 2890. UPON WHICH THIS STANDARD DRAWING IS BASED.
2. ROAD HUMPS TO BE POSITIONED ADJACENT TO EXISTING ROAD LIGHTING, WHERE PRACTICABLE.
3. ROAD LIGHTING TO BE PROVIDED IN ACCORDANCE WITH AS/NZS 1158.
4. LOW SPEED ENVIRONMENT ROAD HUMPS ARE FOR USE IN AREAS WHERE SPEED IS RESTRICTED TO 30km/h OR LESS, SUCH AS IN CAR PARKS.

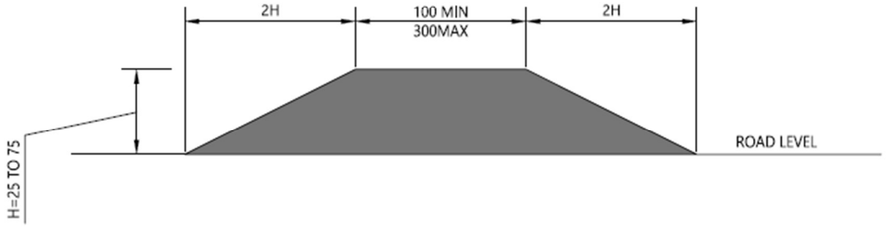
   TYPE 1: APPROPRIATE FOR USE ON LONG AISLES AND CIRCULATING ROADWAYS, SUCH AS LARGE OUTDOOR SURFACE CAR PARKS.

   TYPE 2: APPROPRIATE FOR USE IN CONFINED AREAS OF COVERED AND MULTI-STOREY CAR PARKS.



SECTION C - SCALE 1:20

LOW SPEED ENVIRONMENT ROAD HUMP
TYPE 1



SECTION C - SCALE 1:5

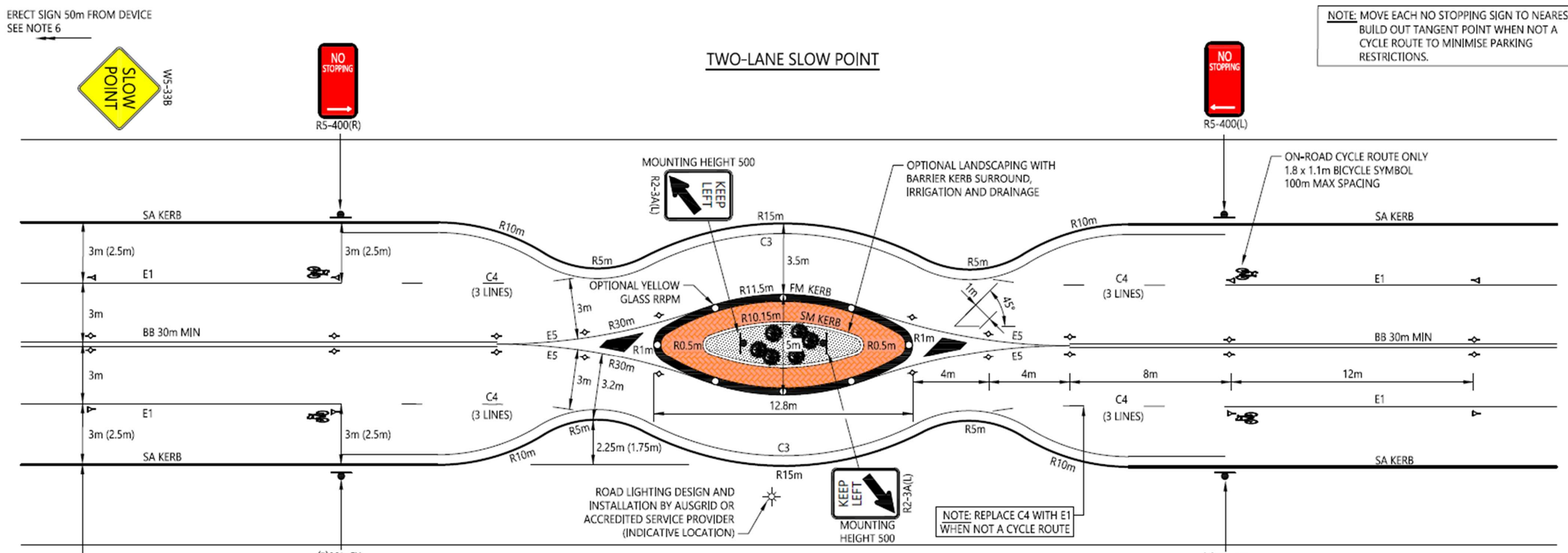
LOW SPEED ENVIRONMENT ROAD HUMP
TYPE 2

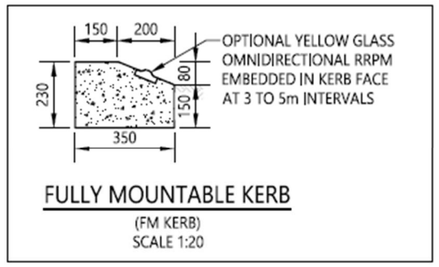
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0 200 400 600 800 1000 1:20

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES ROAD HUMPS	SHEET No. SD 0908 REVISION: - SHEET Sheet 5 of 5

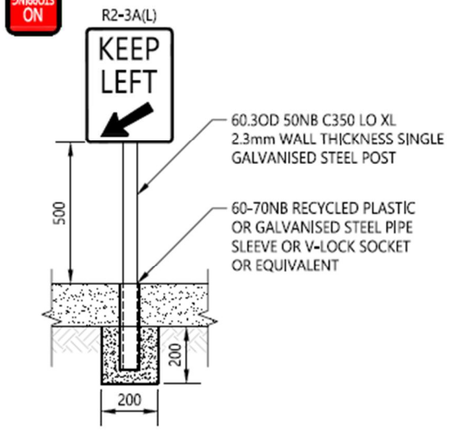
TWO-LANE SLOW POINT

NOTE: MOVE EACH NO STOPPING SIGN TO NEAREST BUILD OUT TANGENT POINT WHEN NOT A CYCLE ROUTE TO MINIMISE PARKING RESTRICTIONS.





FULLY MOUNTABLE KERB
(FM KERB)
SCALE 1:20



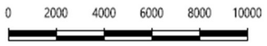
KEEP LEFT SIGN AT TWO-LANE SLOW POINT

NOTES:

1. THIS LAYOUT IS INTENDED AS A GUIDE. DIFFERENT ROAD WIDTHS AND ACCESS LOCATIONS WILL DICTATE THE FINAL CONFIGURATION. SUGGESTED SPACING OF TRAFFIC CALMING DEVICES ON BUS ROUTES TO BE 150 TO 250m.
2. CONSIDER ALTERNATIVE TREATMENT FOR CYCLISTS (CYCLE LANES/BYPASS) WHERE AADT VOLUME IS > 5,000 VEHICLES.
3. VEHICLE DEFLECTION PATHS BASED ON DESIGN SPEED OF 40km/h.
4. ROAD LIGHTING TO BE PROVIDED IN ACCORDANCE WITH AS/NZS 1158.
5. C3 LINES TO BE MARKED IN YELLOW RELECTORISED THERMOPLASTIC PAINT. TRAFFIC ISLAND KERB FACES TO BE MARKED IN WHITE REFLECTORISED ROAD MARKING PAINT. OTHER PAVEMENT MARKINGS TO BE APPLIED IN WHITE REFLECTORISED THERMOPLASTIC PAINT.
6. INSTALL W5-33B SIGNS WHERE DEVICE IS NOT PART OF AN AREA-WIDE LATM SCHEME OR IF DEVICE SPACING IS > 120m.
7. EDGE LINES TO BE MARKED ON ROADS ≥ 11m WIDE.
8. ENSURE ADEQUATE APPROACH SIGHT DISTANCE: 40m AT 50km/h.
9. ENSURE VEHICLE TURNING PATH CHECKS MADE FOR APPROPRIATE DESIGN VEHICLE (INCLUDING IN/OUT OF ACCESSES).
10. CONSULT BUS COMPANIES AND ADJACENT LANDOWNERS DURING PRELIMINARY DESIGN STAGE.
11. ROADS < 11m WIDE MAY REQUIRE LOCALISED WIDENING AND E1 TAPERS ON KERB BUILDOUT APPROACHES.
12. CONSIDER INSTALLING A-SIZE SIGNS IN NARROW ROAD RESERVES OR LOW SPEED ENVIRONMENTS WHERE V_{85} APPROACH SPEEDS ARE < 60km/h.

LEGEND

- Proposed kerb (invert alignment)
- Yellow bidirectional RRPM
- Red unidirectional RRPM
- Proposed sign and post
- Road light
- Bicycle symbol (advisory treatment)
- Terracotta coloured stamped concrete infill or equivalent



1:200



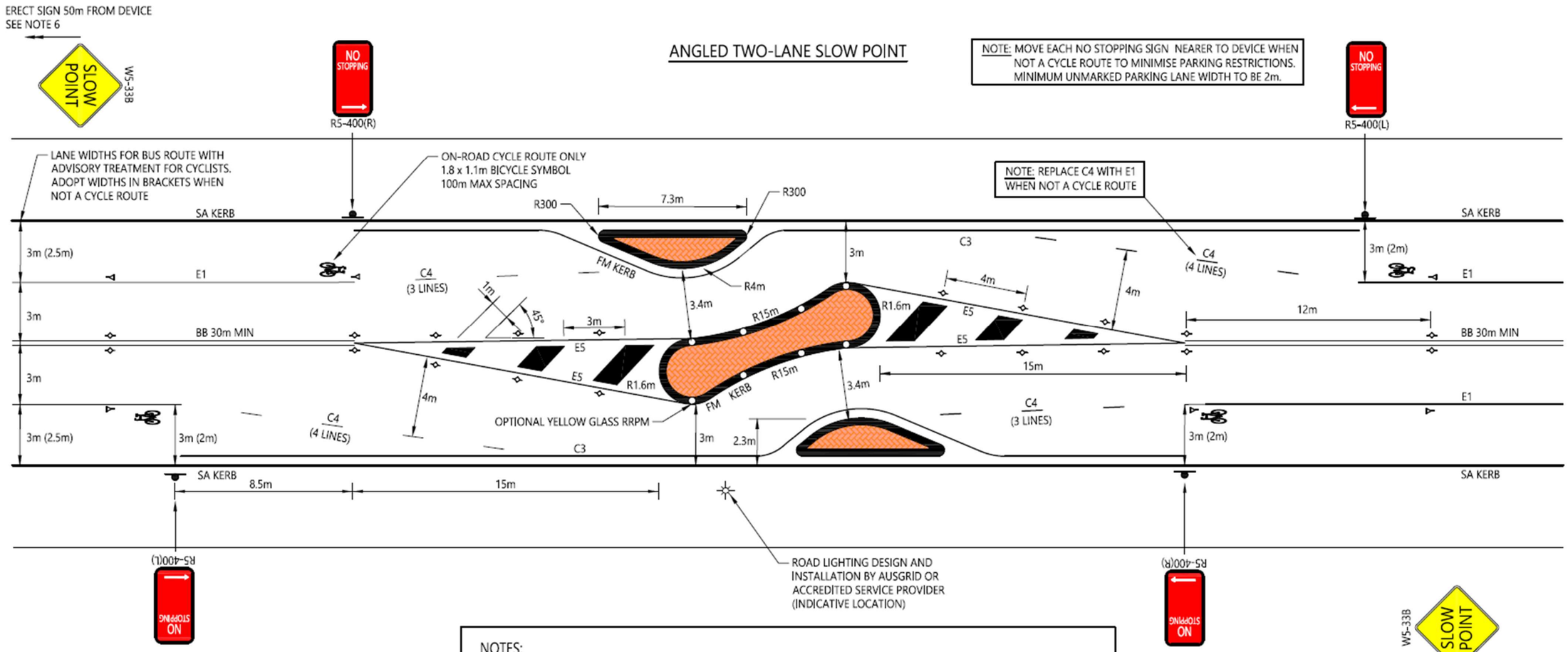
ERECT SIGN 50m FROM DEVICE
SEE NOTE 6

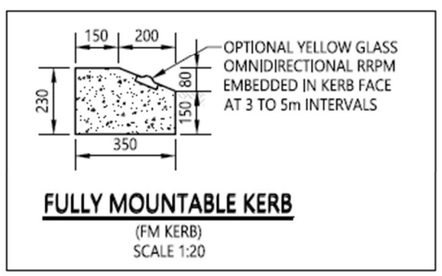
SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES TWO-LANE SLOW POINT

SHEET No. SD 0909 REVISION: -
SHEET Sheet 1 of 2

ANGLED TWO-LANE SLOW POINT

NOTE: MOVE EACH NO STOPPING SIGN NEARER TO DEVICE WHEN NOT A CYCLE ROUTE TO MINIMISE PARKING RESTRICTIONS. MINIMUM UNMARKED PARKING LANE WIDTH TO BE 2m.





FULLY MOUNTABLE KERB
(FM KERB)
SCALE 1:20

NOTES:

1. THIS LAYOUT IS INTENDED AS A GUIDE. DIFFERENT ROAD WIDTHS AND ACCESS LOCATIONS WILL DICTATE THE FINAL CONFIGURATION. SUGGESTED SPACING OF TRAFFIC CALMING DEVICES ON BUS ROUTES TO BE 150 TO 250m.
2. CONSIDER ALTERNATIVE TREATMENT FOR CYCLISTS (CYCLE LANES/BYPASS) WHERE AADT VOLUME IS > 5,000 VEHICLES.
3. VEHICLE DEFLECTION PATHS BASED ON DESIGN SPEED OF 40km/h.
4. ROAD LIGHTING TO BE PROVIDED IN ACCORDANCE WITH AS/NZS 1158.
5. C3 LINES TO BE MARKED IN YELLOW RELECTORISED THERMOPLASTIC PAINT. TRAFFIC ISLAND KERB FACES TO BE MARKED IN WHITE REFLECTORISED ROAD MARKING PAINT. OTHER PAVEMENT MARKINGS TO BE APPLIED IN WHITE REFLECTORISED THERMOPLASTIC PAINT.
6. INSTALL W5-33B SIGNS WHERE DEVICE IS NOT PART OF AN AREA-WIDE LATM SCHEME OR IF DEVICE SPACING IS > 120m.
7. EDGE LINES TO BE MARKED ON ROADS ≥ 11m WIDE.
8. ENSURE ADEQUATE APPROACH SIGHT DISTANCE: 40m AT 50km/h.
9. ENSURE VEHICLE TURNING PATH CHECKS MADE FOR APPROPRIATE DESIGN VEHICLE (INCLUDING IN/OUT OF ACCESSES).
10. CONSULT BUS COMPANIES AND ADJACENT LANDOWNERS DURING PRELIMINARY DESIGN STAGE.
11. ROADS < 11m WIDE MAY REQUIRE LOCALISED WIDENING AND E1 TAPERS ON KERB BUILDOUT APPROACHES.
12. CONSIDER INSTALLING A-SIZE SIGNS IN NARROW ROAD RESERVES OR LOW SPEED ENVIRONMENTS WHERE V_{85} APPROACH SPEEDS ARE < 60km/h.

LEGEND

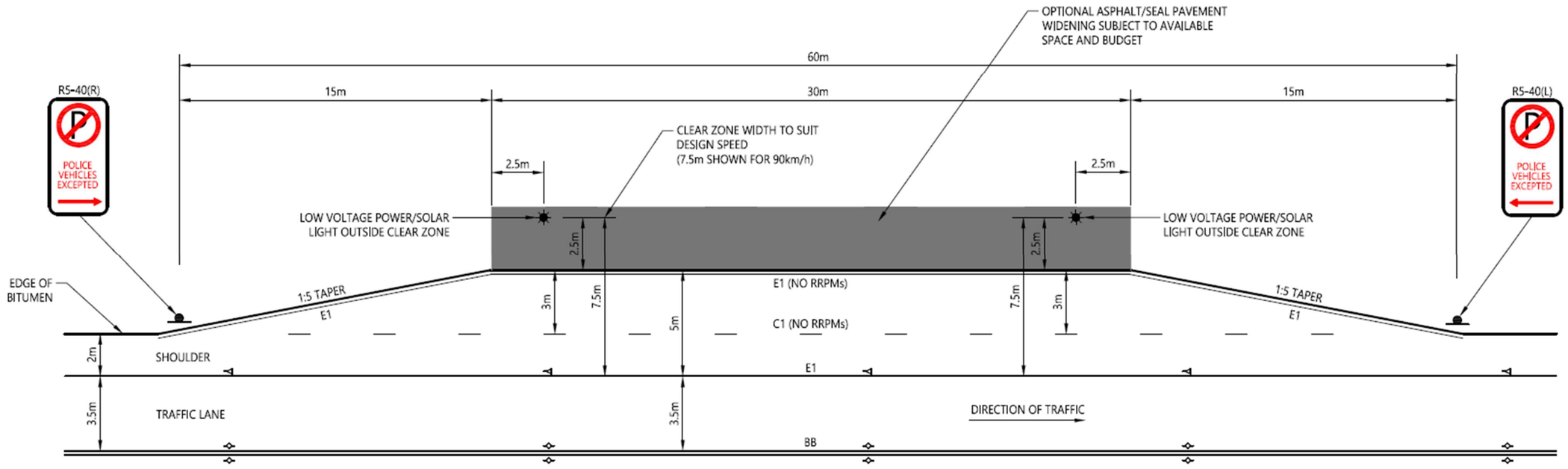
- Proposed kerb (invert alignment)
- Yellow bidirectional RRPM
- Red unidirectional RRPM
- Proposed sign and post
- Road light
- Bicycle symbol (advisory treatment)
- Terracotta coloured stamped concrete infill or equivalent

0 2000 4000 6000 8000 10000
1:200

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES TWO-LANE SLOW POINT	SHEET No. SD 0909 REVISION: - SHEET Sheet 2 of 2

NOTES:

1. EXACT LOCATION OF POLICE ENFORCEMENT BAY TO BE DETERMINED BY NSW POLICE FORCE REPRESENTATIVES AND THE ROADS AUTHORITY.
2. ENSURE LOCATION IS SUITABLE IN TERMS OF AVAILABLE SIGHT DISTANCE, EXISTING SERVICES LOCATIONS AND TREES.
3. OVERHANGING TREES TO BE LOPPED CLEAR OF ROAD LIGHTING, ESPECIALLY WHERE SOLAR PANELS ARE POSITIONED.
4. TAPER LENGTHS AND CLEAR ZONE REQUIREMENTS MAY BE VARIED TO SUIT SITE SPECIFIC CONDITIONS AND THE PREVAILING V_{85} SPEED.



POLICE ENFORCEMENT BAY

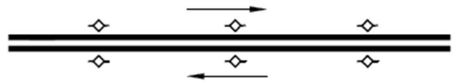
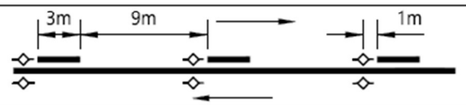
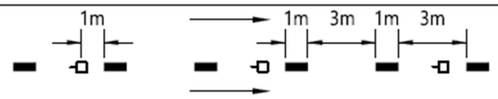
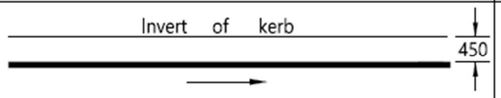
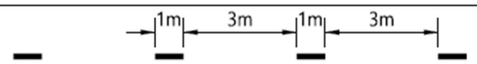
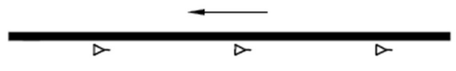
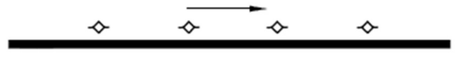
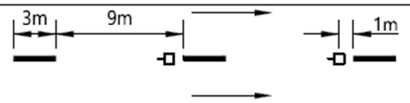
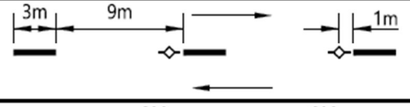
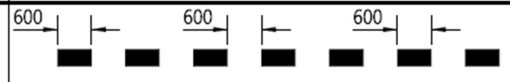
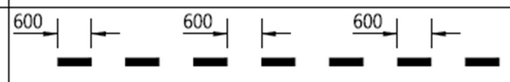
SCALE 1:200

0 2000 4000 6000 8000 10000

1:200

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES POLICE ENFORCEMENT BAY	SHEET No. SD 0910 REVISION: - SHEET Sheet 1 of 1

PAVEMENT MARKING SCHEDULE

	Line Type	Dimensions	Width (mm)	Line Colour	RRPM Type and Colour	RRPM Spacing (m)
LONGITUDINAL	BB - Dividing (barrier) lines (two-way)		100 100 100	White	Bidirectional Yellow	12
	BS - Dividing (barrier) lines (one-way)		100 100 100	White	Bidirectional Yellow	12
	C1 - Continuity line		150	White	Unidirectional White	8
	C3 - No stopping line		100	Yellow	-	-
	C4 - Bicycle lane continuity line		100	White	-	-
	E1 - Edge line		150	White	Unidirectional Red	12
	E5 - Outline edge line		150	White	Bidirectional Yellow	4
	L1 - Lane line		100	White	Unidirectional White	12
	S1 - Dividing (separation) line		100	White	Bidirectional Yellow	12
TRANSVERSE	TB - Give way line		300	White	-	-
	TB1 - Give way line (used on right side of road)		150	White	-	-
	TF - Stop line		300	White	-	-

NOTES:

1. REFER TO TfNSW DELINEATION GUIDELINES FOR FURTHER PAVEMENT MARKING SPECIFICATIONS AND OTHER ROAD AND PATH PAVEMENT MARKINGS.
2. THE PAVEMENT MARKINGS SHOWN ON THIS STANDARD DRAWING REPRESENT THE MOST COMMONLY USED LINE MARKINGS ON COUNCIL'S ROAD NETWORK.
3. ALL PAVEMENT MARKINGS TO BE APPLIED IN ACCORDANCE WITH COUNCIL'S PAVEMENT MARKING SPECIFICATION.
4. RAISED RETROREFLECTIVE PAVEMENT MARKERS (RRPMs) TO BE OFFSET 25 – 50mm FROM UNBROKEN LONGITUDINAL LINES, EXCEPT C3 LINES.

NOT TO SCALE

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES PAVEMENT MARKING SCHEDULE	SHEET No. SD 0911 REVISION: - SHEET Sheet 1 of 1



STREET NAME SIGN DETAILS
SCALE 1:5

0 50 100 150 200 250
1:5

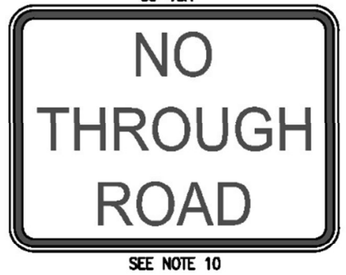
NOTES

1. COLOUR OF SIGNS: STREET NAME BLADE SHALL BE NON-REFLECTIVE DIGITALLY PRINTED (OR ECF) BLUE PMS 288 (RGB 0,66,128) ON WHITE CLASS 100 RETROREFLECTIVE BACKGROUND WITH CLEAR OVERLAMINATE.
2. SIGN MATERIAL SIZE AND SHAPE SHALL BE:
   - 6mm THICK ACRYLIC-PVC BLADE
   - CUT SQUARE AT ENDS
   - MINIMUM LENGTH 500mm
   - MAXIMUM LENGTH 1000mm (END MOUNTED), 1500mm (CENTRE MOUNTED)
   - STANDARD HEIGHT 150mm
   - SIGN HEIGHT WITH NO THROUGH ROAD SUPPLEMENTARY TEXT 200mm
3. REFLECTORISATION: THE BACKGROUND SHALL CONSIST OF WHITE CLASS 100 RETROREFLECTIVE MATERIAL, LAMINATED FROM THE TOP AND BOTTOM EDGE OF THE BLADE.
4. LETTERING TYPE AND SIZE TO AS 1742.5 AND AS 1744 (SPEED <80km/h): STREET NAME BLADES SHALL HAVE LETTERING WITH A HEIGHT OF 100mm SERIES D UPPER CASE WITH NARROW SPACING. SERIES C SHOULD ONLY BE USED WHERE LENGTH OF TEXT EXCEEDS MAXIMUM BLADE LENGTH OF 1200mm.
5. STREET NAME SIGNS SHALL BE PROVIDED AT ALL INTERSECTIONS WHERE SHOWN ON THE APPROVED ENGINEERING PLANS OR AS DIRECTED BY COUNCIL'S REPRESENTATIVE. WHERE SIDE STREET AND MAJOR ROAD SIGNS ARE MOUNTED ON THE ONE POST, THE SIDE STREET SIGN SHALL BE MOUNTED BELOW THE MAJOR ROAD SIGN.
6. STREET NAME SIGNS AT FULLY MOUNTABLE ROUNDABOUTS SHALL BE CONFIGURED AND INSTALLED AT LOCATIONS IN ACCORDANCE WITH SHEET 2.
7. SIGN POST LOCATIONS MAY BE VARIED BY COUNCIL'S REPRESENTATIVE WHERE POWER POLES, TREES OR SIMILAR FEATURES OBSTRUCT VIEWING OF SIGNS BY MOTORISTS.
8. ERECTION OF SIGNS BY DEVELOPERS SHALL BE SUBJECT TO APPROVAL BY COUNCIL'S REPRESENTATIVE.
9. NON-STANDARD SIGNS MAY BE USED SUBJECT TO PRIOR APPROVAL BY COUNCIL'S REPRESENTATIVE.
10. SIGN POST SHALL BE INSTALLED IN PIPE SLEEVE (PREFERRED) OR V-LOCK SOCKET IN PAVED FOOTWAY AREAS.
11. CONSIDER INSTALLATION OF G9-18A NO THROUGH ROAD SIGN(S) TO SUPPLEMENT INTEGRAL NO THROUGH ROAD STREET NAME SIGNS.

ABBREVIATIONS:

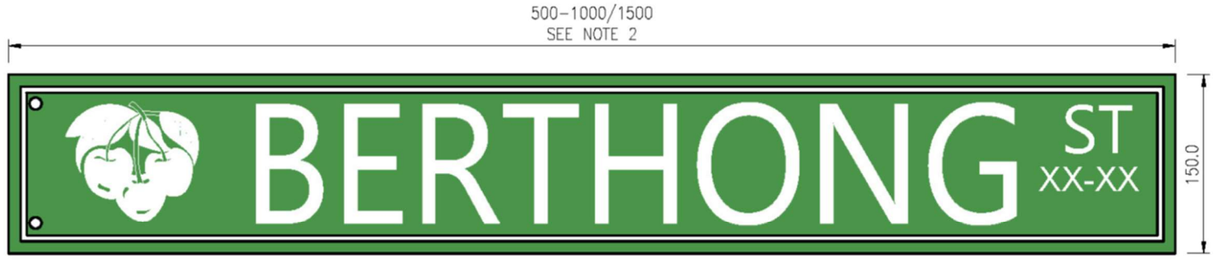
ALY	ALLEY	JNC	JUNCTION
AVE	AVENUE	LA	LANE
BVD	BOULEVARD	PDE	PARADE
CCT	CIRCUIT	PWY	PARKWAY
CL	CLOSE	PL	PLACE
CT	COURT	PL	PLAZA
CR	CRESCENT	RD	ROAD
DR	DRIVE	SQ	SQUARE
ESP	ESPLANADE	ST	STREET
GR	GROVE	TCE	TERRACE
HWY	HIGHWAY	WY	WAY
		WK	WALK

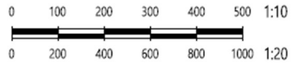
G9-18A



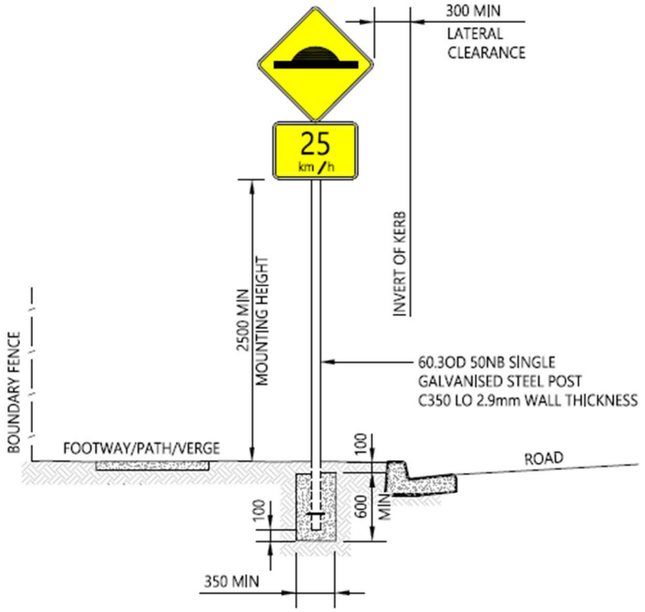
SEE NOTE 10

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES STANDARD STREET NAME SIGN CONFIGURATION	SHEET No. SD 0912 REVISION: - SHEET Sheet 1 of 2



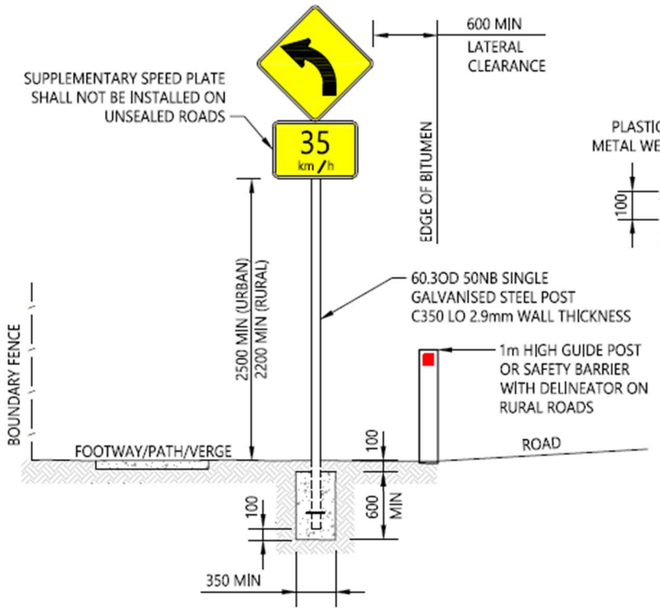


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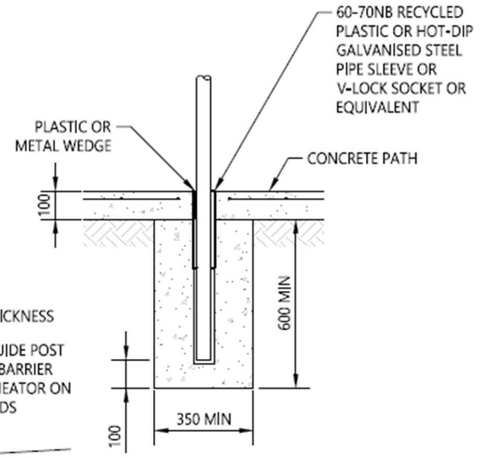
URBAN ROADS WITH KERB AND CHANNEL

SCALE 1:50



URBAN ROADS WITHOUT KERB AND CHANNEL AND RURAL ROADS

SCALE 1:50

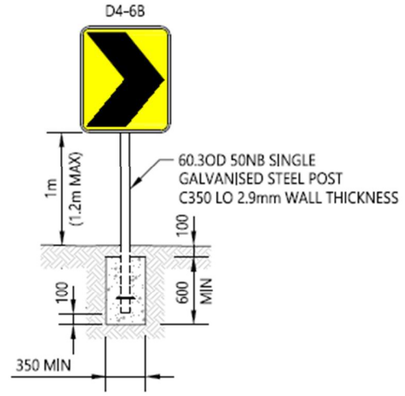


FOOTING DETAIL

SCALE 1:20

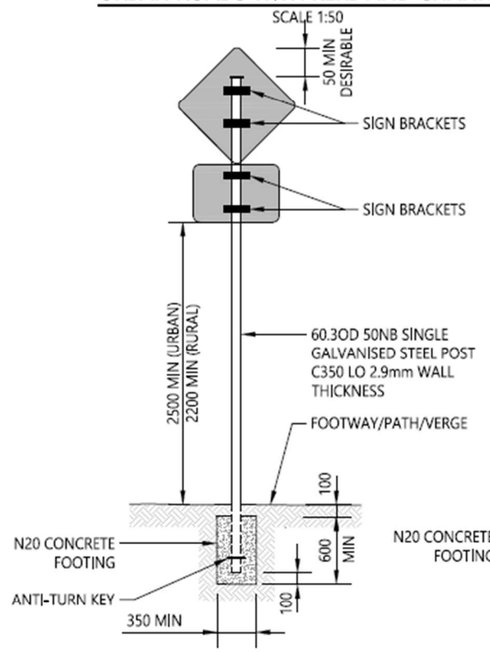
NOTES:

1. SIGN POST TYPE, DIMENSIONS AND FRANGIBILITY REQUIREMENTS SHALL BE IN ACCORDANCE WITH AS 1742.2.
2. SIGN POSTS LOCATED IN MEDIAN OR ROADSIDE TRAFFIC ISLANDS SHALL BE INSTALLED IN PIPE SLEEVE, V-LOCK SOCKET OR EQUIVALENT.
3. ROADSIDE SIGN POSTS LOCATED IN HIGH RISK AREAS, SUCH AS BUSY INTERSECTIONS OR LOCATIONS WITH A HISTORY OF DAMAGED SIGN POSTS, SHALL BE INSTALLED IN PIPE SLEEVE, V-LOCK SOCKET OR EQUIVALENT.
4. PIPE SLEEVE/V-LOCK AND WEDGE SHALL BE INSTALLED FLUSH WITH SURROUNDING CONCRETE SURFACE.



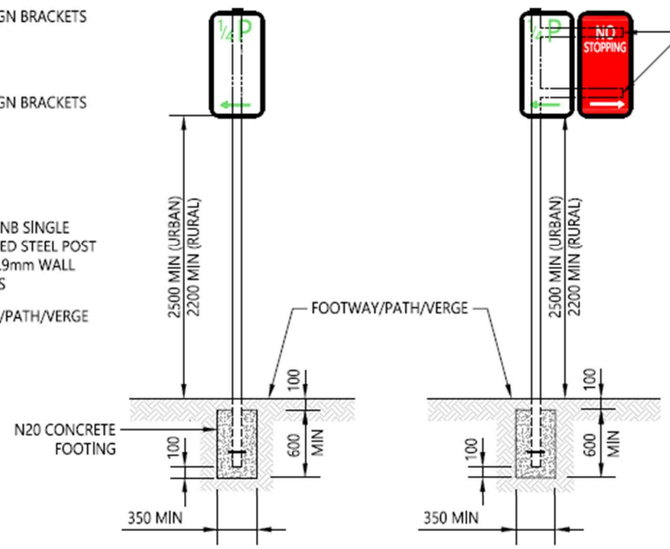
CHEVRON ALIGNMENT MARKER SIGN MOUNTING DETAILS

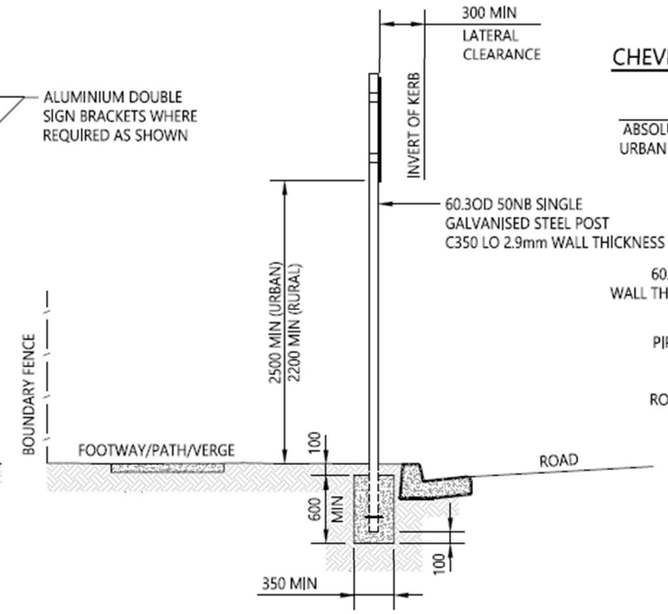
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SIGN MOUNTING DETAILS

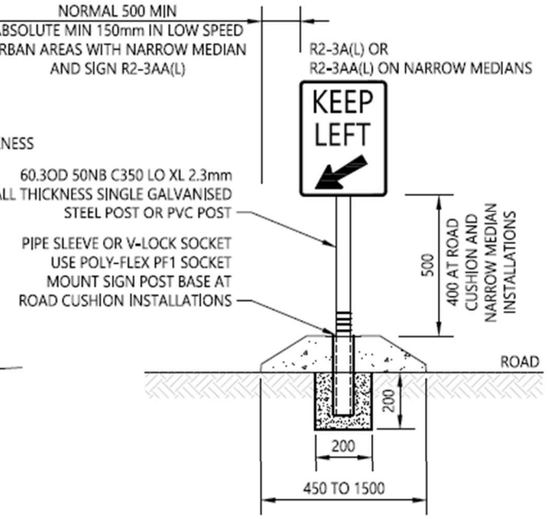
SCALE 1:50





PARKING RESTRICTION SIGN MOUNTING DETAILS

SCALE 1:50



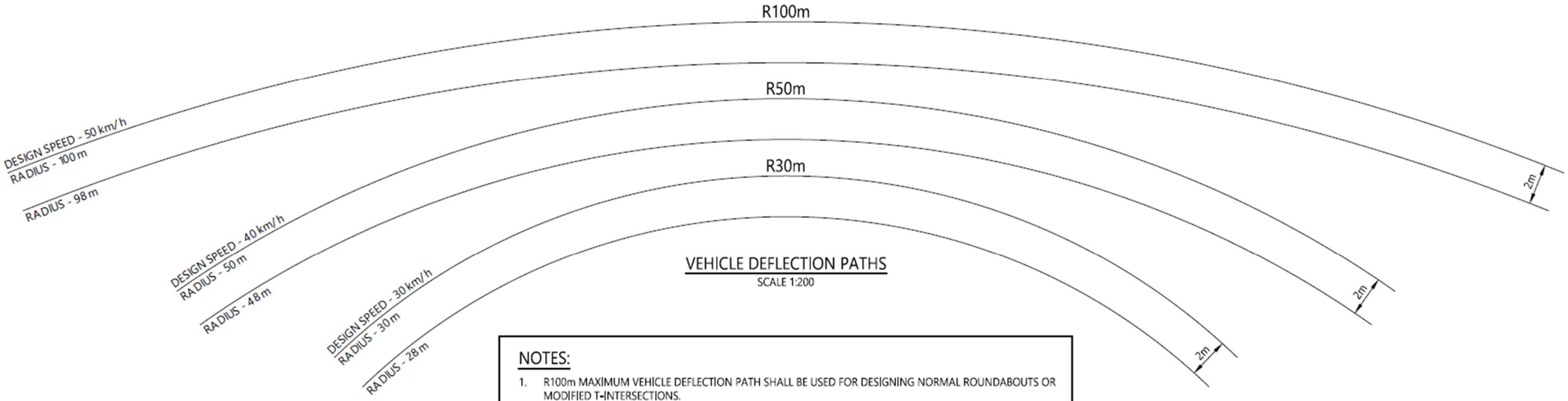
MEDIAN ISLANDS

SCALE 1:20

0 200 400 600 800 1000 1:20

0 500 1000 1500 2000 2500 1:50

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES ROAD AND TRAFFIC SIGN MOUNTING DETAILS	SHEET No. SD 0913 REVISION: - SHEET Sheet 1 of 1



VEHICLE DEFLECTION PATHS
SCALE 1:200

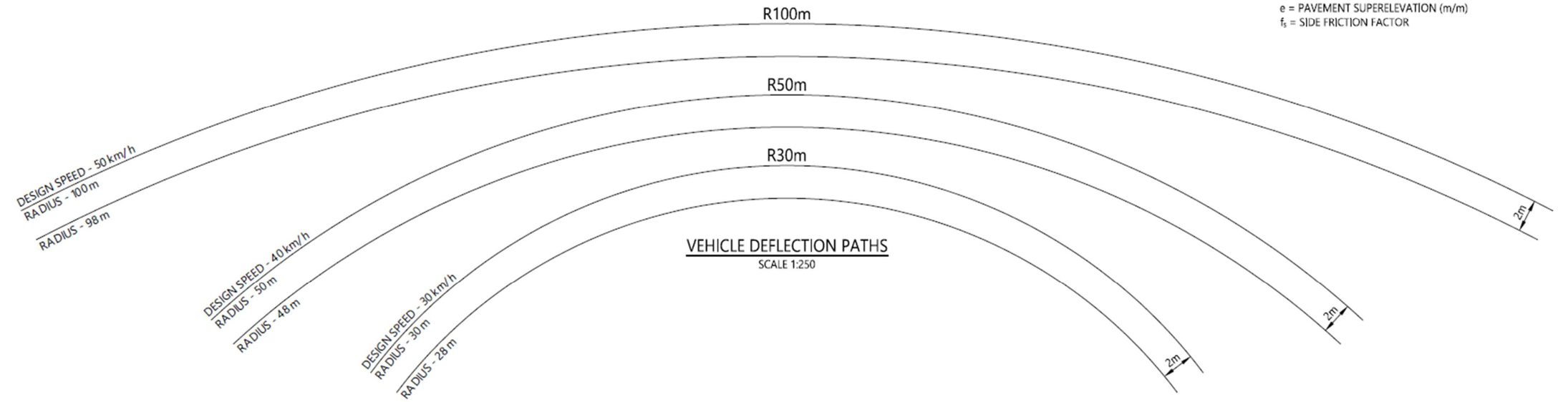
NOTES:

1. R100m MAXIMUM VEHICLE DEFLECTION PATH SHALL BE USED FOR DESIGNING NORMAL ROUNDABOUTS OR MODIFIED T-INTERSECTIONS.
2. R50m AND R30m MAXIMUM VEHICLE DEFLECTION PATHS SHALL BE USED FOR DESIGNING FULLY MOUNTABLE ROUNDABOUTS AND OTHER HORIZONTAL DEFLECTION TRAFFIC CALMING DEVICES IN LOW SPEED ENVIRONMENTS ONLY.
3. R50m AND R30m PATHS WERE DERIVED FROM THE HORIZONTAL CURVE EQUATION IN THE AUSTROADS GEOMETRIC DESIGN GUIDELINES, AS SHOWN ON THIS DRAWING.
4. VEHICLE DEFLECTION PATH TEMPLATES AND RELATED CAD METHODS SHALL BE USED IN ACCORDANCE WITH AUSTROADS GUIDELINES AND THE TfNSW GUIDELINE "ROUNDABOUTS - GEOMETRIC DESIGN METHOD".
5. VEHICLE DEFLECTION PATH TEMPLATES SHALL BE POSITIONED TANGENTIAL TO KERB LINE ENTRY/EXIT ARCS AND TANGENTIAL TO OR CROSS THE CENTRAL ISLAND.

HORIZONTAL CURVE EQUATION

$$V = \sqrt{127R(e + f_s)} \quad \text{OR} \quad R = \frac{V^2}{127(e + f_s)}$$

WHERE:
R = MINIMUM CURVE RADIUS (m)
V = VEHICLE SPEED (km/h)
e = PAVEMENT SUPERELEVATION (m/m)
f_s = SIDE FRICTION FACTOR



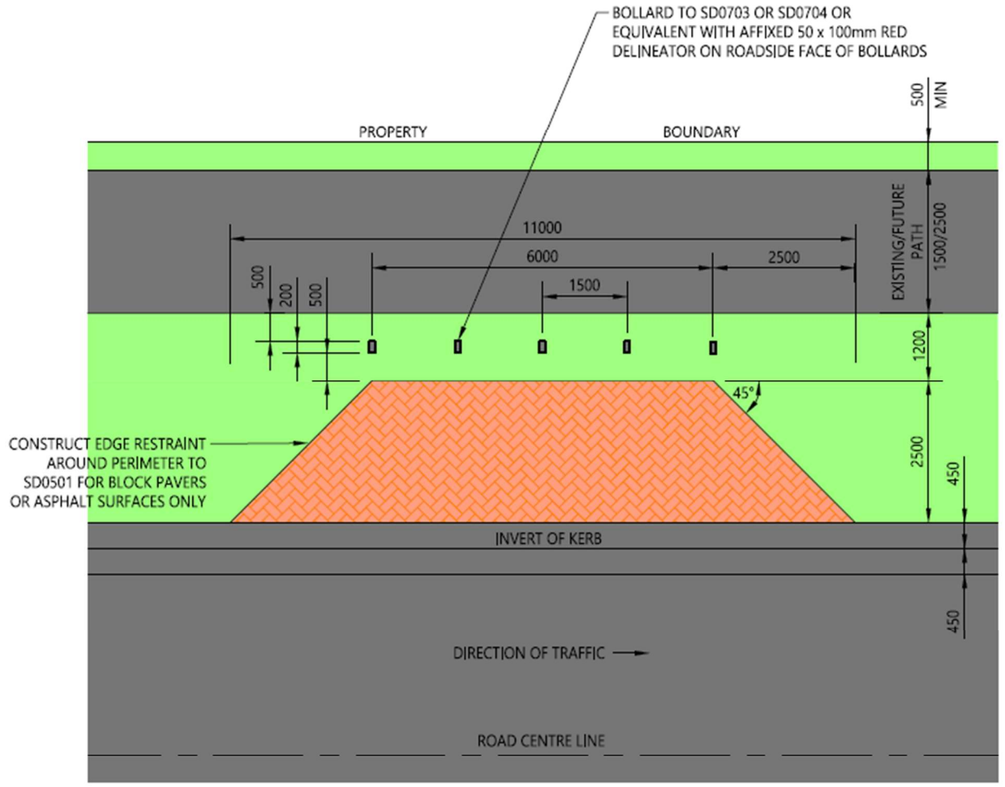
VEHICLE DEFLECTION PATHS
SCALE 1:250

0 2000 4000 6000 8000 10000 1:200
0 2500 5000 7500 10000 12500 1:250

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES ROAD AND TRAFFIC SIGN MOUNTING DETAILS	SHEET No. SD 0914 REVISION: - SHEET Sheet 1 of 1

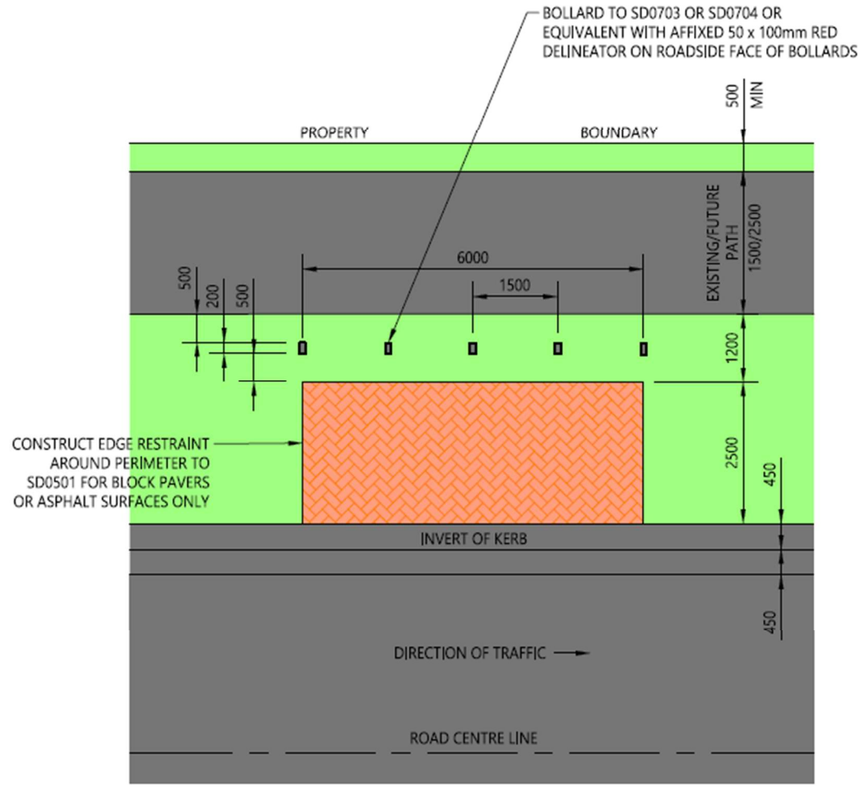
NOTES:

1. THIS STANDARD DRAWING IS BASED ON THE REQUIREMENTS OF TfNSW TECHNICAL DIRECTION TTD 2014/004 - OFF-ROAD PARKING PROVISION ON NARROW ROADS.
2. THE PREFERRED PRACTISE IS TO DESIGN ROADS WITH AN APPROPRIATE WIDTH TO OBVIATE THE NEED FOR OFF-ROAD PARKING SPACES. THEREFORE, THIS TREATMENT WOULD GENERALLY BE FOR RETROFITTING TO AN EXISTING ROAD OR BE INCLUDED WITHIN A SUBDIVISION DEVELOPMENT WITH NARROW CARRAGEWAYS.
3. THIS STANDARD DRAWING IS FOR GUIDANCE PURPOSES ONLY AND IS NOT TO BE USED FOR A DESIGN OR FOR CONSTRUCTION PURPOSES, FOLLOWING A SEPARATE DECISION TO IMPLEMENT OFF-ROAD PARKING ON A NARROW ROAD. THIS STANDARD DRAWING IS ALSO NOT TO BE USED FOR SHARED ZONES.
4. OFF-ROAD PARKING SPACES ON NARROW ROADS SHALL ONLY BE IMPLEMENTED ON URBAN RESIDENTIAL ROADS WITH A SPEED LIMIT ≤50km/h AND NOT WITHIN DESIGNATED NO STOPPING ZONES OR OTHER PARKING RESTRICTIONS, WHICH MAY ADVERSELY AFFECT MINIMUM SIGHT DISTANCE REQUIREMENTS.
5. PARKING SPACE DIMENSIONS SHALL BE IN ACCORDANCE WITH AS 2890.5 - PARKING FACILITIES. PARKING CONTROL SIGNS WHERE REQUIRED SHALL BE INSTALLED IN ACCORDANCE WITH AS 1742.11 AND THE APPLICABLE TfNSW SUPPLEMENT.
6. PARKING SPACES FOR DISABLED PERSONS SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH AS 2890.5 - PARKING FACILITIES, INCLUDING PAVED CONNECTIVITY WITH PATHS AT SPECIFIC GRADES AND PARKING SPACE DELINEATION.
7. ENSURE RESIDUAL FOOTWAY/NATURE STRIP WIDTH IS 2.5m MINIMUM ON EACH SIDE OF THE ROAD TO ALLOW FOR EXISTING/FUTURE SHARED PATH WIDTH.
8. POSITION PARKING SPACES ADJACENT TO VEHICLE ACCESS CROSSINGS WHERE PRACTICABLE (DOWNSTREAM OF CROSSING PREFERRED).
9. AVOID SHORT LENGTHS OF ALTERNATING KERB-TYPES UNLESS SEPARATED BY VEHICLE ACCESS CROSSINGS.
10. DISHED CROSSING (S8 KERB) PREFERRED TO ENABLE BETTER TRANSITION TO/FROM BARRIER (SA) KERB AND EASE OF INGRESS/EGRESS. ROLL TOP KERB WOULD BE MOST SUITABLE ON EXISTING NARROW ROADS IN SUBDIVISION AREAS.
11. TRANSITION CHANGES IN LONGITUDINAL KERB-TYPE OVER 3 TO 6m.
12. ENSURE ALL PUBLIC UTILITY SERVICES ARE NOT ADVERESLY AFFECTED BY THE OFF-ROAD PARKING SPACE(S) WITHIN THE ROAD OR FOOTWAY AREAS. HOUSE STORMWATER CONNECTIONS WILL REQUIRE CONSIDERATION OF CONSTRUCTABILITY REQUIREMENTS. EXISTING AC WATER MAINS UNDER SLABS MAY NEED REPLACEMENT.
13. SLAB TO BE 125mm THICK N32 CONCRETE INTEGRALLY COLOURED WITH 1x20kg BAG OF TERRACOTTA OXIDE FOR EACH $1m^3$ OF CONCRETE AND HERRINGBONE PATTERENED. ALTERNATIVE CONSTRUCTION MATERIALS MAY BE USED SUCH AS BLOCK PAVERS OR ASPHALT, WITH THE APPROVAL OF COUNCIL'S REPRESENTATIVE.
14. CONTROL JOINTS (AND EXPANSION JOINTS WHERE REQUIRED) AND ISOLATION JOINTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH AS 3727. MAXIMUM CONTROL JOINT SPACING SHALL BE 4.5m, OR 1.5 TIMES THE WIDTH OF CONCRETE SLAB, WHICHEVER IS THE LESSER.



ONE PARALLEL PARKING SPACE

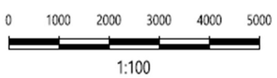
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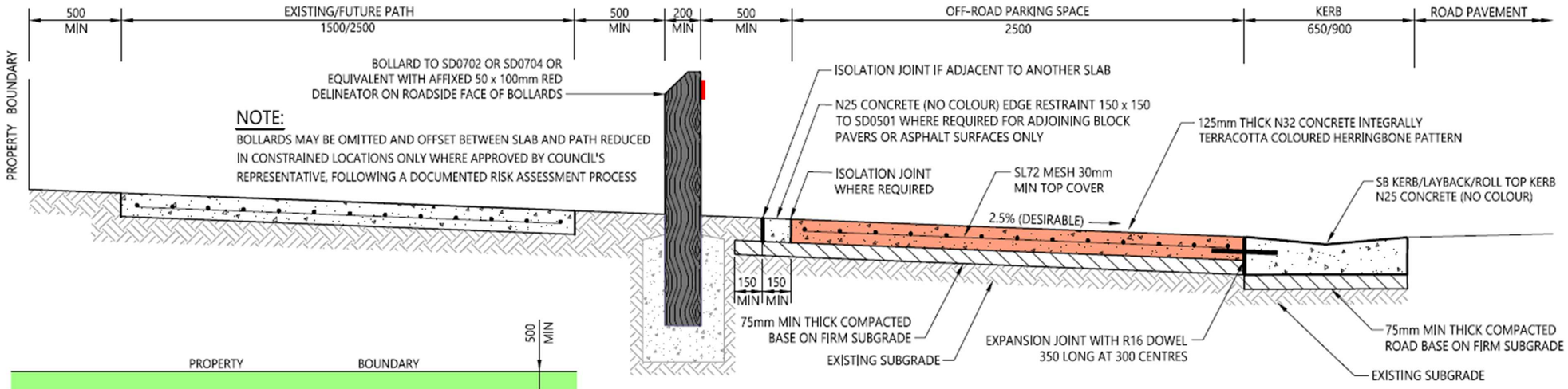
ONE PARALLEL PARKING SPACE

(LONGITUDINALLY CONSTRAINED SITE)

SCALE 1:100

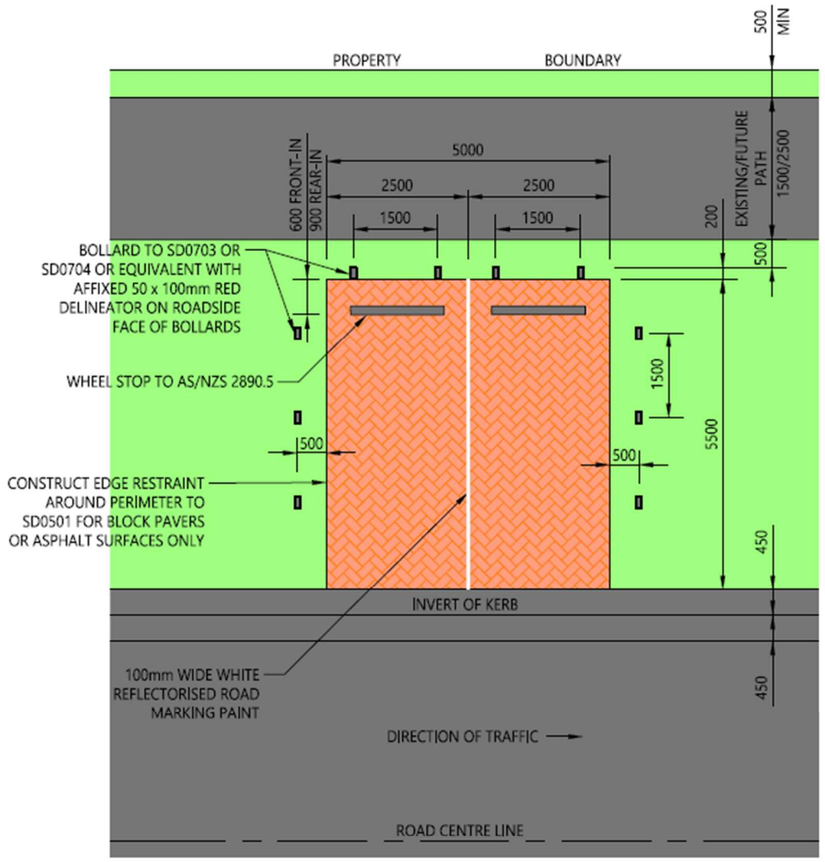


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TYPICAL SECTION

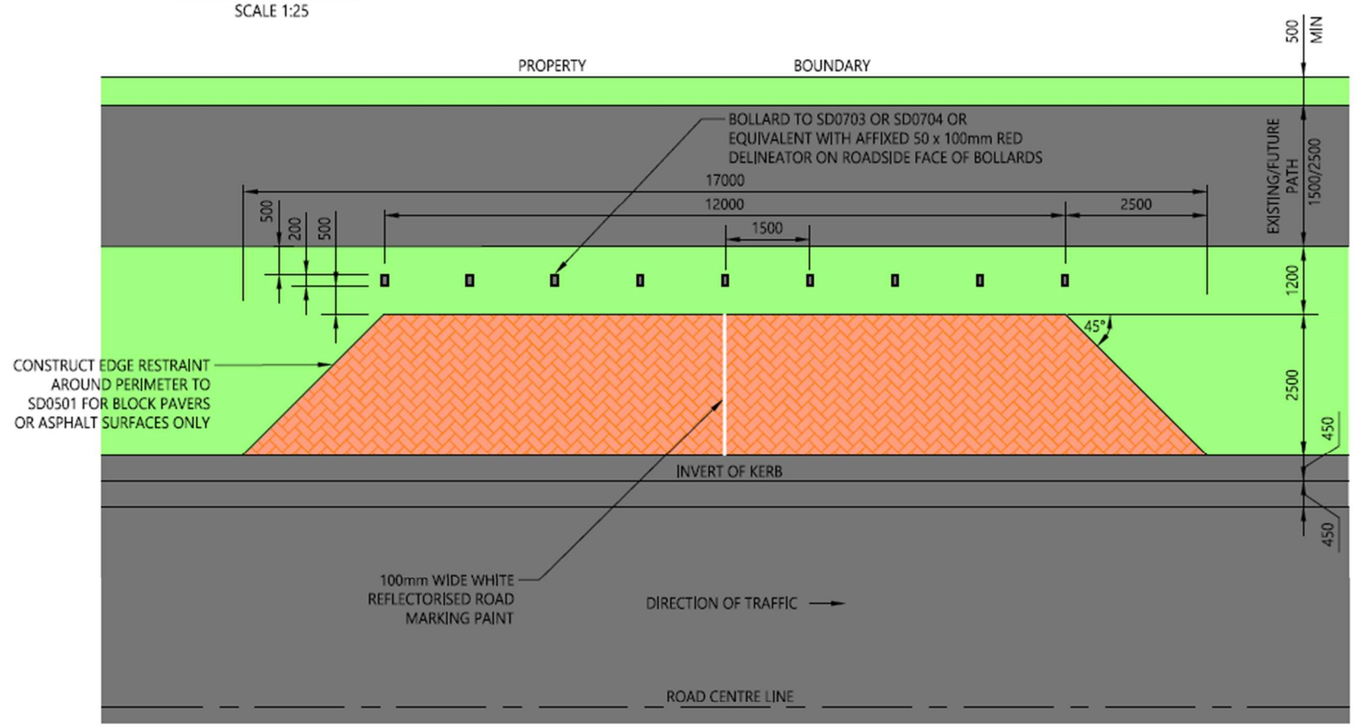
SCALE 1:25



TWO PERPENDICULAR PARKING SPACES

(LOW SPEED LOW VOLUME ROADS ONLY)

SCALE 1:100



TWO PARALLEL PARKING SPACES

SCALE 1:100

0 250 500 750 1000 1250 1:25

0 1000 2000 3000 4000 5000 1:100

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: TRAFFIC MANAGEMENT SERIES OFF-ROAD PARKING SPACES ON NARROW ROADS	SHEET No. SD 0915 REVISION: - SHEET Sheet 2 of 2

TREE PLANTING GENERAL NOTES

1. TREES ARE TO BE SUPPLIED IN ACCORDANCE WITH AS2303. REFER TO SD1021 SECTION 6 – PLANT PROCUREMENT FOR FURTHER DETAIL.

2. TREE SPECIES SUBSTITUTION REQUIRES WRITTEN CONSENT FROM HILLTOPS COUNCIL.

3. MINIMUM STREET TREE INSTALLATION SIZE TO CONFORM TO THE CORRESPONDENCE LIST UNLESS INDICATED IN THE CONDITIONS OF CONSENT OR AGREED TO WITH HILLTOPS COUNCIL.
   RECOMMENDED MINIMUM TREE SIZE:

   - LESS THAN OR EQUAL TO 30 cm POT or 25L FOR RESIDENTS PLANTING IN EXISTING VERGES.
   - LESS THAN OR EQUAL TO 45L FOR COUNCIL PROJECTS.
   - GREATER THAN OR EQUAL TO 45L PRIVATE DEVELOPMENTS OF SUBDIVISION PROJECTS.
   - 100L OR GREATER FOR SIGNIFICANT DEVELOPMENTS OR PUBLIC DOMAIN PROJECTS WHERE EXISTING SERVICES ALLOW.

4. REFER TO SD1021 FOR ALL PROGRAMMING, PLANTING, ESTABLISHMENT AND MAINTENANCE OPERATIONS REQUIRED.

5. REFER TO SD1020 FOR SOIL PROPERTIES REQUIREMENTS.

6. OBTAIN BEFORE YOU DIG AUSTRALIA (BYDA) SERVICE UTILITY PLANS PRIOR TO STARTING WORK.

7. GROUND TRUTH ALL POSSIBLE CONFLICTS WITH UNDERGROUND AND OVERHEAD SERVICES PRIOR TO COMMENCEMENT OF WORKS.

8. ALL TIMBER IN CONTACT WITH THE GROUND BE SUITABLE FOR IN-GROUND USE.

9. NO STREET TREE SHALL BE CLOSER THAN:

   - 12m FROM BUILDING LINE AT INTERSECTION OF MAJOR ROADS, OR 9m FROM MINOR ROADS.
   - 3m FROM DRIVEWAYS OR ACCESS WAYS SUCH AS LANEWAYS.
   - 3m FROM POWER POLES AND LIGHT POLES.
   - AT LEAST 15m FROM BUS STOPS.
   - 2.5m FROM STORMWATER KERB INLET PITS.

10. PLANT TREE 1m FROM BACK OF KERB OR CENTRE FOR 3.5m TO 4.5m VERGE/NATURE STRIPS WERE APPROVED BY COUNCIL'S REPRESENTATIVE.

11. REFER TO AUSTROADS STANDARDS FOR GUIDANCE ON TREES IN HAZARDOUS LOCATIONS OR IN HIGH-SPEED VEHICLE ENVIRONMENTS.

12. INSTALL LINEAR ROOT BARRIER 600 MINIMUM DEPTH, ROOT BARRIER SHALL SIT FLUSH WITH SURROUNDING SOIL AND BE COVERED BY MULCH.

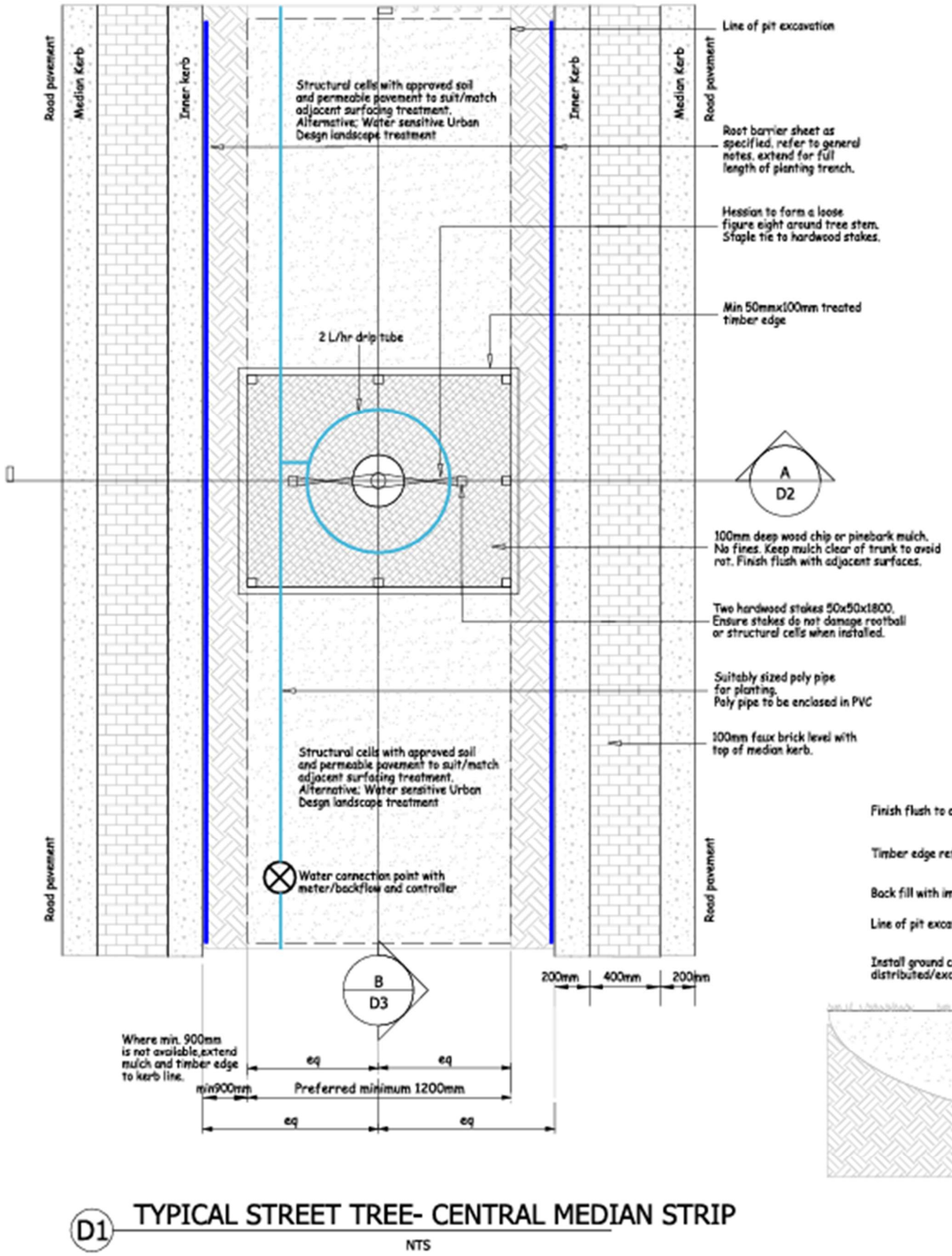
13. ENSURE TREE SPECIES SELECTED WILL PROVIDE SUFFICIENT VERTICAL, (MINIMUM 2.5 CANOPY HEIGHT) AND HORIZONTAL CLEARANCES AT MATURE AGE TO ENSURE THROUGH TRAFFIC IS NOT OBSTRUCTED AND SIGHT LINES ARE MAINTAINED.

14. ENSURE TREE SPECIES SELECTED DO NOT IMPACT ON UTILITIES AND STREET INFRASTRUCTURE SUCH AS UNDERGROUND SERVICES, KERB AND GUTTERING, DRAINAGE, FOOTPATHS AND DRIVEWAYS.

15. REFER TO COUNCILS' CIVIL WORKS SPECIFICATION – DESIGN GUIDELINE AND CONSTRUCTION SPECIFICATION – FOR ADDITION DESIGN AND CONSTRUCTION REQUIREMENTS.

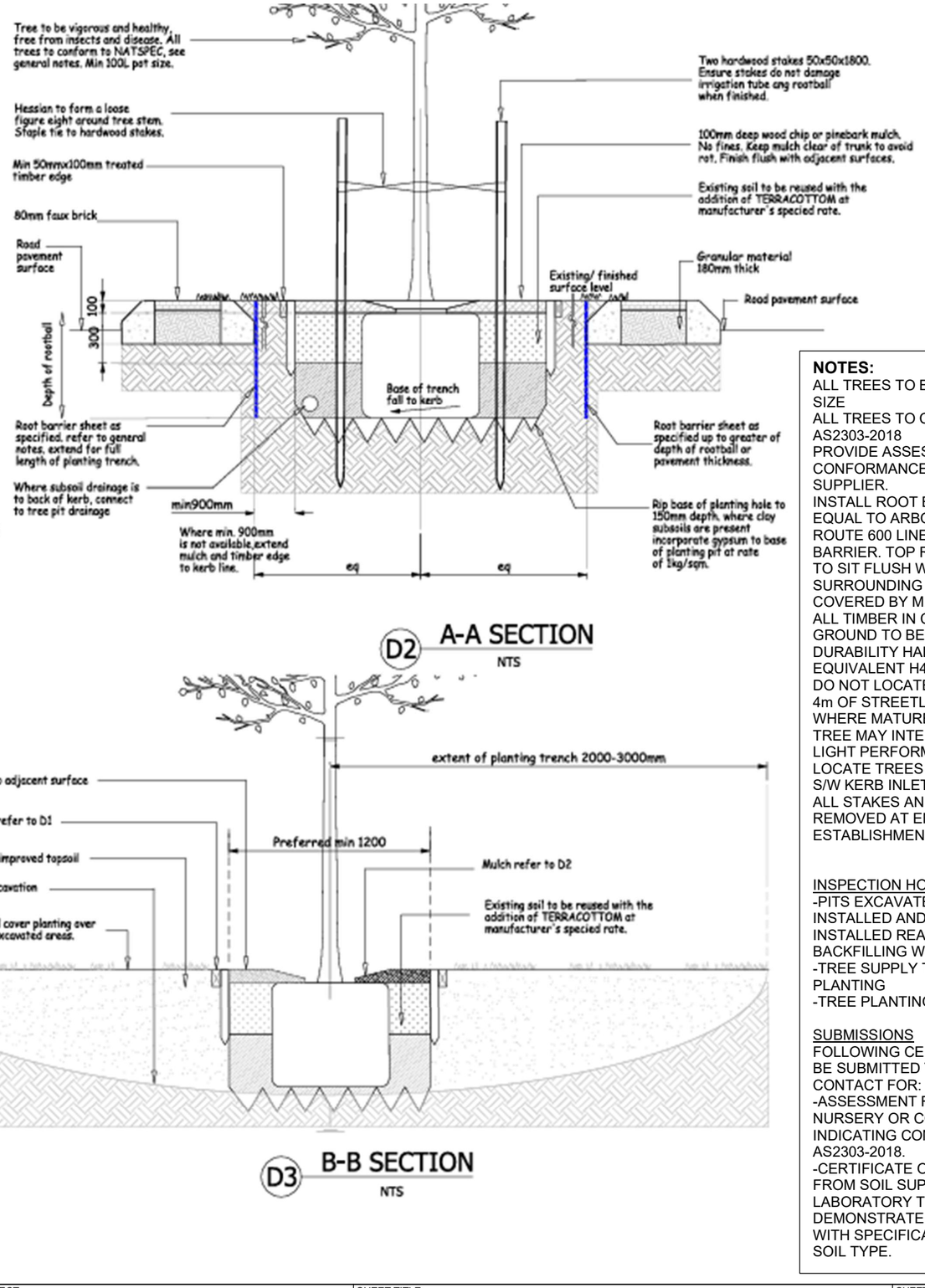
16. THESE STANDARD DRAWINGS ARE BASED ON ORIGINAL DRAWINGS PREPARED BY MICHAEL WHITE LANDSCAPE ARCHITECTURE DATED

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: LANDSCAPING SERIES TREE PLANTING GENERAL NOTES FOR UPDATE AND REPLACEMENT	SHEET No. SD 1001 REVISION: - SHEET Sheet 1 of 1



D1 TYPICAL STREET TREE- CENTRAL MEDIAN STRIP

NTS



D2 A-A SECTION

NTS

D3 B-B SECTION

NTS

NOTES:

ALL TREES TO BE 100L MIN. POT SIZE

ALL TREES TO CONFORM TO AS2303-2018

PROVIDE ASSESSMENT OF CONFORMANCE FROM SUPPLIER.

INSTALL ROOT BARRIER SHEET EQUAL TO ARBOUR GREEN RE ROUTE 600 LINEAR ROOT BARRIER. TOP ROOT BARRIER TO SIT FLUSH WITH SURROUNDING SOIL AND COVERED BY MULCH.

ALL TIMBER IN CONTACT WITH GROUND TO BE CLASS 1 DURABILITY HARDWOOD OR EQUIVALENT H4 TREATED PINE.

DO NOT LOCATE TREE WITHIN 4m OF STREETLIGHTS OR WHERE MATURE CANOPY OF TREE MAY INTERFERE WITH LIGHT PERFORMANCE. DO NOT LOCATE TREES WITHIN 2.5m OF S/W KERB INLET PITS.

ALL STAKES AND HESSION TO BE REMOVED AT END OF 14 WEEK ESTABLISHMENT PERIOD.

INSPECTION HOLD POINTS (3)

-PITS EXCAVATED, DRSAINAGE INSTALLED AND ROOT BARRIER INSTALLED READY FOR BACKFILLING WITH SOILS.

-TREE SUPPLY TO SITE PRIOR TO PLANTING

-TREE PLANTING COMPLETED

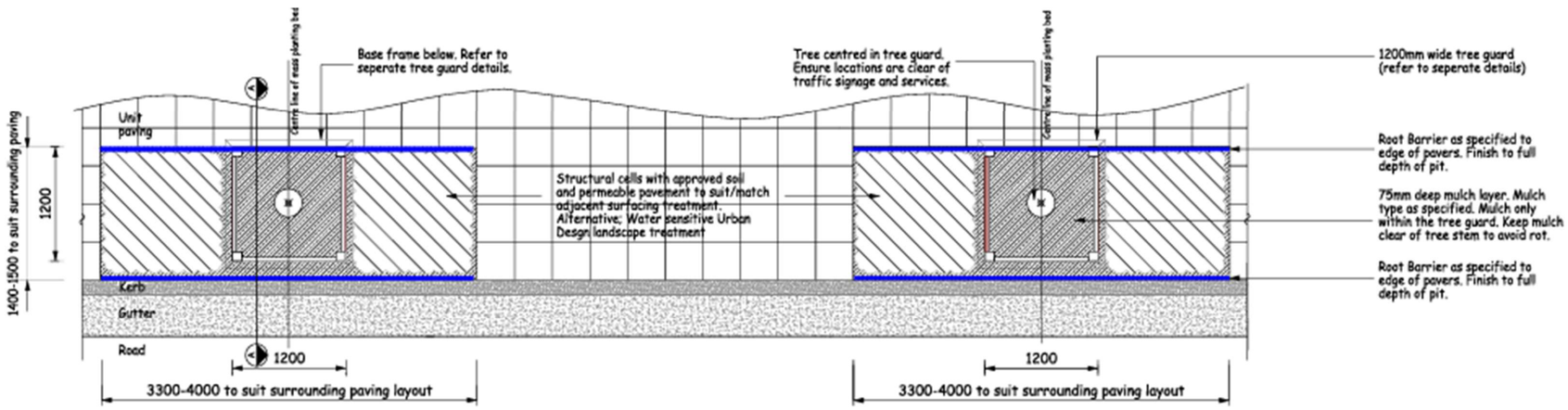
SUBMISSIONS

FOLLOWING CERTIFICATES TO BE SUBMITTED TO COUNCILS CONTACT FOR:

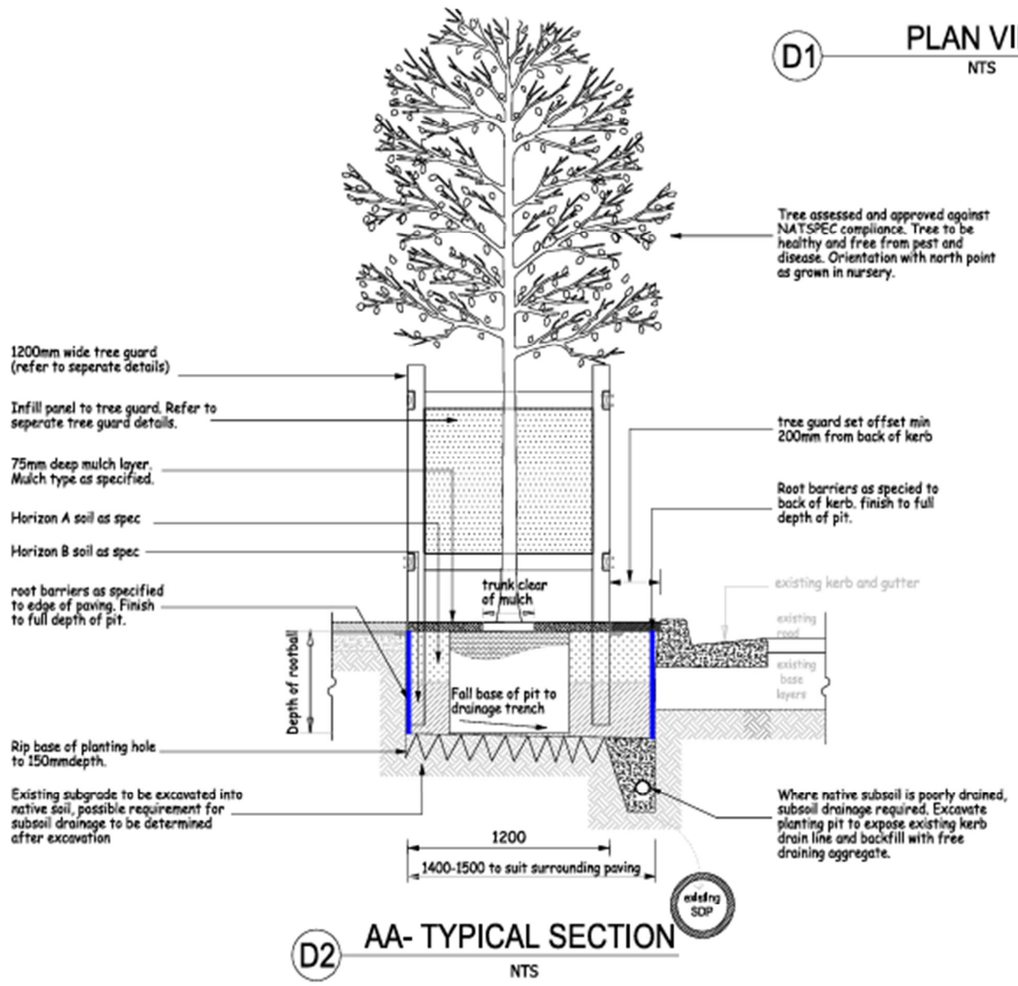
-ASSESSMENT FROM SUPPLY NURSERY OR CONTRACTOR INDICATING COMPLIANCE WITH AS2303-2018.

-CERTIFICATE OF COMPLIANCE FROM SOIL SUPPLIER WITH LABORATORY TESTING TO DEMONSTRATE COMPLIANCE WITH SPECIFICATION FOR EACH SOIL TYPE.

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: LANDSCAPING SERIES STREET TREES IN CENTRAL MEDIAN STRIPS WITH INNER KERB	SHEET No. REVISION: SD 1002 SHEET Sheet 1 of 1



D1 PLAN VIEW
NTS



D2 AA- TYPICAL SECTION
NTS

NOTES:

CONSTRUCTION NOTES
CONTRACTOR SHALL CARRY OUT DIAL BEFORE YOU DIG SEARCH, UTILISE ACCREDITED SERVICE LOCATOR FOR SITES LOCATED CLOSE TO PLANTING LOCATION.
FOLLOWING CERTIFICATES TO BE SUBMITTED.
ASSESSMENT FROM SUPPLY NURSERY OR CONTRACTOR SHOWING COMPLIANCE AGAINST AS2303-2018 INLCUDING CHECK LIST KEY POINTS.
CERTIFICATE COMPLIANCE (LABORATORY) FROM SOIL SUPPLIER FOR EACH SOIL TYPE PROPOSED.

GENERAL - THIS DETAIL IS TYPICAL ONLY AND MAY REQUIRE ADJUSTMENT ON SITE. DO NOT SCALE OFF DRAWING, DIMENSIONS TAKE PRECEDANCE OVER SCALED MEASUREMENTS.

UTILITIES -PRESENCE & LOCATION OF UNDERGROUND SERVICES VARIES FROM SITE TO SITE. MANY SERVICES NOT LOCATED IN STANDARD ALLOCATIONS. LOCATIONS OF SUBSOIL AND STORMWATER PITS ARE REQUIRED TO DERTERMINE SUITABLE CONNECTIONS FOR PIT DRAINAGE. TREES NOT TO BE LOATED WHERE WILL INTERFERE WITH POWERLINES OR UNDERGROUND UTILITIES.

TRAFFIC - DO NOT SET OUT TREES IN TAXI RANKS, BUS STOPS, LOADING ZONES, SLIP LANES, DRIVEWAYS, PEDESTRIAN KERB RAMPS ETC. DO NOT LOCATE TREES WHERE WILL INTERFRERE WITH TRAFFIC SITE LINES, EG APPROACH TO KERB BLISTERS OR DRIVEWAYS. COMPLY WITH FIG. 3.3 AS2890.2 FOR SIGHT LINE CLEARANCES. ANY CONFLICTS TO BE REPORTED TO COUNCIL.

TREE GUARDS - TREE GUARD TYPE DETERMINED BY PROJECT MANAGER ON A SITE-BY-SITE BASIS. IF DECORATIVE PANELS PROPOSED, OREINTATE GUARD WITH PANELS PERPENDIUCULART TO KERB.

TREE SPECIES SELECTION NOTES.
PLANTINGS IN ACORDANCE WITH HILTOPS COUNCILS PLANTING SCHEMES AND CURRENTLY ALLOWABLE TREE SPECIES LIST. ALTERNATIVES CAN BE SUGGESTED PROVIDED SUPPORTING DOCUMENTATION IS LODGED OR WHERE PLANTING IN ENVIRONMENTALLY SENSITIVE AREAS.LARGE TREE IN CONFINED SPACES TO BE AVOIDED UNLESS ADDITIONAL TREE PIT WORK IS CARRIED OUT.

HOLD POINTS
-TREE PIT SET OUT
-PITS EXCAVATED, DRAINAGE AND ROOT BARRIER INSTALLED READY FOR BACK FILLING
-TREE SUPPLY TO SITE, PRIOR TO PLANTING.
TREE PLANTING AND TREE GUARD INSTALLED.

TREE PIT EXCAVATION.
SET OUT TREE, SAW CUT ROAD PAVEMENT, REMOVE METERIALS, PROVIDE FALL IN BASE OF PIT TOWARDS DRAINAGE TRENCH. CONMSTRUCT DRAINAGE SYSTEM AND DRAIN TO S/W SYSTEM. BREAK UP BASE OF TYREE PIT PRIOR TO BACKFILLING. POSTION ROOT BARRIER PRIOR TO PALCEMENT OF SOILS.

ROOT BARRIER
MDPE UV STABLISED ROOT BARRIER MIN 0.7 mm WALL THICKNERSS, MIN HEIGHT 600mm. ENSURE ROOT BARRIER FINISHES FLUSH WITH TOP OF SOIL OF PIT BACKFILL, PEG TO ENSURE BARRIER IS MIN. 100mm ABOVE BASE OF PIT. OVERLAP 300MM AND HEAT SEAL OR SEAL WITH BUTYL TAPE.

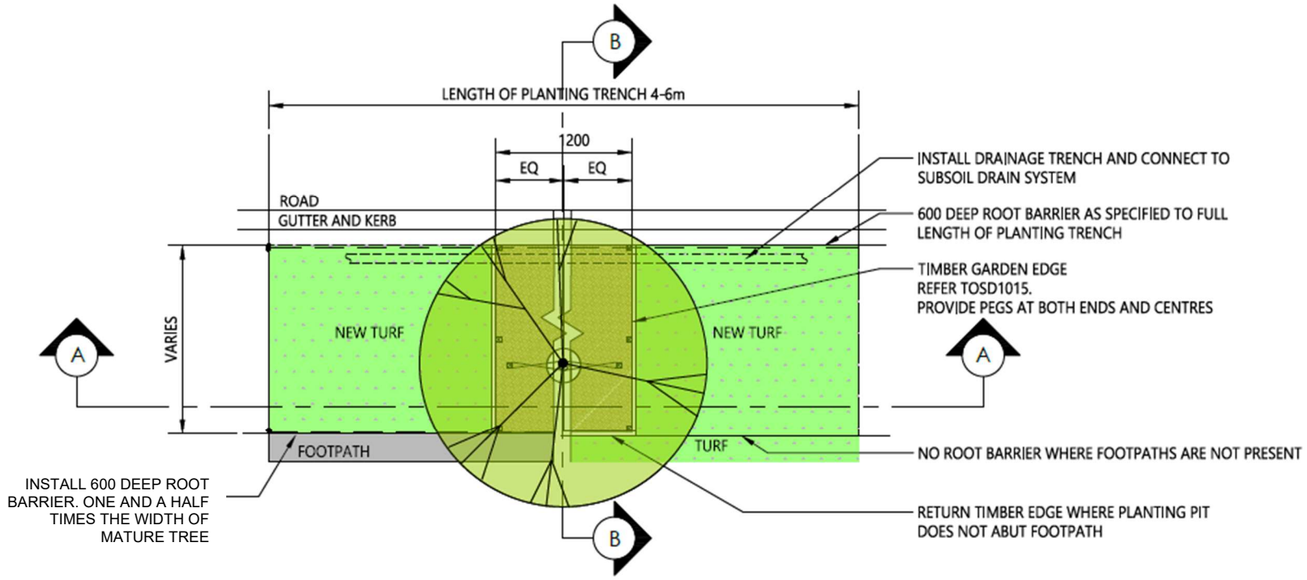
SOILS
HORIZON A SOIL = AS4419-2003 'ORGANIC SOIL' WITH TEXTURE TO AS4419-2003 TABLE II- SANDY LOAM. PLACE NO DEEPER THAN 300mm TO PREVENT ANEROBIC DECOMPOSTION OF ORGANIC MATTER.
HORIZON B SOIL = BELOW 300mm TO AS4419-2003 'SOIL BLEND' WITH MAX 5% ORGANIC CONTENT. TEXTURE TO AS4419-2003 TABLE II – SANDY LOAM DO NOT INCORPORATEORGANIC MATTER TO HORIZON B SOIL.

TREE SUPPLY
ALL TREES SHALL CONFORM TO AS 2303-2018. TIME SITE DELIVERY TO MINIMISE STORAGE ON SITE. ENSURE ROOT BALLS ARE KEPT WATERED AND STORE IN SHADE PRIOR TO PLANTINGS. INSPECT IMMEDIATLEY ON DELIVERY FOR COMPLAINCE AND RETURN ANY TREES THAT DO NOT MEET STANDARD. CROSS REFERENCE – INSPECTIONS AND SUBMISSIONS.

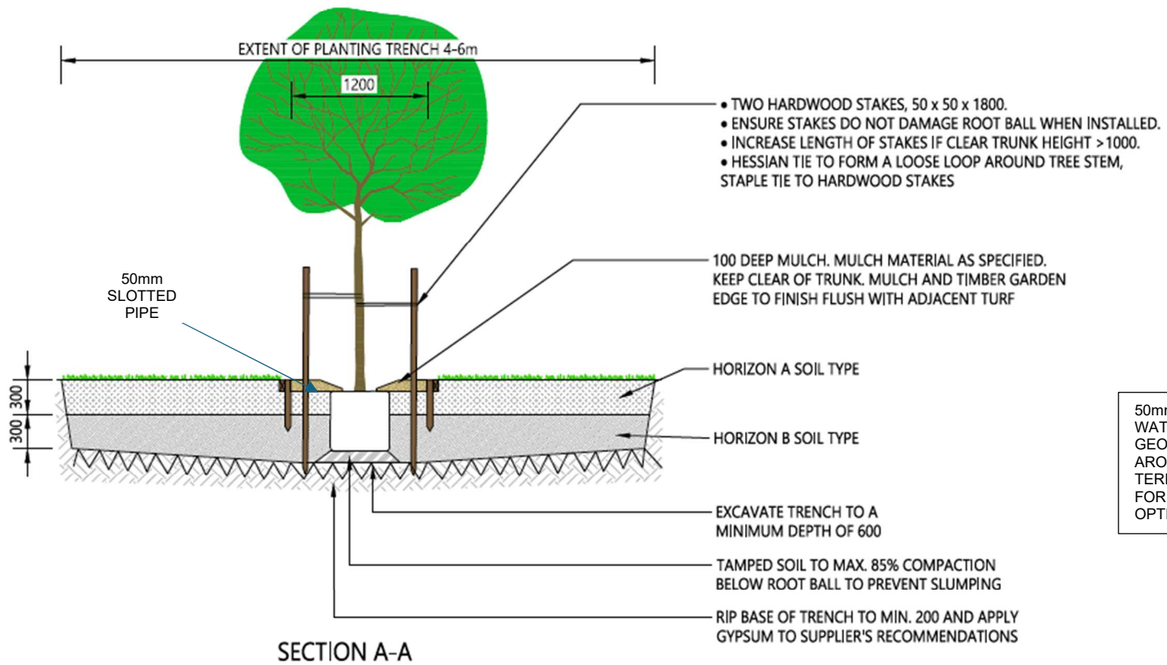
TREE PLANTING
PLANT TREES AFTER PLACEMENT OF ROOT BARRIER AND SOILS. DO NOT LIFT TREES BY TRUNK. SUPPORT FROM UNDER ROOT BALL. REMOVE POT/BAG AND ROOT PRUNE 10mm ALL AROUND ROOT BALL TO ENCOURAGE ROOT DIVISION. PLANT WITH ROOT BALL FLUSH WITH TOP OF SOIL AND PLUMB.

MULCH.
MULCH TYPE SHALL BE WOODCHIP MULCH WITH NO FINES. FINISH MULCH TO BE FLUSH WITH SIRROUNDING PAVEMENT. DO NOT MOUND MULCH LAYER,

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: LANDSCAPING SERIES STREET TREES IN MASS PLANTINGS & MALLS	SHEET No. SD 1003 REVISION: SHEET Sheet 1 of 1



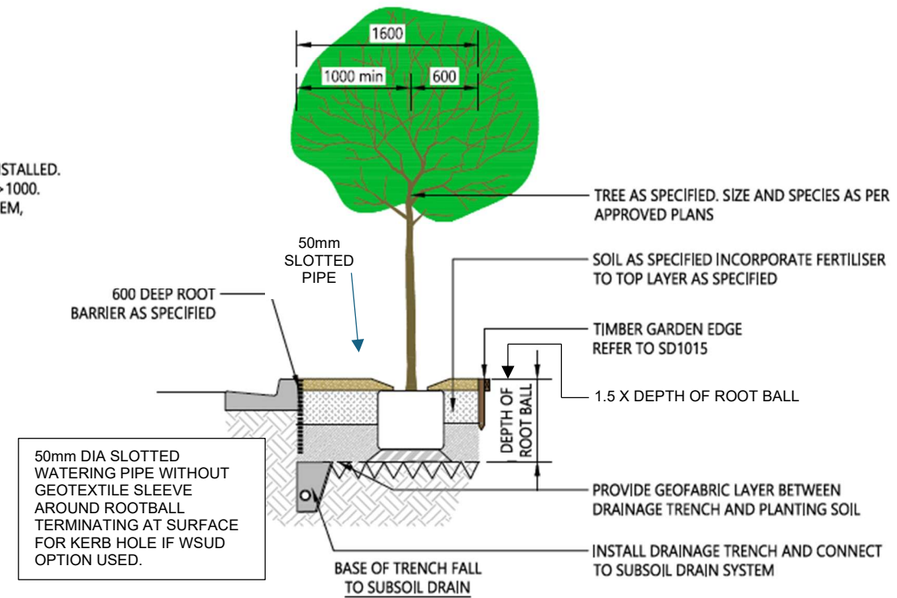
PLAN
SCALE 1:50



SECTION A-A
SCALE 1:50

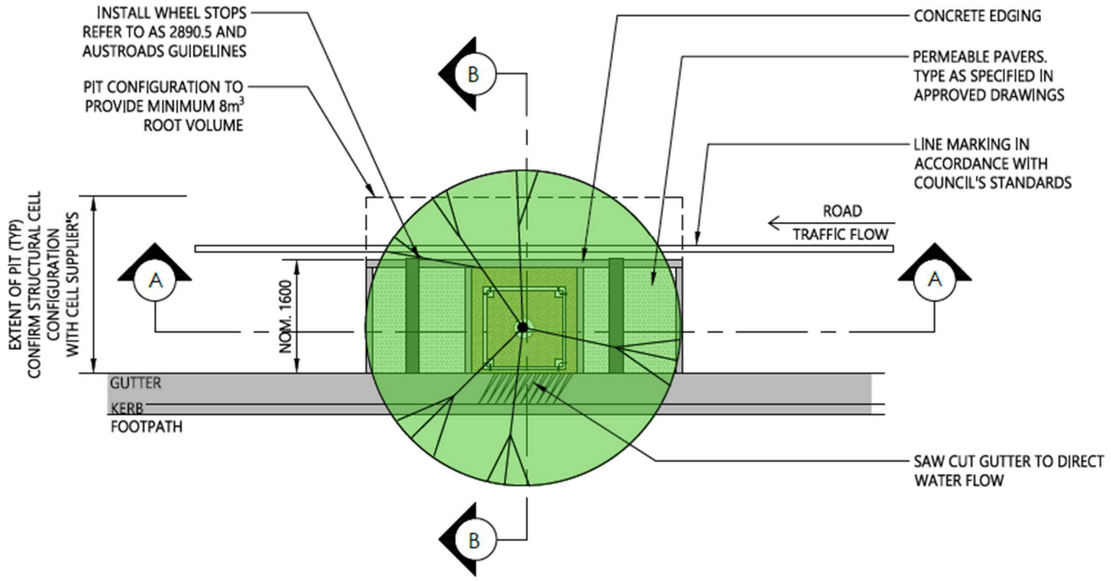
NOTES

1. REFER TO SD1001 FOR ALL TREE PLANTING GENERAL NOTES.
2. TREE TO BE SETBACK MINIMUM 1m FROM BACK OF KERB OR CENTRE FOR 3.5m OR 4.5m WIDE VERGE / NATURE STRIP.

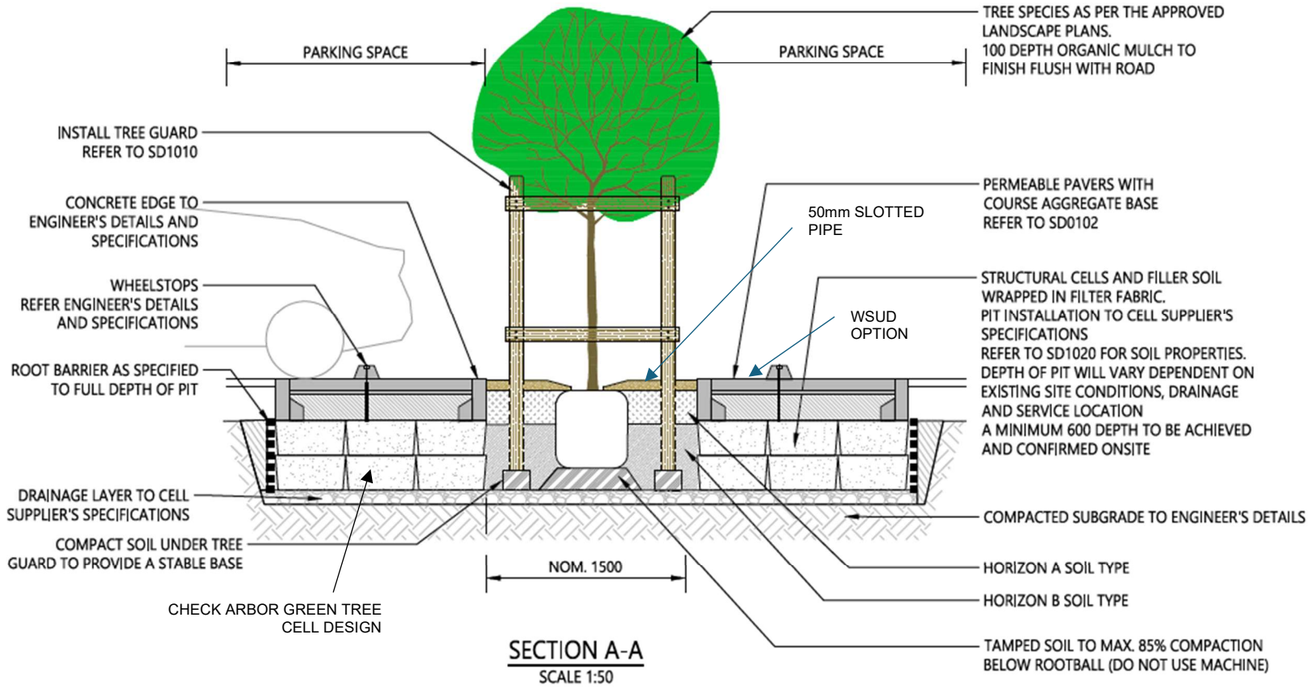


SECTION B-B
SCALE 1:50

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PLAN
SCALE 1:100



SECTION A-A
SCALE 1:50

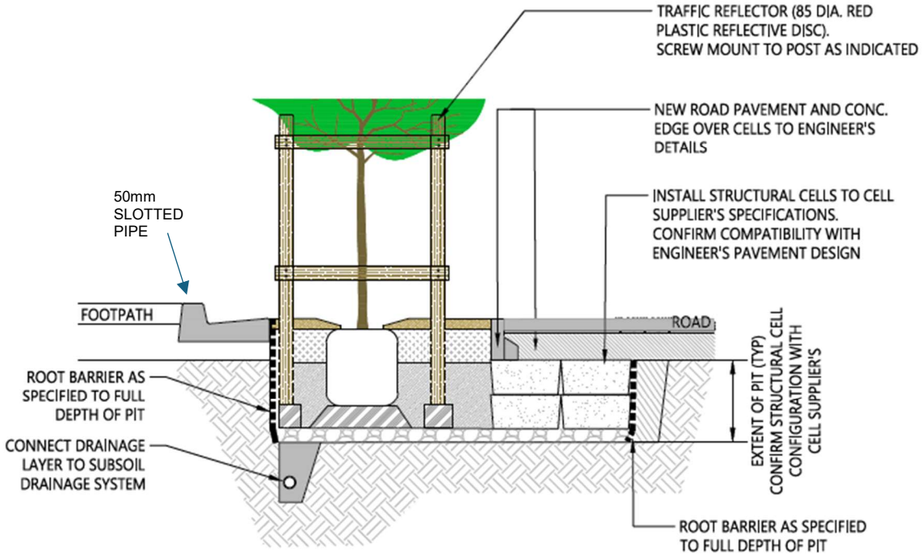
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NOTES

1. REFER TO SD1001 FOR ALL TREE PLANTING GENERAL NOTES.
2. CONFIRM COMPATIBILITY BETWEEN PIT DESIGN AND PAVEMENT DESIGN.
3. STRUCTURAL CELL PRODUCT MUST MEET COUNCIL'S REQUIREMENTS. THE STRUCTURAL CELL SYSTEM PROPOSED TO BE APPROVED BY COUNCIL'S PROJECT OFFICER PRIOR TO IMPLEMENTATION OF THE WORKS.

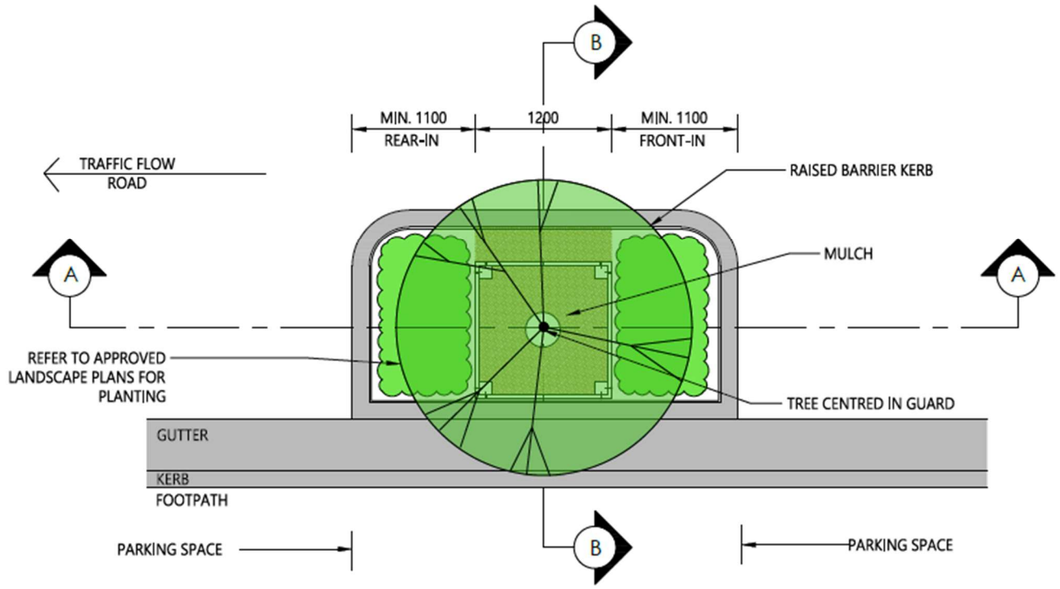
TREE WATERING

SLOTTED PIPE OR WSUD OPTION CUT 50MM DIA HOLE AT 30-45 DEGREES TOWARDS DIRECTION OF FLOW INTO GUTTER. PUSH SLOTTED PIPE INTO END FOR PASSIVE WATERING FROM STORMWATER FLOWS. PROPRIETRY STEEL KERB INLET INSTALLATION MAY BE USED SUBJECT TO COUNCIL APPROVAL.

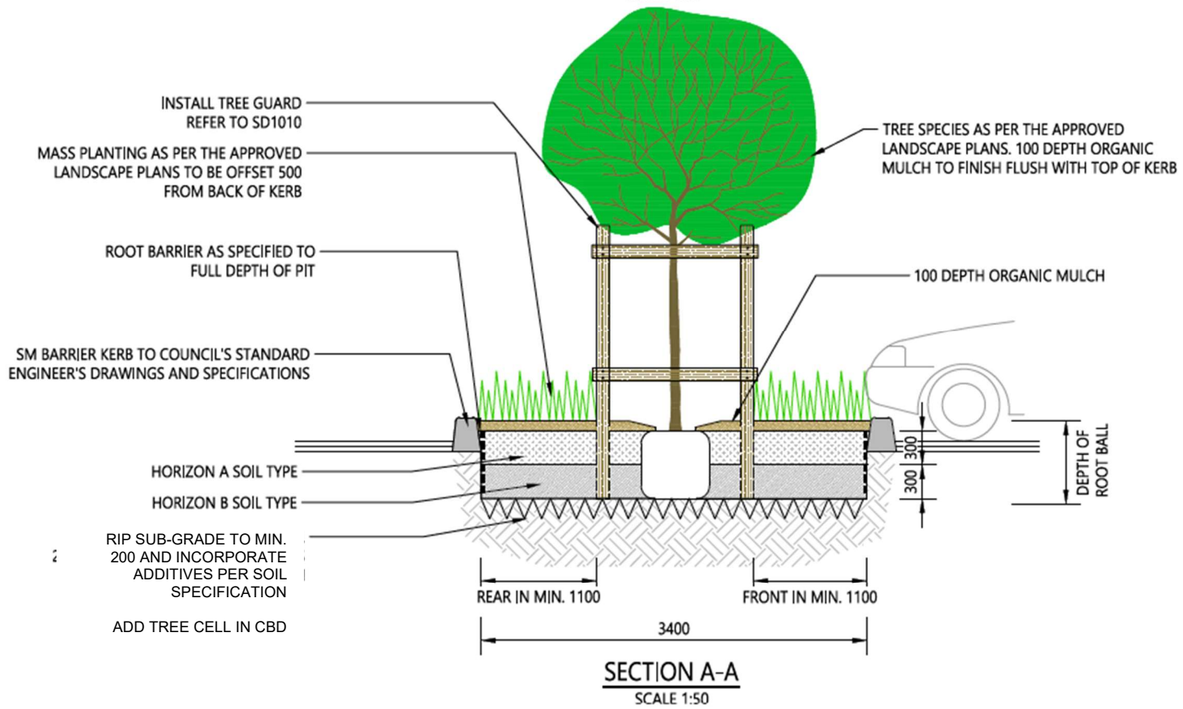


SECTION B-B
SCALE 1:50

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: LANDSCAPING SERIES STREET TREES IN ROAD FLUSH WITH ROAD LEVEL	SHEET No. REVISION: SD 1005 - SHEET Sheet 1 of 1



PLAN
SCALE 1:50

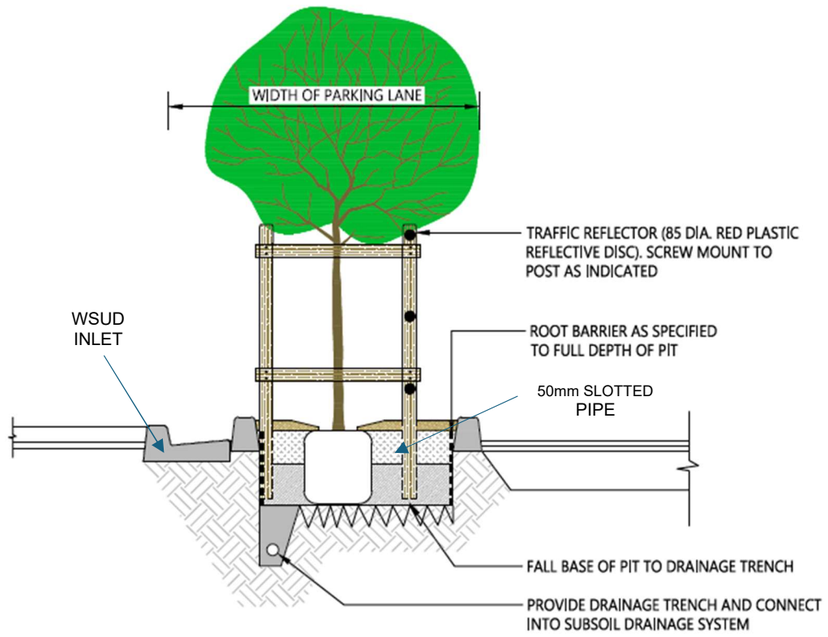


SECTION A-A
SCALE 1:50

NOTES

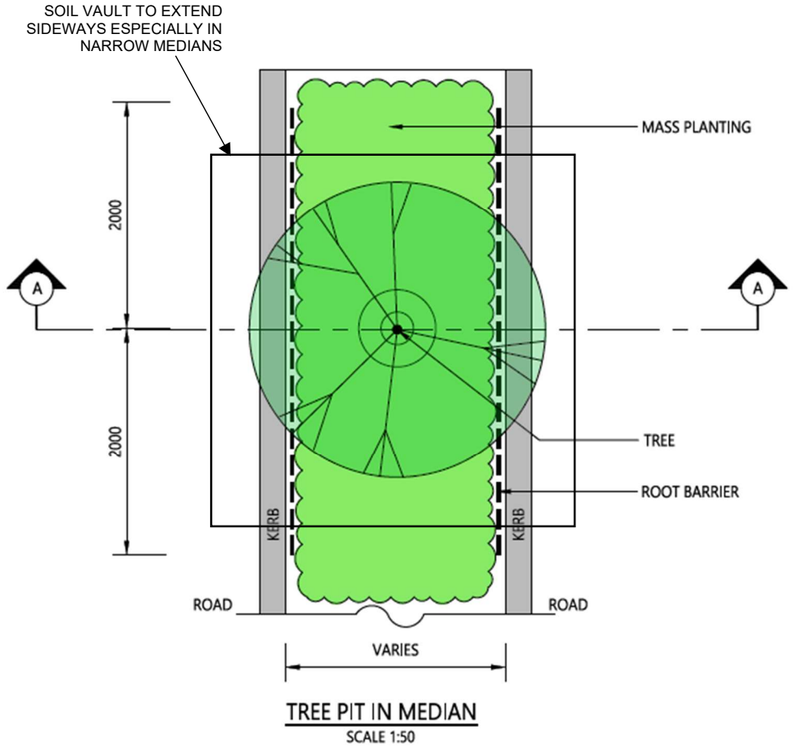
1. REFER TO SD1001 FOR ALL TREE PLANTING GENERAL NOTES.
2. CONFIRM LOCATIONS OF SUBSOIL DRAINAGE SYSTEM PRIOR TO COMMENCING TREE PIT WORKS. NOTIFY COUNCIL'S PROJECT OFFICER IF NO DRAINAGE SYSTEM IS AVAILABLE TO CONNECT INTO.

DRIP IRRIGATION FOR GARDENS AND MEDIANS
SLOTTED PIPE/WSUD.

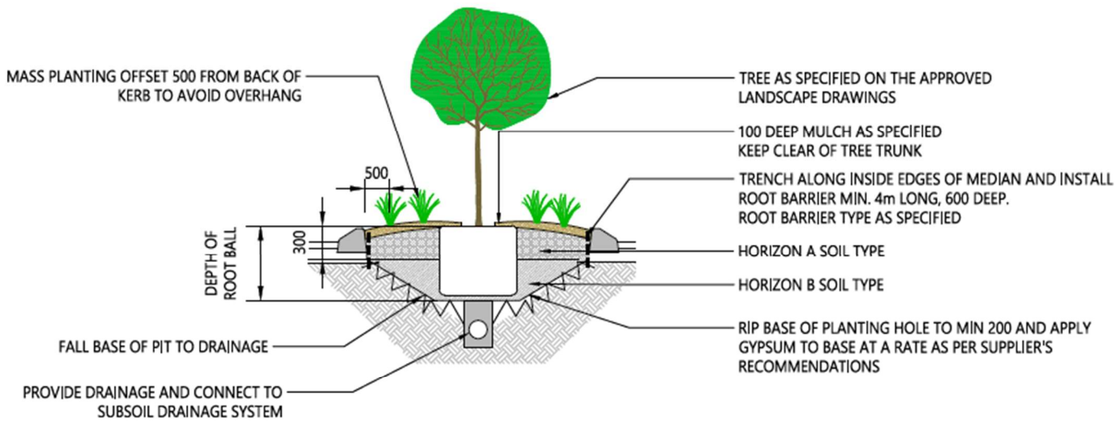


SECTION B-B
SCALE 1:50

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: LANDSCAPING SERIES STREET TREES IN ROAD BLISTERS	SHEET No. SD 1006 REVISION: - SHEET Sheet 1 of 1



TREE PIT IN MEDIAN
SCALE 1:50



SECTION A-A
SCALE 1:50

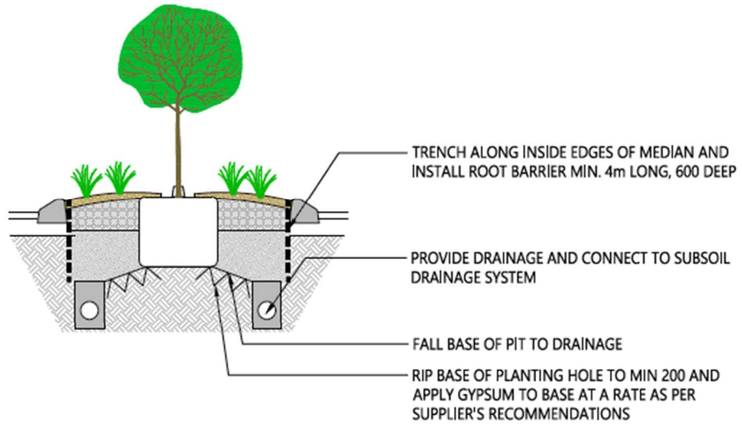
NOTES

1. REFER TO SD1001 FOR ALL TREE PLANTING GENERAL NOTES.
2. COMPLY WITH ALL RELEVANT AUSTRALIAN STANDARDS, AUSTROADS GUIDELINES AND TRANSPORT FOR NSW GUIDELINES.
3. CONFIRM LOCATIONS OF SUBSOIL DRAINAGE SYSTEM PRIOR TO COMMENCING TREE PIT WORKS. NOTIFY COUNCIL'S PROJECT OFFICER IF NO DRAINAGE SYSTEM IS AVAILABLE TO CONNECT INTO.
4. MINIMUM WIDTH OF MEDIAN TO BE 2000mm FOR TREE PLANTING. TREE PLANTING IN MEDIAN TO BE APPROVED BY COUNCIL.

OPTIONS FOR KERB WATERING

DRIP IRRIGATION SYSTEMS OR KERB INLET WATERING SYSTEM

50mm DIA SLOTTED WATERING PIPE WITHOUT GEOTEXTILE SLEEVE AROUND ROOTBALL TERMINATING AT SURFACE.

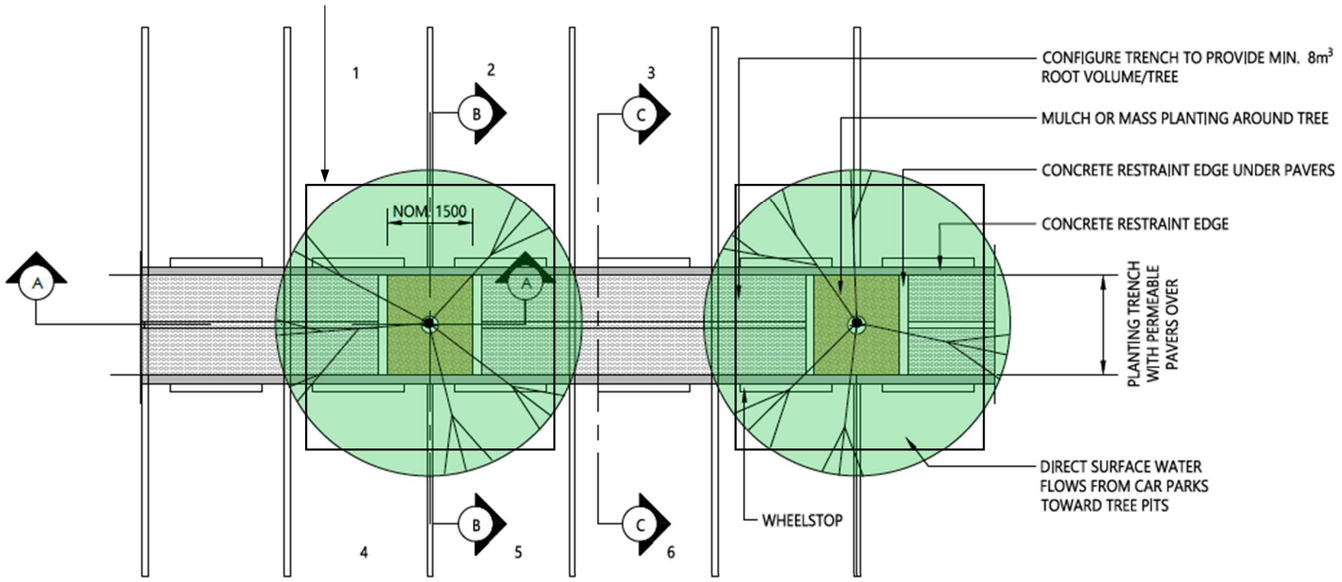


SECTION A-A ALTERNATIVE DRAINAGE LAYOUT
SCALE 1:50

ADDITIONAL NOTES

ADD SOIL VAULT EXTENDED UNDER CARPARK PAVEMENT TO ALLOW FOR GOOD SIDEWAYS ROOT GROWTH FOR STABILITY
WIDTH OF SOIL VAULT WILL DEPEND ON MATURE TREE SIZE
TREE ISLANDS SHOULD RUN PARALLEL TO PREVAILING WIND

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: LANDSCAPING SERIES STREET TREES IN ROAD MEDIAN	SHEET No. SD 1007 REVISION: - SHEET Sheet 1 of 1



CENTRAL PLANTING TRENCH WITH STRUCTURAL CELLS

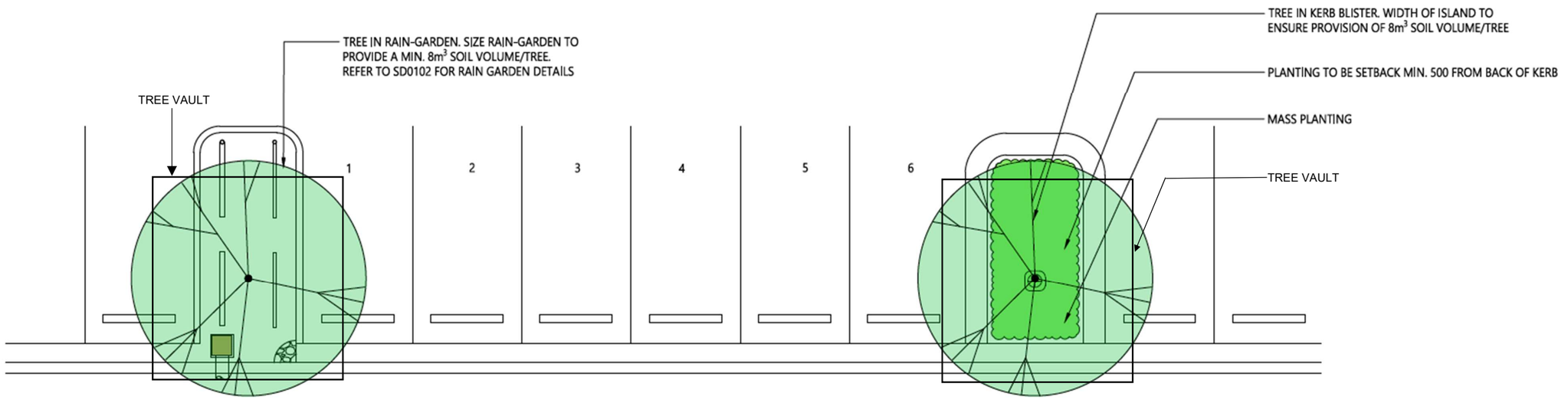
SCALE 1:100

NOTES

1. REFER TO SD1001 FOR ALL TREE PLANTING GENERAL NOTES.
2. CONFIGURE PLANTING PITS TO PROVIDE A MINIMUM OF 8m³ SOIL VOLUME PER TREE.
3. STRUCTURAL CELL SYSTEM PROPOSED FOR USE MUST BE APPROVED BY COUNCIL'S PROJECT OFFICER.

IRRIGATION NOTE

ADD WSUD OPTION IN KERB WATER SYSTEM OR DRIP IRRIGATION



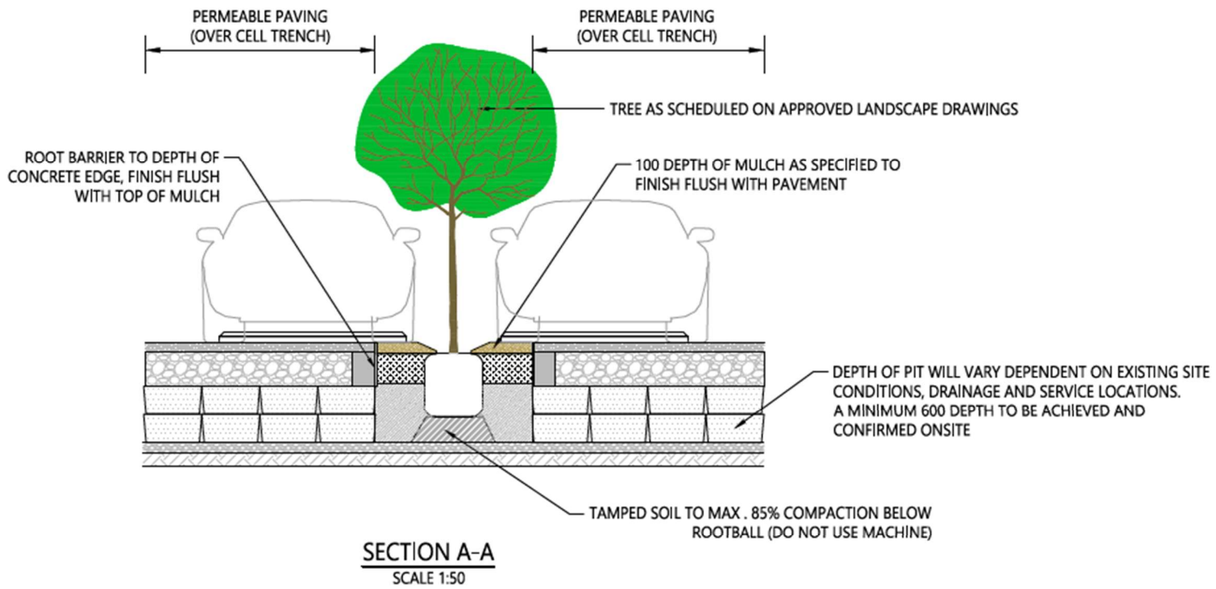
PLANTING IN KERB BLISTER - RAIN GARDEN AND STANDARD OPTIONS

SCALE 1:100

0 1000 2000 3000 4000 5000

1:100

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: LANDSCAPING SERIES TREES IN CAR PARK	SHEET No. SD 1008 REVISION: - SHEET Sheet 1 of 2



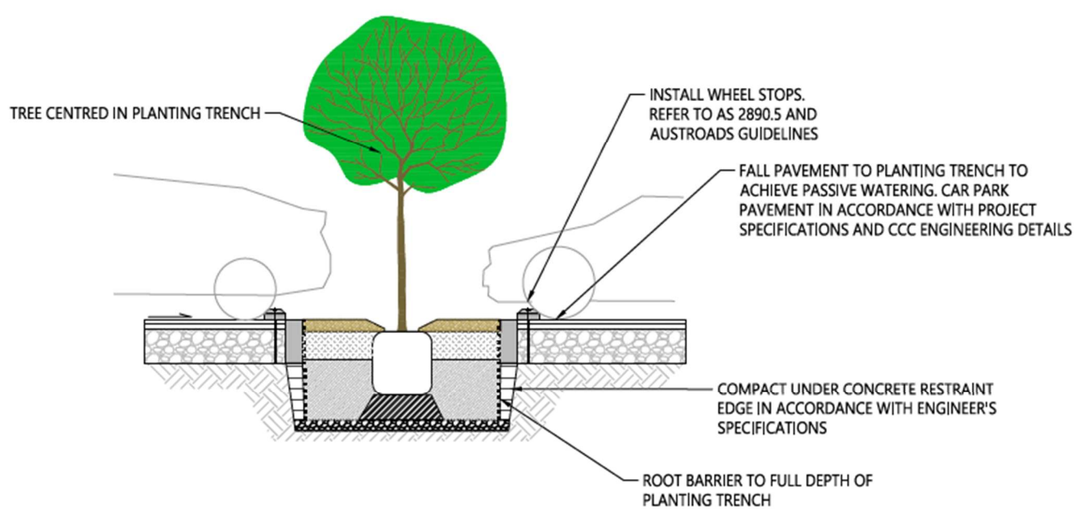
SECTION A-A
SCALE 1:50

NOTE

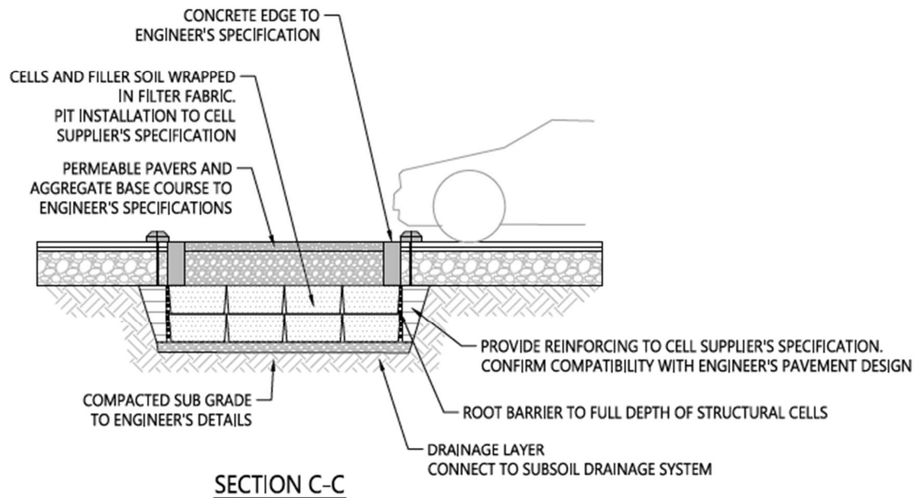
CONSIDER POROUS SURFACE OR TREE GRATES

FUTURE INCLUSIONS

PASSIVE WATERING SYSTEMS WITH "WICKING BED" TYPE PLANTING.



SECTION B-B
SCALE 1:50

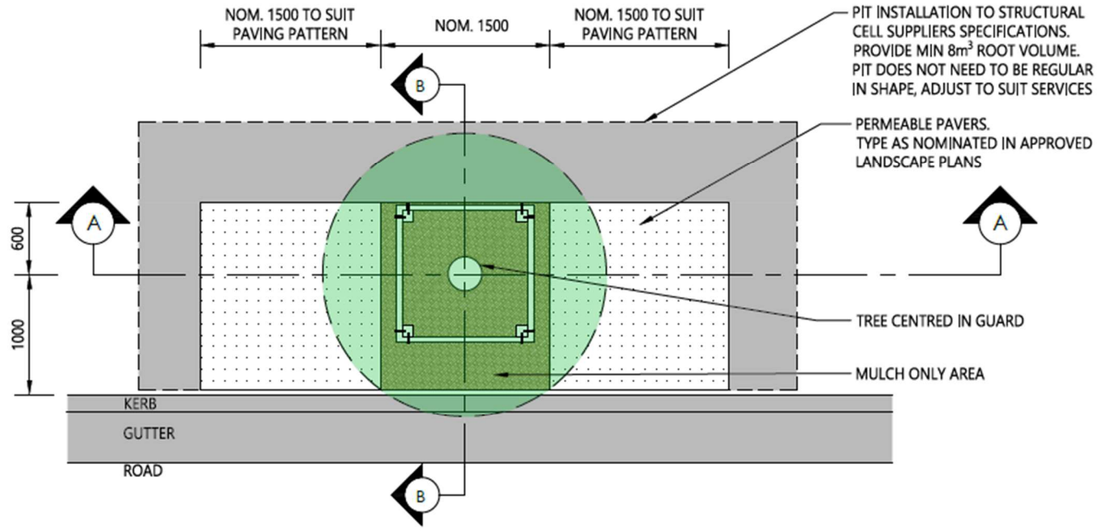


SECTION C-C
SCALE 1:50

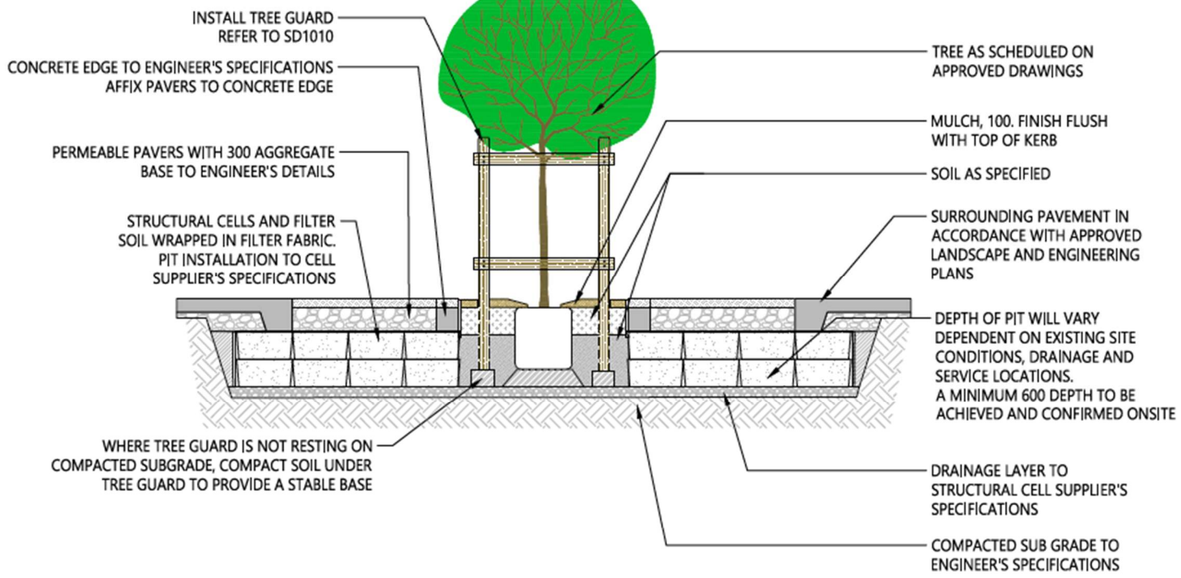
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PLAN
SCALE 1:50

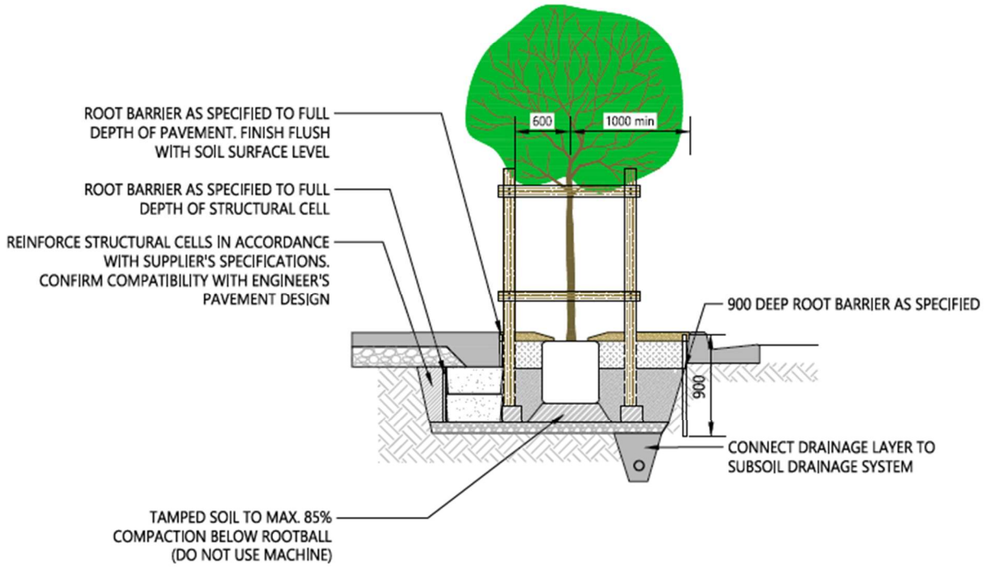


SECTION A-A
SCALE 1:50

NOTES

1. REFER TO SD1001 FOR ALL TREE PLANTING GENERAL NOTES.
2. CONFIRM COMPATIBILITY BETWEEN PIT DESIGN AND PAVEMENT DESIGN.
3. STRUCTURAL CELL PRODUCT MUST MEET COUNCIL'S REQUIREMENTS. THE STRUCTURAL CELL SYSTEM PROPOSED TO BE APPROVED BY COUNCIL'S PROJECT OFFICER PRIOR TO IMPLEMENTATION OF THE WORKS.

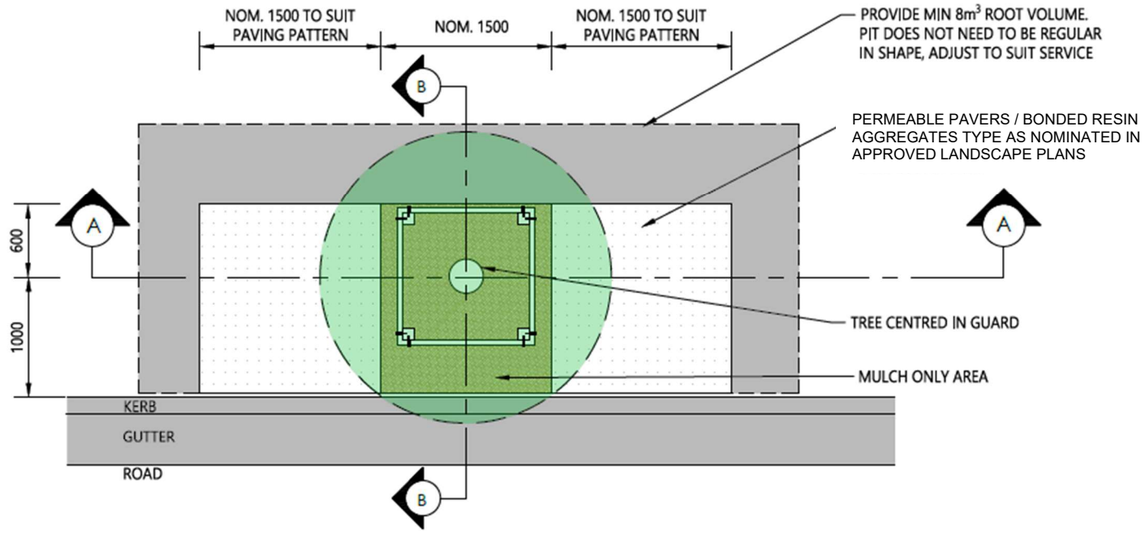
IRRIGATION OPTIONS
CONSIDER SLOTTED PIPE WSUD OPTIONS



SECTION B-B
SCALE 1:50

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1:50

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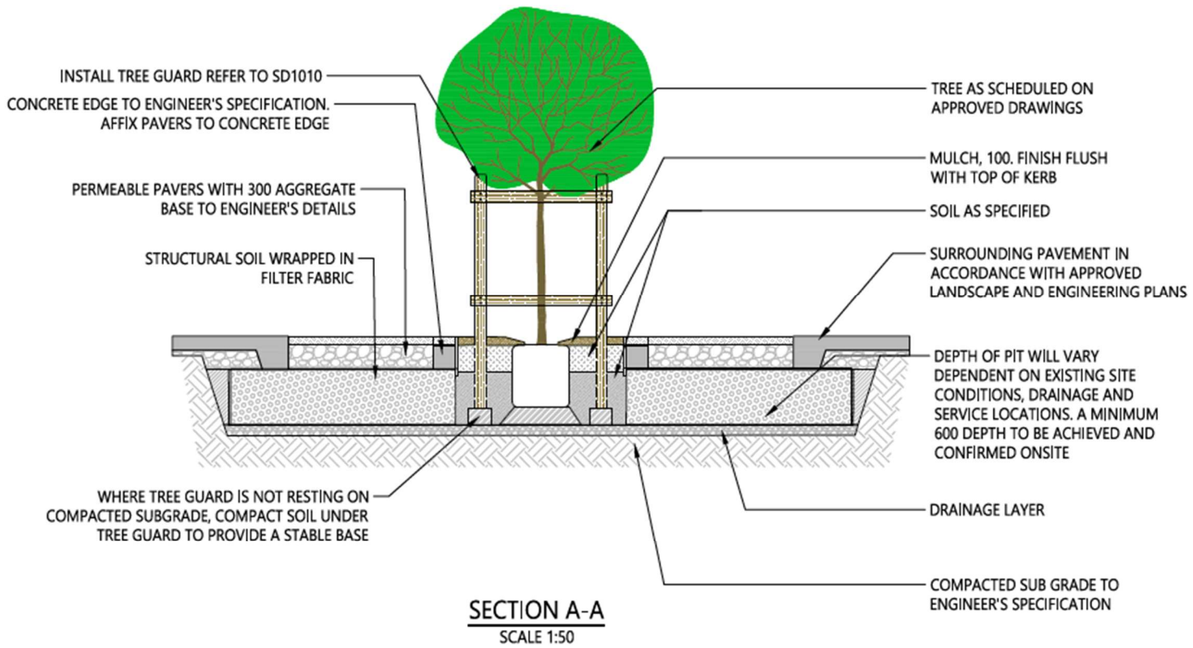


PLAN
SCALE 1:50

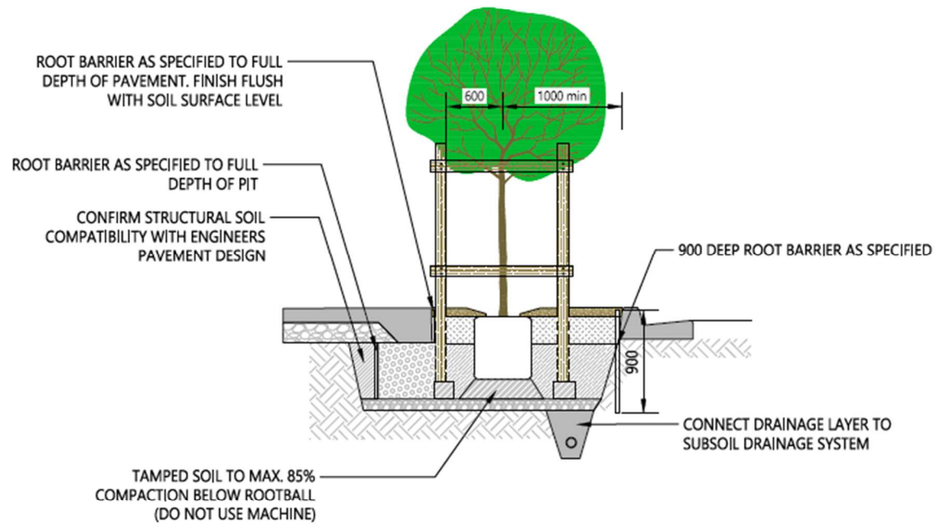
NOTES

1. REFER TO SD1001 FOR ALL TREE PLANTING GENERAL NOTES.
2. CONFIRM COMPATIBILITY BETWEEN PIT DESIGN AND PAVEMENT DESIGN.
3. FOR SOIL DETAILS, REFER TO SD1020 - SOIL SPECIFICATION.
4. FOR LANDSCAPE DETAILS, REFER TO SD1021 - LANDSCAPE SPECIFICATION.

IRRIGATION OPTIONS
CONSIDER SLOTTED PIPE WSUD OPTIONS



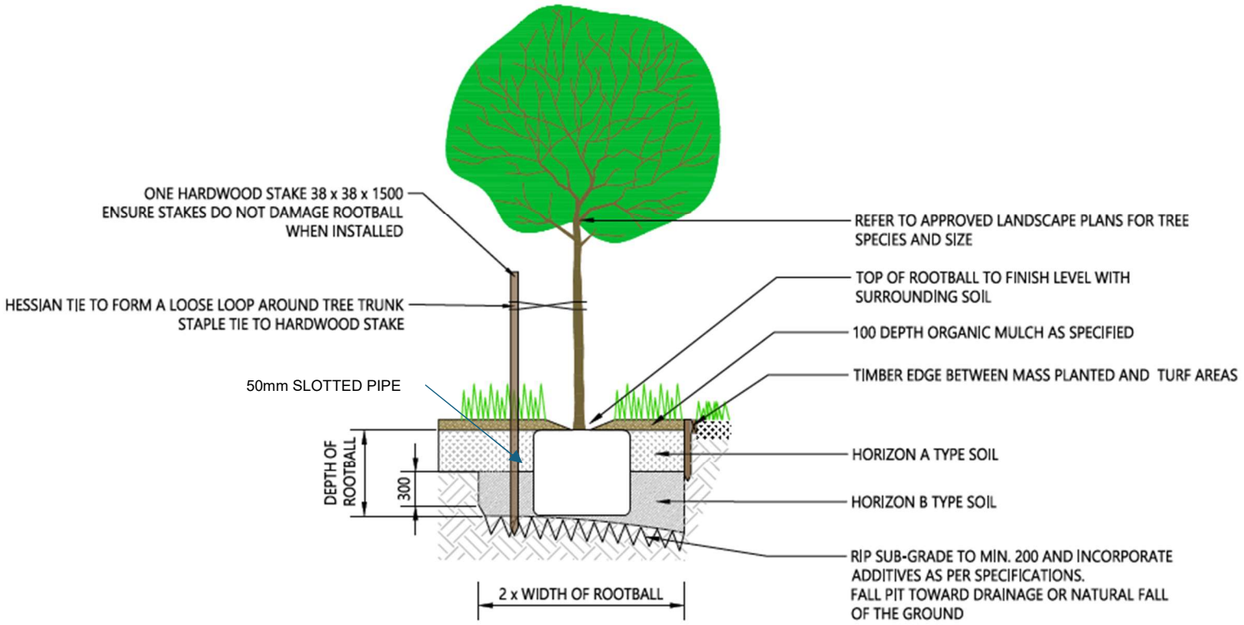
SECTION A-A
SCALE 1:50



SECTION B-B
SCALE 1:50

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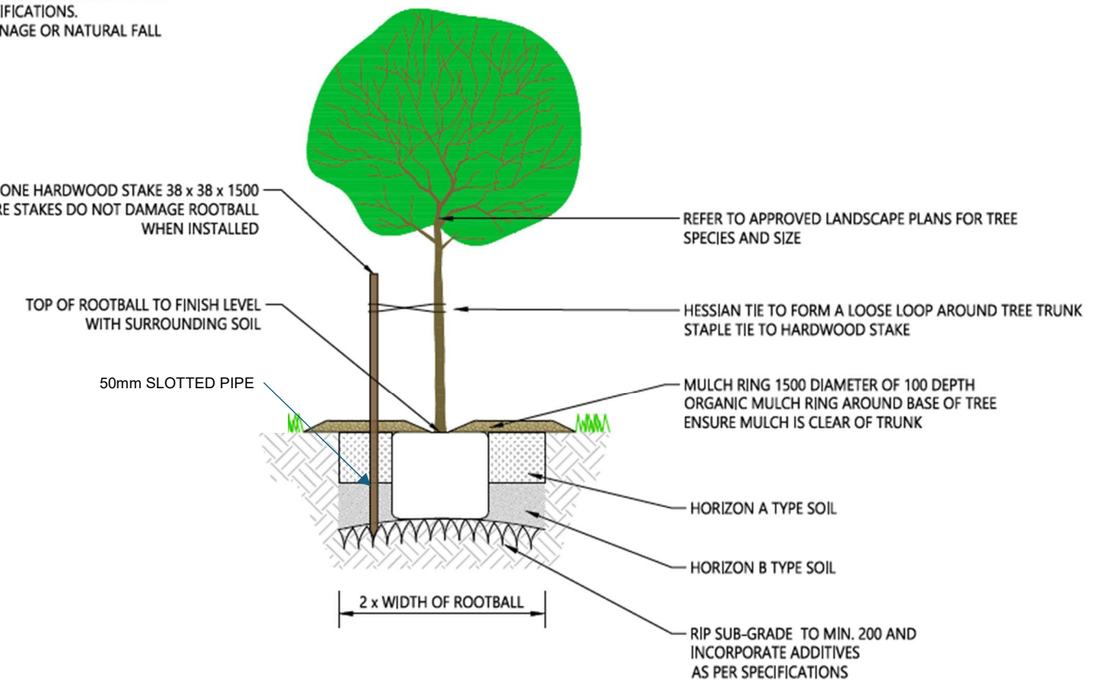


TREE IN PARK & RESERVE - MASS PLANTING (45L+)

SCALE 1:50

NOTE

REFER TO SD1001 FOR ALL TREE PLANTING GENERAL NOTES.



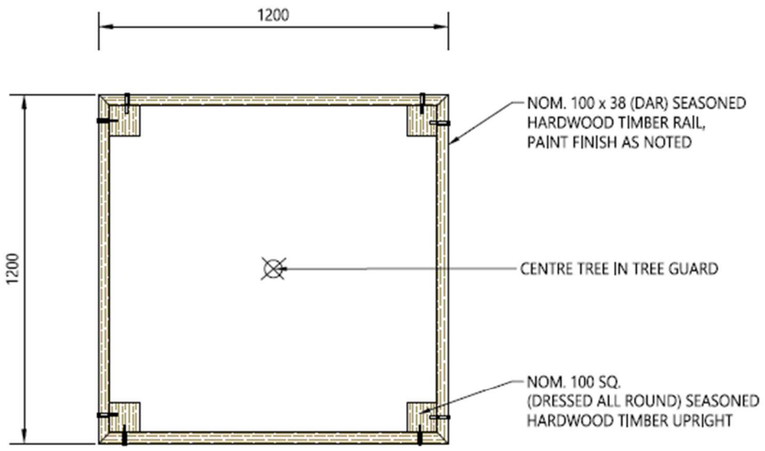
TREE IN PARKS & RESERVE - TURF (45L+)

SCALE 1:50

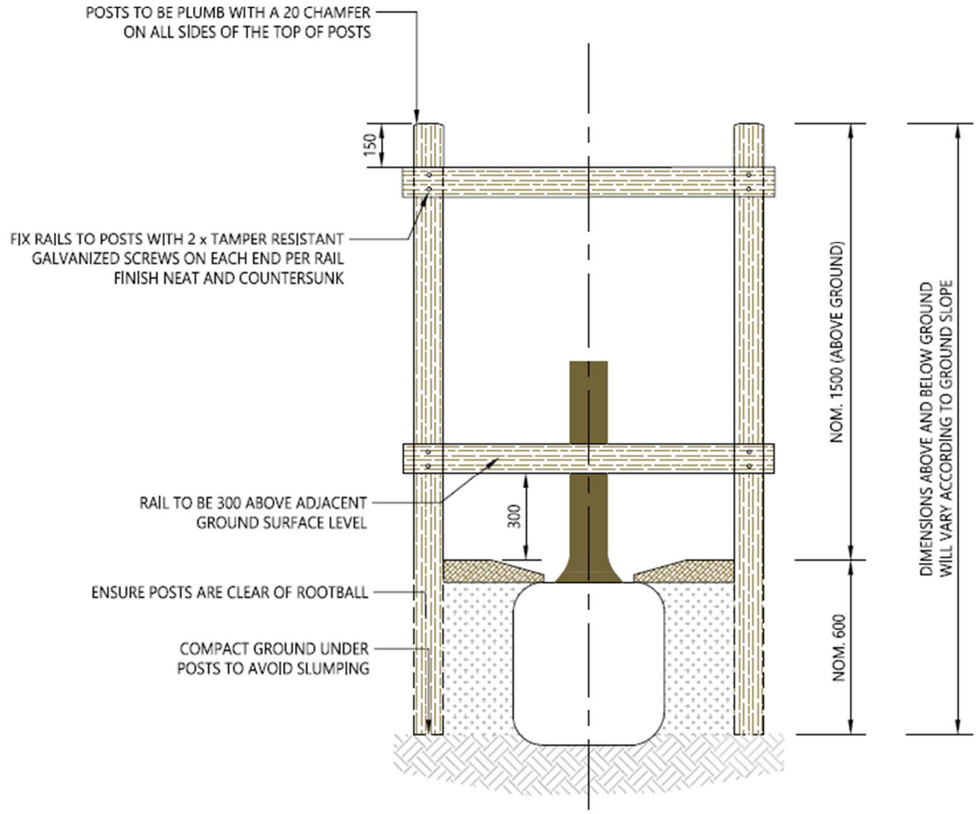
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NOTES

1. ALL TIMBER TO BE SUPPLIED DRESSED ALL ROUND (DAR) AND SEASONED
2. FOR TIMBER IN CONTACT WITH GROUND, USE TIMBER WITH NATURAL DURABILITY CLASS 3 OR 4, TREATED TO H4 IN ACCORDANCE WITH AS 1604.1 FOR ALL OTHER TIMBER USE TIMBER WITH NATURAL DURABILITY CLASS 2-4 TREATED TO H3 IN ACCORDANCE WITH AS 1604
3. ENSURE ALL SAW CUTS ARE PRESERVATIVE PAINT TREATED TO MAINTAIN REQUIRED HAZARD (H4/H3) CLASSIFICATION
4. PAINT FINISH WITH EXTERIOR GRADE PAINT
   - UNDERCOAT AND TWO SURFACE COAT
   - PAINT COLOUR IN ACCORDANCE WITH APPROVED PLANS
5. PREFERRED TREE GUARD IN HIGH TRAFFIC AREAS
6. CONSIDER RECYCLED PLASTIC IN SAME PROFILE



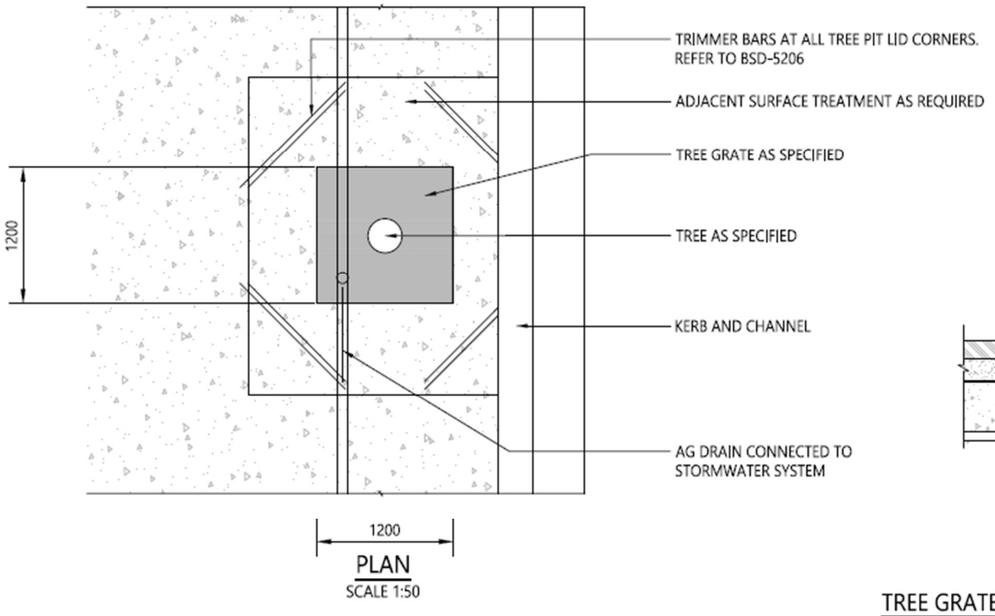
TREE GUARD PLAN
SCALE 1:20



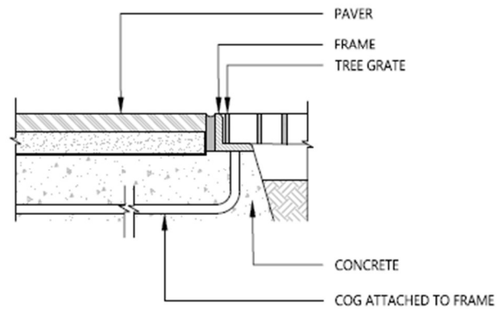
TREE GUARD ELEVATION
SCALE 1:20

0 200 400 600 800 1000
1:20

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: LANDSCAPING SERIES TIMBER TREE GUARD	SHEET No. SD 1012 REVISION: - SHEET Sheet 1 of 1



PLAN
SCALE 1:50



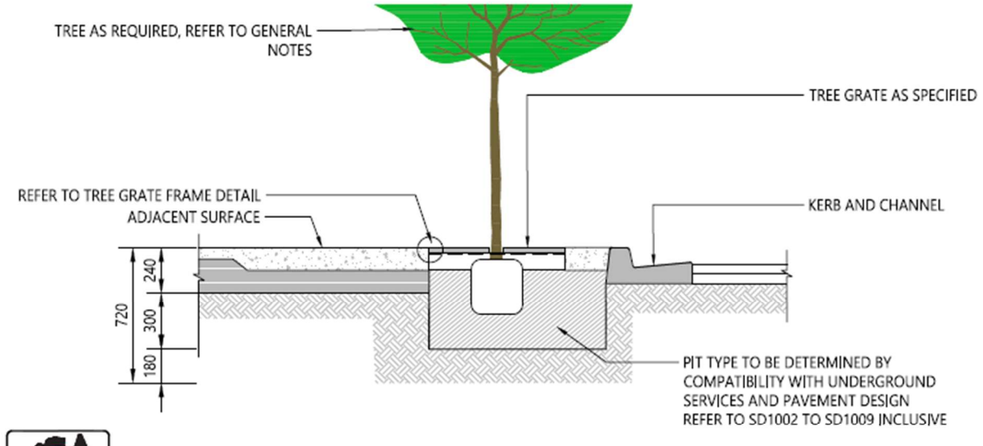
TREE GRATE FRAME DETAIL ADJACENT TO PAVEMENT
SCALE 1:20

NOTES

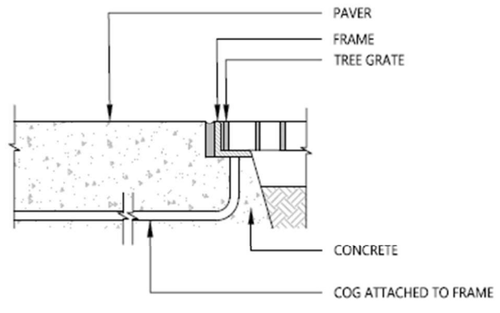
1. PIT TYPE TO BE DETERMINED BY COMPATIBILITY WITH UNDERGROUND SERVICES AND PAVEMENT DESIGN.
2. REFER TO SUPPLIER'S DETAIL DRAWINGS AND INSTALLATION INSTRUCTIONS.
3. WHERE THERE IS INSUFFICIENT WIDTH IN THE VERGE TO ACCOMMODATE 1000mm TREE SETBACK FROM BACK OF KERB, THE TREE GRATE IS TO BE ATTACHED TO THE BACK OF KERB.

NOTES

1. FOR TREE GRATE STYLE AND LOCATIONS FOR USE REFER TO THE INFRASTRUCTURE DESIGN PLANNING SCHEME POLICY.
2. ENSURE TREE GRATE HAS MINIMUM LOAD RATING OF CLASS B (CLASS C DESIRED) TO AS 3996.
3. TREE SPECIES TO BE SELECTED AS PER INFRASTRUCTURE DESIGN PLANNING SCHEME POLICY (CHAPTER 5).
4. TREE PIT TO BE INSTALLED TO FULL DEPTH AND WIDTH.
5. ENSURE SERVICE HAVE BEEN LOCATED PRIOR TO EXCAVATION. IF TREE LOCATION CONFLICTS WITH SERVICE CONSULT WITH SERVICE PROVIDER.
6. WHERE POSSIBLE INCORPORATE WSUD DETAIL CAPTURE STREET LAYER. REFER TO BRISBANE CITY COUNCIL STANDARD DRAWING BSD-9031.
7. LOCATION OF TREE GRATE CAN VARY DEPENDING ON WIDTH OF FOOTPATH. REFER TO INFRASTRUCTURE DESIGN SCHEME POLICY (CHAPTER 5) FOR FOOTPATH LAYOUTS.
8. ADVANCED TREES TO HAVE APPROPRIATE ANCHOR BENEATH LAYOUTS.
9. REFER TO BRISBANE CITY COUNCIL STANDARD DRAWING BSD-5202 FOR CONCRETE AND REINFORCING MESH DETAIL U.N.O.
10. BACKFILL SOIL BLEND TO CONFORM TO THE FOLLOWING AS 4419 SPECS:
    - NO GREATER THAN 20% SCREENED WELL COMPOSTED ORGANIC MATTER CONTENT BY VOLUME
    - 5.5 - 7.5 pH
    - 0.7 - 1.0 kg/l OR GM/CM3 BULK DENSITY
    - APPROX 60% BY VOLUME SCREENED TOPSOIL
    - APPROX 10% 2-3mm WASHED DECO (TO ENHANCE CEC)
    - APPROX 10% MEDIUM (0.25-1.0mm) RIVER SAND
    - ACHIEVING NO GREATER THAN 30-50CM / HR HYDRAULIC CONDUCTIVITY; 15-20% WATER HOLDING CAPACITY; AND NO GREATER THAN 2dS/m ELECTRICAL CONDUCTIVITY (SALINITY)
    - BLEND TO BE NO GREATER THAN 5°C ABOVE AMBIENT ARE TEMPERATURE
11. MODULAR SOIL CELL IS TO BE STRUCTURALLY CERTIFIED TO CARRY LOADS OF 10T MINIMUM. CELL IS TO PROVIDE AT LEAST 90% FREE SOIL VOLUME, WITH POSITIVE VERTICAL AND LATERAL INTERLOCKS (AND HAVE A MINIMUM OF 100MM GAPS TO ALLOW FOR ROOT GROWTH) INSTALLED AS PER MANUFACTURER'S INSTRUCTIONS. CELLS ARE TO BE BACKFILLED WITH BACKFILL SOIL BLEND AS SPECIFIED ABOVE.
12. TOP OF ROOTBALL TO BE EQUAL TO TOP OF BACKFILL SOIL.



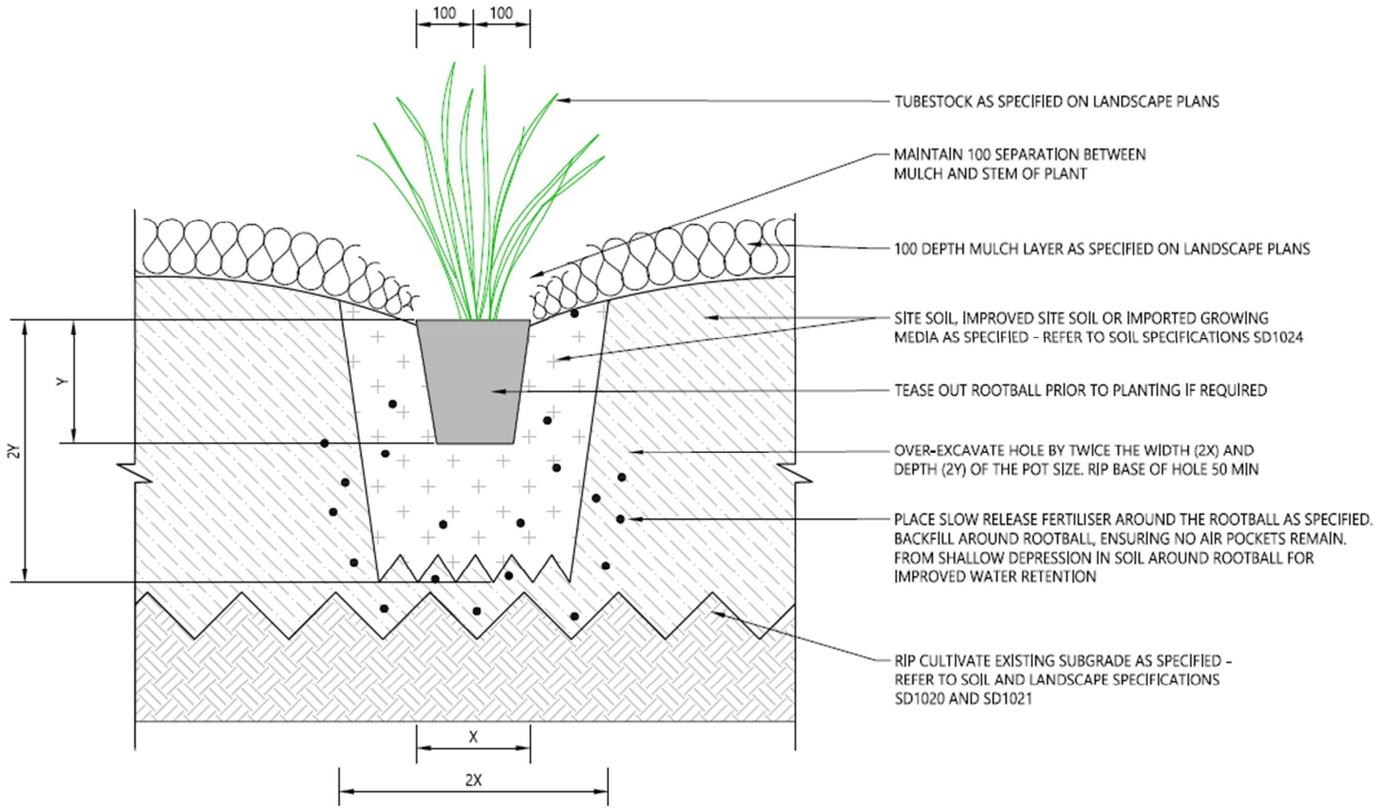
SECTION
SCALE 1:50



TREE GRATE FRAME DETAIL ADJACENT TO CONCRETE
SCALE 1:20

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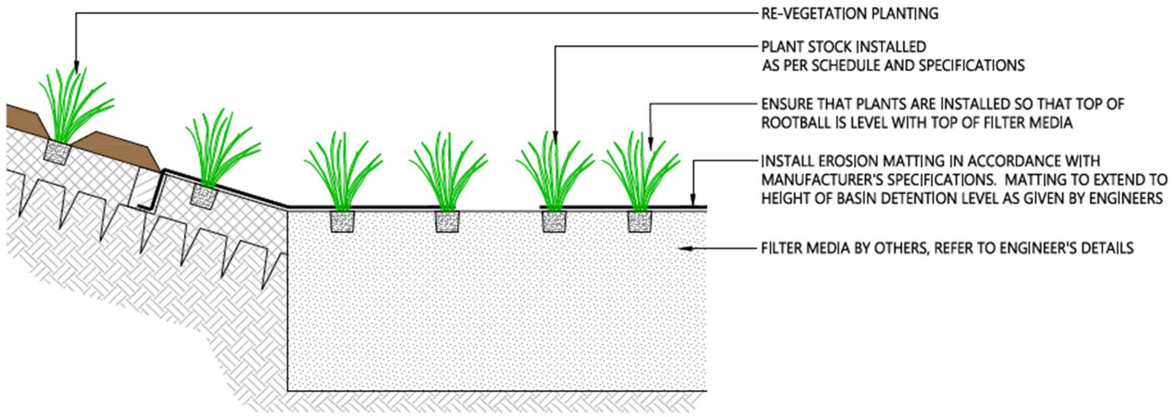
TYPICAL TUBESTOCK PLANT - SECTION

SCALE 1:10

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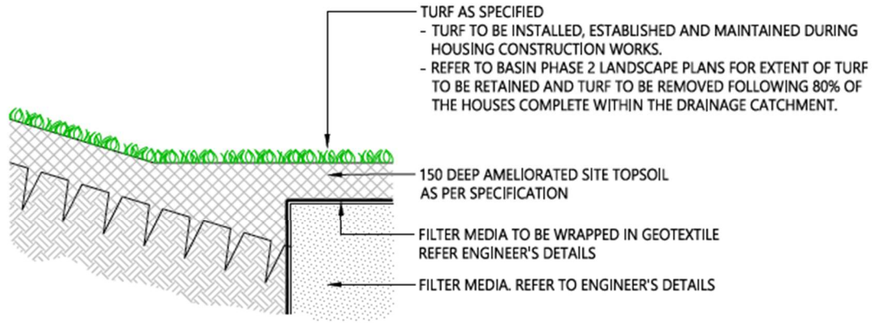
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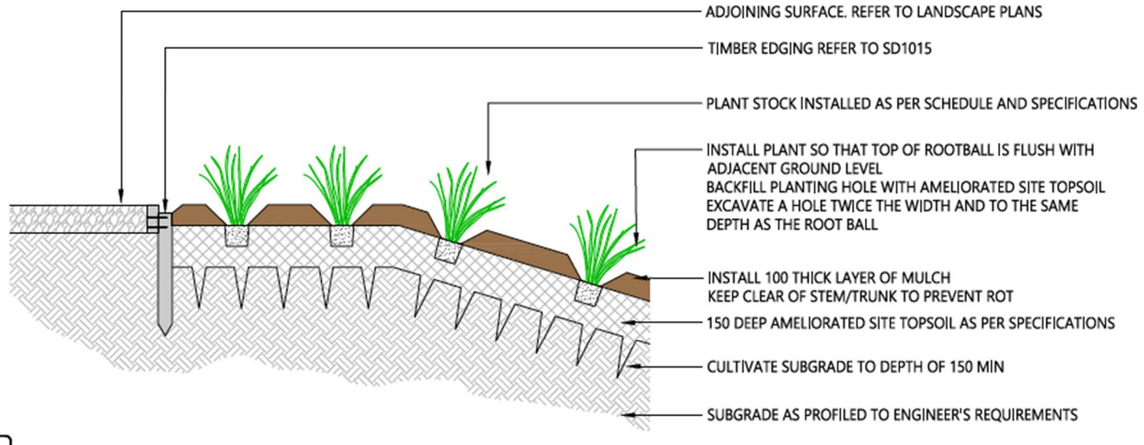
BATTER PLANTING/ BASIN FLOOR - TYPICAL DETAIL

SCALE 1:20



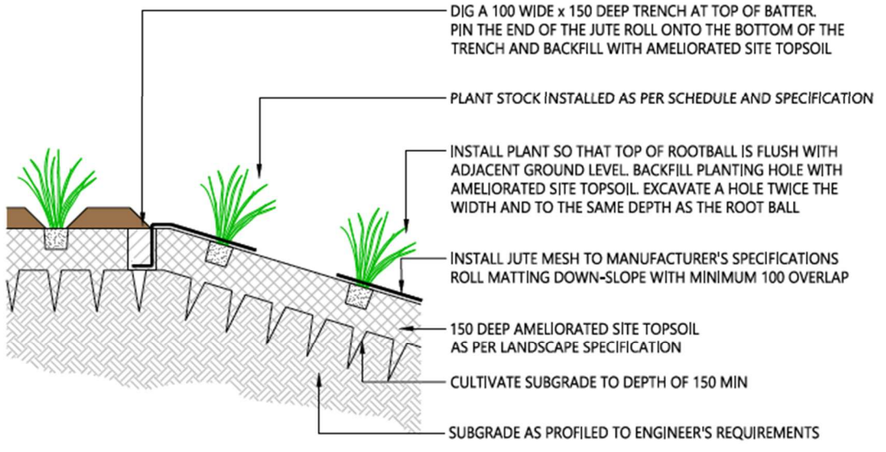
BASIN TEMPORARY TURF - TYPICAL DETAIL

SCALE 1:20



BASIN BATTER PLANTING - TYPICAL DETAIL

SCALE 1:20



JUTE PLANTING - TYPICAL DETAIL

SCALE 1:20

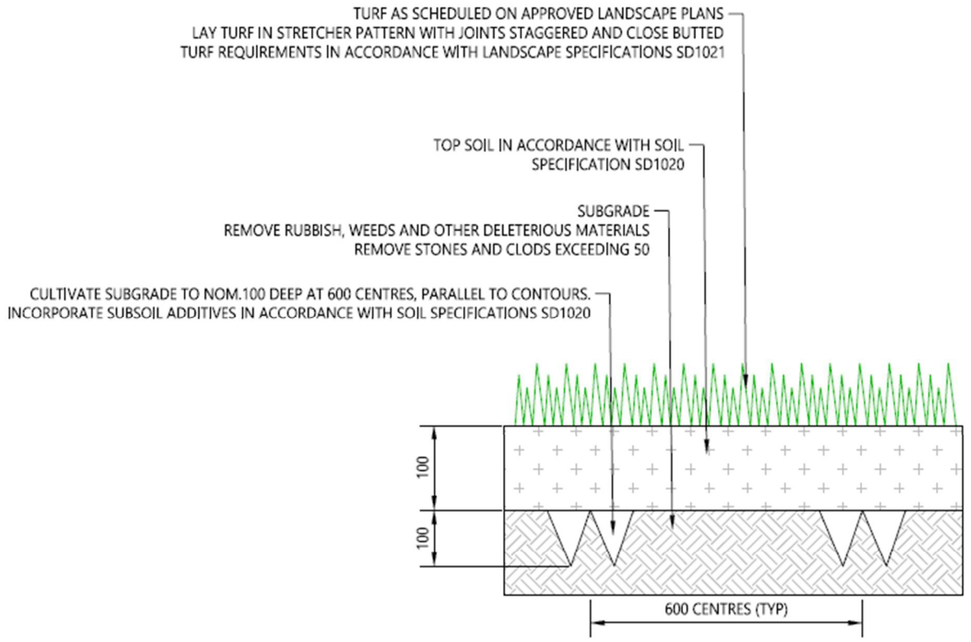
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SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: LANDSCAPING SERIES BIORETENTION BASIN PLANTING

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SHEET	
Sheet 1 of 1	



TYPICAL TURF PLANTING
SCALE 1:10

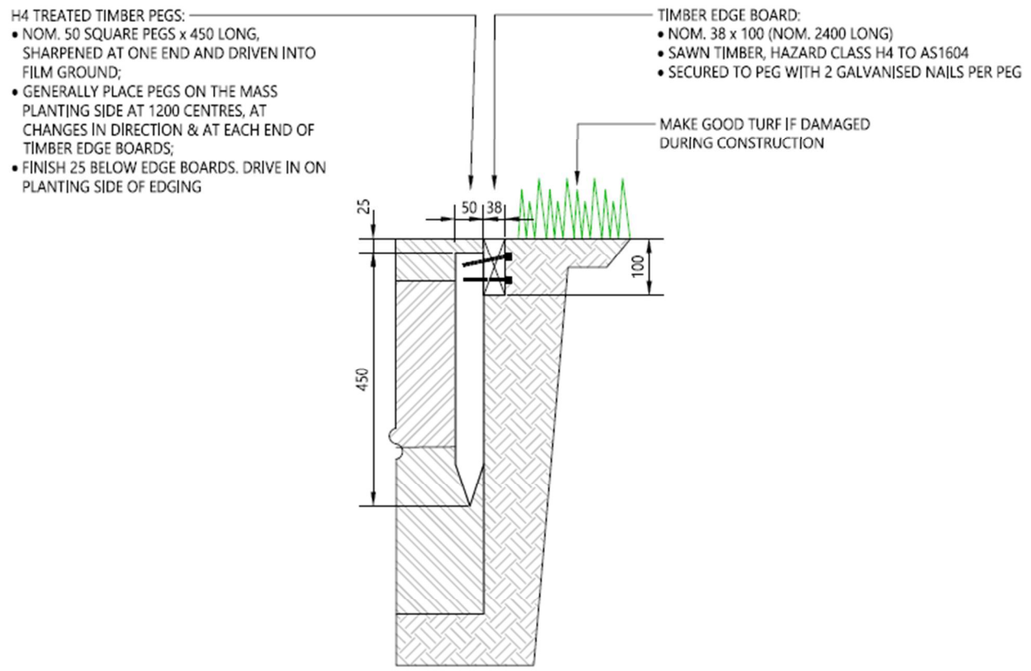
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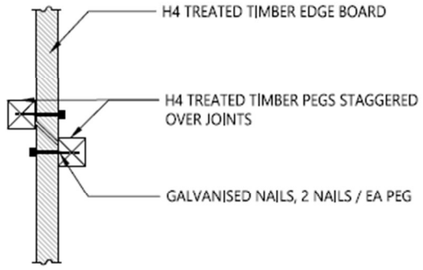
NOTES

1. THIS DETAIL IS NOT INTENDED FOR SPORTS FIELDS. SPECIALIST SPORTS TURF ADVICE IS REQUIRED FOR PLAYING SURFACES.
2. TURF SPECIES TO BE COUCH UNLESS OTHERWISE INDICATED IN CONDITIONS OF CONSENT.

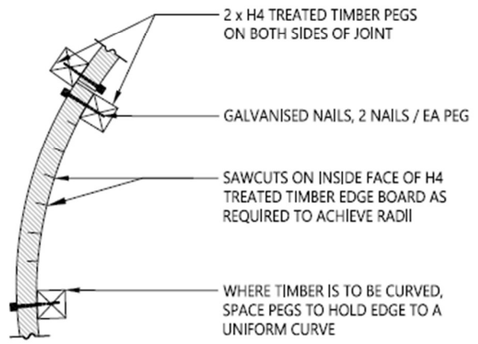
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TYPICAL TIMBER EDGE
SCALE 1:10



STRAIGHT TIMBER EDGING JOINT
SCALE 1:10



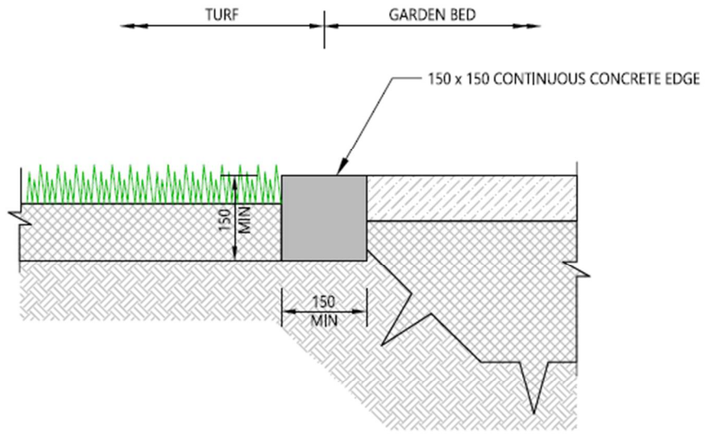
CURVED TIMBER EDGING JOINT
SCALE 1:10

NOTES:

RECYCLED PLASTIC MATERIALS OPTIONAL

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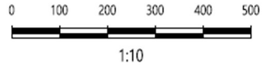
CONCRETE EDGING - LEVEL EDGE
SCALE 1:10

GENERAL NOTES

1. ENSURE MOWN HEIGHT OF GRASS (TURF) AREAS FINISH FLUSH WITH EDGING.
2. ENSURE GARDEN AREAS (MULCH) FINISH FLUSH WITH ADJACENT FINISH SURFACE LEVELS OF GARDEN EDGING.

CONCRETE NOTES

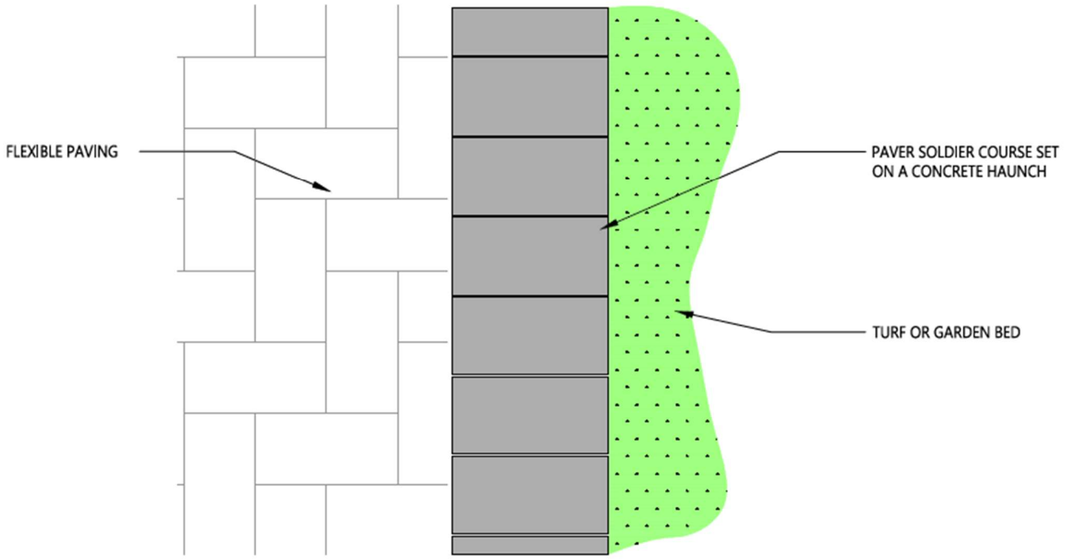
1. ALL MACHINE PLACED (EXTRUDED) CONCRETE TO BE GRADE S32. INSTALL CONTRACTION JOINTS AT 4m INTERVALS BY FORMING GROOVES 40 DEEP BY 6 WIDE TO ALL EXPOSED SURFACES NORMAL TO THE ALIGNMENT OF THE KERB.
2. ALL CONCRETE FOR HAUNCHES UNDER PAVERS TO BE GRADE N25. CLASS 2 FINISH FOR EXPOSED FACE.



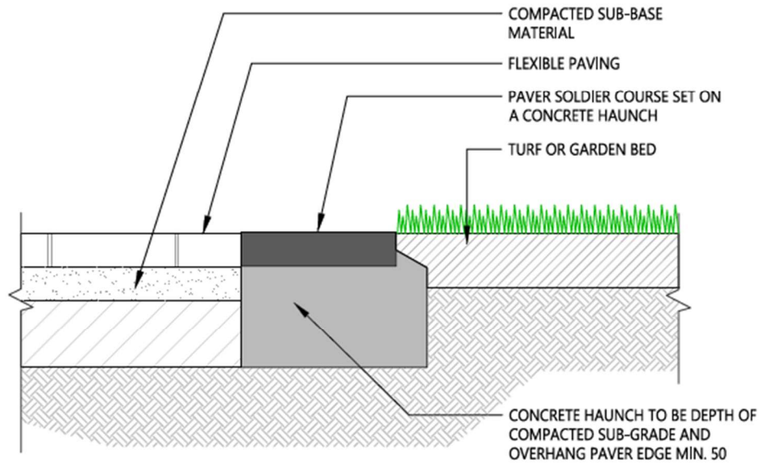
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NOTES

1. ALL CONCRETE FOR HAUNCHES UNDER PAVERS TO BE GRADE N25.
2. REFER TO APPROVED LANDSCAPE AND ENGINEERING DRAWINGS FOR PAVER TYPE.



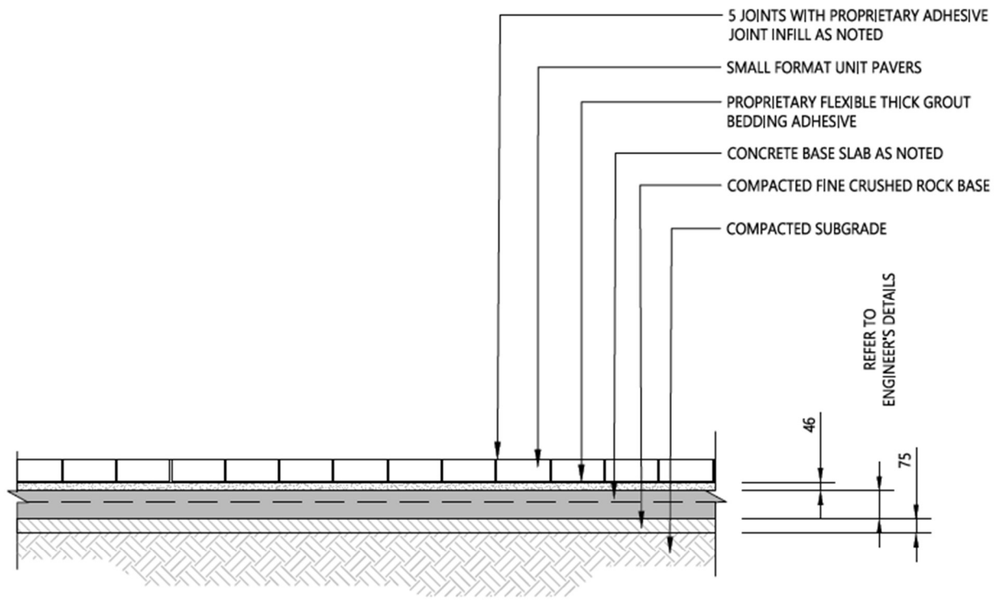
PLAN
PAVER EDGING TO GARDEN, SOFTFALL OR TURF
SCALE 1:10



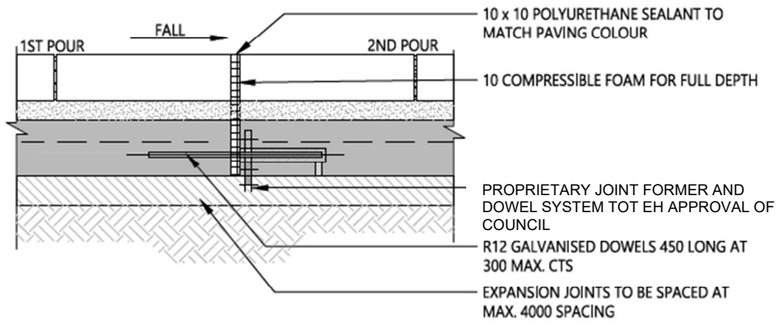
SECTION
SCALE 1:10

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TYPICAL PAVER SECTION
SCALE 1:20



TYPICAL EXPANSION JOINTS
SCALE 1:10

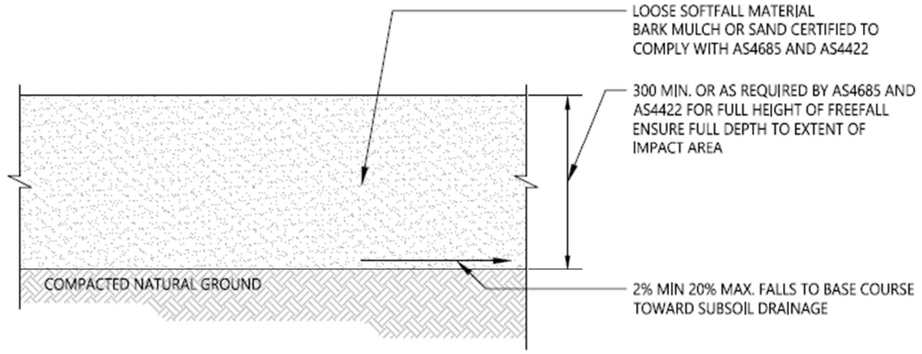
NOTES

1. ALL WORKMANSHIP AND MATERIAL SHALL COMPLY WITH THE CURRENT AUSTRALIAN STANDARD'S IN PARTICULAR AS 3600 AND AS 3727.
2. PAVEMENT IS TO BE FOUNDED ON FIRM NATURAL CUT GROUND OR COMPACTED FILL. ANY SOFT AREAS ARE TO BE REMOVED AND REPLACED WITH COMPACTED FILL TO MEET A MINIMUM OF 100kPa ALLOWABLE BEARING PRESSURE.
3. ANY FILL MUST BE PLACED IN 150 THICK MAXIMUM LAYERS AND COMPACTED TO A RELATIVE DRY DENSITY OF 98% TO AS 1289.5.1.1.
4. THE BASE COURSE IS TO BE GRANULAR GRADED MATERIAL, SUCH AS FINE CRUSHED ROCK.
5. HARDSTANDS GENERALLY TO BE DESIGNED TO HAVE A 2.5% CROSS FALL. POORLY DRAINED SITE MAY REQUIRE SUB SURFACE DRAINAGE TO PROTECT PAVEMENT.
6. THE FINISHED LEVEL OF ANY PAVEMENT ABUTTING A WALL MUST BE BELOW THE DAMP PROOF COURSE AND MUST NOT OBSCURE ANY WEEP HOLES OR DRAINAGE OPENINGS.
7. DOWELS ARE TO BE ACCURATELY ALIGNED PARALLEL TO THE PAVEMENT SURFACE AND THE PAVEMENT CENTRE LINE. ALL DOWELS AND JOINT FORMERS ARE TO BE GALVANISED.
8. POLYURETHANE / SILICONE SEALANT TO MATCH PAVING COLOUR TO TOP 10mm JOINT.
9. CONCRETE THICKNESS, GRADE, REINFORCEMENT AND COVER TO ENGINEER'S DETAILS.
10. PREPARATION AND INSTALLATION OF BEDDING AND PAVERS IS TO BE IN STRICT ACCORDANCE WITH THE PAVER MANUFACTURER'S SPECIFICATIONS.
11. TOLERANCE 3mm MAX CHANGE IN HEIGHT EACH SIDE OF JOINT.
12. HARDSTAND PAVEMENT IS DESIGNED FOR LIGHT DUTY TRAFFIC LOADING (OPERATION OF VEHICLES NOT EXCEEDING 3T). SEEK FURTHER ENGINEERING ADVICE FOR TRAFFIC LOADING EXCEEDING 3T.
13. E-MESH RECYCLED FIBRE REINFORCEMENT OR EQUIVALENT IS TO BE CONSIDERED AS AN ALTERNATIVE TO STEEL REINFORCEMENT IN SUITABLE SITUATIONS, CONFIRM WITH CCC ENGINEER'S PRIOR TO INSTALLATION.

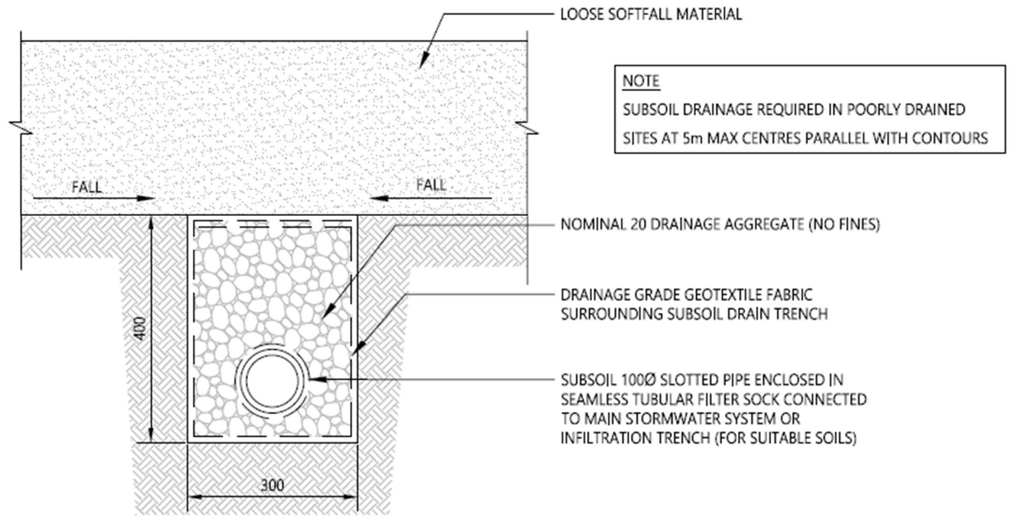
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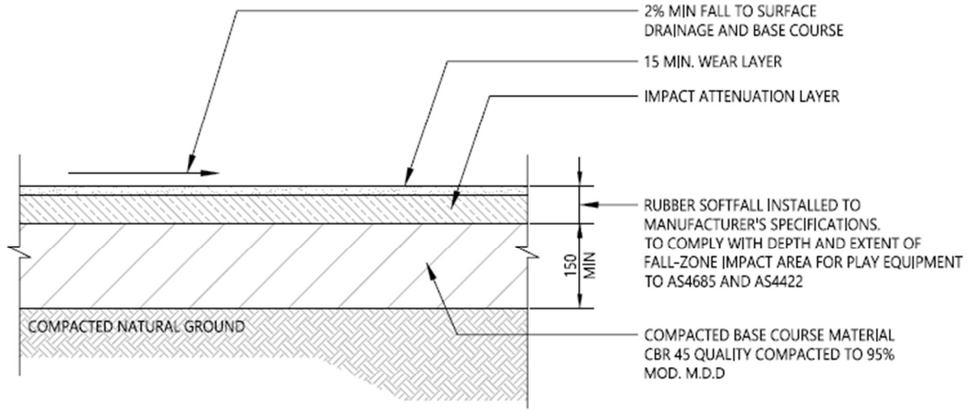
BARK MULCH OR SAND
LOOSE SOFTFALL - TYPICAL PROFILE
SCALE 1:10



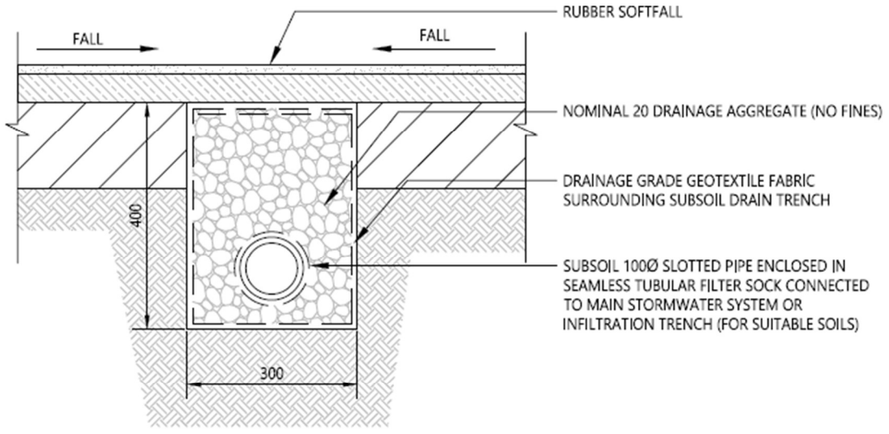
BARK MULCH OR SAND
LOOSE SOFTFALL - SUBSOIL DRAINAGE
SCALE 1:10

NOTES

1. SUBSOIL DRAINAGE REQUIRED IN POORLY DRAINED SITES AT MAXIMUM 5m CENTRES PARALLEL WITH CONTOURS PROVIDE LAYOUT FOR COUNCIL APPROVAL
2. ALL SOFTFALL TO BE TESTED BY AND ACCREDITED SOFTFALL TESTER AT THE TIME OF INSTALLATION WITH A CERTIFICATE OF COMPLIANCE TO BE ISSUED TO COUNCIL
3. REFER TO APPROVED LANDSCAPE PLANS FOR SOFTFALL SCHEDULES



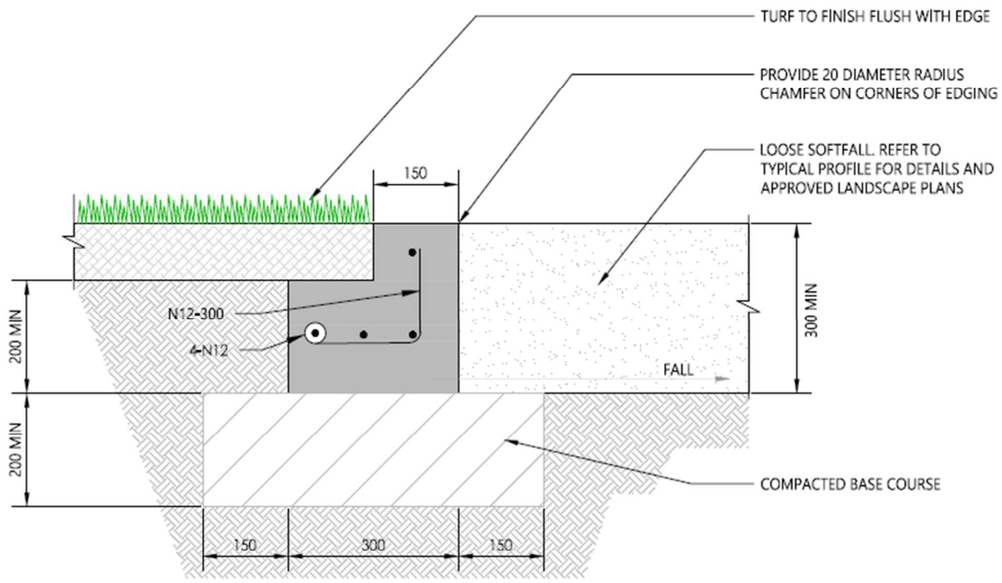
RUBBER SOFTFALL - TYPICAL PROFILE
SCALE 1:10



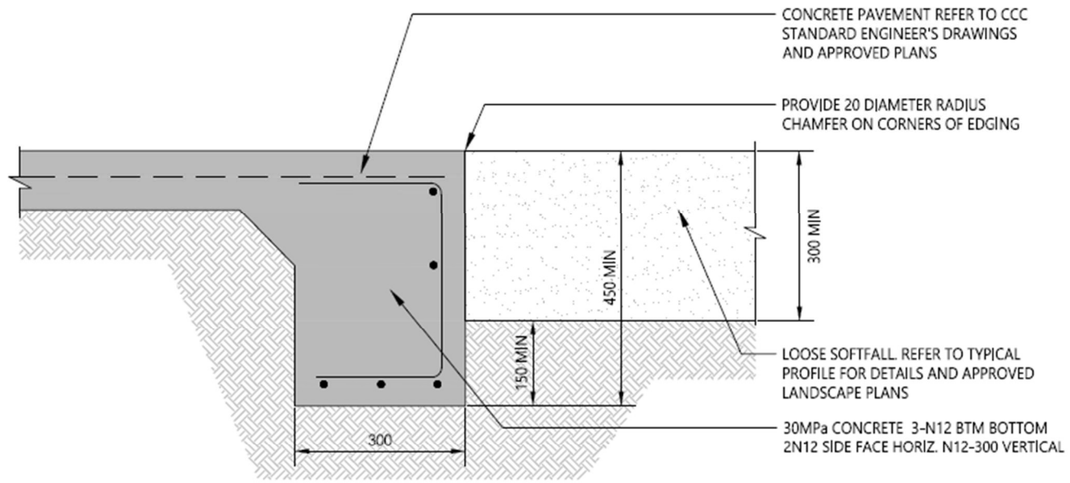
RUBBER SOFTFALL - SUBSOIL DRAINAGE
SCALE 1:10

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1:10

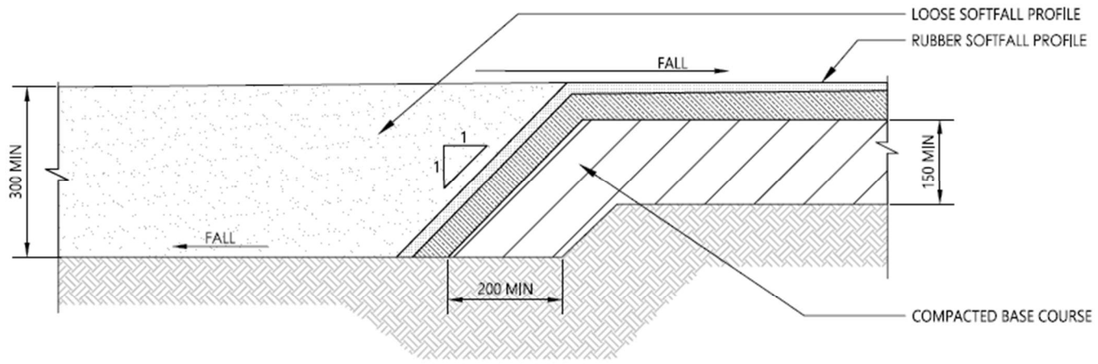
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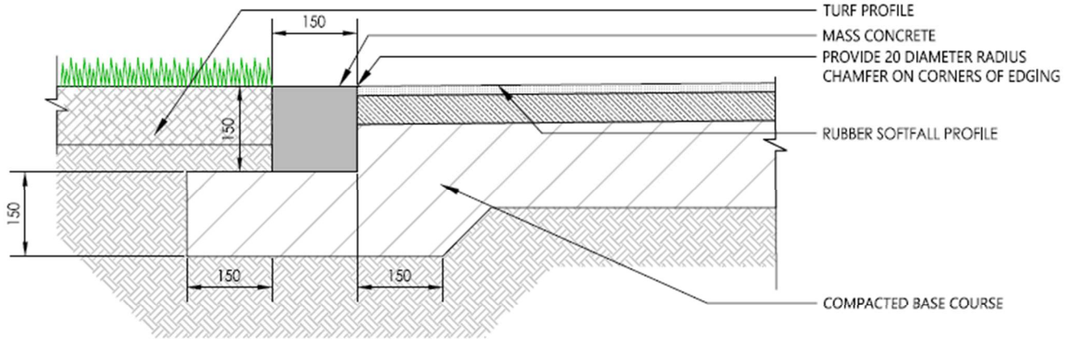
TURF EDGING
LOOSE SOFTFALL - LEVEL EDGING (TYPE 1)
SCALE 1:10



CONCRETE PAVEMENT EDGING
LOOSE SOFTFALL - LEVEL EDGING (TYPE 2)
SCALE 1:10



JUNCTION OF LOOSE SOFTFALL & RUBBER SOFTFALL / WEAR PAD
SCALE 1:10

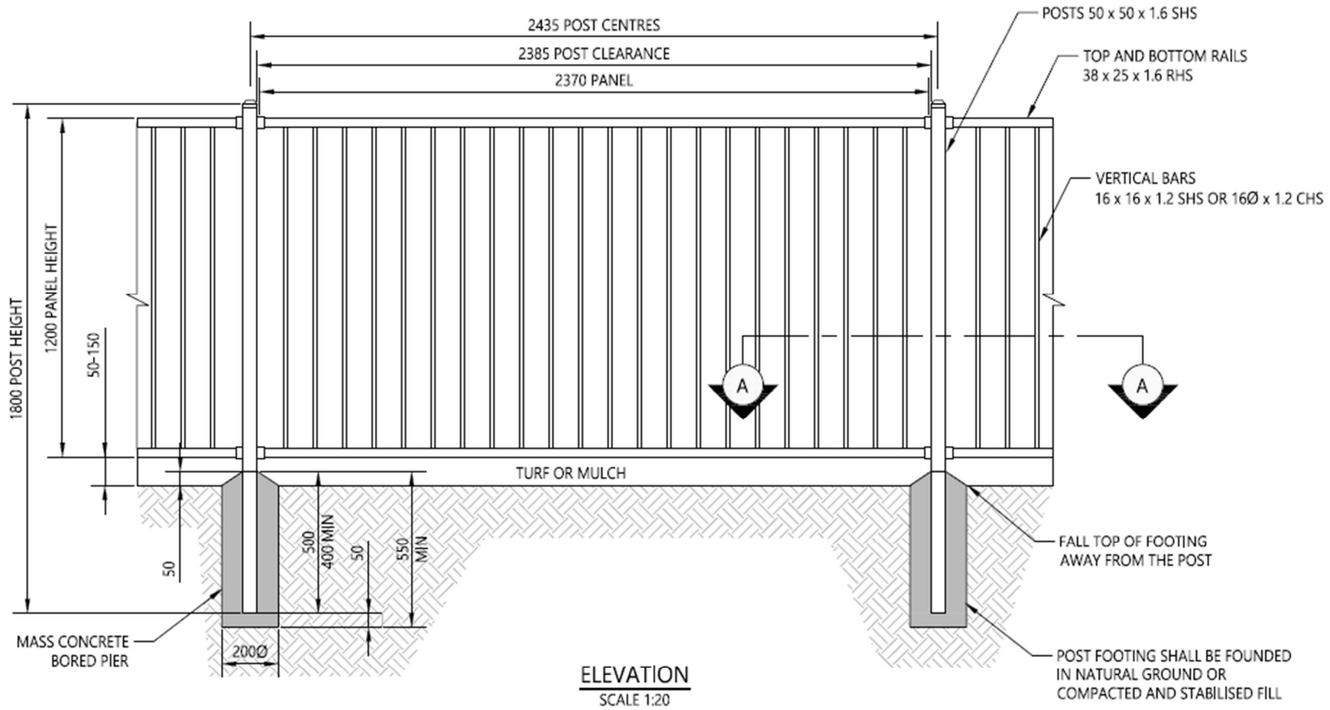


TURF OR CONCRETE PAVEMENT EDGING
RUBBER SOFTFALL - LEVEL EDGING
SCALE 1:10

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1:10

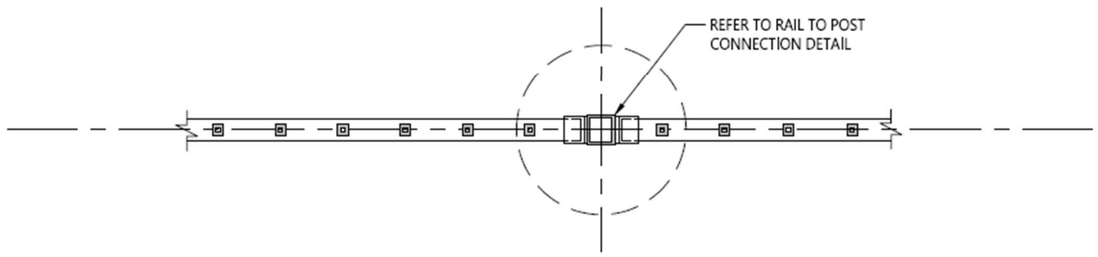
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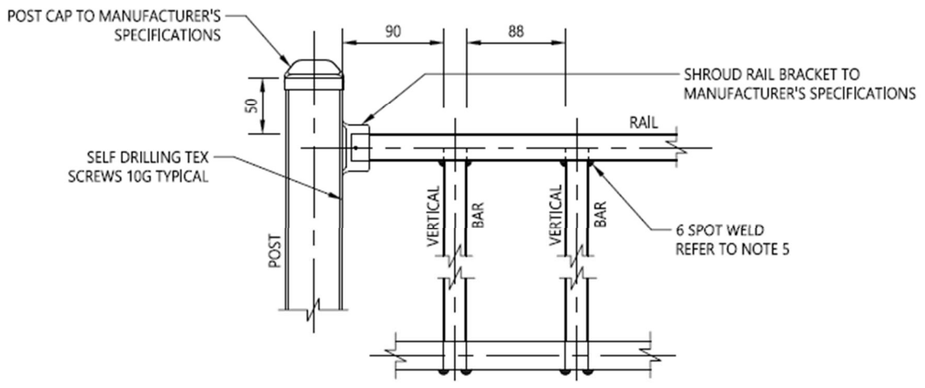
ELEVATION
SCALE 1:20

NOTES

1. GATE, END AND INTERMEDIATE POSTS TO BE 50 x 50 x 1.6 SHS GALVANISED TO AS1163.
2. PANELS TO BE FIXED TO POSTS USING MANUFACTURER SUPPLIED SOCKET CONNECTORS OR 35 x 35 x 2.0 GALVANISED STEEL 'L' BRACKETS. BOTH CONNECTIONS TO BE ATTACHED WITH GALVANISED 12 - 14 x 20 HEXAGON HEAD SELF DRILLING TEX SCREWS.
3. VERTICAL BARS TO PASS THROUGH TOP AND BOTTOM RAILS AND SECURED TO RAIL WITH 6mm SPOT WELD. SHS TO PASS THROUGH AT 45° ANGLE.
4. ALL WELDS TO BE SILICONE BRONZE WELDS (NOT MILD STEEL WHEEL WELDS) TO SUIT THE PROTECTIVE FINISH SPECIFIED.
5. ALL STEEL ELEMENTS ARE TO BE HOT DIP GALVANISED TO PROVIDE A MINIMUM ZINC RATING OF 2275. FERROUS OPEN SECTIONS TO AS/NZS 4791, FERROUS HOLLOW SECTIONS TO AS/NZS 4792.
6. ALL STEEL ELEMENTS TO BE POWDER COATED (UV STABILIZED) TO AS 4506. COLOUR TO BE CONFIRMED WITH CCC.
7. ALL CONCRETE TO BE GRADE N20.
8. POSTS ARE TO BE VERTICAL.
9. RAKE PANELS FOR SLOPE UP TO 1 IN 5. DESIGN TO MINIMISE THE NUMBER OF STEPS IN ANY RUN.
10. ENSURE 1200mm MIN CLEAR SPAN FROM TOP OF FENCE TO ANY CLIMBABLE OBJECT OUTSIDE THE FENCE AREA THAT MAY PROVIDE A FOOTHOLD IE. ROCKS, STEPS, BANKS OR TREES WITH LOW BRANCHES.
11. ENSURE 100mm MAX GAP BETWEEN END POST AND ABUTTING BARRIER.
12. FENCE TO BE INSTALLED GREATER THAN 1000mm AWAY FROM THE EDGE OF A SHARED PATH.



PLAN VIEW A - A
SCALE 1:20



TYPICAL CONNECTION DETAIL
SCALE 1:5

0 50 100 150 200 250 1:5
0 200 400 600 800 1000 1:20

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SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: LANDSCAPING SERIES CHILD SAFETY FENCE	SHEET No. SD 1021 REVISION: - SHEET Sheet 1 of 1

HILLTOPS COUNCIL'S SOIL SPECIFICATIONS

Summary of Expected Actions and Responsibilities

Section	Action	Responsibility
1	Identification of Soil Resources (Survey of soil type, depth of topsoil and subsoil, chemical and physical properties	1. Head Contractor or Soil Scientist engaged by Head Contractor 2. Records to be kept by Head Contractor
2	Assessment of Soil Suitability	1. Head Contractor to develop a plan or engage a Soil Scientist to do so 2. Records and evidence to be kept by Head 3. Contractor Soil Scientist to provide amelioration advice
3	Identification of Landscape Types	• Developer, Consultant and Council to define landscape types and
4	Soil Specifications	• Developer, Consultant and Council to define which landscape types are applicable Head contractor to understand testing requirements
5	Stripping and Stockpiling Plan	4. Head Contractor or Contractor conducting bulk earthworks, advice from soil scientist where needed.
6	Topsoil Amelioration Process	• Landscape Contractor to execute recommendations on site • Landscape Contractor to keep records of inputs and process
7	Certification and Validation	• Landscape Contractor to conduct sampling or engage a Soil Scientist to do so • Soil Scientist to provide interpretation / sign off / additional amendments • Landscape Contractor to keep record of certification or conduct corrective actions (and record of input)
8	Subgrade Preparation	• Head Contractor or Landscape Contractor
9	Topsoil Spread	• Landscape Contractor to execute • Landscape Contractor to keep records of quantities.

1.0 Identification of Site Soil Resources

1.1. When control of the site is taken over by the Head Contractor, any areas identified to have potential for site soil recovery for re-use must be assessed for depth and composition. Soil profiles on site must be assessed to determine the depth of A Horizons (Topsoil), B Horizons (Subsoil) and C Horizons (Bedrock) if present.

1.2. Soil Horizon categories are typically identified by the following;

a. Horizon is a valuable resource and can be (in most cases) easily re-used on-site with some amelioration. Typically, the A Horizon is an organic, friable loam material with vegetation growing within.

b. Horizon can also be re-used as subsoil in landscaping applications; however, must be stripped and stockpiled separately to allow for specific treatment. B Horizon tends to have a higher clay content, nil or no organic matter and can be brightly coloured.

c. Horizon is rarely economically viable for re-use in landscaping and is typically used for fill. However, where A or B Horizon cannot be utilised on site, C Horizon may be amended into a useable topsoil. C Horizons, if encountered, tend to be rocky, (shale / sandstone) and may be difficult to penetrate.

1.3. The re-use of site soils is to be undertaken unless they are found to be unsuitable to avoid the disposal of soil as general solid waste and the need for importation of new soil.

1.4. For small sites (<1 ha), a suitably qualified representative from the Head Contractor may carry out a simple assessment of soil depths of A/B and C Horizons, prior to establishing the stripping depth and/or providing estimates of recovered soil volume

. Where the Head Contractor is not able to define these characteristics, a Soil Scientist is to be engaged. A minimum of 3 investigation boreholes is to be conducted across the site in areas of variable slope and terrain to gain an accurate assessment.

1.5. For sites with a development footprint of >1 ha, a suitability qualified soil scientist is to be engaged to characterise soils across the area and provide a stripping guide for the site. Soils can differ in quality, composition, and limitations across larger areas, and may require separation during the stockpile process to allow for different amelioration practices to be applied. Separation of stockpiles of poorer quality are to be delineated from those of higher quality.

1.6. The Head Contractor is required to maintain a record of measured topsoil / subsoil depth from each borehole constructed in the investigation. Once A and B horizons have been identified, estimates may be made for the recoverable soil volume and estimated stripping depth.

1.7. The Head Contractor is required to be aware of what the B Horizon characteristics are and that B Horizons are to be stripped and stockpiled separately to topsoil material.

1.8. Protect the site from unnecessary damage to soils during early site works. During initial site investigations, minimise disturbance to the site as far as possible by limiting driving heavy machinery, uncontrolled earth movements and installations. Limit site installations to site sheds and access roads and prevent free access movement of all vehicles. Fence to prevent illegal waste dumping.

2.0 Assessment of Soil Suitability

Soil Sampling

2.1. All topsoil that is to be re-used or imported to site must be surveyed, sampled and analysed to determine suitability. Soil samples are to be submitted to a NATA accredited soil laboratory. Results produced by the laboratory must be reviewed and interpreted by a suitably qualified Soil Scientist. The Soil Scientist is required to provide a report outlining any non-compliance's with the relevant soil specifications and provide amelioration advice to achieve a fit for purpose soil for landscaping use.

2.2. It is the responsibility of the Head Contractor to engage the services of the Soil Scientist during the project and retain records. The Landscape Contractor is required to follow the amelioration advice provided by the soil scientist, and retain records of treatment inputs.

2.3. Soil is to be sampled in-situ (prior to stripping) or, if not already tested, then within the stockpile. In the instance soils are to be imported to site, the Head Contractor must contact soil suppliers for representative samples of the product for analysis.

2.4. Soils are to be tested at a minimum frequency of one composite soil sample per 750m3 of material. A composite sample is defined as a large (3L) bag of soil that is made up of 5 -10 smaller sub-samples, mixed to make a sample for testing (SFT). The calculated number of samples required for testing is to be rounded up, rather than down.

Testing Suites

2.5. Samples for testing must be analysed for the most relevant suite of analysis provided in Section 4. In the instance that the landscape situation and associated value is not established, clear or otherwise unknown, it is the responsibility of the Head Contractor and Developer to confirm with Council what suite is best fitting.

2.6. The Head Contractor is to conduct soil sampling (or engage a subcontractor to do so) based on the identified landscape situation and associated value. Samples are to be submitted to a NATA accredited laboratory for analysis.

Subgrade / Subsoil Characterisation

2.7. Once topsoil is stripped and stockpiled, the shallow depths of exposed subsoil is to be to determine if the subsoil is free of chemical and physical limitations and will be supportive of landscape establishment. It is the responsibility of the Head Contractor to conduct sampling and engage a Soil Scientist to conduct the soil sampling.

2.8. Recovered B Horizon may be used for subsoil (below 300mm) backfill for tree pits, however must be tested to the requirements of the specifications in Specification 4 - Tree Pits, Low Value, below 300mm (B Horizon), ameliorated and re-installed as per the detail drawings.

2.9. Where topsoil is to be spread on top of exposed B or C Horizon or jumbled mixes of these, it is required that such subgrade be characterised prior to installation. Mixed subgrade horizons are to be sampled at 1 composite sample per ½ ha. Subgrade and subsoil material must be tested to the requirements presented in Specification 11 - Subgrade Specification, and the process outlined in Section 6 is to be carried out.

2.10. The Head Contractor is to engage a Soil Scientist for amelioration advice using the results from the laboratory analysis.

Interpretation of Results and Recommended Amelioration

2.11 Results are to be obtained from the laboratory for each of the required analysis outlined in Section 4 and to be presented to a suitably qualified Soil Scientist for review. The Soil Scientist must identify the non-compliances and limitations of the soil and provide an amelioration plan that may be executed by the Head or Landscape Contractor to achieve a fit for purpose soil. Where available, the contractor is to supply a species list and details to the Soil Scientist so that amelioration advice can be tailored specifically to the project and selected species.

2.12 It is the responsibility of the Landscape Contractor to read and fully understand the requirements of the amelioration advice and conduct the amelioration as per the report. Where products prescribed by the Soil Scientist cannot be sourced or are economically unfeasible, the contractor must seek the advice of the Soil Scientist to determine a suitable substitute.

3.0 Identification of Landscape Types

3.1. The Developer is to define and confirm with Council what landscapes are to be established across the site prior to the assessment of suitability. It is the responsibility of the Developer to identify how the value of landscapes are to be allocated to each landscaping area.

3.2. Definition of landscape units to determine Specification Type and testing requirements is outlined in the following table.

Landscape Unit	Description
High Value	Best described as landscape areas of high value. Situations include landscapes that are in constant view of the public, with the expectation of fast growth and long-lasting visual impact. Examples would be landscapes around shopping centres, parks, high-rises, display beds, road verges, entrances and other frequently visited or viewed areas. Soil types used within high value applications are expected to have high nutrient levels for sustained optimum
Low Value	Best described as landscapes of lesser value. Situations include landscapes that are less frequented and expected to support vegetation, but instant impact is not critical and maintenance is minimal. Examples would be mass planting areas within residential developments, revegetation and buffer spaces, riparian areas and other less frequented areas. Soil types within low value applications are expected to have reasonable (but not high) nutrient levels that are supportive of long-term growth
General Mass Plantings	Landscapes containing plantings of generalist species (native and/or exotics) which are imported as smaller tube stocks. Establishment is typically slow. Topsoil depth ranges from 200 – 300mm and may be overlaying subsoil or subgrade material. Planting pallets are typically grasses, woody and herbaceous perennials with reasonably low nutrient requirements. Planting methods are typically direct seeding, tubes and plant stock up to 45L
Advanced Tree Plantings	Landscapes supporting larger specimens (45L or more). Pits are dug into the soil (typically 600mm in depth), backfilled with A and B Horizons and drainage. Advanced tree plantings are defined as excavated holes with ameliorated topsoil and subsoil reinstalled in the correct order. Tree vaults are a higher level of engineered systems such as Stratavaults, Cell Systems, Structural soils or otherwise. Soil types used within high value applications are expected to have high nutrient levels for sustained optimum growth.
High Traffic	Areas of significant foot traffic and regular use. Areas typically include public spaces, near entrances, parks and other areas where people are expected to walk on grassed areas. Soil type is expected to be a well-drained sand which is resistant to compaction with some organic matter. This definition does not include applications for sports fields.
Low Traffic	Areas of lesser foot traffic and only occasional recreational passive use. Areas are typically grassed mounds, street verges, residential lawns, nature strips and other areas where grasses are being established and people are rarely expected to walk on. Soil type is expected to be a well-drained sand with organic matter.
Under Pavement	Horticultural landscapes installed under footpaths, structures or buildings. It is expected that the soil resource for growing plants is partially or fully covered by these structures.
Structural Soils / Soils with Aggregates	Soil systems consisting of large aggregates and 'filler soil', allowing for the support of structures / footpaths and horticultural landscapes.
Cell Systems	Soil systems, usually constructed from high strength plastic that are filled with soil allowing for the support of structures / footpaths and horticultural landscapes.
Raingarden	Garden beds comprising of various sand and gravel materials designed specifically for the removal of nutrient from stormwater. Stormwater is typically diverted into these systems for filtration prior to release into stormwater lines. The secondary purpose of raingardens is to support the growth of riparian species, which facilitate further nutrient removal.

4.0 Soil Specification

4.1. References in this specification to Appendix A and associated Tables are to be sourced from Soils for Landscape Development Leake and Haege 2014. AS4419:2018 Soils for Landscaping and Garden Use is the relevant Australian Standard to be referenced in this specification.

4.2. The following Soil Specification Types include;

4.2.1 Specification 1 - General Mass Plantings, Low Value: Requires testing to AS4419:2018 Table 1 - Landscape Soils (On Grade) and additional testing for texture and structure. The soil must fit into the criteria of at least one category within AS4419:2018 Table 1, be friable in nature and have an estimated infiltration >20 mm.

4.2.2 Specification 2 - General Mass Plantings, High Value: Requires testing to specification D2 within Soils for Landscape Development Leake and Haege 2014. The required analysis and target ranges have been provided in Appendix A - Table 1.

4.2.3 Specification 3 - Tree Pits, Low Value, Top 300mm (A Horizon): Requires testing to AS4419:2018 Table 1 - Landscape soils (On Grade) and additional testing for texture and structure. The soil must fit into the criteria for the 'Medium Organic Matter' category within AS4419:2018 Table 1, be friable in nature and have an estimated infiltration >20 mm.

4.2.4 Specification 4 - Tree Pits, Low Value, Below 300mm (B Horizon): Requires testing to AS4419:2018 Table 1 - Landscape soils (On Grade) and additional testing for texture and structure. The soil must fit into the criteria for the 'Low Organic Matter' category within AS4419:2018 Table 1, with organic matter ≤ 3%, be friable in nature and have an estimated infiltration >20mm.

4.2.5 Specification 5 - Tree Pits, High Value, Top 300mm (A Horizon): Requires testing to specification D2 within Soils for Landscape Development Leake and Haege 2014. The required analysis and target ranges have been provided in Appendix A - Table 2.

4.2.6 Specification 6 - Tree Pits, High Value, Below 300mm (B Horizon): Requires testing to AS4419:2018 Table 1 - Landscape soils (On Grade) and additional testing for texture and structure. The soil must fit into the criteria for the 'Low Organic Matter' category within AS4419:2018 Table 1 with organic matter ≤ 3%, be friable in nature and have an estimated infiltration >20 mm.

4.2.7 Specification 7 - Tree Pits Under Pavement - Cell Systems: To be applied only in the instance that there is no previous, system specific soil specification from the manufacturer. Specification 7 requires testing to Specification D2 within Soils for Landscape Development Leake and Haege 2014. The required analysis and target ranges have been provided in Appendix A - Table 3.

4.2.8 Specification 8 - Tree Pits Under Pavement - Structural Soils with Aggregates: To be applied only in the instance that there is no previous, system specific soil specification from the manufacturer. Specification 8 requires testing to specification F1 within Soils for Landscape Development Leake and Haege 2014. The required analysis and target have been provided in Appendix A - Table 4.

4.2.9 Specification 9 - Turf, Low Traffic: Requires testing to specification C1 within Soils for Development Leake and Haege 2014. The required analysis and target ranges have been provided in tables Appendix A - Table 5.

4.2.10 Specification 10 - Turf, High Traffic: Requires testing to specification C2 within Soils Landscape Development Leake and Haege 2014. The required analysis and target ranges been provided in Appendix A - Table 6. This specification is not intended for sports field Specification 11 - Subgrade Specification: Requires testing to a simplified version of specification B3 Soils for Landscape Development Leake and Haege 2014. The required analysis and ranges have been provided in Appendix A - Table 7.

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5.0 Stripping and Stockpiling

5.1. Stripping and stockpiling of topsoil is to occur immediately before bulk earthworks and be such a manner that minimises erosion and sediment loss from site. Ensure that rubbish and matter is removed in the stripped soil. It is the responsibility of the Head to ensure stripping stockpiling is conducted correctly.

5.2. Stockpiles must be in a convenient place away from any risk of running water and subject erosion control measures. They must be protected from contamination during the construction process and records kept of their location and type of soil contained.

5.3. The following table provides a summary of the stripping and stockpiling process

Landscape Unit	Description
Preparation	2. Clear all debris including demolition waste, timber, rubbish wire fences, rock, gravelled driveways, etc. 3. Clear trees and shrub growth and slash if necessary. 4. Clear trees, pasture and weed growth. If heavy or otherwise a problem, spray a broad-spectrum herbicide at manufacturer's rates and allow 1–2 weeks to obtain kill before stripping. Obtain Specific advice on
Stripping	5. Avoid the inclusion of subsoil in topsoil stripping, adjust depth accordingly. to the recommended depths and generally stop stripping if the more brightly coloured or more clayey subsoil starts showing. 6. Strip topsoil to depths as defined from the process in Section 1 including all surface leaf litter, plants and grasses.
Locate stockpiles in a convenient location	• Locate stockpiles 5m or more from concentrated water flows (including drainage lines, roadways). • Locations should have less than 10% slope. • Locate greater than 8m from any retained trees. • Protect upslope using diversion drains. • Protect downslope sediment loss using sediment control structures (silt fencing other approved method).
Management	• Stockpiles must be no higher than 2m but may be flat topped. • Where space is limited within the site footprint, stockpiles may be higher than (to a maximum of 4 m), however batters of the stockpile must remain at a slope 2:1. Stockpiles may be flat topped if required. • Label stockpiles with origin, soil type and date. • Protect stockpiles from waste and rubbish dumping and encroachment of works. • If stockpiles are to be in place longer than 3 months, sow with a seasonally appropriate annual cover

6.0 Topsoil Amelioration

6.1. It is the responsibility of the Landscape Contractor to conduct amelioration on site (or ensure ameliorated prior to import to site). The method for ameliorating soils on-site is at the discretion the contractor and it is expected to be carried out in the most economical, but effective manner possible. As a guide, two common methodologies for on-site amelioration for consideration

6.1.1 In-Situ Amelioration: For soils that are to be ameliorated in-situ (i.e not stripped and left in place). The following process can be carried out:

- Determine topsoil depth and amelioration depth (typically 100mm).
- Prepare area by spraying cover crop and weeds (if required).
- If possible, rip topsoil and subsoil to a maximum depth possible with available machinery important to note ripping is not to be confused with cultivating - subsoil and topsoil materials are not to be mixed together).
- Surface apply amendments such as sand, compost, gypsum or lime (not fertilisers) at prescribed g/m^2.
- Cultivate (using a disc plough or otherwise) into the top 100mm to incorporate amendments.
- Surface apply fertilisers at the prescribed g/m^2.

6.1.2 Stockpile Amelioration: For soils that have been stored in stockpile (i.e stripped and stockpiled onsite during earthworks) the following process are be carried out:

- Prepare stockpile by spraying cover crop and weeds (if required).
- Break down the stockpile in known volumes with an excavator or front-end loader, creating smaller piles of known volume.
- Screen material with a screening bucket.
- Apply amendments such as sand, compost, gypsum or lime (not fertilisers) at the prescribed g/m^3.
- Thoroughly mix amendments into the soil.
- Spread topsoil in the specified location, at the required depth.
- Surface apply fertilisers at the prescribed g/m2.

7.0 Topsoil Certification and Validation

7.1. After topsoil has been ameliorated (regardless of in-situ or stockpile), the soil material must be validated to ensure the amelioration has been carried out in an effective manner. Ameliorated soil is to be sampled and analysed for the nominated Soil Specification Type. It is the responsibility of the Landscape Contractor to engage a Soil Scientist to collect samples and provide interpretations.

7.2. The same process outlined in Section 2 are to be carried out, however soil may be sampled at 1 composite sample per 1,000m^3.

7.3. An appropriately qualified Soil Scientist is required to review the laboratory results and provide commentary on whether the soil may be considered 'fit for purpose' or any additional amelioration is required.

8.0 Subgrade Preparation

8.1. Exposed subgrade or recovered subsoil from stockpiles are to be treated in-situ or as it is exploited from the stockpile. Records and evidence of amelioration of subgrade and subsoil treatment must be provided.

8.2. The method for cut, fill and amendment of subgrade / subsoil on-site is at the discretion of the Head Contractor and it is expected to be carried out in the most economical, but effective manner possible.

8.3. The required steps for subgrade / subsoil preparation and amelioration for areas to have topsoil spread are as follows (Note this process does not apply to subsoil backfill for tree vaults or larger stock):

1. Fair and trim to relative level to accommodate the required overall soil depths.
2. Remove rocks >50 mm diameter.
3. Remove rubbish such as construction generated waste, plastics, metals and glass.
4. Deep rip to a maximum depth allowable by available machinery.
5. Apply ameliorants as per the Soil Scientist's reports.
6. Chisel, disc plough or use an excavator with a tine attachment to loosen the subgrade and mix the ameliorants to 200 mm depth to incorporate.

8.4. Where stockpiled recovered subsoil is applied to cut subgrade, the subgrade shall not be compacted to more than about 70-80% proctor compaction rate. The recovered subsoil from stockpile can be treated in-situ after spreading in the manner described above. It is important to avoid excessive compaction of subsoils and to relieve compaction if it occurs prior to placing topsoil.

9.0 Topsoil Spread and Preparation for Planting

9.1. Validated ameliorated topsoil is to be spread by the Landscape Contractor where required at the nominated depth. Processed topsoil compliant to the specifications is prone to compaction and it is imperative that the following considerations are made when spreading topsoil and preparing for planting:

1. Under no circumstances, is topsoil to be compacted by any means beyond light 'firming'.
2. If soils are required to be stabilised due to slope, water runoff or otherwise, specified erosion control measures are to be installed immediately after topsoil spread.
3. All vehicle traffic, inclusive of light vehicles, machinery or otherwise is to be excluded from areas with topsoil that has been spread.
4. In the event that compaction is unavoidable due to site operations, it is the responsibility of the Landscape Contractor to relive soil compaction by tyning or cultivation prior to planting.
5. Plants and/or cover crops are to be installed as soon as practicably possible after topsoil spread.

Appendix A – Soil Properties Tables
The following tables provides the soil properties requirements for each Soil Specification type identified in 4. Soil Specification.

Table 1: Specification 2 – General Mass Plantings, High Value

Physical Properties			
Property	**Units**	**Target Range**	
Texture, preferred range [1]	n/a	Sandy loam to clay loam	
Organic matter [2]	% dwb	3–6	
Permeability (@ 16 drops by McIntyre Jakobsen) [3]	mm/h	> 30	
Wettability [4]	mm/h	> 5	
Dispersibility in water [7]	Class	> 4	Emerson Aggregate Class
Large particles (naturally occurring) [4]			
2–20 mm	% w/w	< 20	
> 20 mm	% w/w	< 10	
Visible contaminants > 2 mm (glass, plastic and metal) [5]	%w/w	< 0.5	
Chemical Properties			
Property	**Units**	**Target Range**	
pH in water (1:5) standard range [6]	pH units	5.4–6.8	
pH in CaCl2 (1:5) standard range [6]	pH units	5.2–6.5	
Electrical conductivity (1:5) [6]	dS/m	< 0.65	
Phosphorus – P-sensitive plants. Acid soils method [6]	mg/kg	< 30	
Phosphorus – P-Tolerant plants. Acid soils method [6]	mg/kg	30-60	
Exchangeable sodium (Na) [6]	% of ECEC	< 7%	
Exchangeable potassium (K) [6]	% of ECEC	5–10%	
Exchangeable calcium (Ca) [6]	% of ECEC	60–80	
Exchangeable magnesium (Mg) [6]	% of CEC	15–25	
Exchangeable aluminium (Al) [6]	% of CEC	< 2	
Exchangeable Ca/Mg ratio [6]	ratio	3–9	
Available iron (Fe) [6]	mg/kg	100–400	
Available manganese (Mn) [6]	mg/kg	25–100	
Available zinc (Zn) [6]	mg/kg	5–30	
Available Copper (Cu) [6]	mg/kg	1–15	
Available boron (B) [6]	mg/kg	0.5–5	
Available N (ammonium-N + nitrate-N) [6]	mg/kg	> 25	

Method References

1. Texture (SESL)
2. Rayment & Lyons 6B2
3. Rayment & Lyons (2011)
4. AS4419-2018
5. AS4454-2012 Appendix 1
6. McIntyre & Jakobsen-1998
7. Emerson (1991)

Table 2: Specification 5 – Tree Pits, High Value, Top 300mm (A Horizon)

Physical Properties			
Property	**Units**	**Target Range**	
Texture, preferred range [1]	n/a	Sandy loam to clay loam	
Organic matter [2]	% dwb	3–6	
Permeability (@ 16 drops by McIntyre Jakobsen) [3]	mm/h	> 30	
Wettability [4]	mm/h	> 5	
Dispersibility in water [7]	Class	> 4	Emerson Aggregate Class
Large particles (naturally occurring) [4]			
2–20 mm	% w/w	< 20	
> 20 mm	% w/w	< 10	
Visible contaminants > 2 mm (glass, plastic and metal) [5]	%w/w	< 0.5	
Physical Properties			
Property	**Units**	**Target Range**	
pH in water (1:5) standard range [6]	pH units	5.4–6.8	
pH in CaCl2 (1:5) standard range [6]	pH units	5.2–6.5	
Electrical conductivity (1:5) [6]	dS/m	< 0.65	
Phosphorus – P-sensitive plants. Acid soils method [6]	mg/kg	< 30	
Phosphorus – P-Tolerant plants. Acid soils method [6]	mg/kg	30-60	
Exchangeable sodium (Na) [6]	% of ECEC	< 7%	
Exchangeable potassium (K) [6]	% of ECEC	5–10%	
Exchangeable calcium (Ca) [6]	% of ECEC	60–80	
Exchangeable magnesium (Mg) [6]	% of CEC	15–25	
Exchangeable aluminium (Al) [6]	% of CEC	< 2	
Exchangeable Ca/Mg ratio [6]	ratio	3–9	
Available iron (Fe) [6]	mg/kg	100–400	
Available manganese (Mn) [6]	mg/kg	25–100	
Available zinc (Zn) [6]	mg/kg	5–30	
Available Copper (Cu) [6]	mg/kg	1–15	
Available boron (B) [6]	mg/kg	0.5–5	
Available N (ammonium-N + nitrate-N) [6]	mg/kg	> 25	

Method References

1. Texture (SESL)
2. Rayment & Lyons 6B2
3. Rayment & Lyons (2011)
4. AS4419-2018
5. AS4454-2012 Appendix 1
6. McIntyre & Jakobsen-1998
7. Emerson (1991)

Table 3: Specification 7 – Tree Pits Under Pavement – Cell Systems

Physical Properties			
Property	**Units**	**Target Range**	
Texture, preferred range [1]	n/a	Sandy loam to clay loam	
Organic matter [2]	% dwb	3-6	
Permeability (@ 16 drops by McIntyre Jakobsen) [3]	mm/h	> 30	
Wettability [4]	mm/h	> 5	
Dispersibility in water [7]	Class	> 4	Emerson Aggregate Class
Large particles (naturally occurring) [4]			
2–20 mm	% w/w	< 20	
> 20 mm	% w/w	< 10	
Visible contaminants > 2 mm (glass, plastic and metal) [5]	%w/w	< 0.5	
Chemical Properties			
Property	**Units**	**Target Range**	
pH in water (1:5) standard range [6]	pH units	5.4–6.8	
pH in CaCl2 (1:5) standard range [6]	pH units	5.2–6.5	
Electrical conductivity (1:5) [6]	dS/m	< 0.65	
Phosphorus – P-sensitive plants. Acid soils method [6]	mg/kg	< 30	
Phosphorus – P-Tolerant plants. Acid soils method [6]	mg/kg	30-60	
Exchangeable sodium (Na) [6]	% of ECEC	< 7%	
Exchangeable potassium (K) [6]	% of ECEC	5–10%	
Exchangeable calcium (Ca) [6]	% of ECEC	60–80	
Exchangeable magnesium (Mg) [6]	% of CEC	15–25	
Exchangeable aluminium (Al) [6]	% of CEC	< 2	
Exchangeable Ca/Mg ratio [6]	ratio	3–9	
Available iron (Fe) [6]	mg/kg	100–400	
Available manganese (Mn) [6]	mg/kg	25–100	
Available zinc (Zn) [6]	mg/kg	5–30	
Available Copper (Cu) [6]	mg/kg	1–15	
Available boron (B) [6]	mg/kg	0.5–5	
Available N (ammonium-N + nitrate-N) [6]	mg/kg	> 25	

Method References

1. Texture (SESL)
2. Rayment & Lyons 6B2
3. Rayment & Lyons (2011)
4. AS4419-2018
5. AS4454-2012 Appendix 1
6. McIntyre & Jakobsen-1998
7. Emerson (1991)

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Table 4: Specification 8 – Tree Pits Under Pavement – Structural Soils with Aggregates – Filler Soils

Physical Properties

Property	Units	Target Range
Texture, preferred range [1]	n/a	Sandy loam to clay loam
Organic matter [2]	% dwb	3–6
Wettability [4]	mm/h	> 5
Dispersibility in water [7]	Class	> 4
Large particles (naturally occurring) [4]		
Gravel > 4mm4	% w/w	< 20
> 20 mm	% w/w	< 10
Visible contaminants > 2 mm (glass, plastic and metal) [5]	%w/w	< 0.5

Chemical Properties

Property	Units	Target Range
pH in water (1:5) standard range [6]	pH units	5.4–6.8
pH in CaCl2 (1:5) standard range [6]	pH units	5.2–6.5
Electrical conductivity (1:5) [6]	dS/m	< 0.5
Phosphorus – P-sensitive plants. Acid soils method [6]	mg/kg	< 30
Phosphorus – P-Tolerant plants. Acid soils method [6]	mg/kg	30-100
Exchangeable sodium (Na) [6]	% of ECEC	< 7%
Exchangeable potassium (K) [6]	% of ECEC	3–10%
Exchangeable calcium (Ca) [6]	% of ECEC	60–80
Exchangeable magnesium (Mg) [6]	% of CEC	15–25
Exchangeable aluminium (Al) [6]	% of CEC	< 5
Exchangeable Ca/Mg ratio [6]	ratio	3–9
Available iron (Fe) [6]	mg/kg	100–400
Available manganese (Mn) [6]	mg/kg	25–100
Available zinc (Zn) [6]	mg/kg	5–30
Available Copper (Cu) [6]	mg/kg	1–15
Available boron (B) [6]	mg/kg	0.5–5
Available N (ammonium-N + nitrate-N) [6]	mg/kg	> 20

Physical Properties – Aggregate Component

Property	Units	Target Range
63.0	% Passing	100
53	% Passing	85-100
37.5	% Passing	20-65
26.5	% Passing	0-20
19.0	% Passing	0-5
13.2	% Passing	0-2
4.75	% Passing	0-1
Sodium Sulfate Soundness [9]	% Weight loss	≤ 9

Method References

1. Texture (SESL)
2. Rayment & Lyons 6B2
3. Rayment & Lyons (2011)
4. Wet Sieve Method
5. AS4454-2012 Appendix 1
6. McIntyre & Jakobsen-1998
7. Emerson (1991)
8. AS1141.11-2009
9. AS1141.24-1997

Table 5: Specification 9 – Turf, Low Traffic

Physical Properties

Property	Units	Target Range	
2.0 mm (fine gravel) [1]	% retained by mass	< 10	
1.0 mm (very coarse sand) [1]		< 10	
0.5 mm (coarse sand) [1]		10-30	30-50
0.25 mm (medium sand) [1]		20-40	
0.1 mm (fine sand) [1]		10-30	
0.05 (very fine sand) [1]		5-15 (max 20% combined vfs, Si +Cl)	
0.002 mm (silt) [1]		< 12 (Si + Clay combined 5–8)	
< 0.002 mm (clay) [1]		3-8	
Large particles [2]		2–20 mm = < 10% > 20 mm = 0%	
Organic matter content [4]	% w/w	2 to 8	
Permeability [3]	mm/hour	>30(@ 16 drops by McIntyre Jakobsen)	
Wettability (AS 4419) [2]	mm/hour	> 5	
Dispersibility in water [6]	Class	> 4	Emerson Aggregate Class

Chemical Properties

Property	Units	Target Range
pH in water (1:5) [5]	pH units	5.4–8.0
pH in $CaCl^2$ (1:5) [5]	pH units	5.2–7.5
Electrical conductivity (1:5) [5]	dS/m	< 0.5
Exchangeable Na percentage [5]	% of ECEC	< 7
Exchangeable Ca/Mg ratio [5]	Ratio	3-9
Available phosphorus Mehlich 3 [5] Available phosphorus Olsen	mg/kg	50–150 20–50
Available nitrogen (nitrate N + ammonium N) [5]	mg/kg	20-60

Method References

1. AS1289.1632-2003
2. AS4419-2018
3. McIntyre & Jakobsen-1998
4. Rayment & Lyons 6B2
5. Rayment & Lyons (2011)
6. Emerson (1991)

Table 6: Specification 10 – Turf, High Traffic

Physical Properties

Property	Units	Target Range	
2.0 mm (fine gravel) [1]	% retained by mass	< 10	
1.0 mm (very coarse sand) [1]		< 10	
0.5 mm (coarse sand) [1]		10-30	30-50
0.25 mm (medium sand) [1]		20-40	
0.1 mm (fine sand) [1]		10-30	
0.05 (very fine sand) [1]		< 15 (max 20% combined vfs, Si +Cl)	
0.002 mm (silt) [1]		< 8 (Si + Clay combined 5–8)	
< 0.002 mm (clay) [1]		2-6	
Large particles [2]		2–20 mm = < 2% > 20 mm = 0%	
Organic matter content [4]	% w/w	2 to 5	
Permeability [3]	mm/hour	> 50-200 (@ 16 drops by McIntyre Jakobsen)	
Wettability (AS 4419) [2]	mm/hour	> 5	
Dispersibility in water [6]	Class	> 4	Emerson Aggregate Class

Chemical Properties

Property	Units	Target Range
pH in water (1:5) [5]	pH units	5.4–8.0
pH in $CaCl^2$ (1:5) [5]	pH units	5.2–7.5
Electrical conductivity (1:5) [5]	dS/m	< 0.5
Exchangeable Na percentage [5]	% of ECEC	< 7
Exchangeable Ca/Mg ratio [5]	Ratio	3-9
Available phosphorus Mehlich 3 [5] Available phosphorus Olsen	mg/kg	50–150 20–50
Available nitrogen (nitrate N + ammonium N) [5]	mg/kg	30-100

Method References

1. AS1289.1632-2003
2. AS4419-2018
3. McIntyre & Jakobsen-1998
4. Rayment & Lyons 6B2
5. Rayment & Lyons (2011)
6. Emerson (1991)

Table 7: Specification 11 - Subgrade Specification

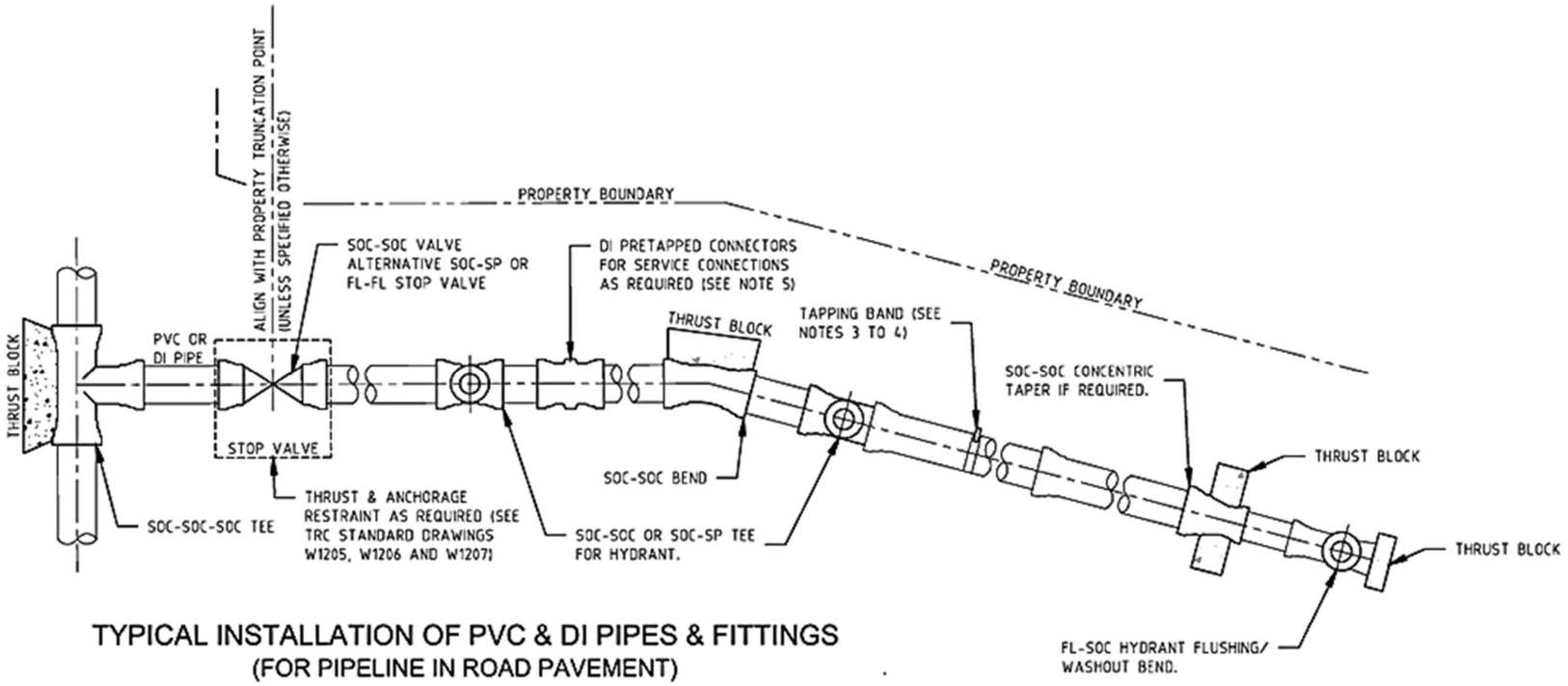
Physical Properties

Property	Units	Target Range
Texture, preferred range [1]	n/a	Loam to clay loam
Texture, preferred range [1]	n/a	Required for calculation
Texture, preferred range [1]	mm/hr	> 20
Texture, preferred range [1]	% dwb	< 3
Texture, preferred range [1]		
Texture, preferred range [1]	**Units**	**Target Range**
Texture, preferred range [1]	pH units	5.4–6.8
Texture, preferred range [1]	pH units	5.2–6.5
Texture, preferred range [1]	dS/m	< 0.65
Texture, preferred range [1]	% of ECEC	< 7%
Texture, preferred range [1]	% of ECEC	5–10%
Texture, preferred range [1]	% of ECEC	60–80
Texture, preferred range [1]	% of CEC	15–25
Texture, preferred range [1]	% of CEC	< 2
Texture, preferred range [1]	ratio	3–9

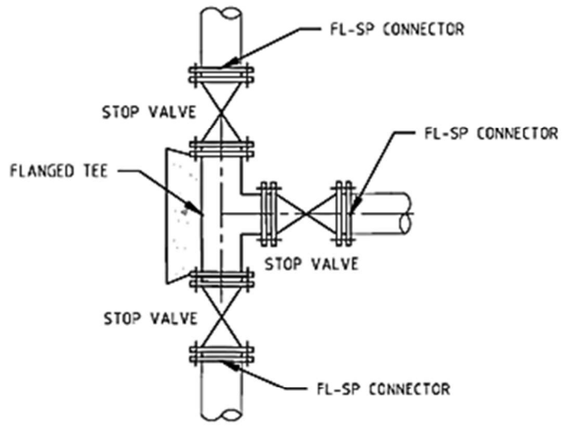
Method References

1. Texture (SESL)
2. Rayment & Lyons 6B2
3. Rayment & Lyons (2011)
4. AS4419-2018
5. AS4454-2012 Appendix 1
6. McIntyre & Jakobsen-1998
7. Emerson (1991)

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: LANDSCAPING SERIES SOIL SPECIFICATIONS	SHEET No. SD 1022 REVISION: - SHEET Sheet 4 of 4



TYPICAL INSTALLATION OF PVC & DI PIPES & FITTINGS
(FOR PIPELINE IN ROAD PAVEMENT)

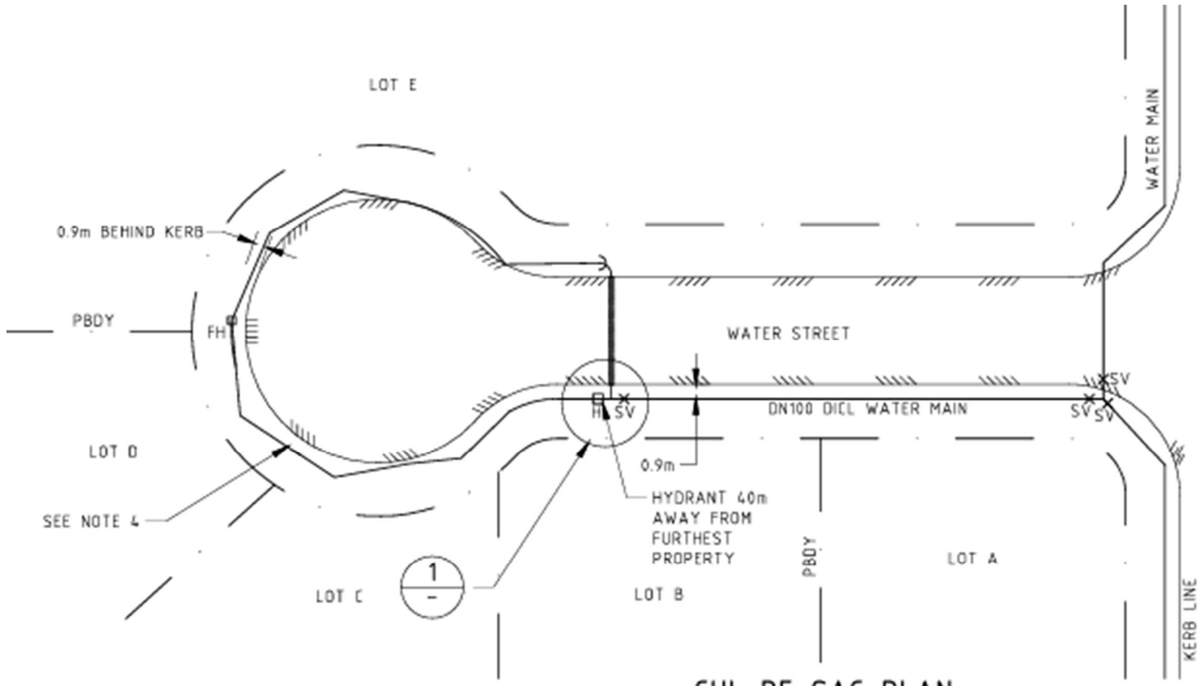


TYPICAL VALVE CONNECTION DIRECT TO NEW MAIN

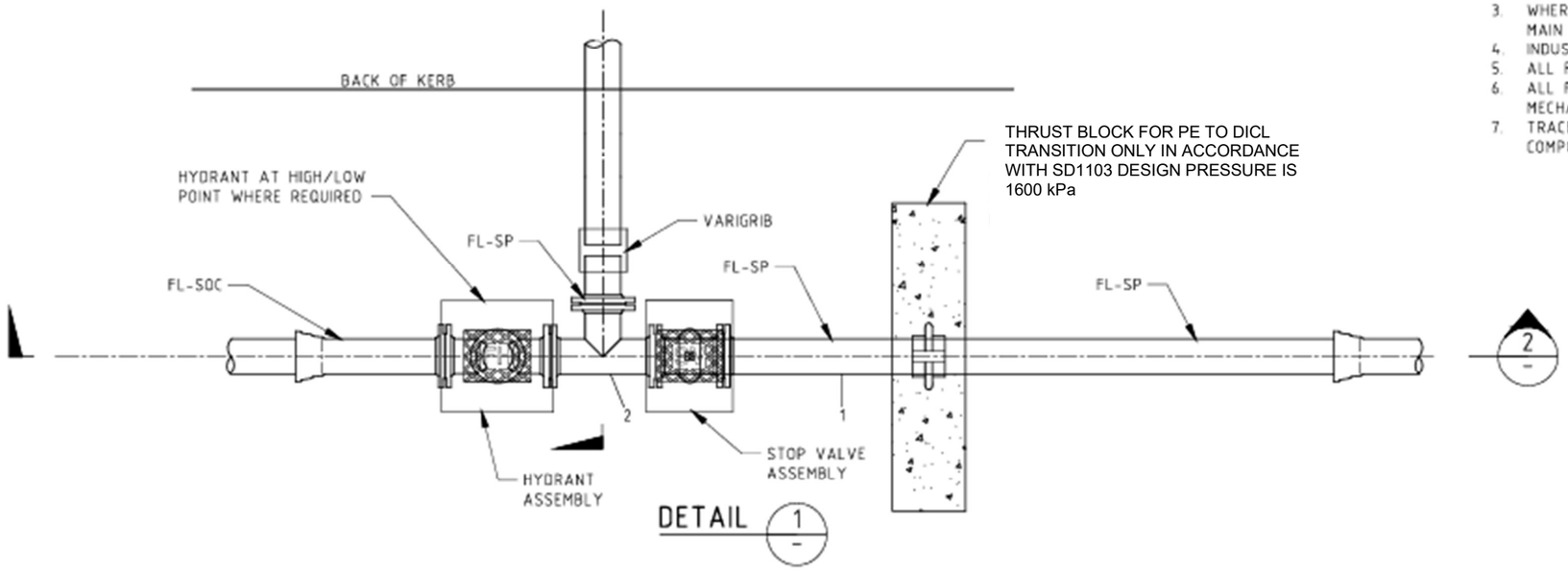
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES
2. INSTALL PIPEW0RK PARALLEL TO PROPERTY BOUNDARIES.
3. STAINLESS STEEL AN FBE COASTED TAPPING BANDS DO NOT REQUIRE ADDITIONAL CORROSION PROTECTION
4. TAPPING BANDS APPROVED BY THE MANUFACTURER FOR USE ON SPECIFIC TYPES OF PIPE ARE TO BE SUED FOR ALL SERVICE CONNECTIONS.
5. DUCTILE IRON PIPE AND FITTINGS TO COMPLY WITH AS/NZS2280 REFER HC SPECIFICATIONS AND BE POLYETHYLENE WRAPPER OR EPOXY COATED.
6. uPVC, PVC-M, PVC-O PIPES AND FITTINGS TO COMPLY WITH AS/NZS1477. AS/NZS4765 AND AS/NZS4441. PVC PIPES SHALL BE MINIMUM PN16 UNLESS SPECIFIED OTHERWISE BY HILLTOPS COUNCIL. REFER HC SPECIFICATIONS

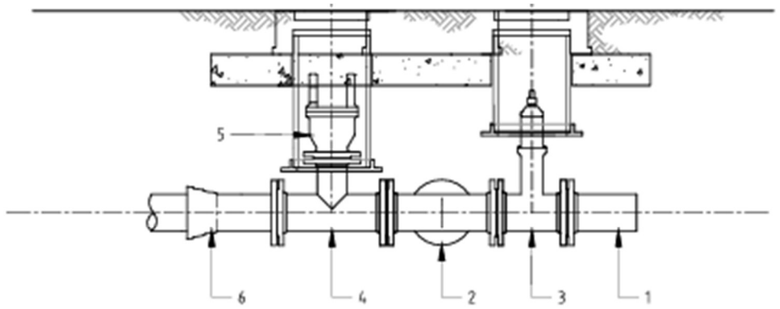
SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES MAINS AND CONNECTION - TYPICAL MAINS CONSTRUCTION RETICULATION MAIN ARRANGEMENT	SHEET No. SD 1101 REVISION: - SHEET Sheet 1 of 5



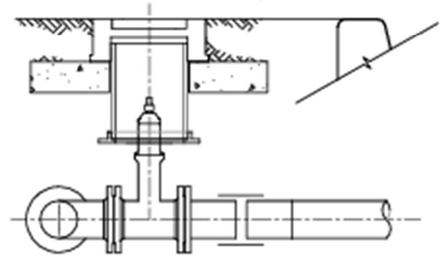
CUL-DE-SAC PLAN



DETAIL 1



SECTION 2



SECTION 3

NOTES:

1. ALL PIPE FITTINGS TO COMPLY WITH TRC WATER SPECIFICATION
2. ALL BOLTS TO BE STAINLESS STEEL GRADE 316. NUTS AND WASHERS ANTI-SEIZE PASTE TO BE APPLIED TO THREADS
3. WHERE DRAINAGE LINKS OR PEDESTRIAN ACCESS EXISTS BETWEEN CUL-DE-SACS. A WATER MAIN LINKING SHOULD BE UTILISED & THE LOOP MAIN NOT INSTALLED
4. INDUSTRIAL RING TO REMAIN DN100 DICL. RESIDENTIAL RING TO BE DN63 PE 100 PN16
5. ALL FITTINGS TO BE FBE COATED
6. ALL FITTINGS TO BE PN16 ELECTROFUSION COUPLINGS OR BUTT-WELDED FITTINGS OR MECHANICAL COUPLINGS TO AS/NZS4129. NO COMPRESSION FITTINGS WILL BE PERMITTED
7. TRACER WIRE REQUIRED FOR ALL PE SERVICES TERMINATING/CONNECTED TO METAL COMPONENTS AT EACH END

TABLE 1 - PIPE WORK SCHEDULE

ITEM	DESCRIPTION
1	DN100 DICL FL-SP PIPE 2400 LONG WITH PUDDLE FLANGE
2	DN100 DICL PE FL-FL TEE
3	DN100 DICL FL-FL RESILIENT SEATED VALVE
4	DN100 X 80 FL HYDRANT TEE
5	DN80 SPRING HYDRANT
6	DN100 OR DN63 PE FL-SOC CONNECTOR
7	DN 100 BLANK FLANGE FBN COATED TAPPED TO 50mm BSP.
8	DN 50 BRASS NIPPLE
9	DN 50-63 PE FEMALE ADAPTER (PLASSON OR APPROVED EQUIVALENT)

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES MAINS AND CONNECTION – WATER RETICULATION LAYOUT – CUL-DE-SAC	SHEET No. SD 1101 - REVISION: SHEET Sheet 2 of 5

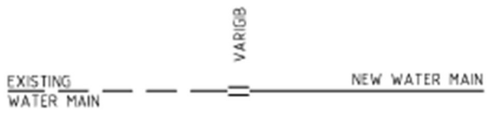


DIAGRAM A

CONNECTION DIAGRAM - EXISTING WATER MAIN TO NEW WATER MAIN

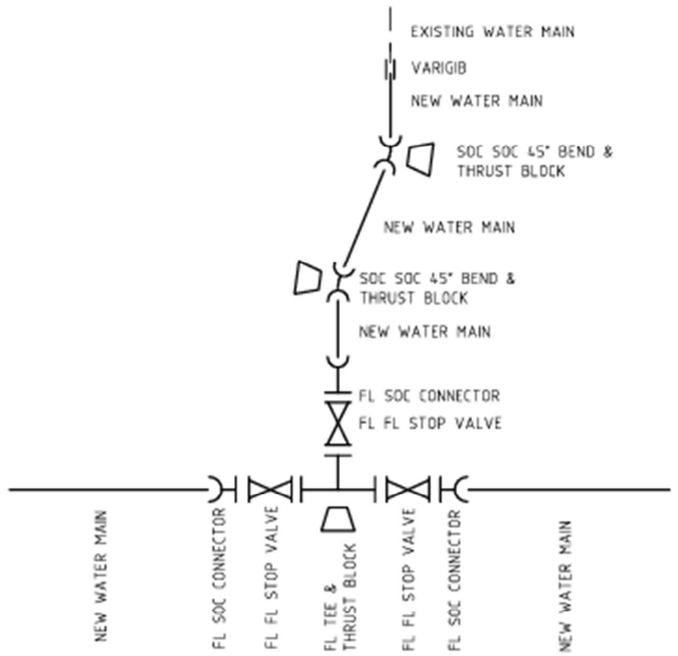


DIAGRAM B

CONNECTION - NEW WATER MAIN TO EXISTING

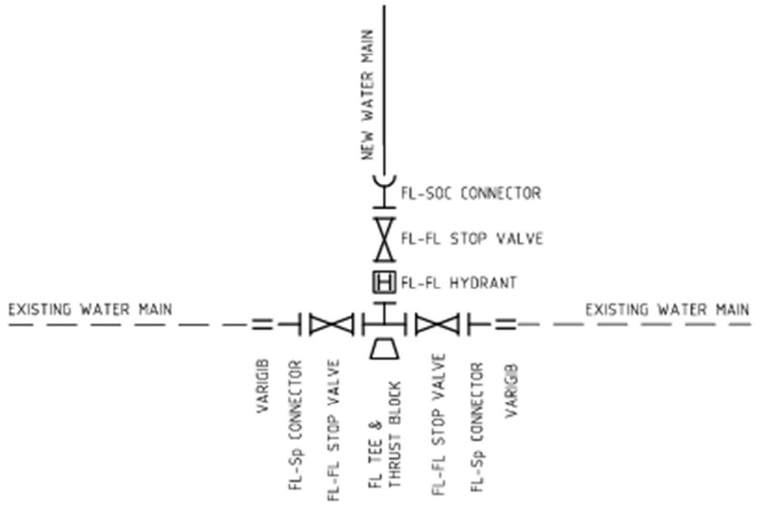


DIAGRAM C

TEE CONNECTION - NEW WATER MAIN OFF EXISTING WATER MAIN

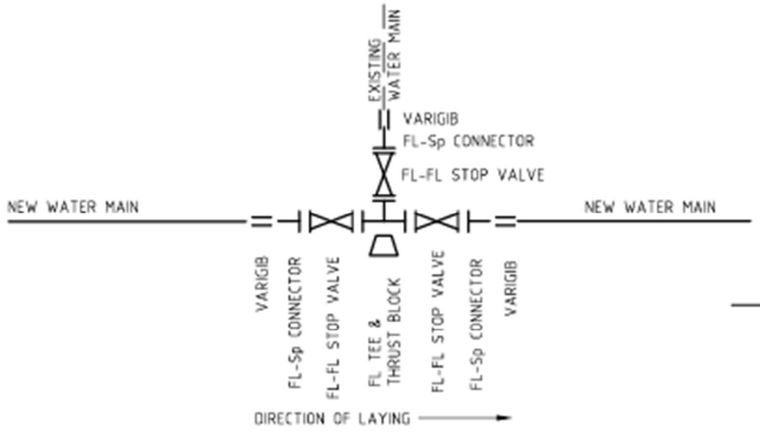


DIAGRAM D

TEE CONNECTION - NEW WATER MAIN TO EXISTING WATER MAIN

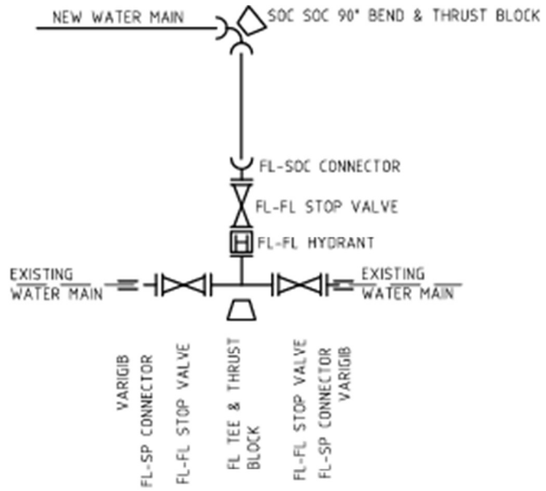


DIAGRAM E

TEE CONNECTION - NEW WATER MAIN TO EXISTING MAIN ON DIFFERENT ALIGNMENT

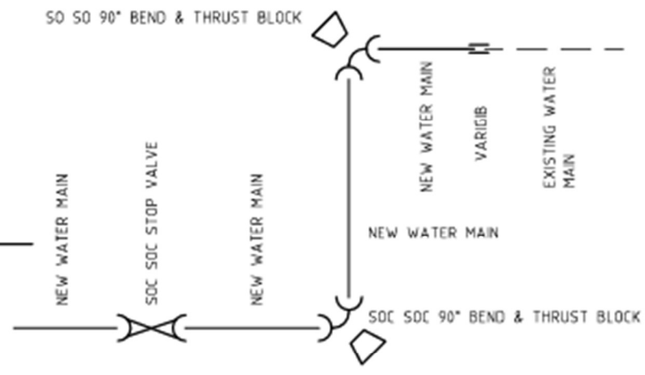
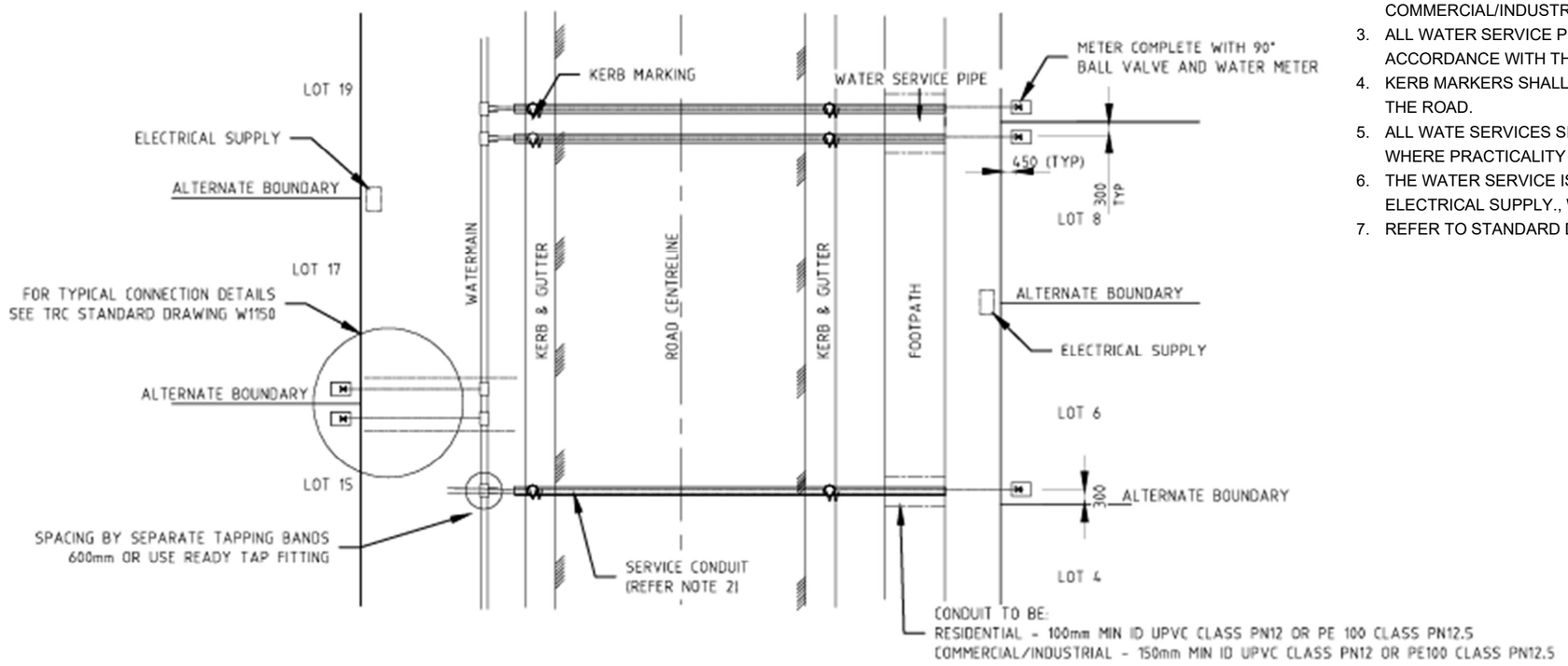


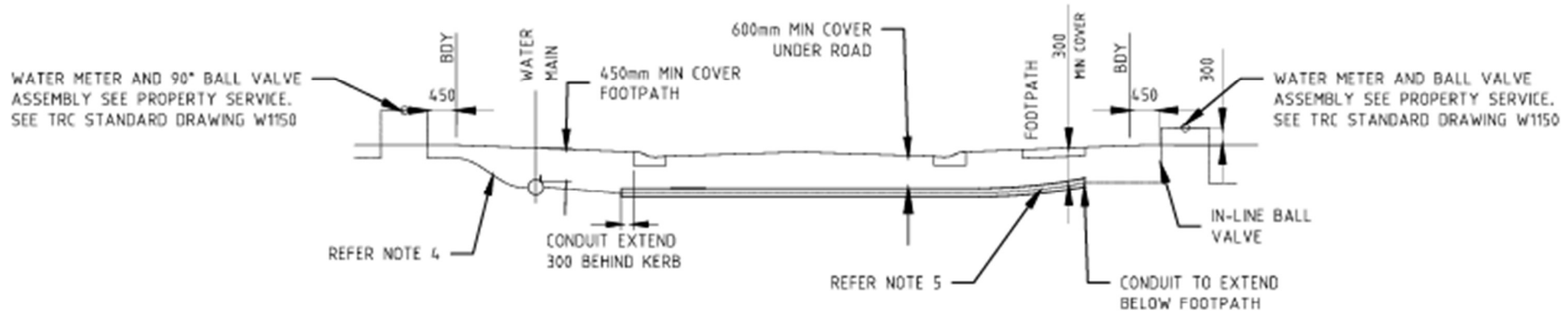
DIAGRAM F

CONNECTION - NEW WATER MAIN TO EXISTING ON DIFFERENT ALIGNMENT

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES MAINS AND CONNECTION – TYPICAL WATERMAIN CONNECTION DIAGRAMS	SHEET No. SD 1101 REVISION: - SHEET Sheet 3 of 5



TYPICAL PLAN

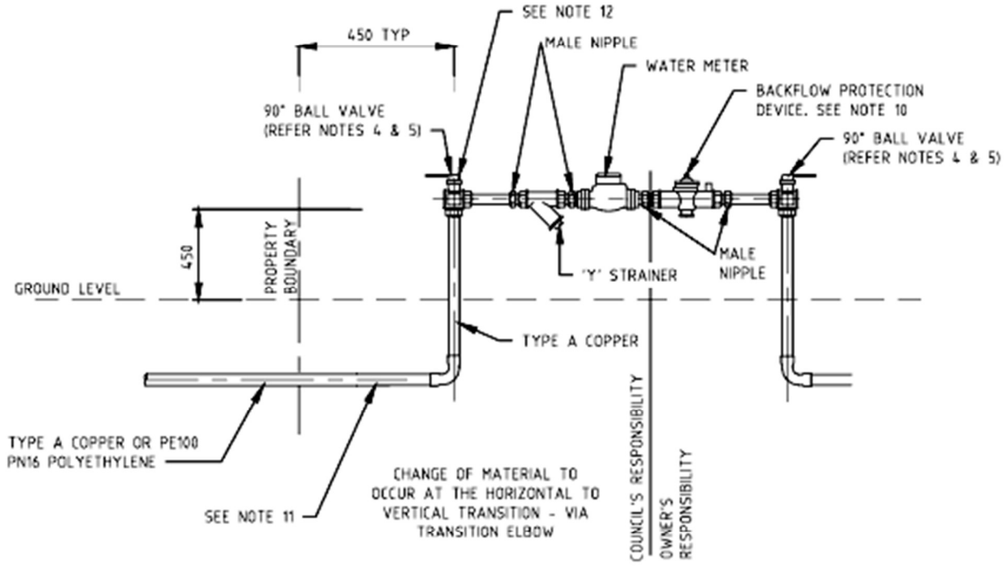


TYPICAL SECTION

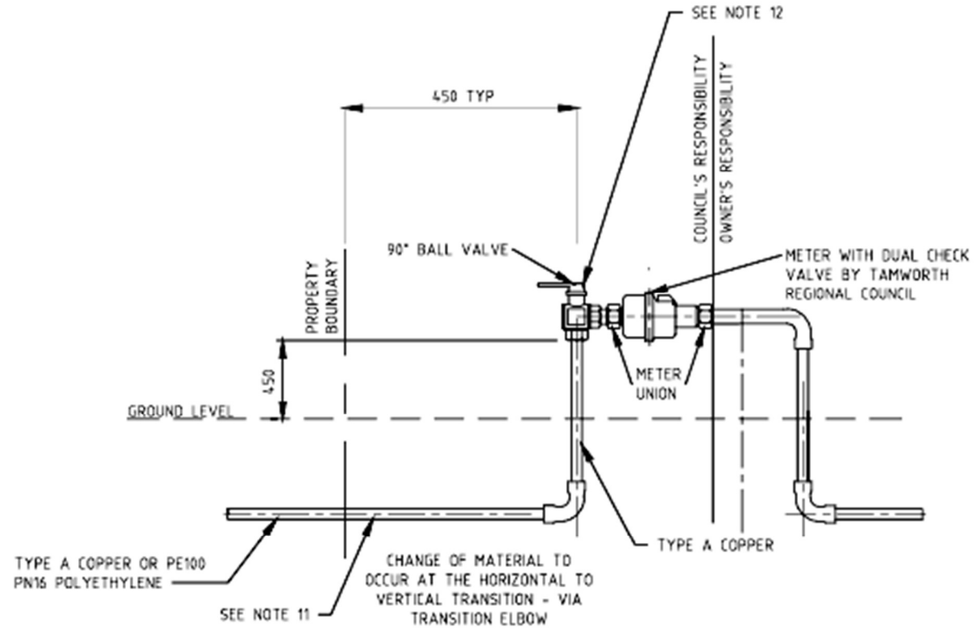
NOTES

1. ALL WATER SERVICES SHALL HAVE UPVC CONDUIT WHEN LOCATED WITHIN THE ROAD PAVEMENT OR UNDER A FOOTPATH.
2. WATER SERVICE CONDUITS UNDER HE ROAD PAVEMENT SHALL BE UPVC CLASS 12 OR PE100 CLASS 12.5. CONDUIT TO HAVE 600mm COVER UNDER ROAD PAVEMENT, AND TO BE 100mm MIN ID FOR RESIDENTIAL SERVICES, AND 150mm MIN ID FOR COMMERCIAL/INDUSTRIAL SERVICES. CONDUITS TO EXTEND BELOW FOOTPRINTS.
3. ALL WATER SERVICE PIPEWORK AND ASSOCIATED FITTINGS SHALL BE JOINTED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.
4. KERB MARKERS SHALL BE SET IN THE KERB TO MARK THE LINE OF CONDUIT CROSSING THE ROAD.
5. ALL WATE SERVICES SHALL BE ALIGNED AT 90^0 TO THE PROPERTY BOUNDARY UNLESS WHERE PRACTICALITY DOES NOT ALLOW.
6. THE WATER SERVICE IS TO BE LOCATED ON THE OPPOSITE SIDE OF THE LOT TO THE ELECTRICAL SUPPLY., WHERE POSSIBLE.
7. REFER TO STANDARD DRAWING SD1102.

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES MAINS AND CONNECTION – PROPERTY SERVICE LAYOUT DN50 OR SMALLER SERVICES	SHEET No. SD 1101 REVISION: - SHEET Sheet 4 of 5



20/25/32mm COMMERCIAL/INDUSTRIAL WATER METER
NO FIRE HOLE REELS

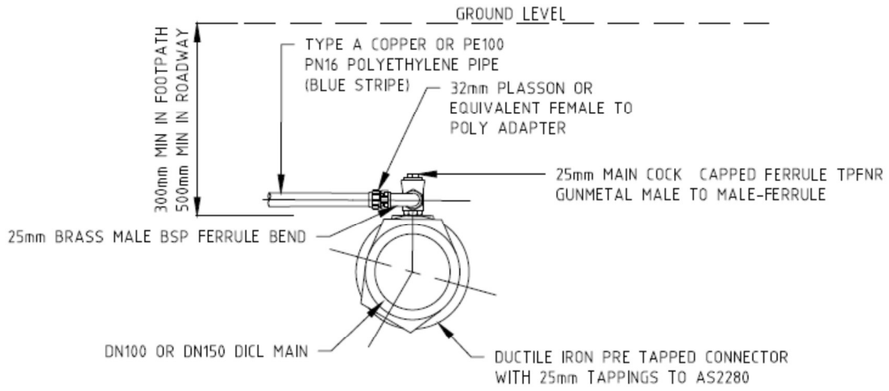


20/25 DOMESTIC WATER METER

NOTES

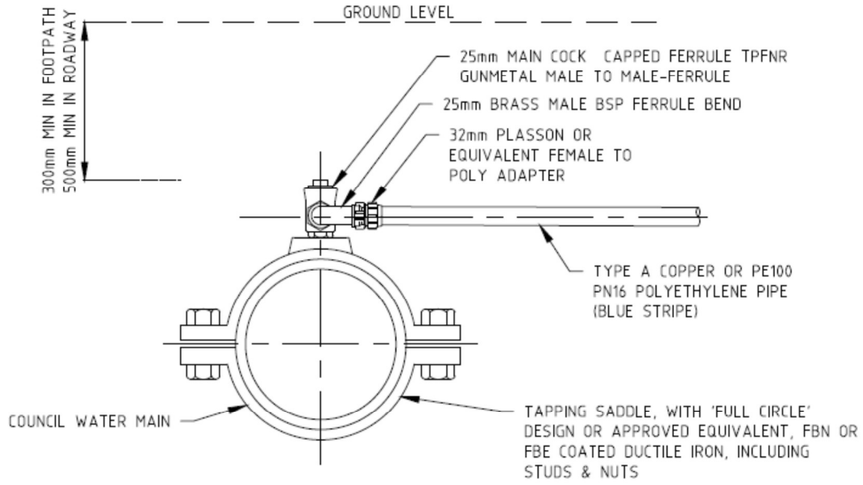
1. ALL DIMENSIONS IN MILLIMETRES.
2. DO NOT SCALE
3. REFER SD1101 FOR SERVICE LAYOUT DETAILS, SERVICE CONDUIT DETAILS AND CONNECTION DETAILS
4. ANY LINE TAKEN OFF THE SUPPLY SHALL REQUIRE ADDITIONAL BACKFLOW PREVENTION DEVICE INSTALLED AT THE ZONE CONNECTION POINT AND DUPLICATED AT THE BOUNDARY DEVICE
5. TEMPORARY SUPPORT FOR METER INSTALLATION TO BE PROVIDED PRIOR TO PRIVATE PLUMBERS CONNECTION
6. END CAP BALL VALVE TO BE INSTALLED WITH END CAP AT END OF SERVICE LINE
7. DOUBLE CHECK VALVE REQUIRED FOR 32mm METERS AND ABOVE – AS A MINIMUM BACKFLOW PREVENTION DEVICE
8. ALL PE FITTINGS TO BE PN16ELECTROFUSION COUPLINGS OR BUTT-WELDED FITTINGS OR MECHANICAL COUPLINGS TO AS/NZS4129. NOT COMPRESSION FITTINGS WILL BE PERMITTED
9. TRACER WIRE REQUIRED FOR ALL PE SERVICES TERMINATING/CONNECTED TO METAL COMPONENTS AT EACH END
10. BACKFLOW PROTECTION DEVICE AS PER NCC VOLUME 3 – SECTION B BOUNDARY PROTECTION
11. MIN SERVICE SIZE TO BE 25mm TYPE A COPPER OR DN32 PE100 PN16
12. CHANGE OF SERVICE SIZE TO OCCUR AFTER BALL VALVE

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES MAINS AND CONNECTION – PROPERTY SERVICES CONNECTION TO MAIN	SHEET No. SD 1101 REVISION: - SHEET Sheet 5 of 5



PRE-TAPPED CONNECTION

UP TO 25mm DN100 OR DN150 MAIN



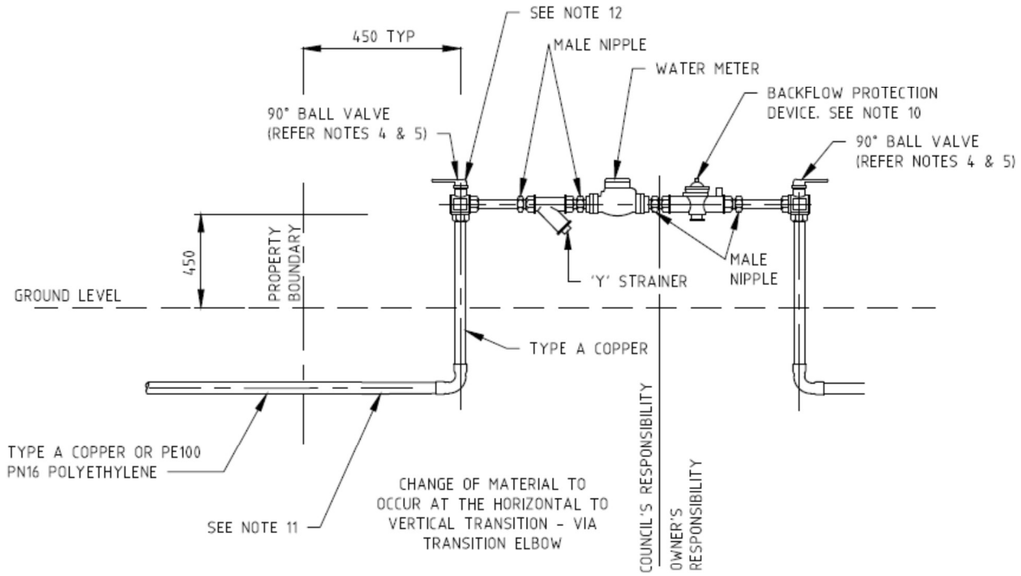
TAPPING SADDLE CONNECTION

UP TO 50mm COPPER TO ANY SIZE MAIN (EXCLUDES MILD STEEL PIPES)

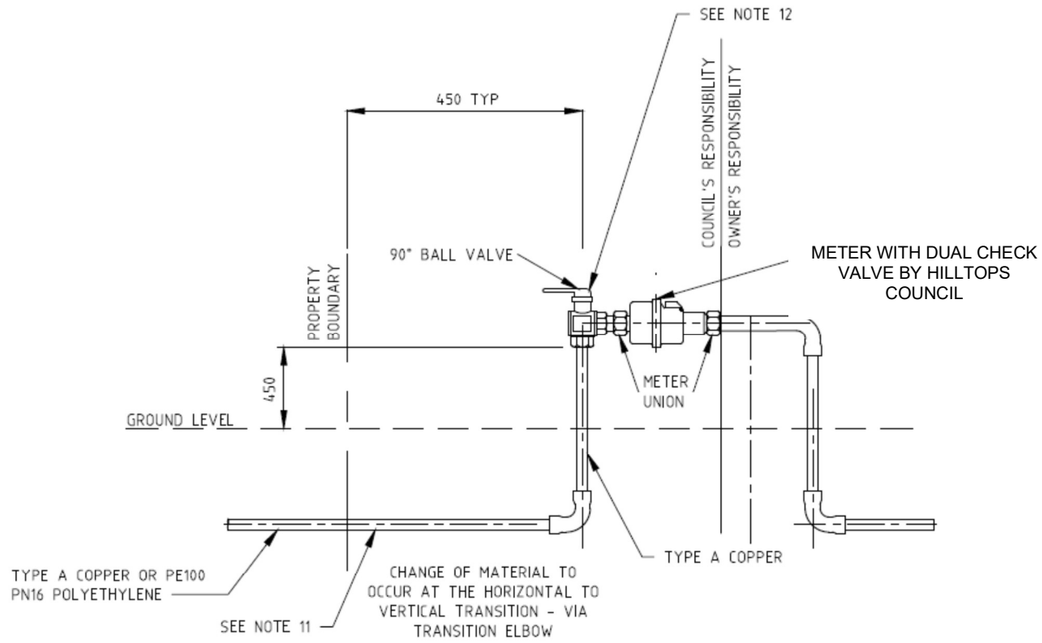
NOTES

1 ALL DIMENSIONS IN MILLIMETRES
2 DO NOT SCALE
3 REFER TO STANDARD DRAWING SD 1101
4 COPPER PIPE TO BE TYPE A
5 WHERE THERE IS A PAVEMENT OF ANY SORT OVER A WATERMAIN SERVICE TAPPING. A CAST IRON OR PLASTIC BOX WILL BE REQUIRED IN TEH PAVEMENT DIRECTLY OVER THE TAPPING VALVE
6 ALL PE FITTINGS TO BE PN16 ELECTROFUSION COUPLING OR BUTT-WELDED FITTINGS OR MECHANICAL COUPLINGS TO AS/NZS4129. NO COMPRESSION FITTINGS WILL BE PERMITTED

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES SERVICE DETAILS – DN20, DN25 & DN32 PROPERTY SERVICE DETAILS	SHEET No. SD 1102 REVISION: - SHEET Sheet 1 of 6



20/25/32mm COMMERCIAL/INDUSTRIAL WATER METER
NO FIRE HOLE REELS

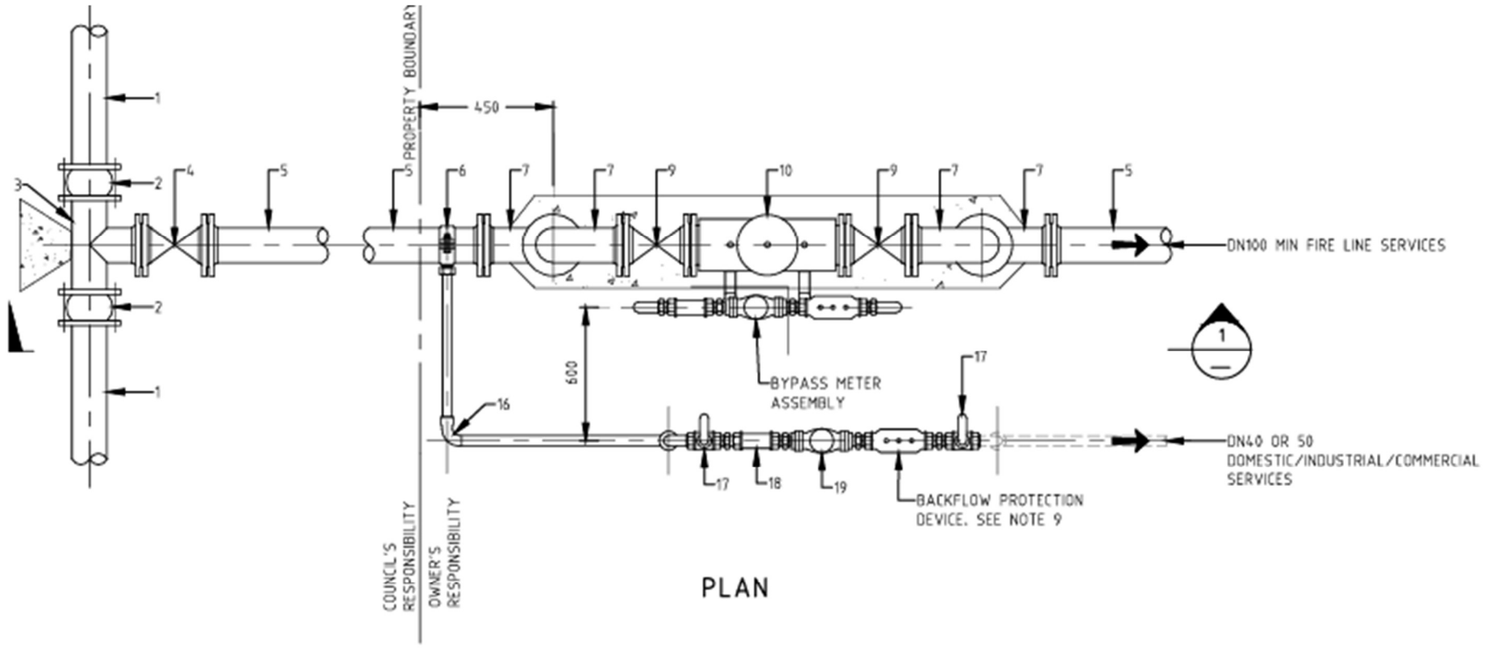


20/25 DOMESTIC WATER METER

NOTES

1. ALL DIMENSIONS IN MILLIMETRES
2. DO NOT SCALE
3. REFER TO STANDARD DRAWING SD1101 FOR SERVICE LAYOUT DETAILS, SERVICE CONDUITS DETAILS AND CONNECTION DETAILS
4. ANY LINE TAKEN OFF THE SUPPLY SHALL REQUIRE ADDITIONAL BACKFLOW PREVENT DEVICES INSTALLED AT THE ZONE CONNECTION POINT AND DUPLICATED AT THE BOUNDARY DEVICE
5. TEMPORARY SUPPORT FOR METER INSTALLATION TO BE PROVIDED PRIOR TO PRIVATE PLUMBERS CONNECTION
6. END CAP BALL VALVE TO BE INSTALLED WITH END CAP AT END OF SERVICE LINE
7. DOUBLE CHECK VALVE REQUIRED FOR 32mm METERS AND ABOVE – AS A MINIMUM BACKFLOW PREVENTION DEVICE
8. ALL PE FITTINGS TO BE PN16 ELECTROFUSION COUPLINGS OR BUTT- WELDED FITTINGS OR MECHANICAL COUPLINGS TO AS/NZS4129. NO COMPRESSION FITTINGS WILL BE PERMITTED
9. TRACER WIRE REQUIRED FOR ALL PE SERVICES TERMINATING/CONNECTED TO METAL COMPONENTS AT EACH END
10. BACKFLOW PROTECTION DEVICE AS PER NCC VOLUME 3 – SECTION B BOUNDARY PROTECTION
11. MIN SERVICE SIZE TO BE 25mm TYPE COPPER OR DN32 PE100 PN16
12. CHANGE OF SERVICE SIZE TO OCCUR AFTER BALL VALVE

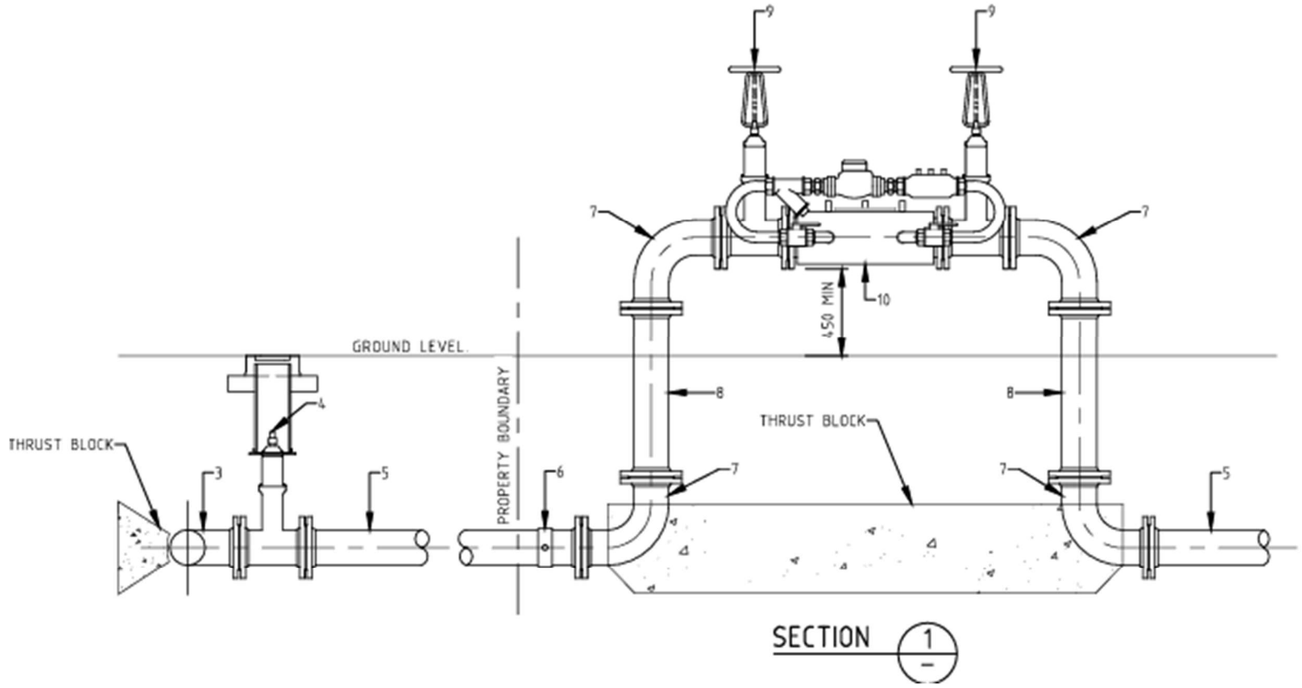
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PLAN

TABLE 1 - FITTING SCHEDULE

ITEM	DESCRIPTION	NO.
1	COUNCIL WATER MAIN	
2	MULTIFIT GIBAULT WITH S/S NUTS AND BOLTS	2
3	DICL TEE SP/SP/FL	1
4	SLUICE VALVE FL/FL. RESILIENT SEATED	1
5	DICL PIPE DN100 MIN	
6	TAPPING BAND	1
7	DICL 90° BEND FL/FL	4
8	DICL PIPE PIECE FL/FL	2
9	RISING SPINDLE SLUICE VALVE FL/FL, RESILIENT SEATED	2
10	DOUBLE DETECTOR CHECK VALVE WITH 40mm METERED BYPASS (35kPa 1st CHECK ASSEMBLY)	1
16	TYPE 'A' COPPER TUBE AND BENDS	1
17	BALL VALVE	1
18	'Y' STRAINER	1
19	WATER METER	1

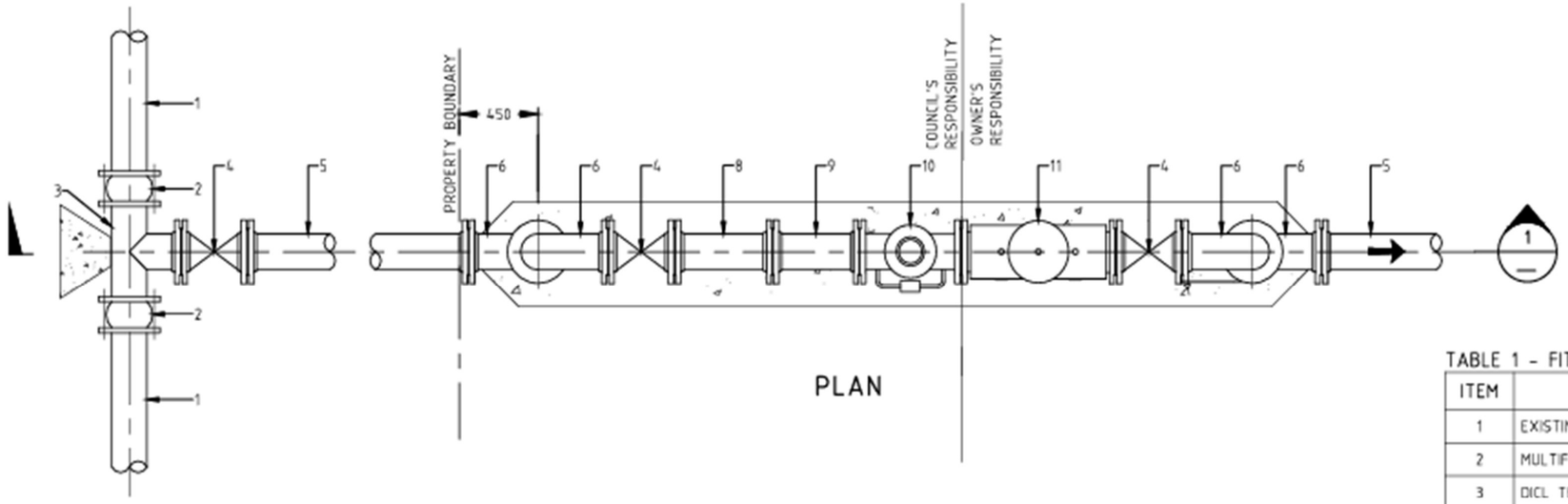


SECTION 1

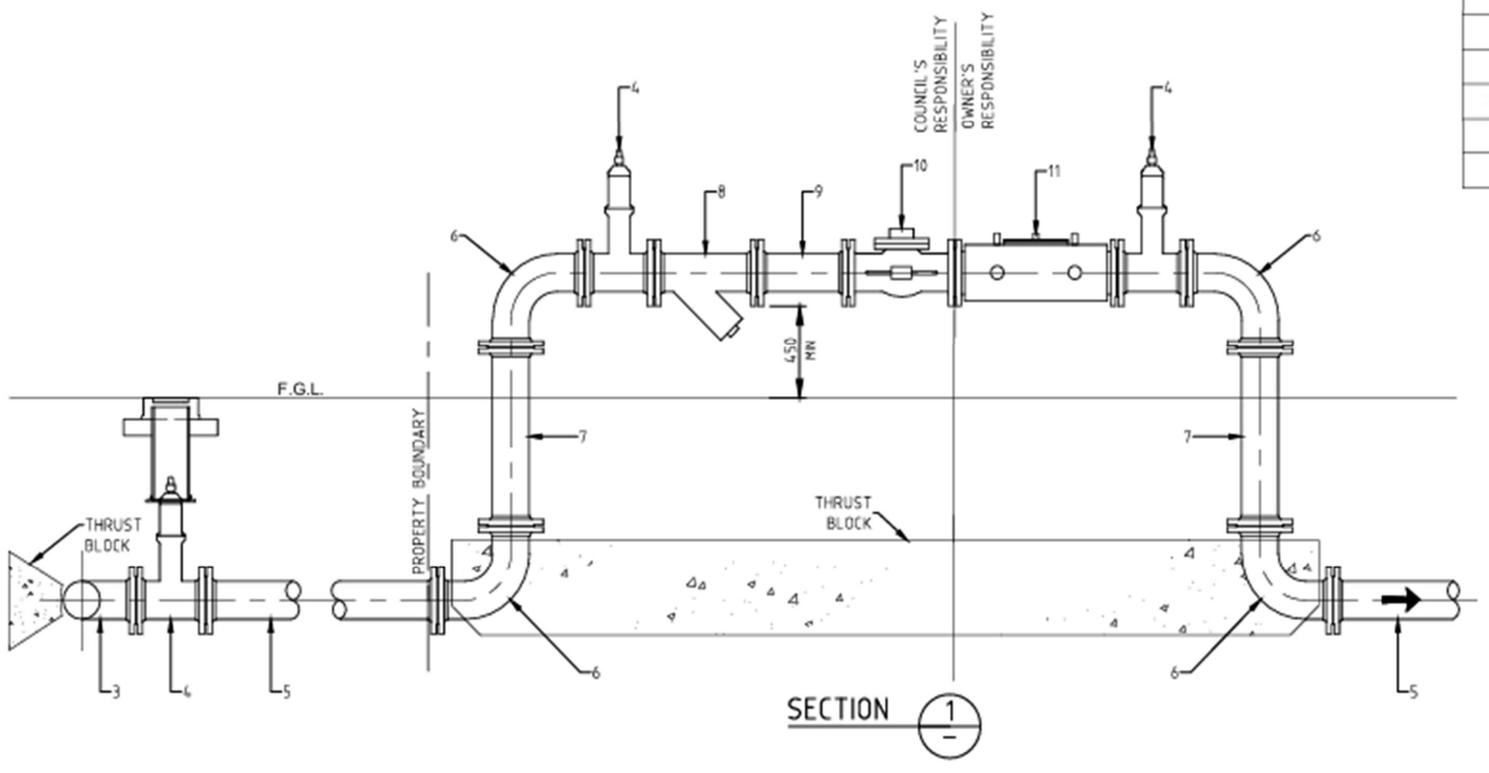
NOTES

1. ALL DIMENSIONS IN MILLIMETRES
2. DO NOT SCALE
3. ANY BRANCH LINE TAKEN OFF THE DOMESTIC SERVICES SHALL REQUIRE AN ADDITIONAL BACKFLOW PREVENTION DEVICE TO BE INSTALLED AT TAKE OFF POINT
4. ALL PIPE FITTINGS TO COMPLY WITH HILLTOPS COUNCIL SPECIFICATIONS, REFER TO TRC STANDARD DRAWING W1152
5. CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING PIPE LENGTHS AND FITTINGS TO ENSURE CONSTRUCTABILITY PRIOR TO ORDERING PIPES AND FITTINGS
6. LOCKED CHAIN TO BE INSTALLED ON VALVES WITH TRC 888 PADLOCK
7. INSTALLATION MUST PROVIDE A MINIMUM OF 600mm CLEARANCE ON ALL SIDES FOR ALL MAINTENANCE FUNCTIONS
8.
9. BACKFLOW PROTECTION DEVICE AS PER NCC VOLUME 3 SECTION B CONTAMINATED/ZONE PROTECTION

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES SERVICE DETAILS – DN50 OR SMALLER PROPERTY SERVICES WITH DN100 OR LARGER FIRE SERVICES	SHEET No. SD 1102 REVISION: - SHEET Sheet 3 of 6



PLAN



SECTION 1

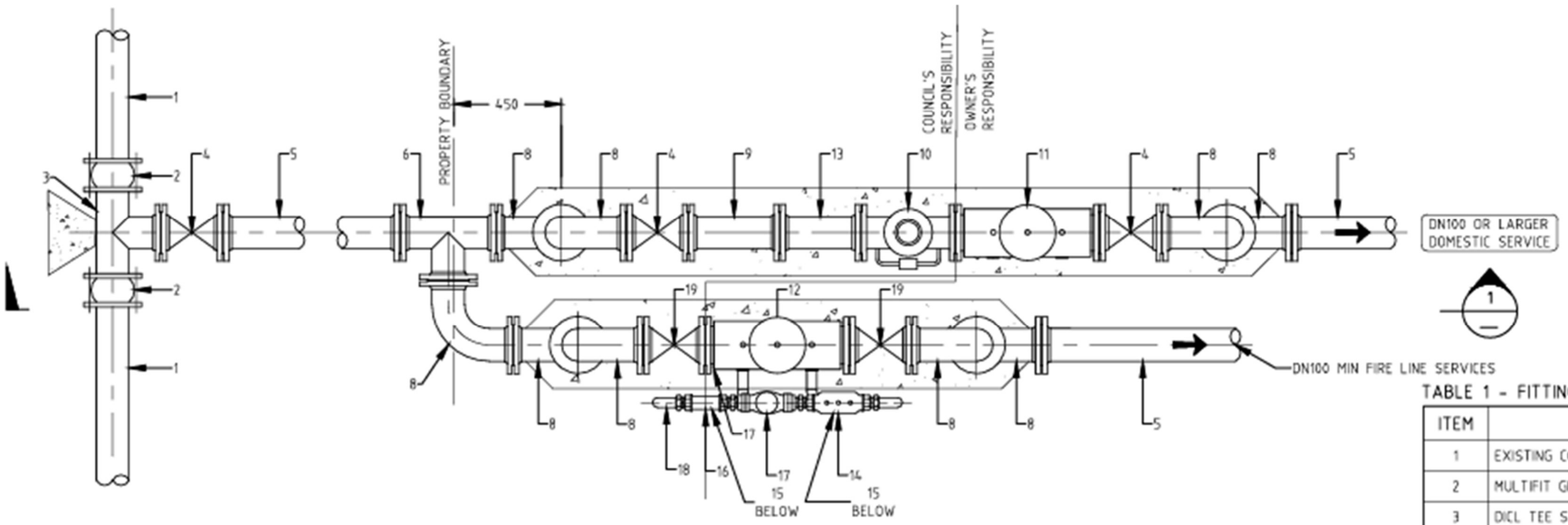
TABLE 1 - FITTING SCHEDULE

ITEM	DESCRIPTION	NO.
1	EXISTING COUNCIL WATER MAIN	
2	MULTIFIT GIBAULT WITH S/S NUTS AND BOLTS	2
3	DICL TEE SP/SP/FL	1
4	SLUICE VALVE FL/FL. RESILIENT SEATED	3
5	DICL PIPE DN 100 MIN	
6	DICL 90° BEND FL/FL	4
7	DICL PIPE PIECE FL/FL	2
8	LINE STRAINER	1
9	DICL PIPE PIECE FL/FL 300mm LONG MIN	1
10	COMBINATION METER WITH 20mm/25mm BYPASS METER	1
11	DOUBLE CHECK VALVE	1

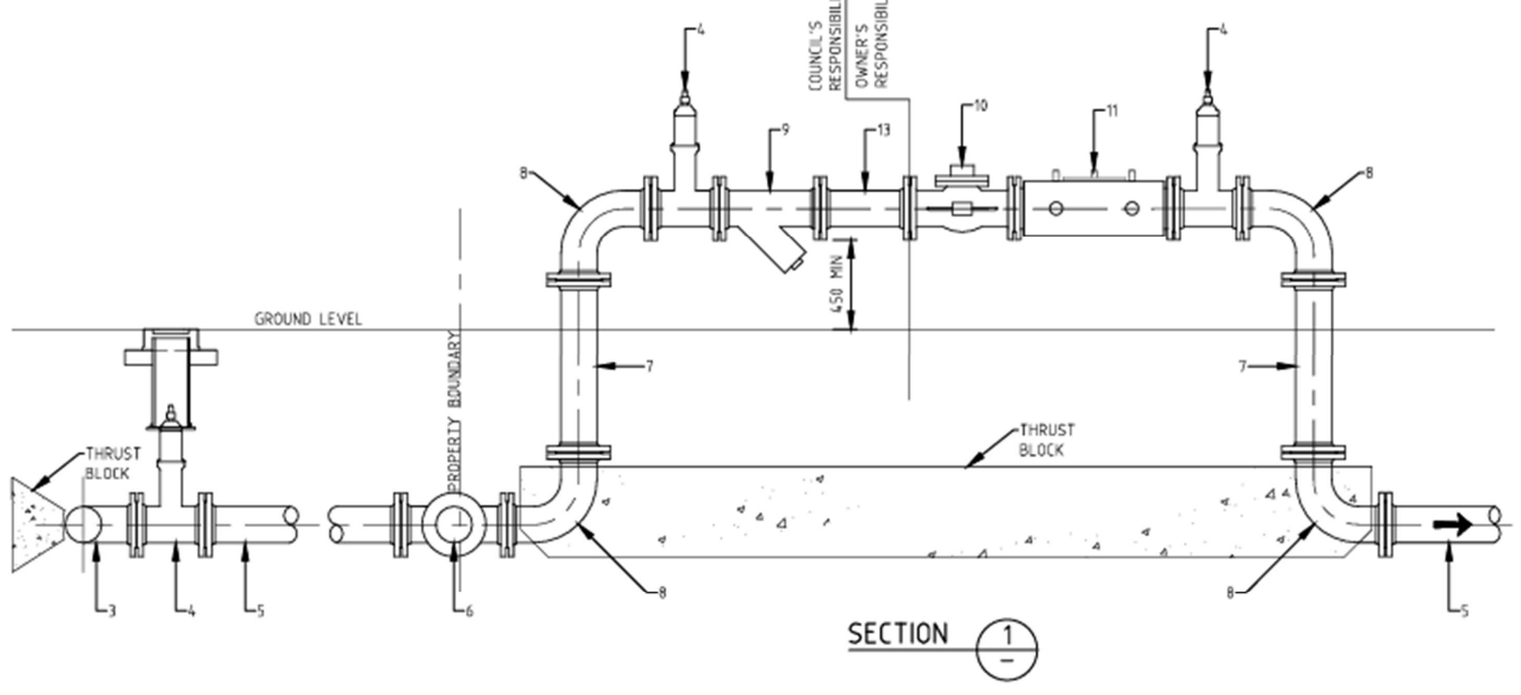
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES
2. DO NOT SCALE
3. ANY BRANCH LINE TAKEN OFF THE DOMESTIC SERVICE SHALL REQUIRE AN ADDITIONAL BACKFLOW PREVENTION DEVICE TO BE INSTALLED AT TAKE OFF POINT
4. ALL PIPE FITTINGS TO COMPLY WITH HILLTOPS COUNCIL SPECIFICATIONS, REFER TO TRC STANDARD DRAWING W1152
5. CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING PIPE LENGTHS AND FITTINGS TO ENSURE CONSTRUCTABILITY PRIOR TO ORDERING PIPES AND FITTINGS.
6. IF THE DOMESTIC & FIRE SERVICES ARE COMBINED THE ISOLATION VALVES ARE TO BE OUTSIDE SCREW & YOLK
7. INSTALLATION MUST PROVIDE A MINIMUM OF 600mm CLEARANCE ON ALL SIDES FOR ALL MAINTENANCE FUNCTIONS
8. **ALL FITTINGS TO BE FBE COATED**

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES SERVICE DETAILS – DN100 OR LARGER PROPERTY SERVICE	SHEET No. SD 1102 REVISION: - SHEET Sheet 4 of 6



PLAN



SECTION 1

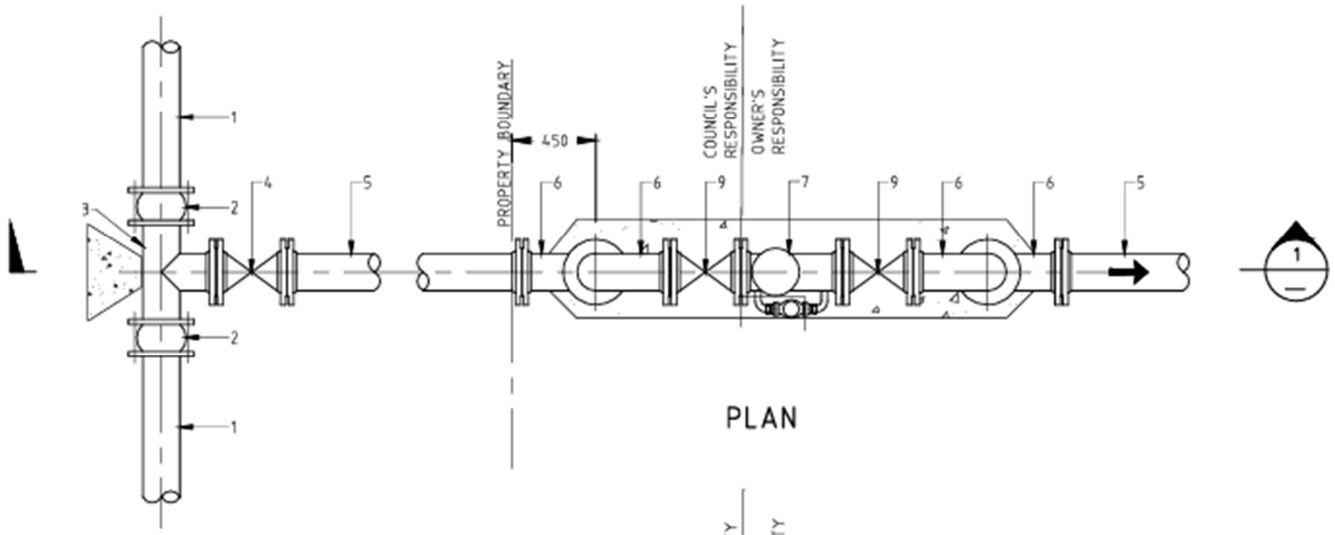
TABLE 1 - FITTING SCHEDULE

ITEM	DESCRIPTION	NO.
1	EXISTING COUNCIL WATER MAIN	
2	MULTIFIT GIBAULT WITH S/S NUTS AND BOLTS	2
3	DICL TEE SP/SP/FL	1
4	SLUICE VALVE FL/FL. RESILIENT SEATED	3
5	DICL PIPE DN 100 MIN	
6	DICL TEE FL/FL/FL	1
7	DICL PIPE PIECE FL/FL	4
8	DICL 90° BEND FL/FL	9
9	LINE STRAINER	1
10	COMBINATION METER	1
11	DOUBLE CHECK VALVE	1
12	DOUBLE DETECTOR CHECK VALUE (35Kpa 1st CHECK ASSEMBLY)	1
13	DICL PIPE PIECE FL/FL 300mm LONG	1
14	40mm DOUBLE CHECK VALVE	1
15	40mm BALL VALVE	2
16	40mm 'Y' STRAINER	1
17	40mm WATER METER	1
18	40mm TYPE 'B' COPPER TUBE	
19	RISING SPINDLE SLUICE VALVE FL/FL, RESILIENT SEATED	2

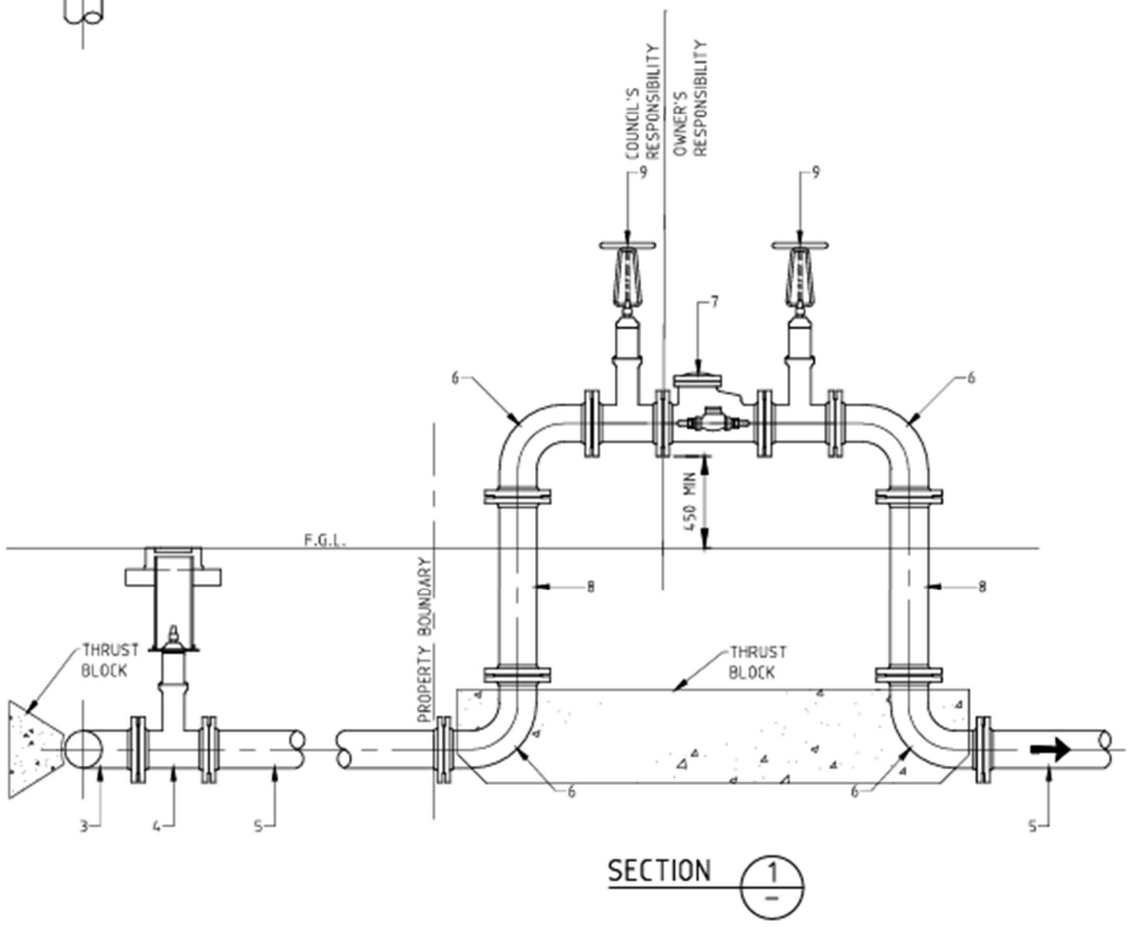
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES
2. DO NOT SCALE
3. ANY BRANCH LINE TAKEN OFF THE DOMESTIC SERVICE SHALL REQUIRE AN ADDITIONAL BACKFLOW PREVENTION DEVICE TO BE INSTALLED AT TAKE OFF POINT
4. ALL PIPE FITTINGS TO COMPLY WITH HILLTOPS COUNCIL SPECIFICATIONS, REFER TO TRC STANDARD DRAWING W1152
5. CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING PIPE LENGTHS AND FITTINGS TO ENSURE CONSTRUCTABILITY PRIOR TO ORDERING PIPES AND FITTINGS.
6. IF THE DOMESTIC & FIRE SERVICES ARE COMBINED THE ISOLATION VALVES ARE TO BE OUTSIDE SCREW & YOLK
7. INSTALLATION MUST PROVIDE A MINIMUM OF 600MM CLEARANCE ON ALL SIDES FOR ALL MAINTENANCE FUNCTIONS
8. ALL FITTINGS TO BE FBE COATED

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES SERVICE DETAILS – DN100 OR LARGER PROPERTY SERVICE WITH DN100 OR LARGER SEPARATE FIRE SERVICE	SHEET No. SD 1102 REVISION: - SHEET Sheet 5 of 6



PLAN



SECTION 1

TABLE 1 - FITTING SCHEDULE

ITEM	DESCRIPTION	NO.
1	EXISTING COUNCIL WATER MAIN	
2	MULTIFIT GIBAULT WITH S/S NUTS AND BOLTS	2
3	DICL TEE SP/SP/FL	1
4	SLUICE VALVE FL/FL. RESILIENT SEATED	1
5	DICL PIPE DN 100 MIN	
6	DICL 90° BEND FL/FL	4
7	SINGLE DETECTOR TOP CHECK VALVE WITH 20mm METERED LOW FLOW BY-PASS	1
8	DICL PIPE PIECE FL/FL	2
9	RISING SPINDLE SLUICE VALVE FL/FL, RESILIENT SEATED	2

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES
2. DO NOT SCALE
3. ANY BRANCH LINE TAKEN OFF THE DOMESTIC SERVICE SHALL REQUIRE AN ADDITIONAL BACKFLOW PREVENTION DEVICE TO BE INSTALLED AT TAKE OFF POINT
4. ALL PIPE FITTINGS TO COMPLY WITH HILLTOPS COUNCIL SPECIFICATIONS
5. CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING PIPE LENGTHS AND FITTINGS TO ENSURE CONSTRUCTABILITY PRIOR TO ORDERING PIPES AND FITTINGS
6. IF THE DOMESTIC & FIRE SERVICES ARE COMBINED THE ISOLATION VALVES ARE TO BE LOCATED OUTSIDE SCREW AND YOLK
7. INSTALLATION MUST PROVIDE A MINIMUM OF 600mm CLEARNCE ON ALL SIDES FOR MAINTENANCE FUNCTIONS
8. ALL FITTINGS TO BE FBE COATED

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES SERVICE DETAILS – DN100 OR LARGER SPRINKLER SERVICE	SHEET No. REVISION: SD 1102 - SHEET Sheet 6 of 6

TABLE 1 - VEHICULAR LOADING

MATERIAL		ZONE	
ROAD SURFACE	VERGE & TRACK		
ROAD SURFACE LAYER	TO MATCH EXISTING	SURFACE COURSE	
TO MATCH EXISTING ROAD BASE OR TO TRC'S PAVEMENT REQUIREMENTS	TO TRC'S REQUIREMENTS (SEE NOTE 7)	ROAD BASE	
TO TRC'S PAVEMENT REQUIREMENTS		SELECT TRENCH FILL	
EMBEDMENT MATERIAL IN ACCORDANCE WITH DESIGN DRAWINGS AND TRC REQUIREMENTS		OVERLAY	EMBEDMENT
		SIDE SUPPORT	
		BEDDING	
		OVER-EXCAVATION	

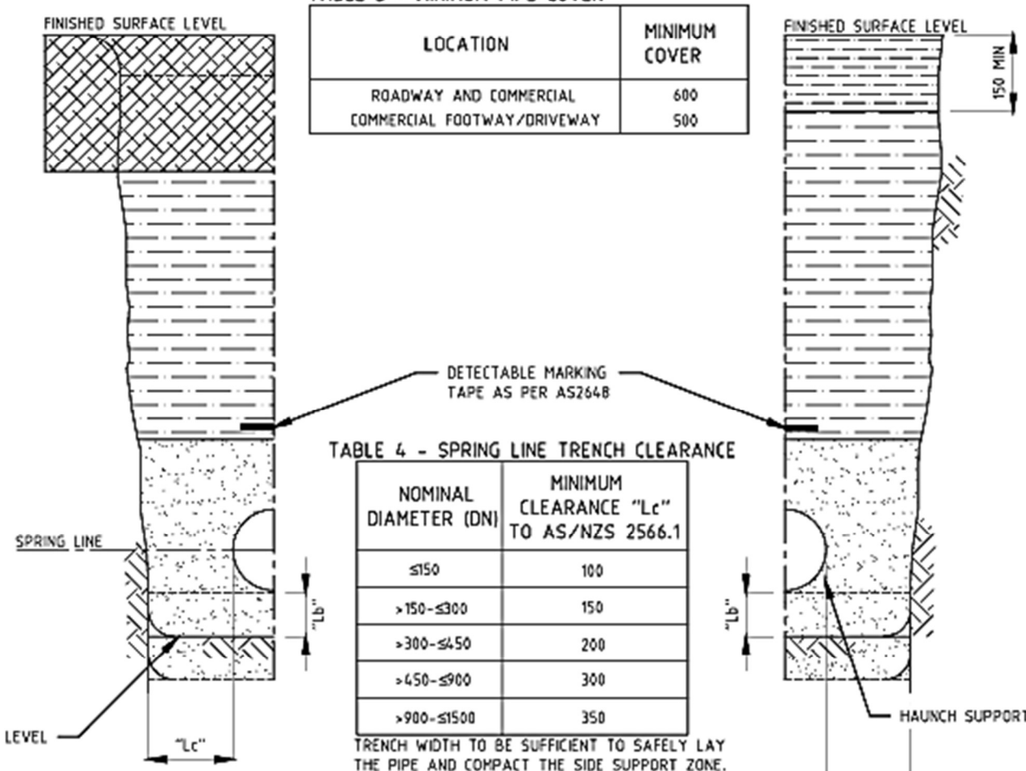


TABLE 3 - MINIMUM PIPE COVER

LOCATION	MINIMUM COVER
ROADWAY AND COMMERCIAL	600
COMMERCIAL FOOTWAY/DRIVEWAY	500

TABLE 4 - SPRING LINE TRENCH CLEARANCE

NOMINAL DIAMETER (DN)	MINIMUM CLEARANCE "Lc" TO AS/NZS 2566.1
≤150	100
>150-≤300	150
>300-≤450	200
>450-≤900	300
>900-≤1500	350

TRENCH WIDTH TO BE SUFFICIENT TO SAFELY LAY THE PIPE AND COMPACT THE SIDE SUPPORT ZONE.

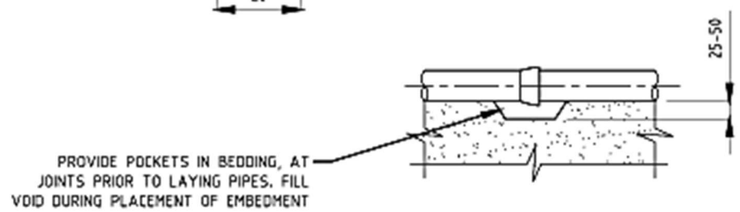
TABLE 2 - NON VEHICULAR LOADING

ZONE		MATERIAL
TOPSOIL OR FOOTWAY SURFACE		ORIGINAL MATERIAL OR IMPORTED MATERIAL OF EQUAL QUALITY
SELECT TRENCH FILL		INORGANIC SELECT FILL WITH 75 MAXIMUM STONE SIZE
EMBEDMENT	OVERLAY	EMBEDMENT MATERIAL IN ACCORDANCE WITH DESIGN DRAWINGS AND TRC REQUIREMENTS
	SIDE SUPPORT	
	BEDDING	
OVER-EXCAVATION		

NOTE
THIS TABLE INCLUDES LOCATIONS WHERE OCCASIONAL VEHICLE LOADING OCCIRS E.G PARKLANDS, FOOTWAYS

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. BEDDING SPECIAL BEDDING SHALL BE SPECIFIED TO SUIT THE CONDITIONS IF THE TRENCH FLOOR HAS:
   IRREGULAR OUTCROPS OF ROCK.
   ALLOWABLE HORIZONTAL BEARING PRESSURE < 50kPa
   UNCONTROLLED GROUND WATER HAS DISTURBED THE FLOOR OF THE TRENCH
3. EMBEDMENT, TRENCH FILL AND COMPACTION TO MEET THE REQUIREMENTS OF HILLTOPS COUNCIL SPECIFICATIONS
4. SIDES OF EXCAVATION TO BE KEPT VERTICAL TO AT LEAST 150 ABOVE THE PIPE.
5. USE GEOTEXTILE FILTER FABRIC WHERE SPECIFIED.
6. COMPACT AND EVENLY GRADE FINISHED TRENCH FLOOR
7. DEPTH OF TRENCH, ROAD DESIGN AND GROUND CONDITIONS WILL VARY FROM SITE TO SITE.
8. SEE SHEET W1251 OR W1252 FOR "Lb" AND "Lc" DIMENSIONS



PIPE JOINT BEDDING POCKETS

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES TRENCH/EMBEDMENT – EMBEDMENT AND TRENCH FILL TYPICAL ARRANGEMENT	SHEET No. SD 1103 REVISION: - SHEET Sheet 1 of 7

MINIMUM DIMENSIONS OF HORIZONTAL THRUST BLOCKS

TABLE 1 - 90° BENDS

NOMINAL DIAMETER D(mm)	LOAD (kN)	MINIMUM BEARING PRESSURE (kPa)	MINIMUM BEARING AREA (m^2)	TYPE	LENGTH L(mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)
100	23.1	50	0.460	B	900	310	200
		100	0.230	B	670	320	130
		200	0.120	A	400	150	160
		400	0.040	A	300	110	160
150	48.9	50	0.980	B	1000	600	400
		100	0.490	B	800	350	250
		200	0.250	B	350	270	190
		400	0.170	A	300	210	190
225	104.4	50	2.090	B	1400	600	700
		100	1.090	B	1000	600	400
		200	0.320	B	700	420	330
		400	0.260	A	500	300	230
250	127.2	50	2.340	*	*	*	*
		100	1.270	B	1500	500	350
		200	0.640	B	920	460	240
		400	0.320	B	530	360	240
300	183.3	50	3.710	*	*	*	*
		100	1.860	*	*	*	*
		200	0.930	B	1000	560	370
		400	0.460	A	800	320	270
375	282.3	50	5.630	*	*	*	*
		100	2.830	*	*	*	*
		200	1.420	B	1200	620	560
		400	0.710	A	900	440	360
450	399.7	50	7.990	*	*	*	*
		100	4.000	*	*	*	*
		200	2.000	B	1540	700	600
		400	1.000	A	1100	510	400
500	488.2	50	9.760	*	*	*	*
		100	4.880	*	*	*	*
		200	2.440	*	*	*	*
		400	1.220	A	1400	450	430
600	691.8	50	13.840	*	*	*	*
		100	6.920	*	*	*	*
		200	3.460	*	*	*	*
		400	1.730	A	1500	670	430

TABLE 2 - 45° BENDS

NOMINAL DIAMETER D(mm)	LOAD (kN)	MINIMUM BEARING PRESSURE (kPa)	MINIMUM BEARING AREA (m^2)	TYPE	LENGTH L(mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)
100	12.5	50	0.250	B	300	300	300
		100	0.130	B	300	230	200
		200	0.070	A	300	110	140
		400	0.030	A	300	110	140
150	26.5	50	0.530	B	700	460	300
		100	0.260	B	500	320	200
		200	0.130	A	400	150	190
		400	0.070	A	300	150	190
225	56.5	50	1.130	B	1000	600	500
		100	1.090	B	1000	600	400
		200	0.320	B	700	420	330
		400	0.260	A	500	300	230
250	68.8	50	1.350	*	*	*	*
		100	0.690	B	800	460	400
		200	0.350	A	600	350	240
		400	0.180	A	400	210	240
300	100.4	50	2.010	*	*	*	*
		100	1.000	B	1000	500	500
		200	0.500	B	800	360	270
		400	0.250	A	800	290	270
375	152.8	50	3.060	*	*	*	*
		100	1.530	B	1400	540	460
		200	0.770	B	840	440	460
		400	0.380	A	550	350	360
450	216.3	50	4.330	*	*	*	*
		100	2.160	*	*	*	*
		200	1.080	B	1200	500	400
		400	0.540	A	650	450	400
500	264.2	50	5.280	*	*	*	*
		100	2.640	*	*	*	*
		200	1.320	A	1200	570	630
		400	0.660	A	750	470	430
600	374.4	50	7.490	*	*	*	*
		100	3.740	*	*	*	*
		200	1.870	*	*	*	*
		400	0.940	A	1100	400	480

TABLE 3 - 22½° BENDS

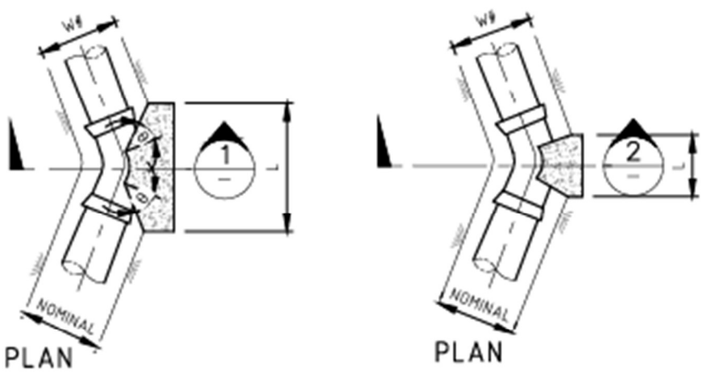
NOMINAL DIAMETER D(mm)	LOAD (kN)	MINIMUM BEARING PRESSURE (kPa)	MINIMUM BEARING AREA (m^2)	TYPE	LENGTH L(mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)
100	6.4	50	0.130	A	400	200	130
		100	0.040	A	200	120	130
		200	0.030	A	200	110	160
		400	0.020	A	200	110	160
150	13.5	50	0.270	A	600	300	160
		100	0.130	A	400	180	160
		200	0.070	A	300	150	190
		400	0.030	A	200	150	190
225	28.8	50	0.540	B	800	380	350
		100	0.290	B	500	280	300
		200	0.150	A	300	270	230
		400	0.070	A	200	180	230
250	33.1	50	0.070	B	900	400	380
		100	0.350	A	600	330	250
		200	0.180	A	400	210	240
		400	0.090	A	250	190	240
300	51.2	50	1.020	B	1100	530	400
		100	0.510	B	800	340	300
		200	0.260	A	500	250	270
		400	0.130	A	300	220	270
375	77.9	50	1.560	B	1300	700	500
		100	0.780	B	900	500	360
		200	0.390	A	650	260	360
		400	0.190	A	300	260	360
450	110.3	50	2.210	B	1200	800	600
		100	1.100	B	1200	520	400
		200	0.550	A	700	400	400
		400	0.280	A	400	300	400
500	134.7	50	2.690	*	*	*	*
		100	1.350	A	1500	450	430
		200	0.680	A	900	330	430
		400	0.340	A	650	330	430
600	190.9	50	3.820	*	*	*	*
		100	1.910	A	1800	600	450
		200	0.960	A	1200	380	480
		400	0.480	A	600	380	480

TABLE 4 - 6°, 11¼° BENDS

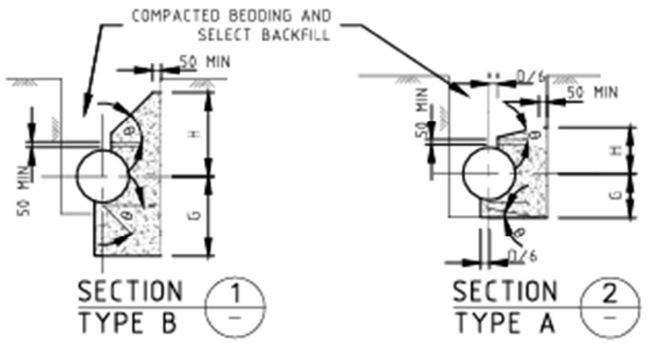
NOMINAL DIAMETER D(mm)	LOAD (kN)	MINIMUM BEARING PRESSURE (kPa)	MINIMUM BEARING AREA (m^2)	TYPE	LENGTH L(mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)
100	3.2	50	0.040	A	200	120	130
		100	0.030	A	200	110	130
		200	0.020	A	200	110	160
		400	0.010	A	200	110	160
150	4.8	50	0.140	A	400	200	160
		100	0.070	A	200	200	160
		200	0.040	A	200	150	190
		400	0.010	A	200	150	190
225	14.3	50	0.290	A	500	340	200
		100	0.140	A	300	280	200
		200	0.070	A	200	180	230
		400	0.040	A	200	180	230
250	17.4	50	0.330	A	600	380	200
		100	0.180	A	300	380	200
		200	0.070	A	200	190	230
		400	0.040	A	200	190	230
300	23.7	50	0.310	A	700	480	240
		100	0.260	A	500	270	240
		200	0.090	A	300	220	270
		400	0.040	A	200	220	270
375	39.2	50	0.780	A	1150	340	360
		100	0.390	A	650	260	360
		200	0.200	A	350	260	360
		400	0.100	A	200	260	360
450	55.4	50	1.110	A	1400	400	400
		100	0.550	A	800	300	400
		200	0.280	A	400	300	400
		400	0.140	A	250	300	400
500	67.7	50	1.350	A	1500	470	430
		100	0.680	A	900	330	430
		200	0.340	A	500	330	430
		400	0.170	A	250	330	430
600	93.9	50	1.920	A	1800	510	500
		100	0.960	A	1200	380	480
		200	0.480	A	600	380	480
		400	0.240	A	300	380	480

* DENOTES THRUST BLOCKS DESIGNED TO SUIT SITE CONDITIONS
℄ DENOTES FLOW LINE

NOTES:
1. REFER TO TRC STANDARD DRAWING W1206 FOR NOTES.
FOR MINIMUM TRENCH WIDTH SEE TRC STANDARD DRAWING W1201

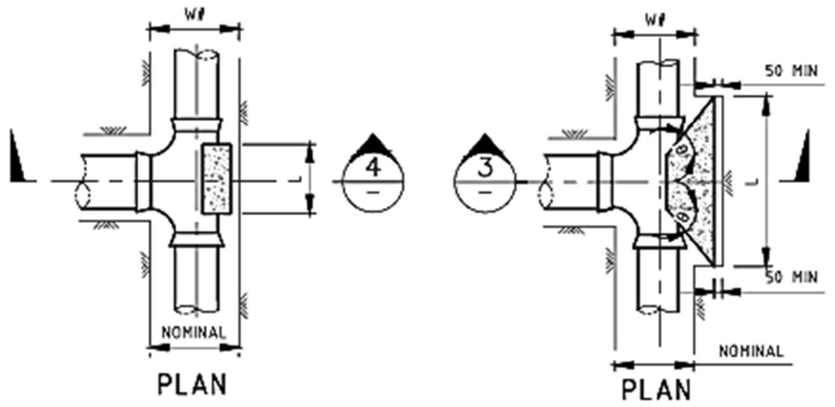


THRUST BLOCKS FOR HORIZONTAL BENDS
NTS

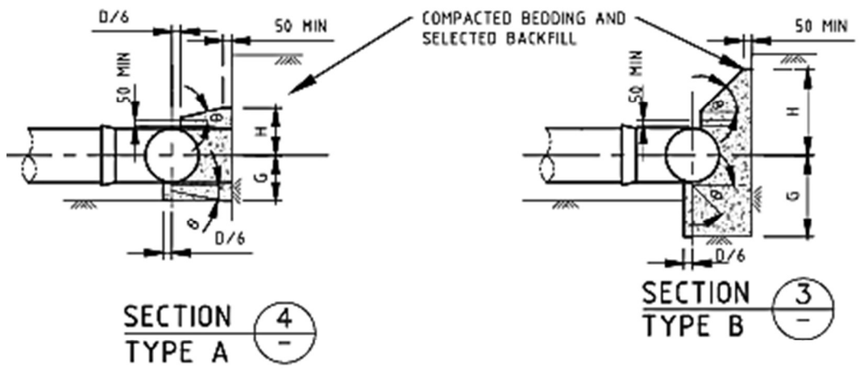


THRUST BLOCKS FOR HORIZONTAL BENDS
NTS

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES TRENCH/EMBEDMENT – CONCRETE THRUST BLOCK DETAILS	SHEET No. SD 1103 REVISION: - SHEET Sheet 2 of 7



THRUST BLOCKS FOR HORIZONTAL TEES
NTS



THRUST BLOCKS FOR HORIZONTAL TEES
NTS

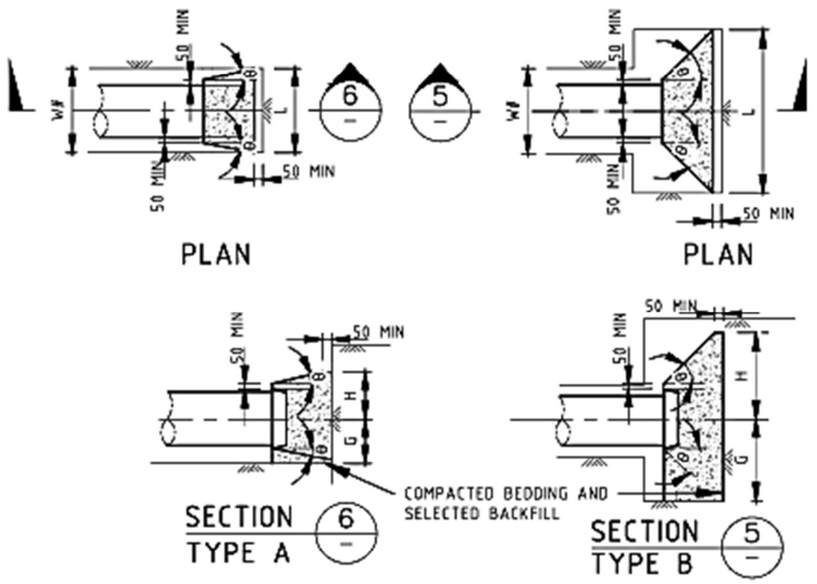
TABLE 1 - TEES, END CAPS & PLUGS

NOMINAL DIAMETER D(mm)	LOAD (kN)	MINIMUM BEARING PRESSURE (kPa)	MINIMUM BEARING AREA (m^2)	TYPE	LENGTH L(mm)	HEIGHT ABOVE ℄ H(mm)	DEPTH BELOW ℄ G(mm)
100	14.3	50	0.330	B	600	320	230
		100	0.140	B	400	300	130
		200	0.120	A	300	150	160
		400	0.040	A	200	120	160
150	34.6	50	0.690	B	800	500	340
		100	0.350	B	500	430	230
		200	0.180	A	400	260	190
		400	0.080	A	300	140	190
225	73.8	50	1.480	B	1200	650	600
		100	0.740	B	800	575	350
		200	0.370	A	600	340	230
		400	0.180	A	400	220	230
250	89.9	50	1.800	*	*	*	*
		100	0.900	B	1000	590	400
		200	0.450	A	700	400	240
		400	0.220	A	400	300	240
300	131.2	50	2.620	*	*	*	*
		100	1.310	B	1200	600	500
		200	0.460	B	930	430	270
		400	0.330	A	500	390	270
375	199.7	50	3.990	*	*	*	*
		100	2.000	*	*	*	*
		200	1.000	B	1200	480	340
		400	0.500	A	700	350	340
450	282.6	50	5.650	*	*	*	*
		100	3.450	*	*	*	*
		200	1.420	B	1100	700	600
		400	1.000	A	800	490	400
500	345.2	50	6.900	*	*	*	*
		100	3.430	*	*	*	*
		200	1.730	*	*	*	*
		400	0.860	A	900	500	430
600	489.2	50	9.780	*	*	*	*
		100	4.890	*	*	*	*
		200	2.450	*	*	*	*
		400	1.220	A	1200	530	480

NOTE NOMINAL DIAMETER FOR TEES REFERS TO BRANCH SITE

℄ DENOTES CENTRELINE

* DENOTES THRUST BLOCKS DESIGNED TO SUIT SITE CONDITIONS



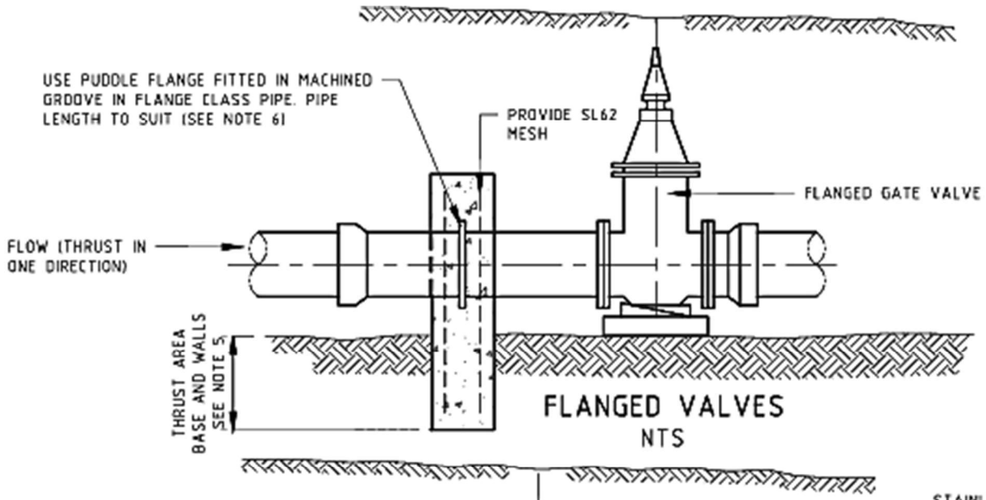
THRUST BLOCK FOR END CAPS AND PLUGS
NTS

NOTES

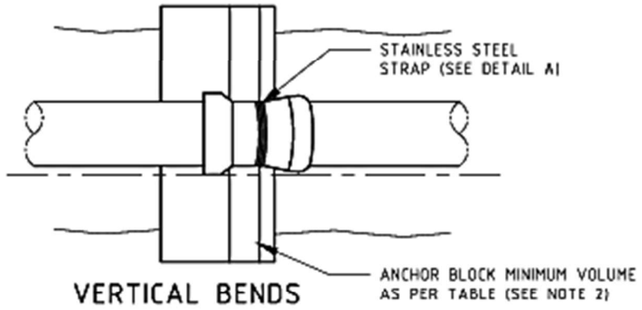
1. THRUST BLOCKS HAVE BEEN DESIGNED BASED ON A MAXIMUM WATER PRESSURE OF 1400kPa (140m HEAD)
2. THRUST BLOCK BEARING AREA TO BE EQUAL TO OR GREATER THAN THAT SHOWN IN THE TABLES
3. THRUST BLOCK DIMENSIONS MAY BE VARIED ONLY WITH TRC AUTHORISED REPRESENTATIVES WRITTEN APPROVAL
4. THRUST BLOCKS ARE FOR MAINS LAID TO STANDARD MINIMUM COVER (500mm) OR GREATER
5. CONCRETE TO BE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 25MPa IN ACCORDANCE WITH AS 1379 AND AS3600
6. THRUST BLOCKS TO BE CAST AGAINST UNDISTURBED GROUND
7. TRENCH WIDTH 'W' TO BE INCREASED WHERE NECESSARY AT THRUST BLOCKS TO KEEP ANGLE θ LESS THAN 45°
8. POLYETHLENE PIPE WRAPPING TO BE CONTINUOUS THROUGH THRUST BLOCKS
9. THRUST BLOCKS TO BE BASED ON 50kPa BEARING PRESSURE UNLESS OTHERWISE NOMINATED.
10. REFERENCE SHOULD BE MADE TO THE TRC'S AUTHORISED REPRESENTATIVE IF NOMINATED BEARING PRESSURE IS UNOBTAINABLE
11. MINIMUM BEARING PRESSURE GUIDANCE
    50kPa = SOIL (CLAY-SILT)
    100kPa = SOIL (GRAVELLY)
    200kPa = ROCK (WEATHERED)
    400kPa = ROCK
12. ALL FITTINGS SHALL BE PE WRAPPED. WHERE FLANGED CONNECTIONS ARE ADOPTED, THE BOLT ASSEMBLY SHALL ALSO BE PE WRAPPED.
13. THRUST BLOCKS MUST REMAIN CLEAR FROM ALL CONNECTIONS SP/SO AND FL

FOR MINIMUM TRENCH WIDTH SEE TRC STANDARD DRAWING W1201

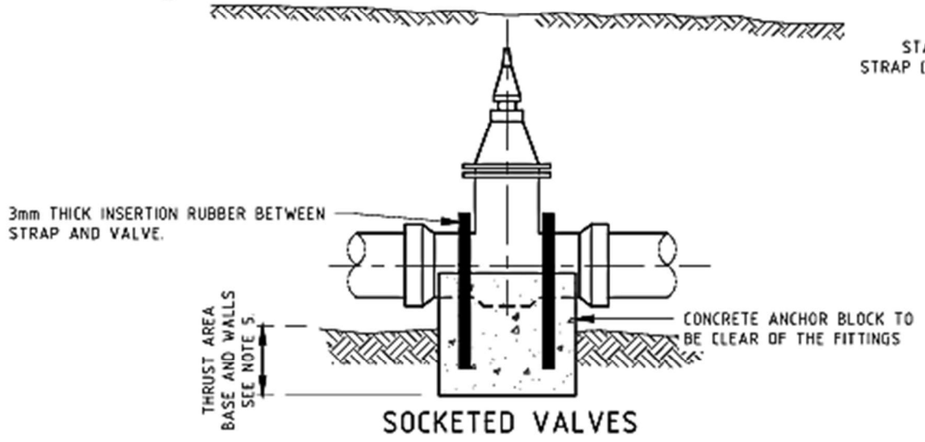
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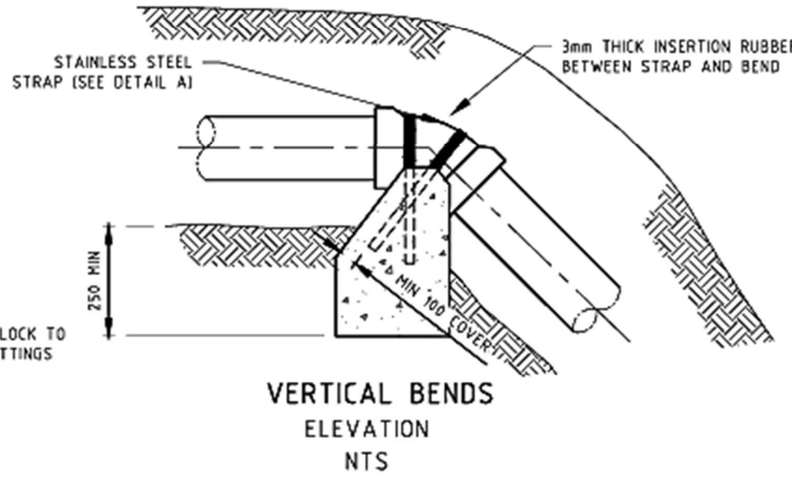
FLANGED VALVES
NTS



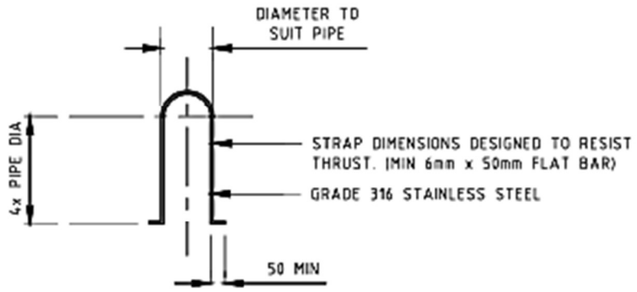
VERTICAL BENDS
PLAN
NTS



SOCKETED VALVES
NTS



VERTICAL BENDS
ELEVATION
NTS



DETAIL A
STAINLESS STEEL STRAP
NTS

TABLE 1 - MINIMUM RESTRAINT BLOCK VOLUME FOR ANCHORAGE OF VERTICAL COMPONENT OF THRUST

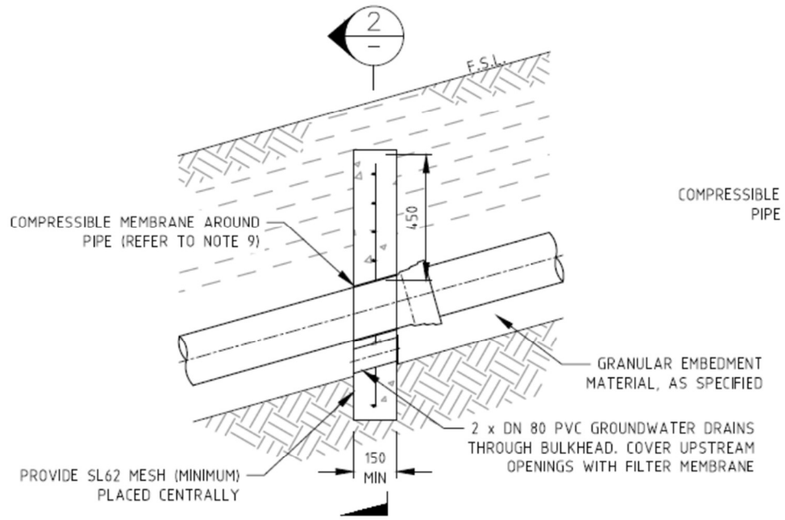
PIPE DN	TYPICAL PIPE OD	CONCRETE VOLUME m^3		
		11.25° BEND	22.5° BEND	45° BEND
100	122	0.14	0.27	0.5
150	177	0.29	0.57	1.06
200	232	0.5	0.98	1.82
225	259	0.63	1.23	2.27
250	286	0.76	1.50	2.76
300	345	1.11	2.18	4.02
375	426	1.69	3.32	6.13
450	507	DETAILED DESIGN REQUIRED (ALTERNATIVE METHODS TO BE CONSIDERED)		
500	560			
600	667			
750	826			

NOTES
1. ALL DIMENSIONS IN MILLIMETRES UNLESS SHOWN.
2. ANCHOR BLOCKS IN TABLE 1 ARE DESIGNED FOR A MAXIMUM WATER PRESSURE OF 1400kPa (140m HEAD)
3. IN CALCULATING THE CONCRETE VOLUME FOR THE RESTRAINT BLOCK NO CONTRIBUTION FROM THE SELF WEIGHT OF THE PIPELINE, WATER OR OVERLYING SOIL HAS BEEN INCLUDED
4. WHERE DI PIPES AND FITTINGS WITH RESTRAINED JOINTS ARE USED THRUST BLOCKS ARE NOT REQUIRED (REFER MANUFACTURERS REQUIREMENTS)
5. THRUST BLOCK REINFORCEMENT AS SPECIFIED IN DESIGN DRAWINGS
6. WHERE SPECIFIED PROVIDE CONCRETE THRUST BLOCKS FOR SOC-SOC VALVES THRUST AREA TO BE AS FOR DEAD ENDS AS SHOW IN SD1103
7. INSTALL PUDDLE FLANGES ON FLANGE CLASS DICL PIPE
8. DESIGN OF ANCHOR BLOCKS AT VERTICAL BENDS TO INCLUDE ALLOWANCE FOR THE HORIZONTAL COMPONENT OF THRUST. NOTE THAT BEARING AREAS AS PER SD1103 MAY NOT BE APPROPRIATE

ANCHOR BLOCK CONSTRUCTION NOTES

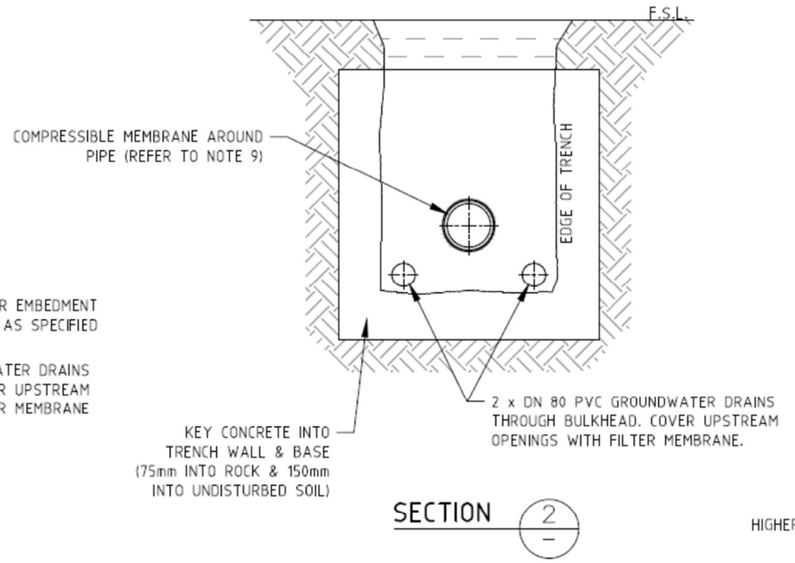
- LOCATE ANCHOR BLOCK CENTRALLY AROUND BEND.
- KEY ANCHOR BLOCK INTO BASE OF TRENCH A MINIMUM DEPTH OF 250.
- POUR CONCRETE AGAINST A SOLID EXCAVATION FACE.
- CONCRETE TO BE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 25MPa IN ACCORDANCE WITH AS1379 AND AS3600
- KEEP CONCRETE CLEAR OF ALL BOLTS, NUTS AND PIPE JOINTS.

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES TRENCH EMBEDMENT – CONCRETE THRUST BLOCK DETAILS	SHEET No. SD 1103 REVISION: - SHEET Sheet 4 of 7

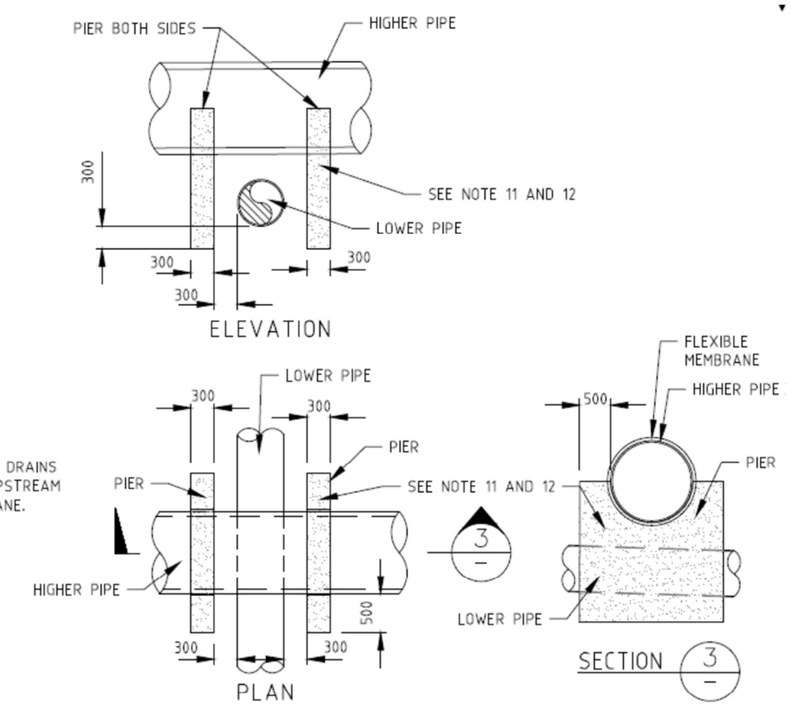


CONCRETE BULKHEAD
DETAILS

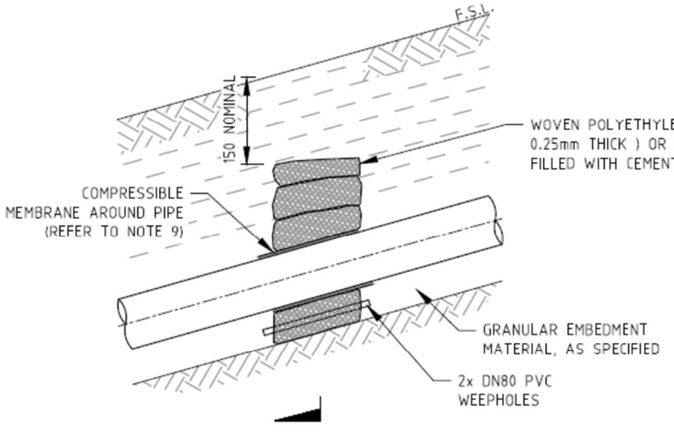
NOTE:
BULKHEAD TO BE ADOPTED FOR WATER MAIN GRADES BETWEEN 15% TO 29%



SECTION 2

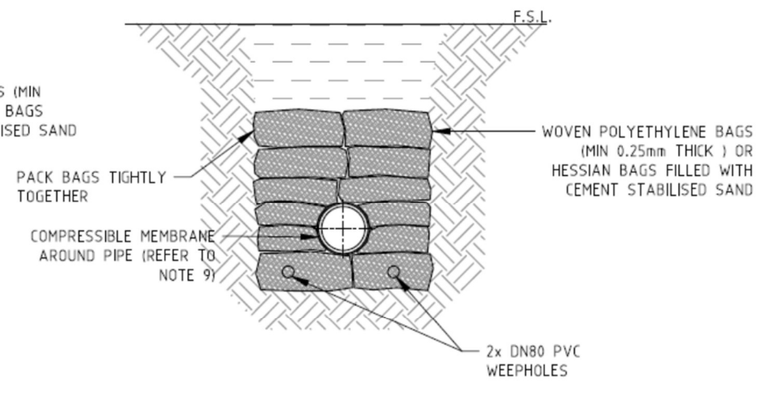


MASS CONCRETE PIER
TYPICAL DETAIL



TRENCH STOP
DETAIL

NOTE:
TRENCH STOP TO BE ADOPTED FOR WATER MAIN GRADES GREATER THAN 10%

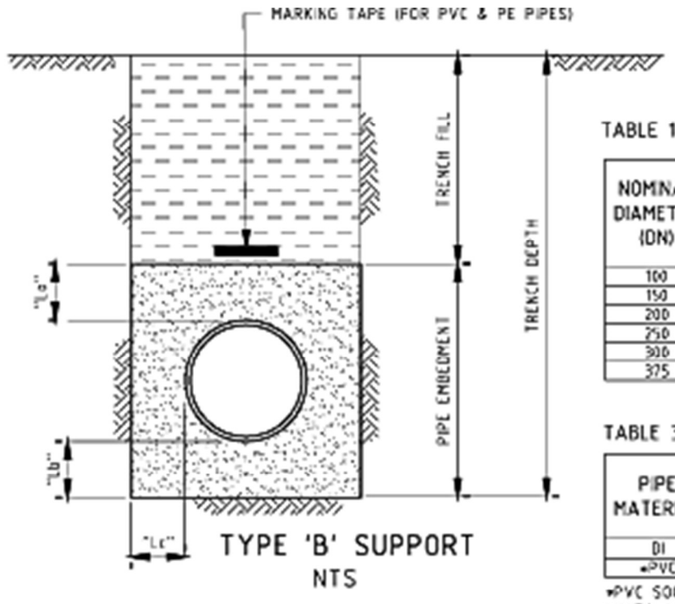


SECTION 1

NOTES.

1. ALL DIMENSIONS IN MILLIMETRES
2. CONSTRUCT CONCRETE BULKHEADS AND TRENCH STOPS AT LOCATIONS & SPACING SPECIFIED IN THE DESIGN DRAWINGS AND PART 4 ENGINEERING DESIGN MINIMUM STANDARDS FOR SUBDIVISIONS AND DEVELOPMENTS
3. BULKHEAD AT RETAINING WALL TO BE UNDER WALL
4. KEY CONCRETE BULKHEADS INTO SIDES AND BOTTOM OF TRENCH AGAINST A BEARING SURFACE OF UNDISTURBED SOIL
5. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 25MPa
6. DO NOT DEFORM PIPES DURING PLACEMENT OF CONCRETE
7. SEAL BAGS TO PREVENT LEAKAGE OF CONTAINED MATERIAL
8. PROVIDE A CONTINUOUS DRAINAGE PATH
   - THROUGH BULKHEADS AND TRENCH STOPS
   - AROUND VALVE CHAMBERS
   - TRENCH DRAINAGE TO BE PROVIDED
9. COMPRESSIBLE MEMBRANE AROUND PIPE TO BE 3mm THICK RUBBER FOR BULKHEADS AND TRENCH STOPS ON SLOPES
10. FOR SLOPES >30% CONTINUOUSLY ENCASE THE PIPE TO PREVENT MOVEMENT AND TRANSFER OF GROUND WATER. WRAP JOINTS TO PREVENT DAMAGE TO RRJ
11. THE REQUIREMENTS FOR A MASS CONCRETE PIER SHALL BE NOMINATED BY THE DESIGN ENGINEER
12. FLEXIBLE MEMBRANE REQUIRED BETWEEN ALL PIPE AND CONCRETE INTERFACES

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES TRENCH EMBEDMENT – THRUST AND ANCHOR BLOCK DETAILS GATE VALVES AND VERTICAL BENDS	SHEET No. SD 1103 REVISION: - SHEET Sheet 5 of 7



TYPE 'B' SUPPORT
NTS

TABLE 1 - STANDARD TRENCH DETAILS

NOMINAL DIAMETER (DN)	PIPE MATERIAL OPTIONS	MINIMUM TRENCH WIDTH	STANDARD TRENCH DEPTH - NON -TRAFFICABLE E.G FOOTWAY	STANDARD TRENCH DEPTH -INDUSTRIAL FOOTWAY/ LOCAL ROADWAY	BEDDING Lb	SIDE SUPPORT Lc	OVERLAY Lo
100	DI, PVC	300	700	800	75	100	100
150	DI, PVC	400	850	900	75	100	100
200	DI	500	950	950	100	150	150
250	DI	600	1000 (SEE TABLE 2)	1100	100	150	150
300	DI	650	1100 (SEE TABLE 2)	1200	100	150	150
375	DI	800	1200 (SEE TABLE 2)	1250 (SEE TABLE 2)	100	200	150

TABLE 2 - ADDITIONAL DEPTH FOR VALVE INSTALLATIONS

NOMINAL DIAMETER (DN)	NON TRAFFICABLE	INDUSTRIAL FOOTWAY/ LOCAL ROADWAY
150	0	0
150	0	0
200	0	0
250	100	0
300	100	0
375	200	150

NOTE: (REFER NOTE 4, TABLE 3 & FIGURE 1)

TABLE 3 - MAXIMUM DEFLECTION OF RUBBER RING PIPE JOINTS FOR VALVE INSTALLATIONS

PIPE MATERIAL	STANDARD PIPE LENGTH	JOINT DEFLECTION ANGLE	MAX OFFSET FOR 1 PIPE FIGURE 1(A)	MAX OFFSET FOR 2 PIPES FIGURE 1(B)	MAX OFFSET FOR 3 PIPES FIGURE 1(C)
DI	5.7m	3°	250	500	1050
*PVC	6m	1°	100	200	430

*PVC SOCKETS, WHERE DESIGNED FOR A DEFLECTION OF MORE THAT 1°, MAY BE USED WITHIN THE LIMITS ADVISED BY THE MANUFACTURER.

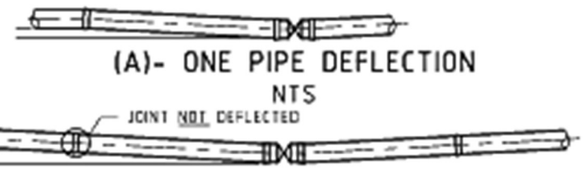
TABLE 4 - MAXIMUM PARTICLE SIZE

NOMINAL DIAMETER (DN)	MAXIMUM PARTICLE SIZE (mm)
<100	10
100 ≤ DN ≤ 150	14
≥150	20

××ADOPTED TABLE 5.4 OF AS/NZS 2566.2

NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED
2. THIS DRAWING APPLIES TO RETICULATION MAINS LAID IN STABLE GROUND AND WHERE GROUNDWATER FLOWS ARE NOT ANTICIPATED SPECIAL DESIGN REQUIRED FOR TOTHER GROUND CONDITIONS
3. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH HILLTOPS SPECIFICATIONS AND STAND DRAWINGS SD1101 & SD1103 INCLUSIVE
4. FOR VALVE INSTALLATIONS, LOCALLY INCREASE TRENCH DEPTH TO SUITE DEFLECTIVE DI OR PVC PIPE JOINTS AS DEPICTED IN FIGURE 1 OR BENDING PE SO AS TO ACHIEVE 100 COVER OVER THE VALVE SPINDLE. FOR VALVES OF HEIGHT NOT EXCEEDING DIMENSIONS "H" REFER AS2638, TABLE 2 SPECIFIES REQUIREMENTS FOR LOCALLY INCREASED TRENCH DEPTH PIPE JOINTS MAY BE DEFLECTED AS NOMINATED IN TABLE 3.
5. WHERE A MAIN IS TO CROSS A MAHOR ROADWAY, PREPARE DESIGN PLANS IN CONSULTATION WITH THE ROAD AUTHORITY
6. COMPACT AND TEST EMBEDMENT AND RENCH FILL IN ACCORDANCE WITH HILLTOPS SPECIFICATIONS

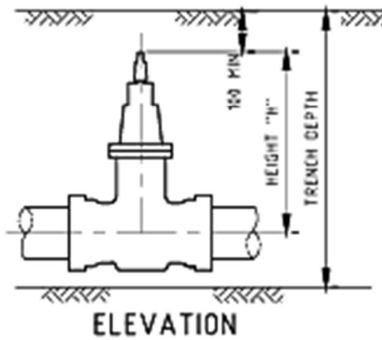


(A)- ONE PIPE DEFLECTION
NTS

(B)- TWO PIPE DEFLECTION
NTS

(C)- THREE PIPE DEFLECTION
NTS

FIGURE 1



ELEVATION

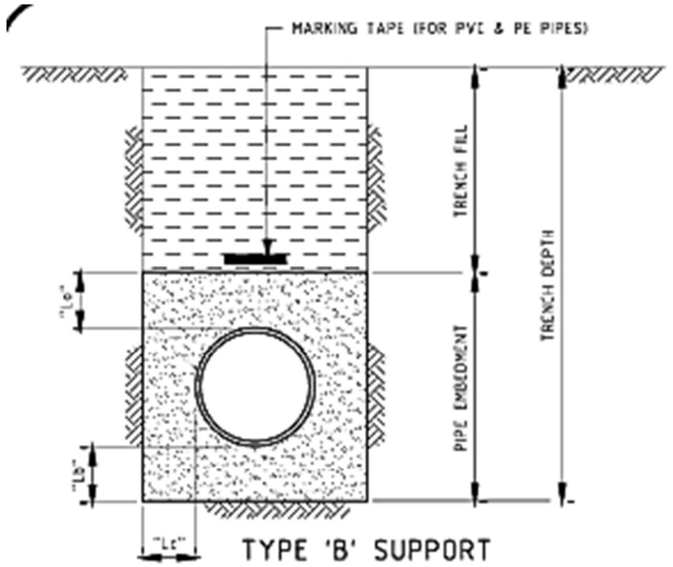
TABLE 5 - VALVE HEIGHTS

NOMINAL DIAMETER (DN)	MAXIMUM VALVE HEIGHT 'H' (PER AS 2638)
100	450
150	520
200	630
250	750
300	825
375	985

TABLE 6 - MATERIALS SPECIFICATIONS

PIPES & FITTINGS	SPECIFICATIONS
DI	AS/NZS 2280
STEEL	AS/NZS 1579
PVC-M	AS/NZX 4765
PVC-O	AS/NZS 4441
PVC-U	AS/NZS 1477

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES TRENCH EMBEDMENT – STANDARD TRENCH DETAILS RETICULATION MAINS DN100 TO DN375	SHEET No. SD 1103 REVISION: - SHEET Sheet 6 of 7



TYPE 'B' SUPPORT
NTS

TABLE 1 - STANDARD TRENCH DETAILS

NOMINAL DIAMETER (DN)	PIPE MATERIAL OPTIONS **	MINIMUM TRENCH WIDTH	STANDARD TRENCH DEPTH - NON -TRAFFICABLE E.G FOOTWAY	STANDARD TRENCH DEPTH -INDUSTRIAL FOOTWAY/ LOCAL ROADWAY	BEDDING Lb	SIDE SUPPORT Lc	OVERLAY Lo
450	DI, STEEL	950	1350	1400	100	250	150
500	DI, STEEL	1200	1350	1350	150	320	150
750	DI, STEEL	1430	1750	1750	150	320	150
≥ 900	DI, STEEL	PROJECT SPECIFIC	PROJECT SPECIFIC	PROJECT SPECIFIC	PROJECT SPECIFIC	PROJECT SPECIFIC	PROJECT SPECIFIC

** OTHER PIPE MATERIALS MAY BE APPROVED BY TAMWORTH REGIONAL COUNCIL WATER AND WASTE DIRECTORATE FOR SPECIFIC PROJECTS

TABLE 2 - ADDITIONAL DEPTH FOR VALVE INSTALLATIONS

NOMINAL DIAMETER (DN)	VALVE NOMINAL DIAMETER (DN)	NON TRAFFICABLE	INDUSTRIAL FOOTWAY/ LOCAL ROADWAY
450	375	150	750
500	450	350	350
600	500	350	350
750	600	500	500

NOTE: (REFER NOTE 4, TABLE 3 & FIGURE 1)

TABLE 3 - MAXIMUM DEFLECTION OF RUBBER RING PIPE JOINTS FOR VALVE INSTALLATIONS

PIPE MATERIAL	STANDARD PIPE LENGTH	JOINT DEFLECTION ANGLE	MAX OFFSET FOR 1 PIPE FIGURE 1(A)	MAX OFFSET FOR 2 PIPES FIGURE 1(B)	MAX OFFSET FOR 3 PIPES FIGURE 1(C)
DI	5.7m	3°	250	500	1200
STEEL	#	#	#	#	#

REFER TO MANUFACTURER

TABLE 4 - VALVE HEIGHTS

NOMINAL DIAMETER (DN)	MAXIMUM VALVE HEIGHT 'H' (PER AS 2638)
450	1160
500	1280
600	1470
750	2350*
900	2550*
1020	3050*

* INCLUDES GEARBOX

TABLE 5 - MATERIALS SPECIFICATIONS

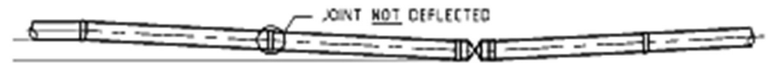
PIPES & FITTINGS	SPECIFICATIONS
DI	AS/NZS 2280
STEEL	AS/NZS 1579

NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED
2. THIS DRAWING APPLIES TO RETICULATION MAINS LAID IN STABLE GROUND AND WHERE GROUNDWATER FLOWS ARE NOT ANTICIPATED SPECIAL DESIGN REQUIRED FOR TOTHER GROUND CONDITIONS
3. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH HILLTOPS SPECIFICATIONS AND STAND DRAWINGS SD1101 & SD1103 INCLUSIVE
4. FOR VALVE INSTALLATIONS, LOCALLY INCREASE TRENCH DEPTH TO SUITE DEFLECTIVE DI OR PVC PIPE JOINTS AS DEPICTED IN FIGURE 1 OR BENDING PE SO AS TO ACHIEVE 100 COVER OVER THE VALVE SPINDLE. FOR VALVES OF HEIGHT NOT EXCEEDING DIMENSIONS "H" REFER AS2638, TABLE 2 SPECIFIES REQUIREMENTS FOR LOCALLY INCREASED TRENCH DEPTH PIPE JOINTS MAY BE DEFLECTED AS NOMINATED IN TABLE 3.
5. WHERE A MAIN IS TO CROSS A MAJOR ROADWAY, PREPARE DESIGN PLANS IN CONSULTATION WITH THE ROAD AUTHORITY
6. COMPACT AND TEST EMBEDMENT AND RENCH FILL IN ACCORDANCE WITH HILLTOPS SPECIFICATIONS



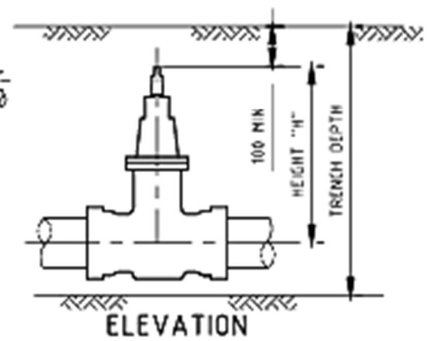
(A)- ONE PIPE DEFLECTION
NTS



(B)- TWO PIPE DEFLECTION
NTS

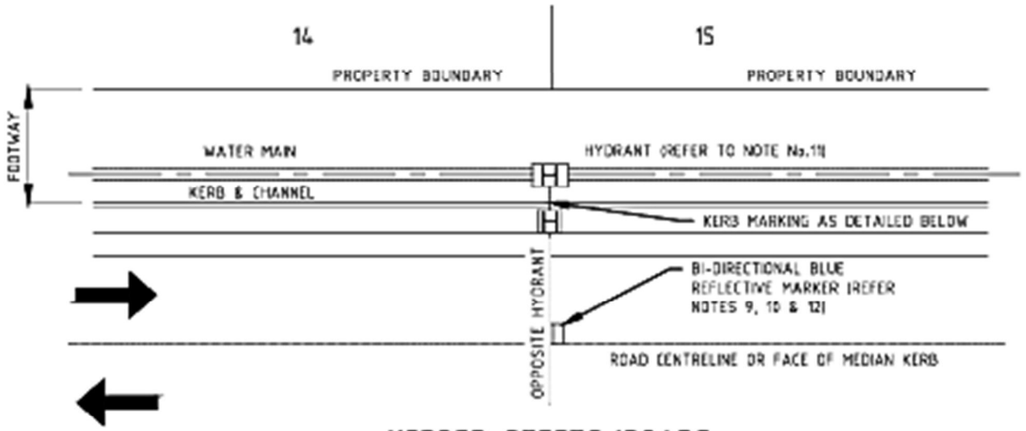


(C)- THREE PIPE DEFLECTION
FIGURE 1
NTS



ELEVATION

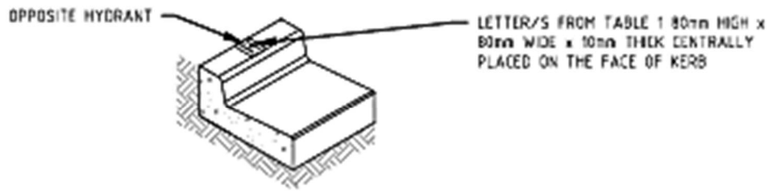
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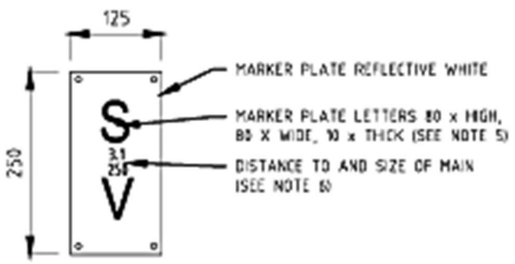
KERBED STEETS/ROADS
TYPICAL PAVEMENT MARKING PLAN FOR HYDRANTS

TABLE 1 - VALVE AND HYDRANT MARKING

SEVICES	ABBREVIATIONS
STOP VALVE	SV
SCOUR VALVE	SCV
HYDRANT PATH	HP
HYDRANT ROAD	HR
WATERMAIN OR WATER SERVICE	W
AIR VALVE	AV
PRESSURE REDUCING VALVE	PRV

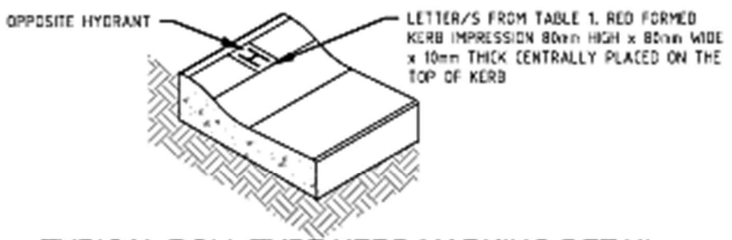


TYPICAL KERB MARKING DETAIL

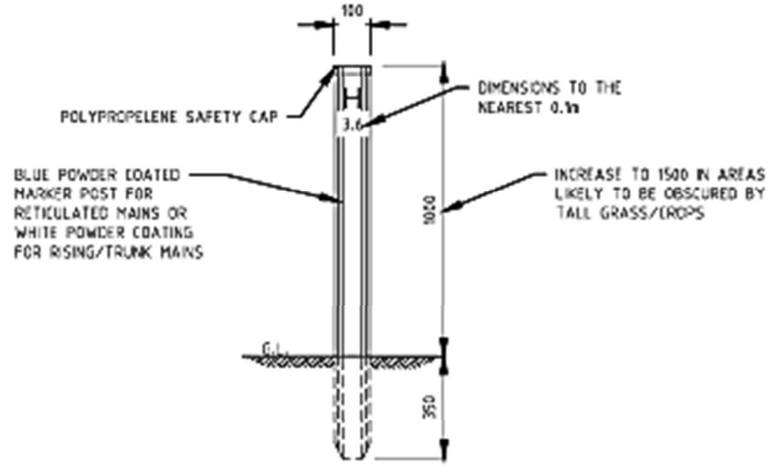


TYPICAL PLATE ARRANGEMENT

NOTE
MAY BE FIXED TO POLE, POST, KERB OR BUILDING



TYPICAL ROLL TYPE KERB MARKING DETAIL

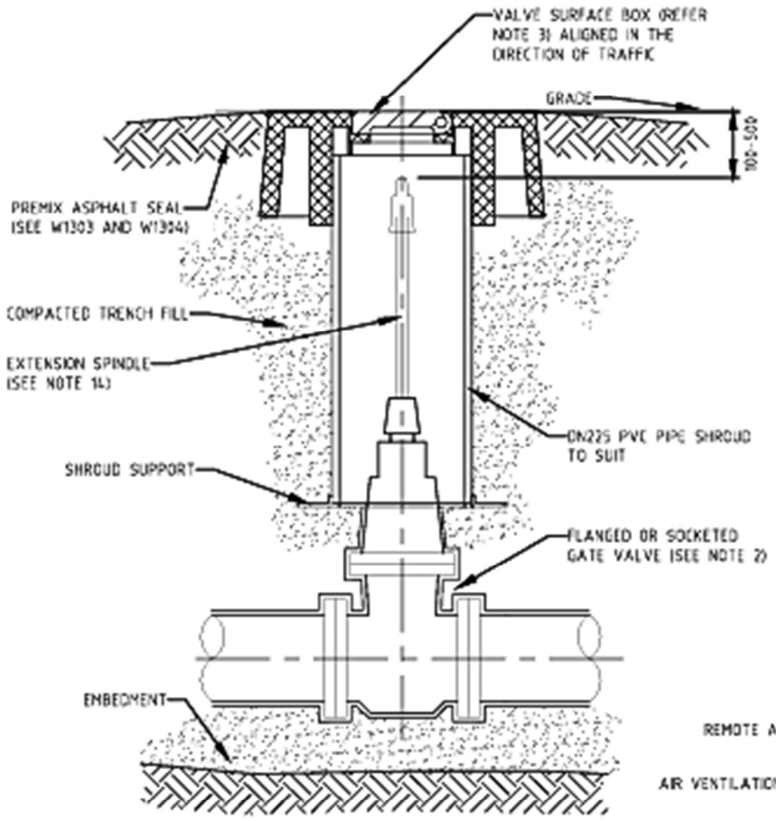


MARKER POST
FRONT ELEVATION

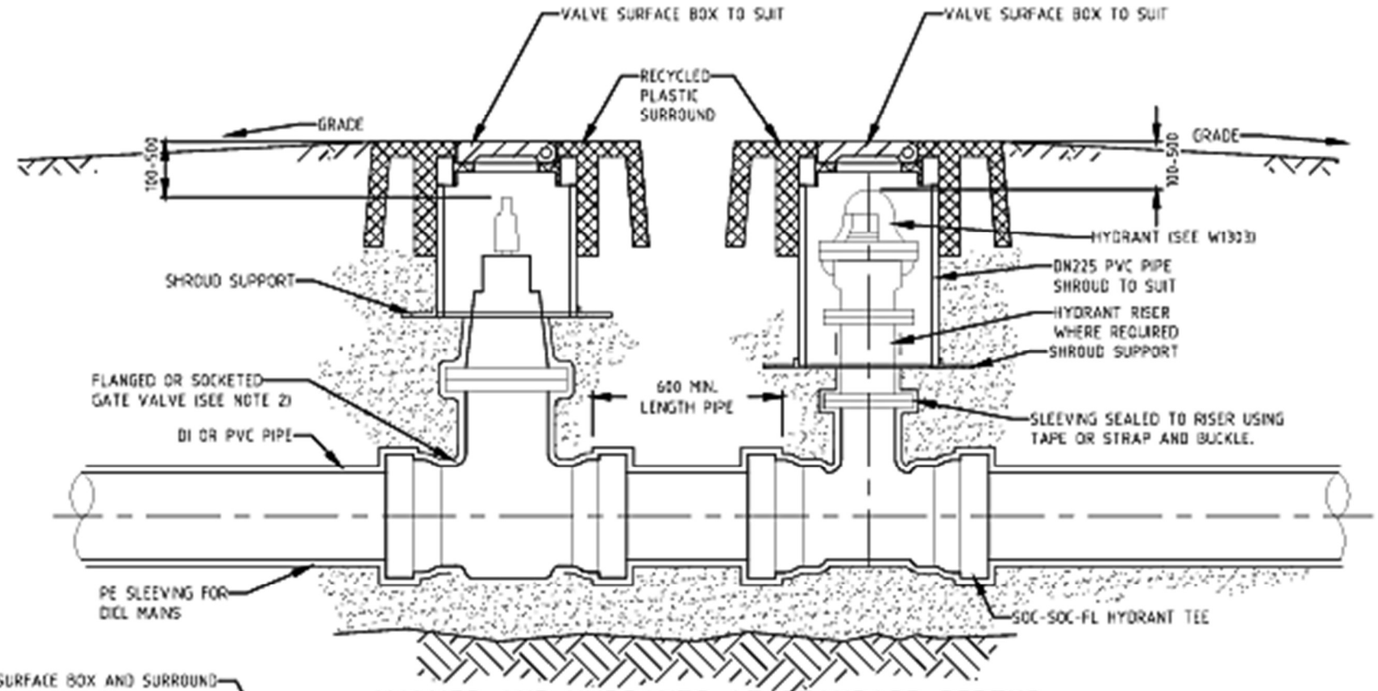
NOTES

1. ALL DIMENSIONS IN MILLIMETRES
2. DO NOT SCALE
3. ALL HYDRANT KERB, PAVEMENT & BOX MARKINGS SHALL BE PERMANENT
4. MARKER POSTS SHALL ONLY BE USED IN STREETS AND ROADS WHERE THERE IS NO KERB & CHANNEL OR AS DIRECTED
5. THE NOTICE PLATE SHALL BE REFLECTORIZE ALUMINIUM WITH RED LETTERING ON A WHITE BACKGROUND
6. DISTANCE TO AND SIZE OF MAIN/FITTING TO BE MARKED ON POLE, POST OR MARKER PLATE
   - NUMBERS TO BE 12 (MIN) HIGH
   - NUMBERS TO BE PAINTED OR PUNCHED TO CREATE A PERMANENT IDENTIFICATION
   - TOP NUMBER TO BE DISTANCE TO MAIN (m) (TO NEAREST 0.1m)
   - BOTTOM NUMBER TO BE DN OF MAIN (mm)
7. MARKER POSTS SHALL BE POSITIONS AT THE FRONT OF THE PROPERTY BOUNDARY OPPOSITE THE FITTING
8. DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE. BLUE DELINEATOR MARKER TO COMPLY WITH AS1906.3
9. BLUE DELINEATOR MARKER TO BE INSTALLED ON ROAD CENTRELINE WHEN NO LINE MARKING OR RAISED PAVEMENT EXISTS
10. BLUE DELINEATOR MARKER TO BE INSTALLED IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES WHEN LINE MARKING AND/OR RAISED PAVEMENT MARKERS EXIST
11. REFER TO STANDARD DRAWING SD1104 FOR FIRE HYDRANT INSTALLATION DETAILS
12. SIMILAR MARKINGS, POSTS, ETC MAY BE USED FOR STOP VALVES (SV), SCOUR VALVES (SCV) & AIR VALVES (AV) EXCEPT THAT BLUE DELINEATOR MARKERS SHALL NOT BE USED ON ROAD OR POSTS
13. THE DISTANCE TO THE HYDRANT IN METRES, TO AN ACCURACY OF 0.1m SHALL BE PERMANENTLY MARKED ON THE PLATE WITH LEGIBLE NUMBERS A MINIMUM OF 80mm HIGH
14. SURFACE OR ROAD PAVEMENT SHALL BE THOROUGHLY CLEANED OF DUST, DIRT AND EXTRANEOUS MATTER WITH A WIRE BRUSH

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES FITTINGS – KERB MARKER AND POST DETAILS	SHEET No. SD 1104 REVISION: - SHEET Sheet 1 of 9

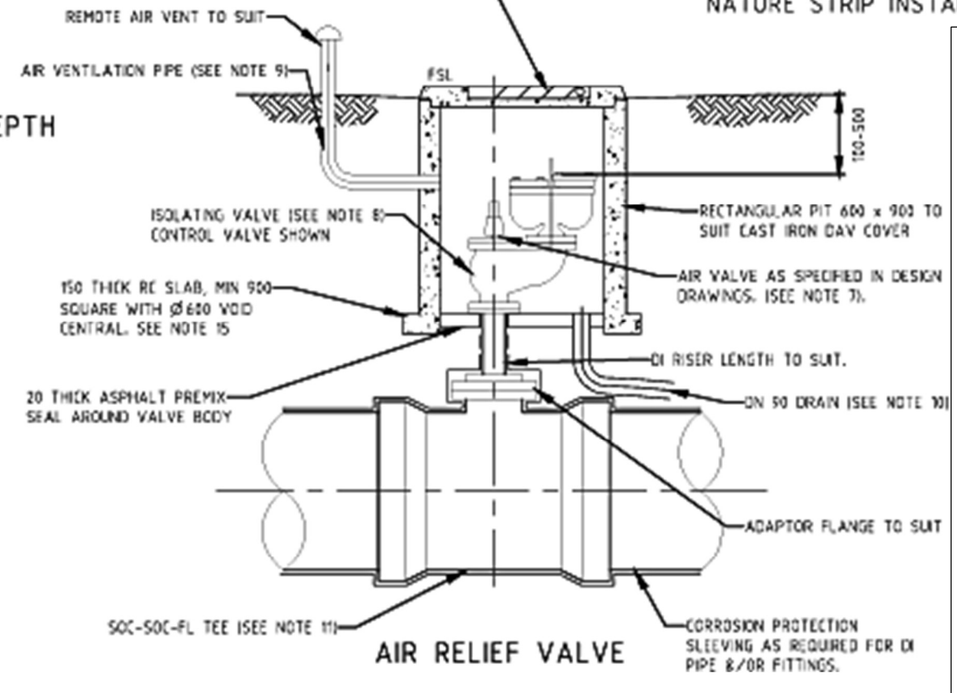


VALVES DEEPER THAN STANDARD DEPTH
IN SEALED ROAD PAVEMENT



VALVES AND HYDRANTS AT STANDARD DEPTHS
NATURE STRIP INSTALLATION SHOWN

LID COLOURS	
YELLOW	HYDRANTS, RETIC SV, SCV, DAV
WHITE	TRUNK MAIN SV, SCV, DAV
RED	CLOSED/BOUNDARY VALVES
LILAC	RECYCLED WATER VALVES

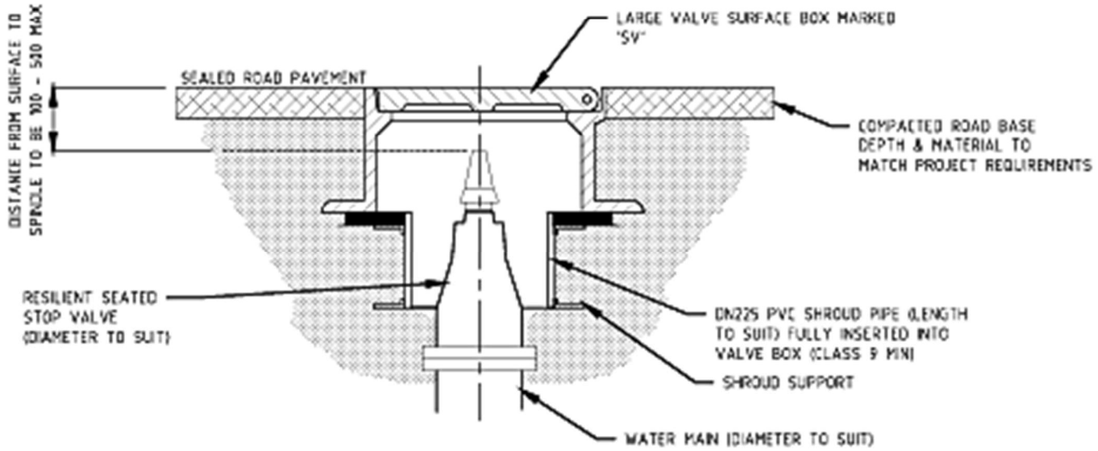


AIR RELIEF VALVE

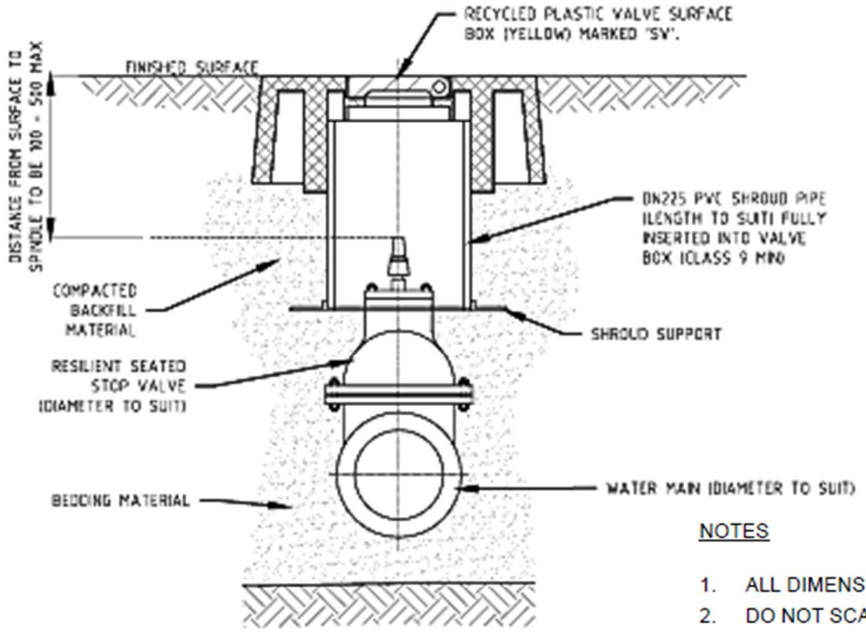
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES
2. VALVES DN150 AND GREATER TO BE RESTRIANED. SEE STANDARD DRAWING.
3. SURFACE BOX TO BE PAINTED WITH APPROVED ROAD MARKING PAINT, COLOUR TO BE AS PER LID COLOUR TABLE.
4. TO PREVENT TRANSFER OF TRAFFIC LOAD TO THE MAIN, ENSURE SHROUD AND ANY SHROUD SUPPORT DOES NOT COME INTO CONTACT WITH THE GATE OR HYDRANT VALVE.
5. DISTANCE BETWEEN VALVE SPINDLE AND TOP OF VALVE BOX IS TO BE 300MM MAX. OTHER WISE AN EXTENSION SPINDLE IS TO BE PROVIDED.
6. HYDRNT IS TO BE DN80 UNLESS OTHERWISE SPECIFIED.
7. AIR VALVES TO BE SINGLE OR DOUBLE ORIFICE AS DETAILED IN DRAWINGS.
8. ISOLATING STOP VALVE TO BE AUTHPRIOSED VALVE E.G. BUTTERFLY, GATE, BALL ETC. ISLOTING VALVE TO BE INSTALLED SUCH THE AIR VALVE AND HYDRANT CAN BE REMOVED WITH THE VALVE IN PLACE.
9. PROVIDE VENTILATION TO AIR VALVE CHMABER WHERE REQUIRED.
10. DIRECTION AND GRADE OF DRAINAGE PIPE TO SUIT THE POSTION OF THE STORM WATER DRAIN.
11. FLANGED BRANCH DIAMETER TO VE AS SHOWN IN DESIGN DRAWINGS
12. ACCESS COVERS TO BE MINIMUM
    - CLASS “D” FOR ROADWAY
    - CLASS “B” FOR FOOTWAYS

    ACCESS COVERS FOR AIR VALVE CHMABERS TO BE MARKED “AV”
13. JOINTS TO BE 20 mm TO 50 mm THICK FOR CEMENET MORTAR. ALTERNATIVELY, A 6mm THICK BED OF BUTYL MASTIC MAY BE USED.
14. SPINDLE EXTENSIONSTO BE CENTRAL IN SHROUD. SPINDLE GUIDE TO BE INSTALLED WHERE CONSTRUCTED OF CORROSION RESISTANT MATERIALS.
15. CONCRETE SUPPORT SLAB TO SPAN THE TRENCH AND EXTEND MIN 300 mm ONTO SUPPORT EARTH.

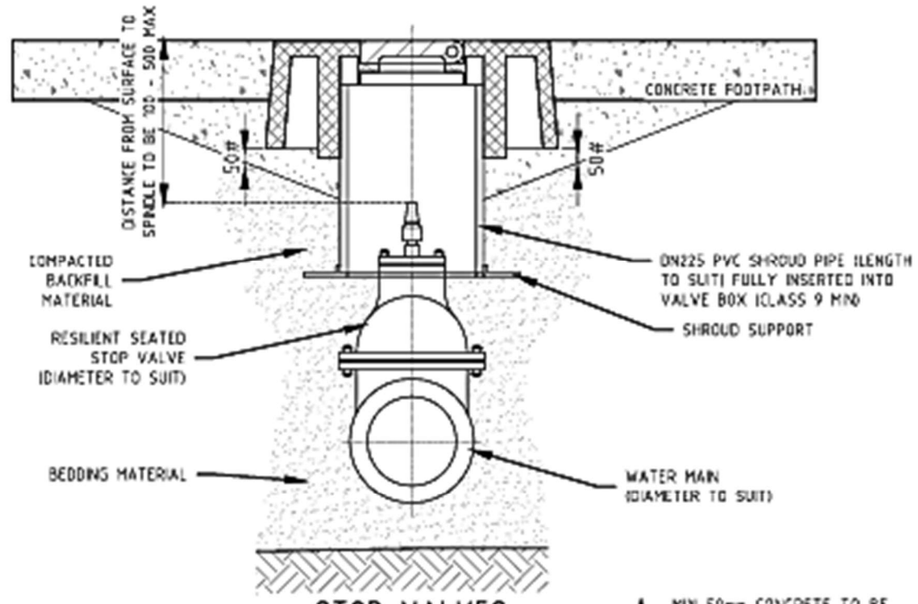
SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES FITTINGS – TYPICAL VALVE, HYDRANT AND AIR RELIEF VALVE INSTALLATION	SHEET No. SD 1104 REVISION: - SHEET Sheet 2 of 9



STOP VALVES
IN SEALED ROAD PAVEMENT



STOP VALVES
WITH NO VEHICULAR LOADING



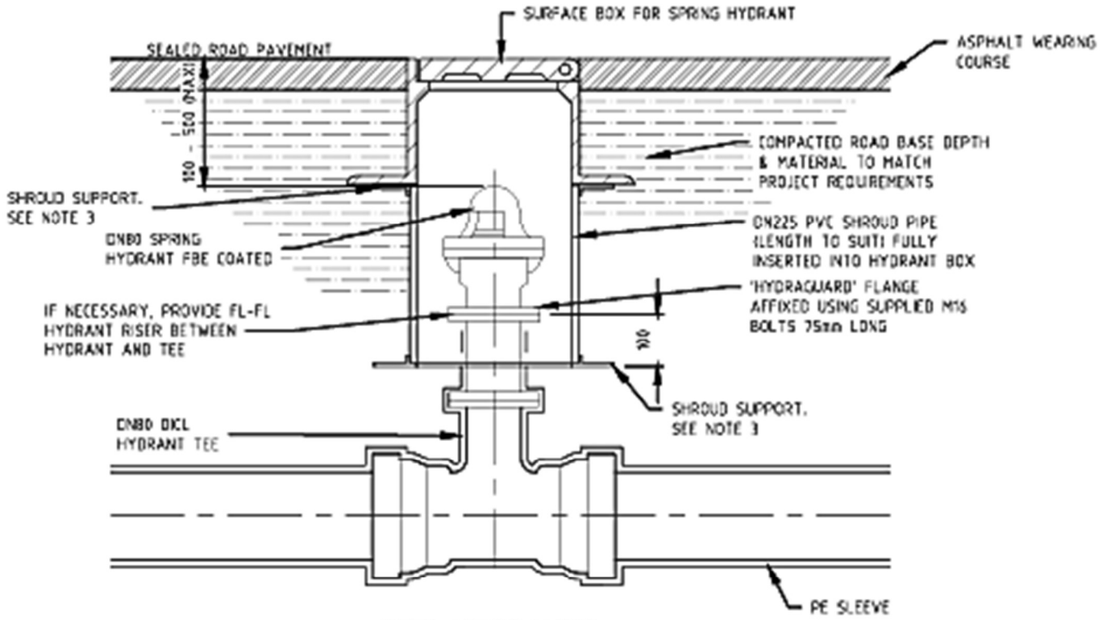
STOP VALVES
IN CONCRETE FOOTPATH

MIN 50mm CONCRETE TO BE APPLIED UNDER SV LID AND SURROUND

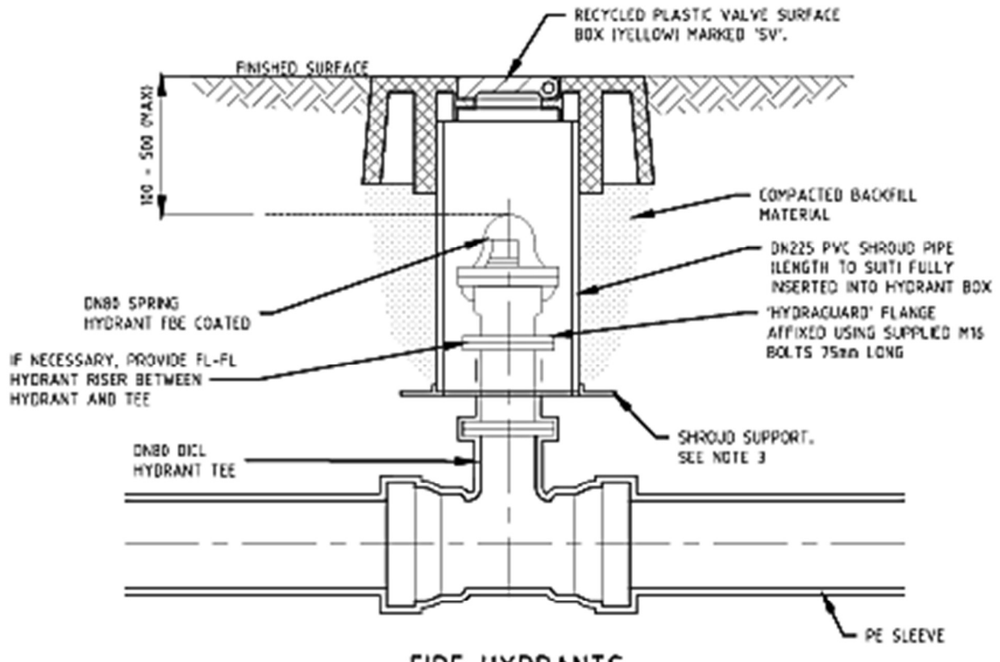
NOTES

1. ALL DIMENSIONS IN MILLIMETRES
2. DO NOT SCALE
3. STOPE VALVES TO BE ANTI CLOCKWISE. DIRECTION ARROW TO BE DISPLAYED ON SPINDLE TOP
4. REFER TO SD1104 FOR DETAILS OF VALVE MARKING
5. DISTANCE BETWEEN VALVE SPINDLE AND TOP OF VALVE BOX IS TO BE 500mm MAX. OTHERWISE AN EXTENSION SPINDLE IS TO BE PROVIDED

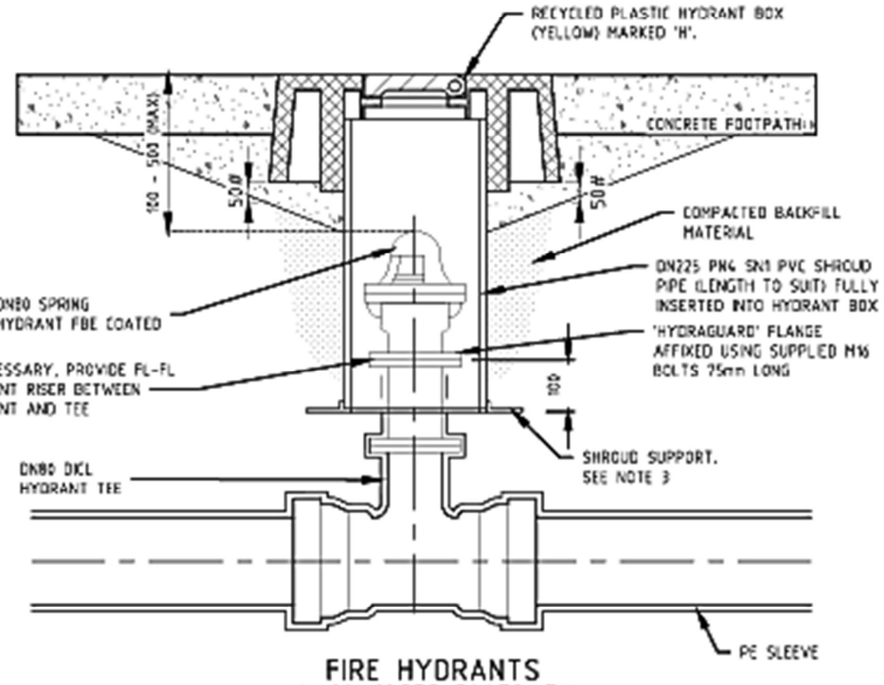
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FIRE HYDRANTS
IN SEALED ROAD PAVEMENT



FIRE HYDRANTS
WITH NO VEHICULAR LOADING

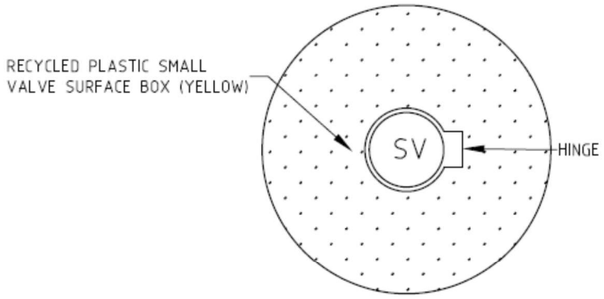


FIRE HYDRANTS
IN CONCRETE FOOTPATH

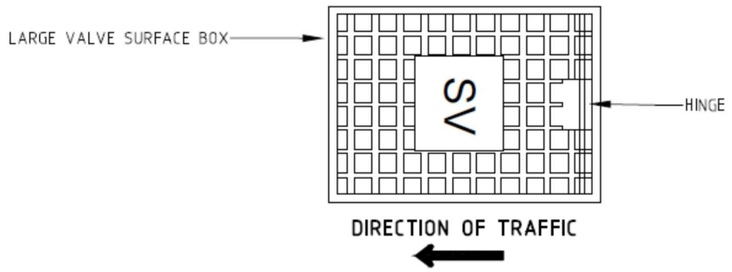
NOTES

1. ALL DIMENSIONS IN MILLIMETRES
2. DO NOT SCALE
3. TO PREVENT THE TRANSFER OF TRAFFIC LOAD TO THE MAIN, THE PVC SHROUD PIPE AND SHROUD SUPPORT SHALL NOT COME IN CONTACT WITH THE SPRING HYDRANT FLANGE
4. HYDRANTS FOR ALL NEW WORKS ARE TO BE LOCATED IN FOOTPATH AREAS, UNLESS SPECIFIED OTHERWISE
5. REFER STANDARD DRAWINGS SD1104 FOR DETAILS OF HYDRANT MARKING
6. ALL FITTINGS TO BE FBE COATED

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES FITTINGS – FIRE HYDRANT INSTALLATION DETAILS	SHEET No. REVISION: SD 1104 - SHEET Sheet 4 of 9



NON-TRAFFICABLE VALVE SURFACE BOX



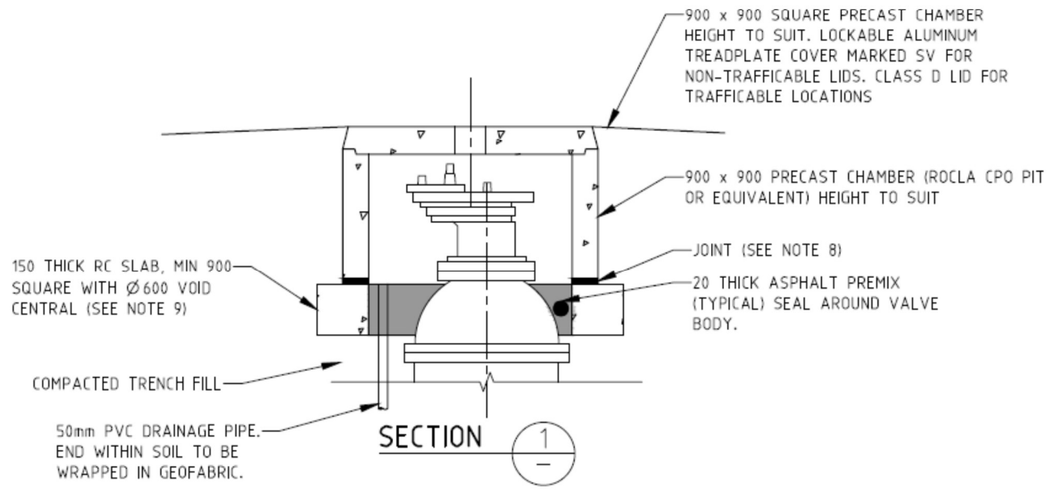
TRAFFICABLE VALVE SURFACE BOX



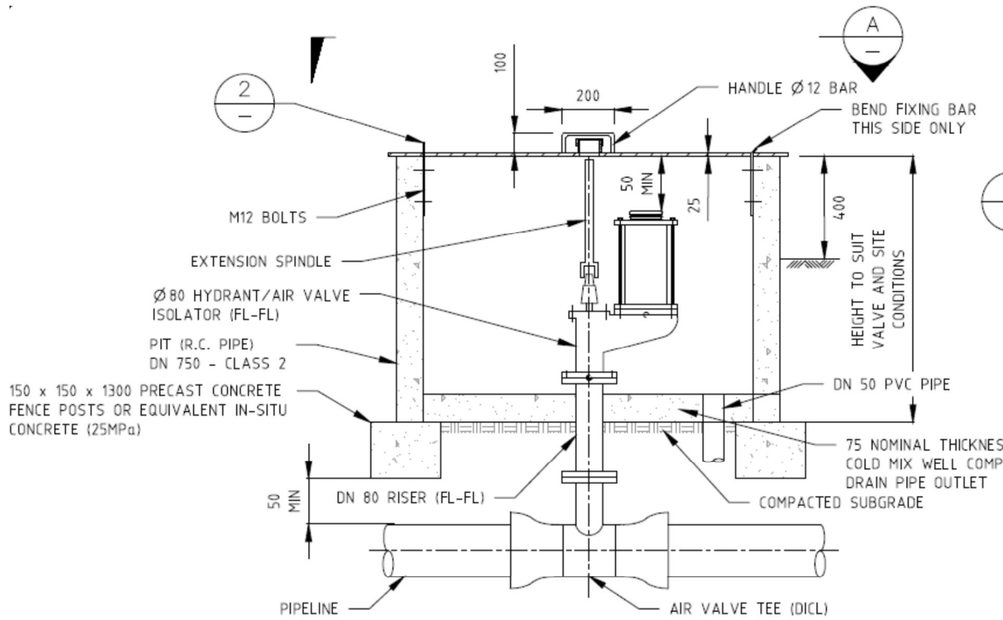
GEARED STOP VALVE

NOTES

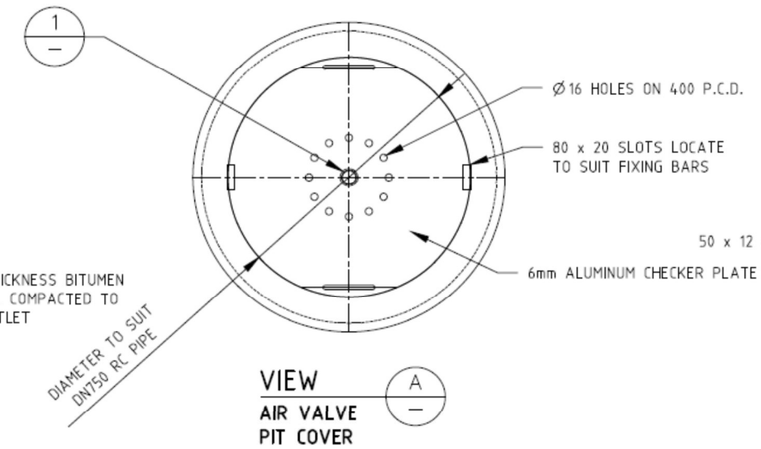
1. ALL DIMENSIONS IN MILLIMETRES
2. ALL SURFACE BOX COVERS AND FRAMES TO BE IN ACCORDANCE WITH AS3996
   - CLASS D LOADING – TRAFFICABLE
   - CLASS B LOADING – NON TRAFFICABLE
3. INSTALL COVER, FRAME, SHROUD AND SHROUD SUPPORT SO THAT NO LOADING IS TRANSMITTED TO THE VALVE OR PIPE
4. FOR NON TRAFFICABLE APPLICATIONS ELEVATE COVER UP TO 50mm ABOVE FINISHED SURFACE LEVEL AND GRADE SOIL AWAY TO PREVENT WATER ENTRY
5. DISTANCE BETWEEN VALVE SPINDLE AND TOP OF VALVE BOX IS TO BE 300mm MAX. OTHERWISE AN EXTENSION SPINDLE IS TO BE PROVIDED
6. IN ISOLATED NON TRAFFIC AREAS HINGED COVERS TO CLOSE IN THE DIRECTION OF MAIN. IN ALL OTHER AREAS HINGED COVERS TO CLOSE IN THE DIRECTION OF ADJACENT ROAD LANE TRAFFIC
7. SEE STANDARD DRAWING SD1104 FOR STOP VALVE INSTALLATION DETAILS
8. JOINTS TO BE 20mm TO 50mm THICK FOR CEMENT MORTAR. ALTERNATIVELY, A 6mm THICK BED OF BUTYL MASTIC MAY BE USED
9. CONCRETE SUPPORT SLAB TO SPAN THE TRENCH AND EXTEND MIN 300 ONTO SUPPORTIVE EARTH



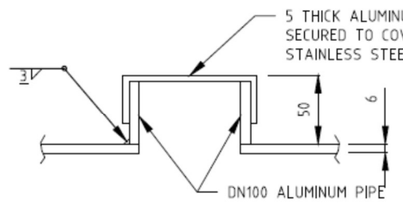
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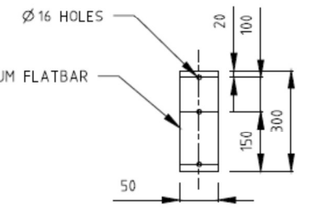
AIR VALVE INSTALLATION - TYPE 1
INLINE AIR VALVE WITH HYDRANT ISOLATOR



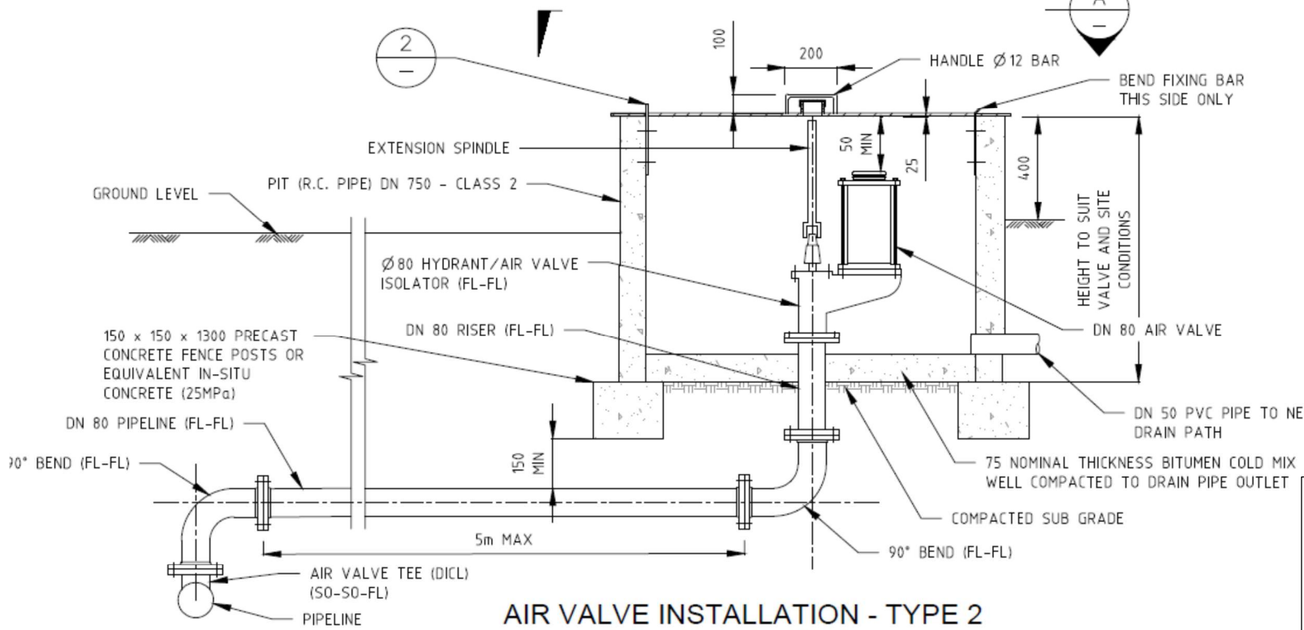
VIEW A — AIR VALVE PIT COVER



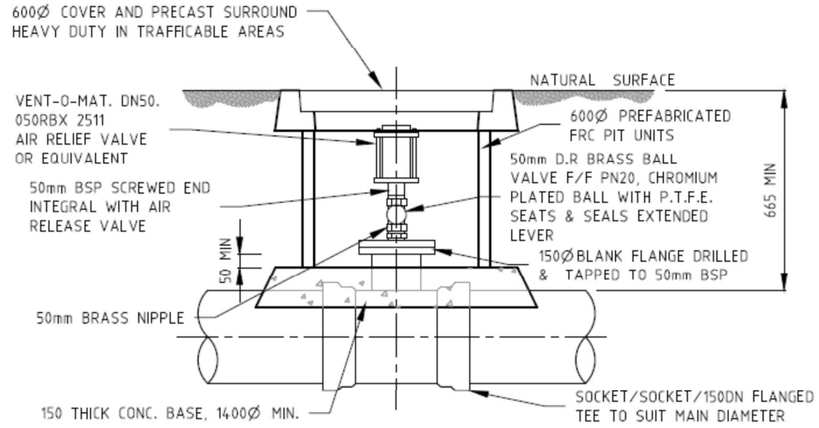
DETAIL 1 — VALVE KEY OPENING



DETAIL 2 — FIXING DETAIL



AIR VALVE INSTALLATION - TYPE 2
OFFLINE AIR VALVE WITH HYDRANT ISOLATOR

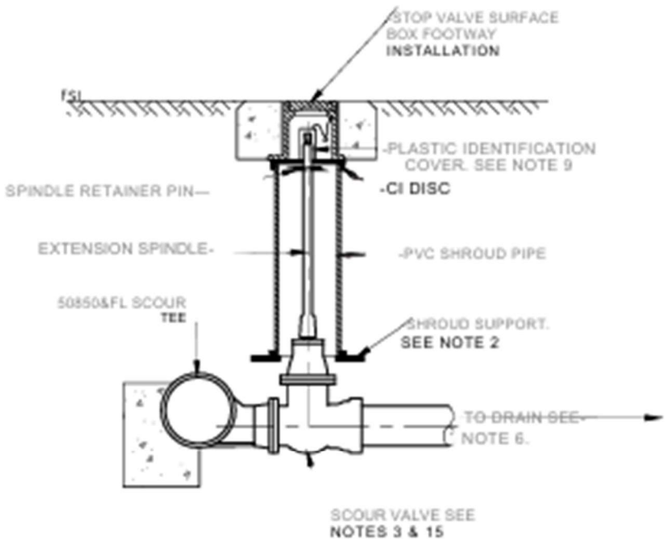


DN50 AIR RELEASE VALVE SUITABLE FOR MAINS 300Ø OR SMALLER

NOTES

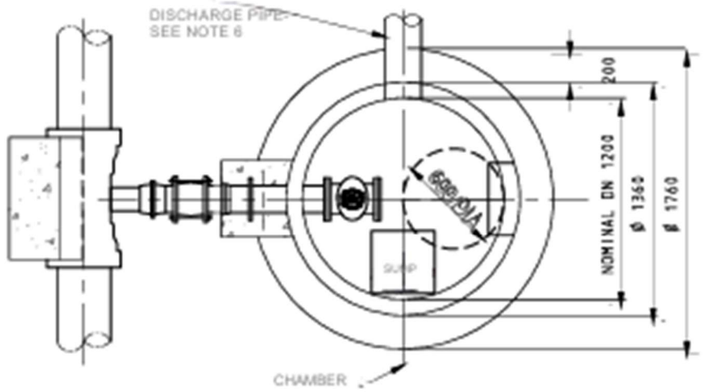
1. TYPE 2 TO BE USED ONLY IF TYPE 1. INSTALLATION IS NOT SUITABLE.
2. COVERS TO HAVE STENCIL MARKING 'WATER A.V.'
3. ALL DICL PIPES TO BE WRAPPED WITH POLYETHYLENE SLEEVE
4. ALL FLANGES ON DICL PIPES AND FITTINGS SHALL BE DRILLED TO AS4087 FIGURE B5 – CLASS 16.
5. ALL FLANGES ON STEEL PIPES AND FITTINGS SHALL BE DRILLED TO AS4087 FIGURE B7-CLASS 14.
6. FOR WATER MAINS LARGER THAN 450mm DIA. AIR RELEASE VALVES AND PITS SHALL BE INDIVIUALLY SIZED AND DETAILED.
7. REFER TO HILLTOPS STANDRARD DRAWINGS FOR WATER SUPPLY FITTINGS AND VALVES.
8. ALL FITINGS TO BE RATED TO 1600kPa MINIMUM.

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES FITTINGS – AUTOMATIC AIR RELEASE VALVE INSTALLATION DETAILS	SHEET No. SD 1104 REVISION: - SHEET Sheet 6 of 9



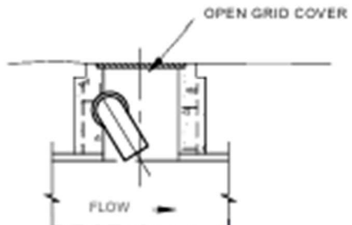
GRAVITY SCOUR (SEE NOTE 3).

NTS



PLAN

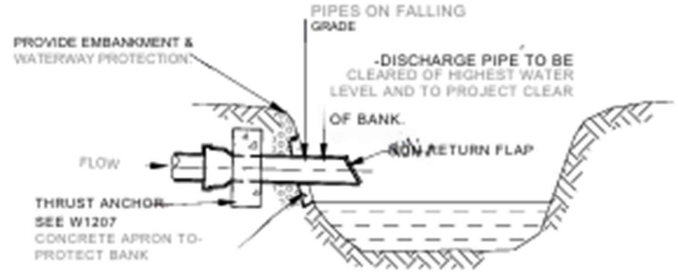
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SECTION A-A

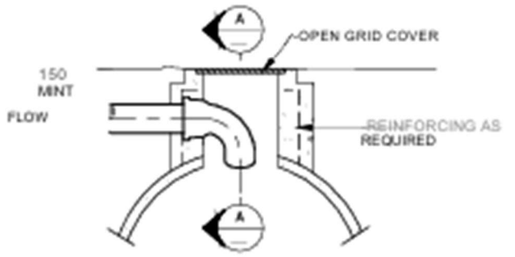
SCOUR DISCHARGE TO APPROVED DRAINAGE SYSTEM

NTS



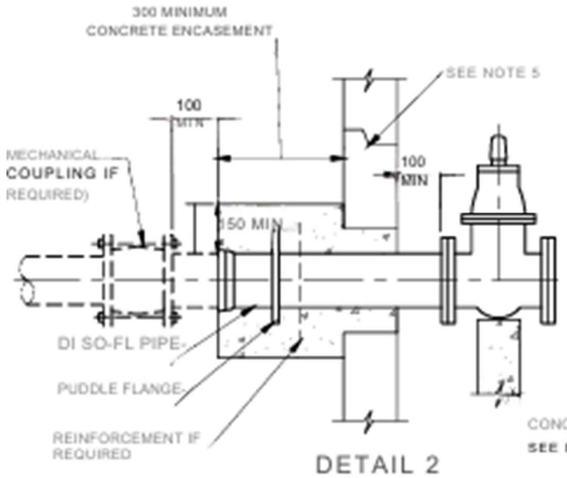
SCOUR DISCHARGE TO STORAGE LAGOON

NTS



ELEVATION

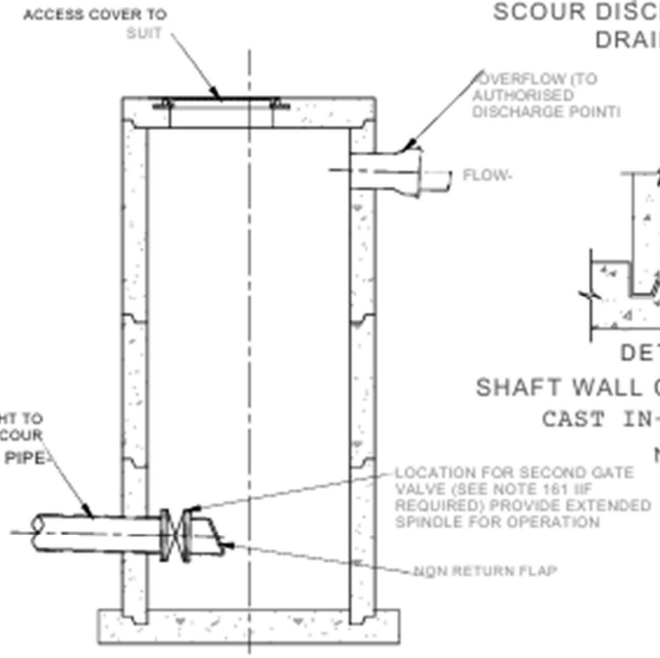
NTS



DETAIL 2

TYPICAL PIPE ENTRY

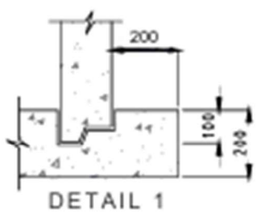
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ELEVATION

PUMP SCOUR (SEE NOTE 3)

NTS



DETAIL 1

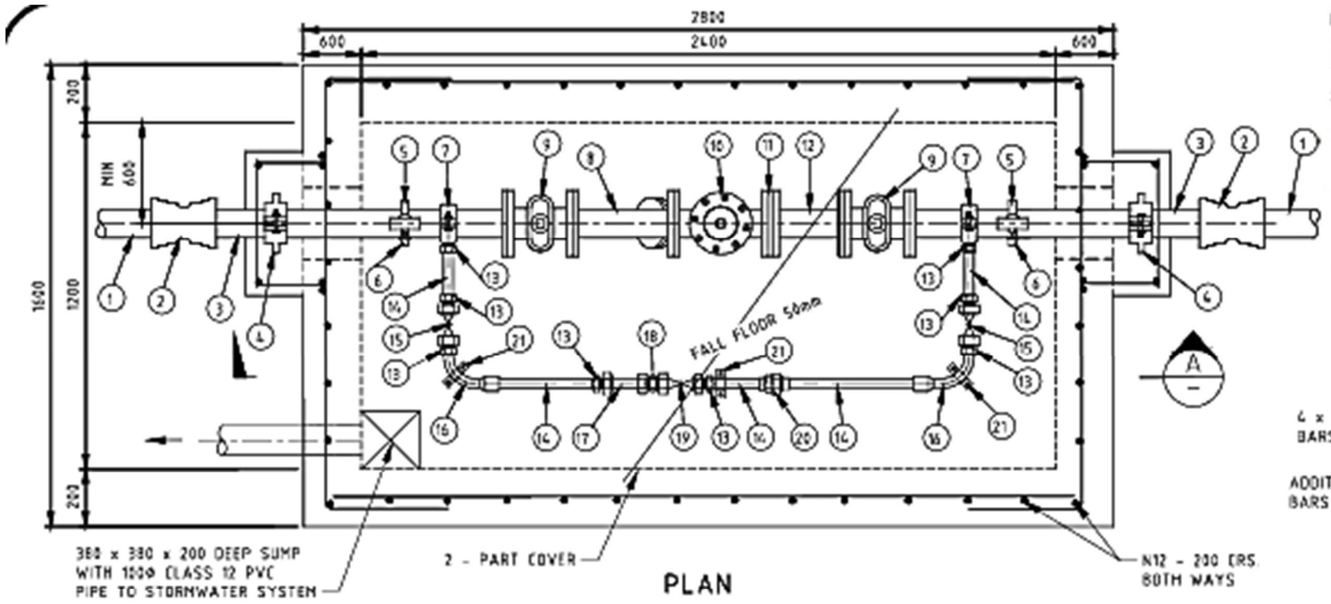
SHAFT WALL CONNECTION TO CAST IN-SITU SLAB

NTS

NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH STAND DRAWING SD1104
3. TYPE OF SCOUR INSTALLATION, LOCATION AND DISCHARGE ARRANGEMENT TO BE AS SPECIFIED IN THE DESIGN DRAWINGS
4. TYPE OF SCOUR INSTALLATION GRAVITY SCOUR – WHERE SCOUR BRANCH DISCHARGES TO A GRAVITY CHAMBER IS NOT REQUIRED, THEN A PARTIAL TYPE PIPE SURROUND FOR PROTECTION OF INVERT SCOUR MAY BE USED
5. INLET PIPE HOLE NOT BE WITHIN 75 OF WALL UNITY JOINT. STEP IRON HOLES NOT BE WITHIN 100 OF WALL UNITY JOINT
6. SELECT DISCHARGE PIPE DIAMETER TO ENSURE MAXIMUM DISCHARGE CAPACITY CONSISTENT WITH SIZE OF SCOUR BRANCH. DIRECTION AND SIZE OF DISCHARGE PIPE TO BE AS SPECIFIED IN THE DESIGN DRAWINGS
7. CONCRETE TO BE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 25MPa (UNREINFORCED) OR 25MPa (REINFORCED). 40MPa SPECIAL CLASS CONCRETE
8. METAL ACCESS COVER TO BE Ø600, SEALED TYPE (WATERTIGHT), CLASS "B" FOR FOOTWAYS & CLASS "D" FOR CARRIAGEWAYS
9. SEAL JOINTS BETWEEN CONVERSION SLAB AND SHAFT SECTION AS PER MANUFACTURER'S INSTRUCTIONS
10. CONCRETE PLINTH TO BE CAST IN-SITU
11. PLACE ADJUSTABLE SPINDLE SUPPORTS AT 2m INTERVALS
12. ALL SCOUR VALVES SHALL BE RESILIENT SEATED
13. GRADE FLOOR TOWARDS SUMP
14. A FL-FL SCOUR VALVE AND FL-SO CONNECTOR MAY BE USED
15. ALL FITTINGS TO BE FBE COATED
16. PROVIDE NON- RETURN VALVE AND SECOND GATE VALVE ONLY WHEN SPECIFIED BY HILLTOPS COUNCIL

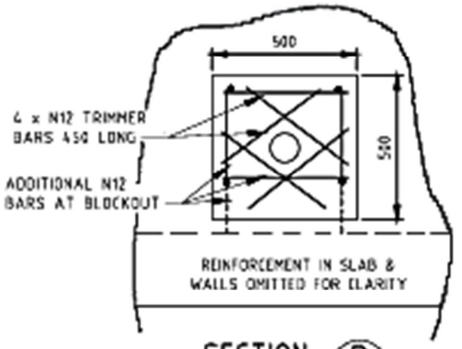
SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES FITTINGS – SCOUR CONNECTION DETAIL AND DISCHARGE	SHEET No. SD 1104 REVISION: - SHEET Sheet 7 of 9



PLAN

NOTES:

1. ALL FLANGES TO CLASS 16 AS4087 FIG. 85
2. ALL SLUICE VALVES TO AS. 2638 CLASS 16 RESILIENT SEALED OR APPROVED EQUIVALENT.
3. MINIMUM CONCRETE COMPRESSIVE STRENGTH SHALL BE 25MPa AT 28 DAYS
4. ALL PIPES & FITTINGS TO HAVE A MAXIMUM WORKING PRESSURE OF 1600kPa OR GREATER APPROVED EQUIVALENT MEANS BY TRC.
5. ALL PIPE FITTINGS TO COMPLY WITH HILLTOPS COUNCIL SUPPLY CONTRACT
6. SPECIFICATION REFER TO TRE STANDARD DRAWING W1152
7. PRV MARKER POST SHALL BE PROVIDED AND LOCATED ADJACENT TO THE PIT

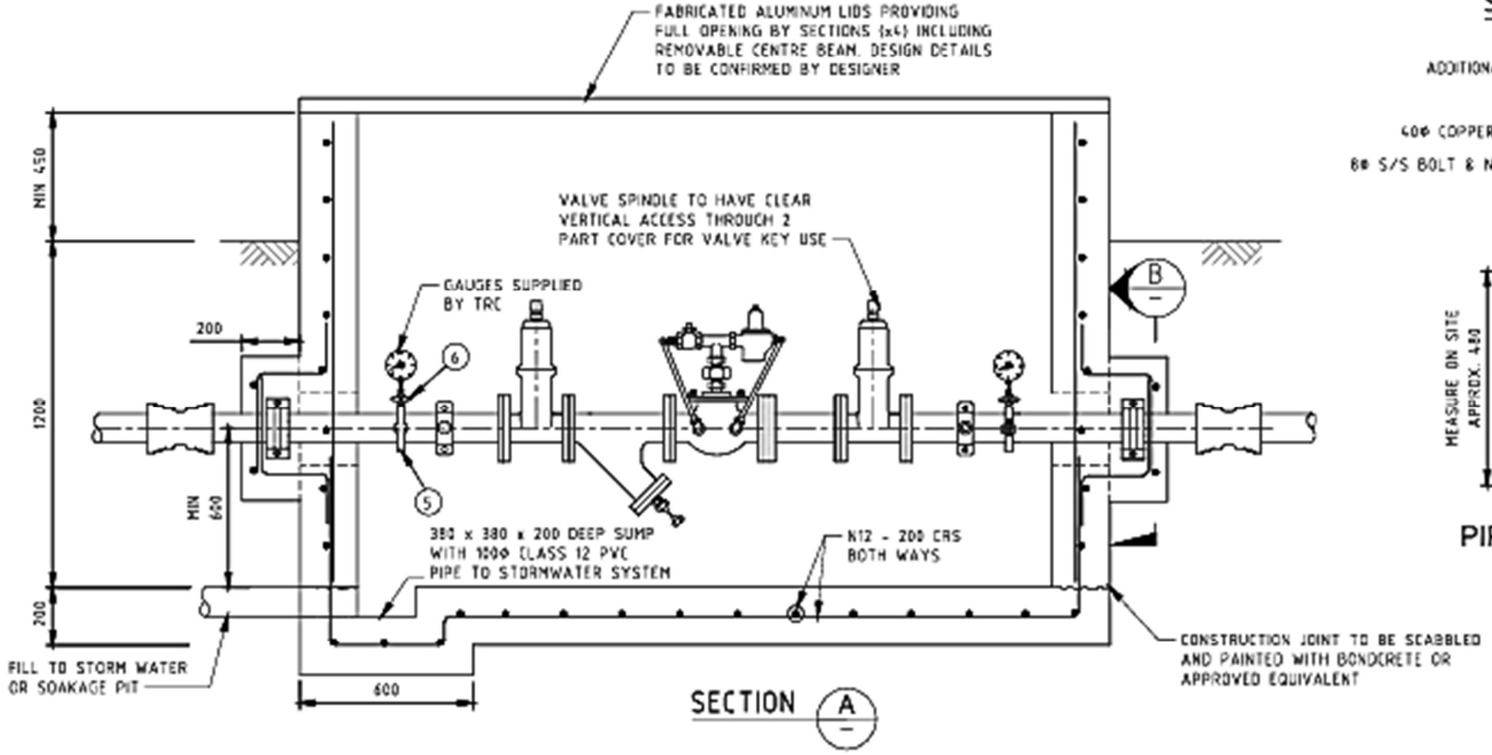


SECTION B

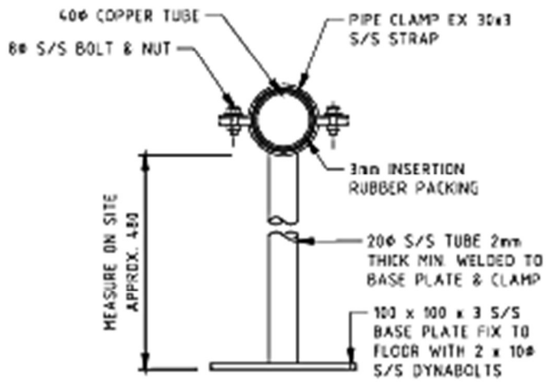
ADDITIONAL REINFORCEMENT AT BLOCKOUTS

TABLE 1 - FITTINGS SCHEDULE

ITEM	FITTINGS SCHEDULE	DIA.	No.
1	D.I.C.L. PIPE	100	
2	D.I.C.L. CONNECTOR SOCKET-SOCKET OR GIBAULT	100	2
3	D.I.C.L. FLANGE-SPIGOT CONN. 1100 LONG	100	2
4	PUDDLE FLANGE(Machined & glued in place)	100	2
5	20mm TAPPING SADDLE (S/S)	100	2
6	DR BRASS BALL VALVE PN20 CHROMIUM PLATED BRASS BALL WITH PTFE SEAT & SEALS	20	2
7	40mm TAPPING BAND (SS ADJUSTABLE CLAMPS)	100	2
8	FBN COATED D.I. FL/FL 'Y' STRAINER CL 16 S/S MESH SIZE 1.6mm MAX. WITH 25mm THREADED BRASS PLUG ON OUTLET, FITTED WITH 25mm BALL VALVE	100	1
9	FBN COATED STOP VALVE FL/FL RESILIENT SEATED	100	2
10	PRESSURE REDUCING VALVE - CLA-VAL SERIES 600. DI FBN COATED	100	1
11	D.I. UNI. FLANGE	100	1
12	D.I.C.L. FLANGE-SPIGOT CONNECTOR 205 LONG	100	1
13	BRASS MALE TUBE BUSH	40	8
14	COPPER PIPE TYPE 'B' (CUT TO SUIT)	40	5
15	DR BRASS BALL VALVE PN20 CHROMIUM PLATED BRASS BALL WITH PTFE SEAT & SEALS	40	2
16	COPPER LONG RADIUS 90° BEND	40	2
17	BRASS FEMALE BSP 'Y' STRAINER. SHED 2 - 800 MICRON MESH (2000kPa WORK PRES.)	40	1
18	BRASS NIPPLE	40	1
19	PRESSURE REDUCING VALVE - CLA-VAL SERIES 600. DI FBN COATED	40	1
20	BRASS UNION COPPER TO COPPER	40	1
21	S/S PIPE SUPPORT BRACKET		3



SECTION A



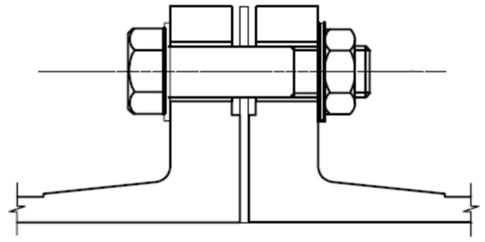
PIPE SUPPORT BRACKET

TABLE 2 - REINFORCEMENT SCHEDULE

BAR	SIZE	LENGTH	No.
2500, 550	N12	3700	8
1400, 550	N12	2500	28
1100	N12	1100	60
2600	N12	2600	12
350, 200, 150	N12	700	8
400	N12	400	4
450	N12	450	8
450, 600	N12	1050	16

TOTAL - 36 x 6m LENGTHS N12 BARS
2 x 1500 x 950 SL92 MESH 2x1500x600
SL92 MESH

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES FITTINGS – DN100 PRESSURE REDUCING VALVE INSTALLATION DETAILS Sheet 8 of 9	SHEET No. SD 1104 REVISION: - SHEET Sheet 8 of 9



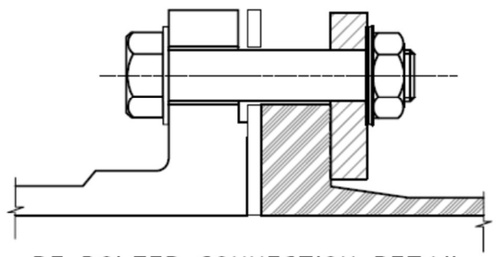
CORROSION PROTECTION PROCEDURE FOR
FUSION BONDED COATED DUCTILE IRON
FLANGES WITH STAINLESS STEEL BOLTS

NTS

(SEE NOTE 2)

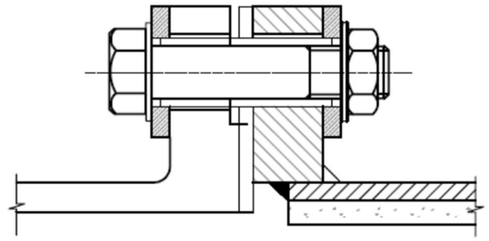
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES
2. WHERE FLANGES ARE COATED WITH FUSION BOND EPOXY OR NYLON, THEY DO NOT REQUIRES SLEEVING. USE ONLY STAINLESS-STEEL BOLTS (SEE NOTE 3.). TAKE CARE TO PREVENT DAMAGE TO THE FLANGES PROTECTIVE COATING.
3. STAINLESS STEEL BOLTS SYSTEM. ALL STAINLESS-STEEL BOLTS, NITS, WASHERS AND BACKING PLATES TO BE MANUFACTURERED FROM GRADE 316 MATERIAL. NOT ALL ELASTOMERS ARE NON-CONDUCTIVE.
4. USE SPECIAL HIGH RESISTIVITY (LOW CONDUCTIVITY) GASKET MATERIAL. NOT ALL ELASTOMERS ARE NON-CONDUCTIVE.
5. GASKET MATERIALS TO COMPLY WITH MANUFACTURER'S SPECIFICATION.
6. TIGHTENING SEQUENCE SHOWN FOR AS 4087 FLANGES <DN450. LARGER SIZES TO FOLLOW SIMILAR PRINCIPAL.



PE BOLTED CONNECTION DETAIL

NTS

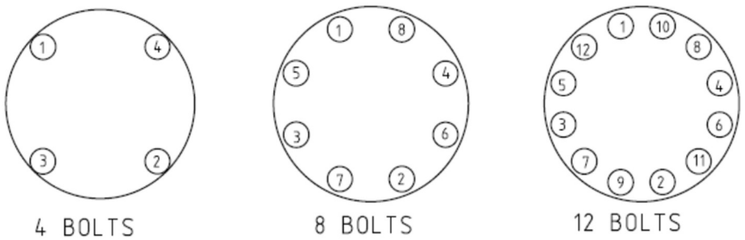


INSULATED FLANGED JOINT FOR

FOR STEEL MAINS

NTS

(SEE NOTE 4)

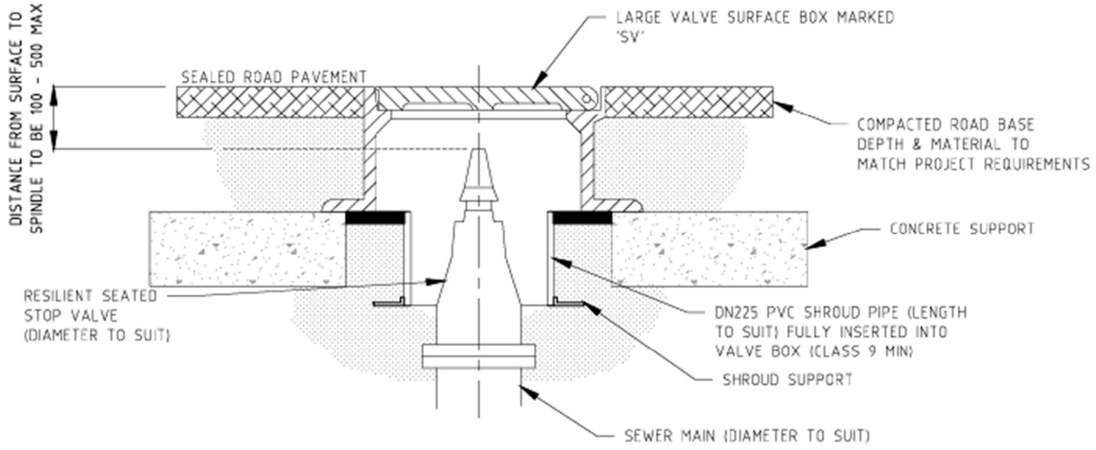


4 BOLTS 8 BOLTS 12 BOLTS

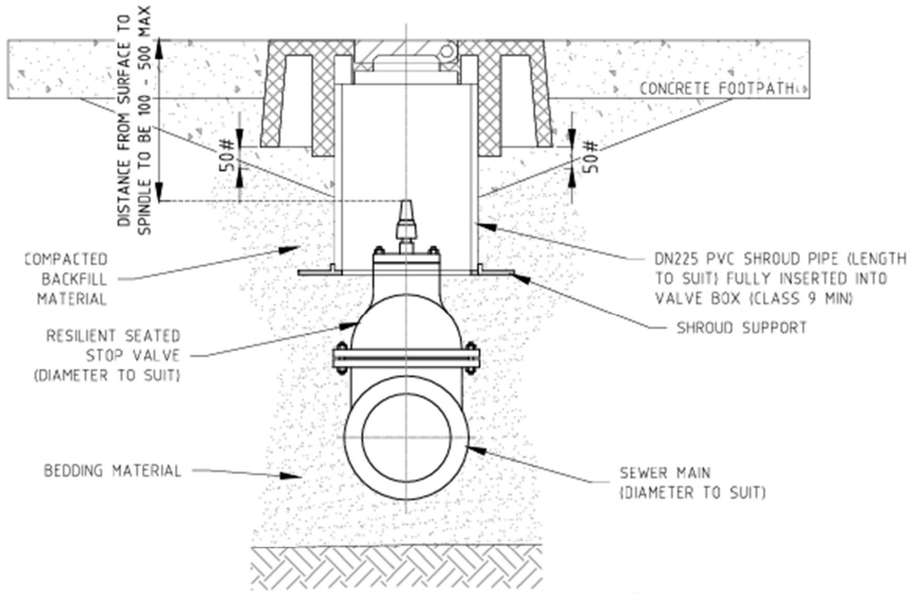
TIGHTENING SEQUENCE

NTS

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: WATER SERIES FITTINGS – FLANGED JOINTS- BOLTING DETAILS	SHEET No. REVISION: SD 1104 - SHEET Sheet 9 of 9

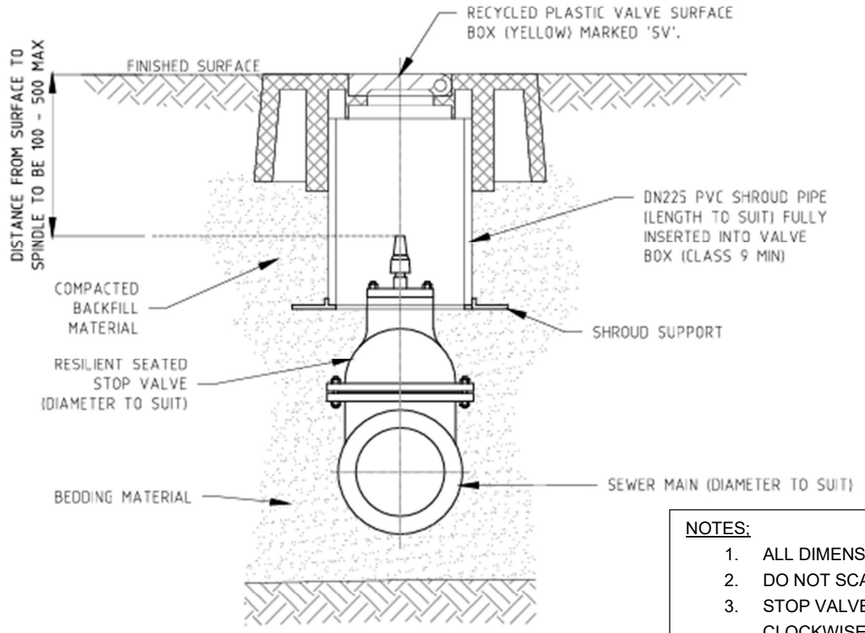


STOP VALVES
IN SEALED ROAD PAVEMENT



STOP VALVES
IN CONCRETE FOOTPATH

\# MIN 50mm CONCRETE TO BE APPLIED UNDER SV LID AND SURROUND



STOP VALVES
WITH NO VEHICULAR LOADING

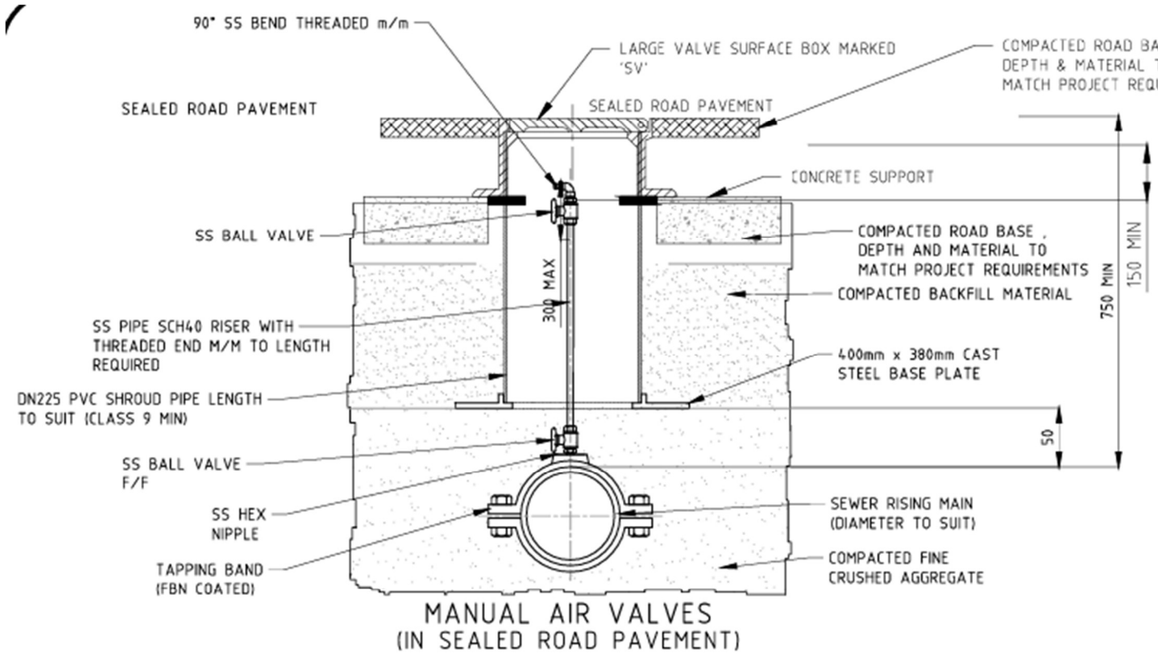
TABLE 1 - COVER TABLE (FOR VERTICALLY PLACED VALVES)

VALVE DIAMETER	MINIMUM COVER 'C' (SEE NOTE 6)
100	450
150	550
200	630
250	730
300	810
375	980
450	1160
500	1285
600	1475
750	2000

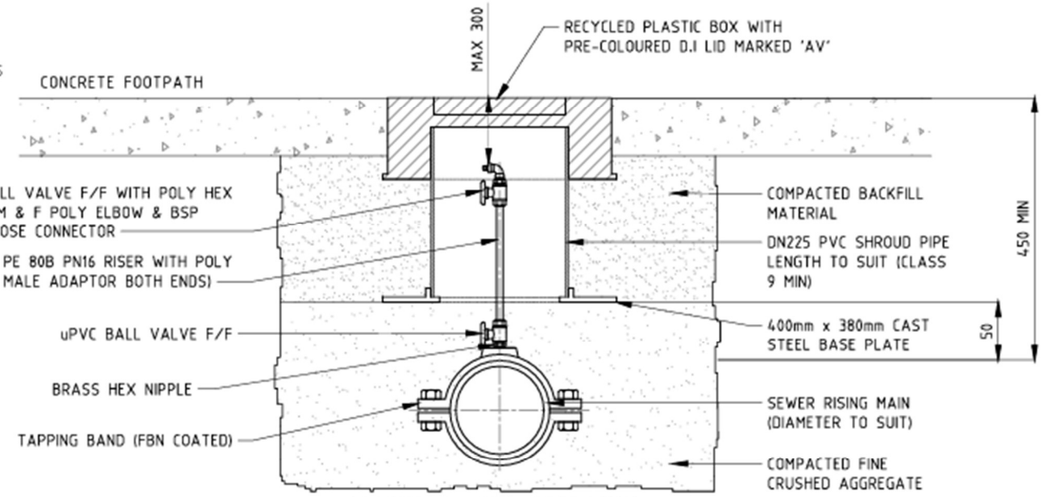
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES
2. DO NOT SCALE
3. STOP VALVES TO BE ANTI CLOCKWISE (YOUNG AND BOOROWA) OR CLOCKWISE (HARDEN) CLOSING. DIRTECTION ARROW TO BE DISPLAYED ON SPINDLE TOP.
4. REFER TO HILLTOPS STANDARD DRAWING FOR VALVE MARKING.
5. WHERE DISTANCE BETWEEN VALVE SPINDLE AND TOP OF VALVE BOX IS GREATER THAN 500mm, EXTENSION SPINDLE IS TO BE PROVIDED.
6. COVER REQUIRED IN ROAD CARRIAGEWAY TO BE 750mm MINIMUM.

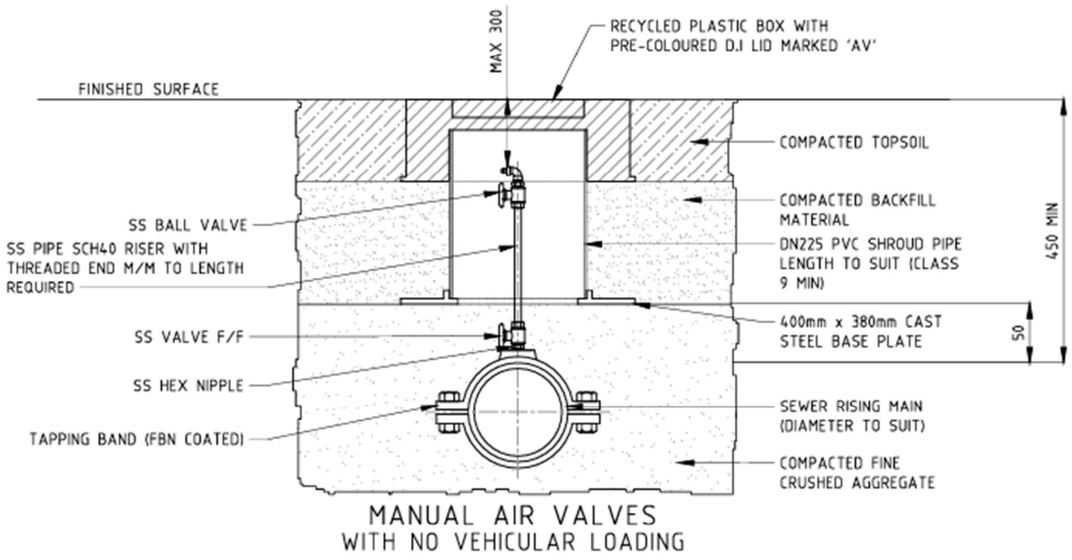
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MANUAL AIR VALVES
(IN SEALED ROAD PAVEMENT)



MANUAL AIR VALVES
IN CONCRETE FOOTPATH

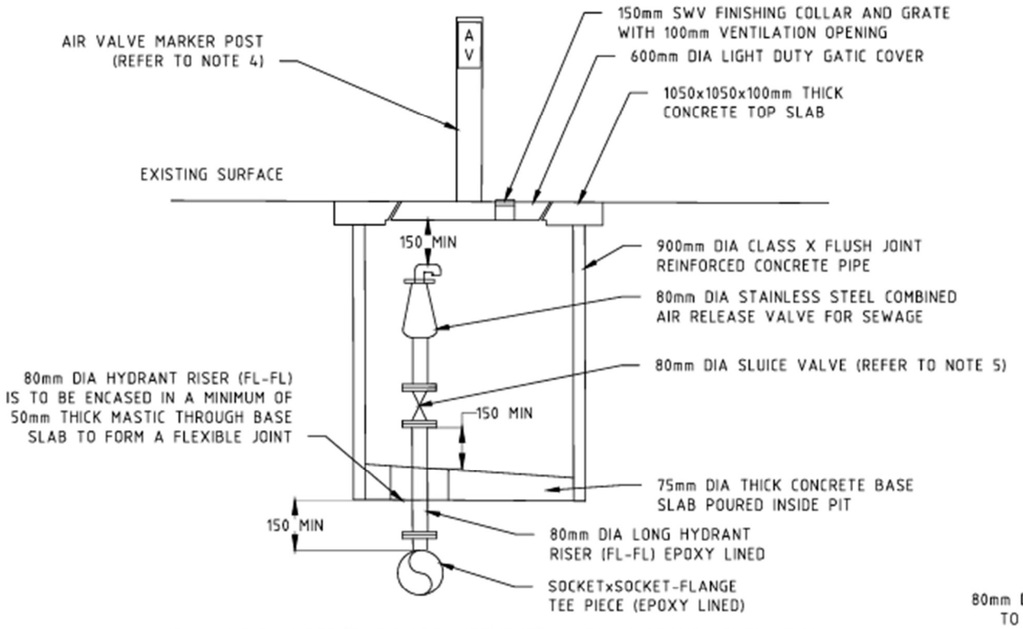


MANUAL AIR VALVES
WITH NO VEHICULAR LOADING

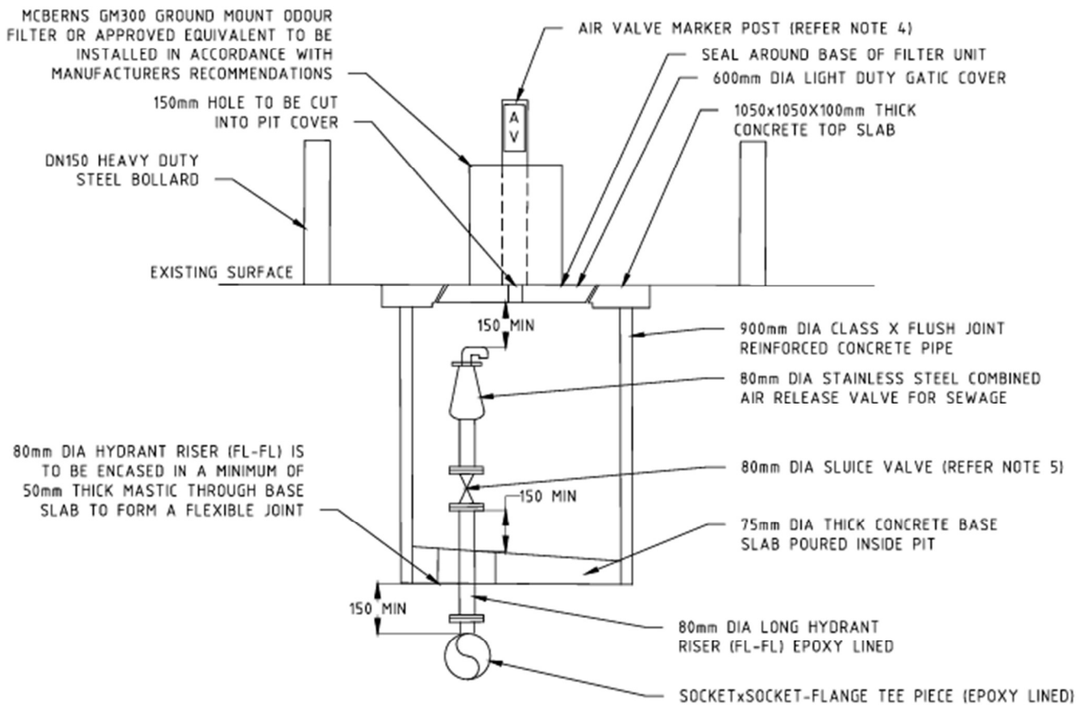
NOTES

1. STAINLESS STEEL (SS) PIPES, FITTINGS A VALVES TO BE GRADE 316 SUITABLE FOR WORKING PRESSURE OF 1200kPa
2. THE AIR RELEASE VALVE DETAILS SHOWN ON THIS DRAWING ARE SUITABLE FOR THE FOLLOWING PIPELINE MATERIAL
   - DICL
   - UPVC TO AS2977
   - UPVC TO AS1477
3. DUCTILE IRON FLANGES TO BE CLASS 16 TO AS4087 FIG.B5. STAINLESS STEEL FLANGES TO BE CLASS 16 TO AS4087 FIG. B7. FLANGE INSTALLATION TO BE OFF-CENTRE.
4. SCREW THE 50mm DIAMETER 90° BEND TO THE BALL VALVE USING TEFLON TAPE.
5. BONDING SURROUND TO ACCESS CHAMBER
   - JOINT BETWEEN MAKE-UP RING AND SURROUND PRE-PACKED WITH QUICK SETTING MORTAR OR MORTAR MADE FROM 3 PARTS SAND TO 1 PART CEMENT.
   - SCABBLE AND CLEAN JOINT SURFACES SO THAT ALL LOOSE OR SOFT MATERIAL IS REMOVED.
   - BRUSH JOINT SURFACES CLEAN, SPONGE WET AND PRIME WITH A CEMENT/WATER SLURRY PRIOR TO PLACING CEMENT MORTAR.
   - A SUITABLE ALTERNATIVE TO CEMENT MORTAR IS BUTYL MASTIC APPLIED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION.

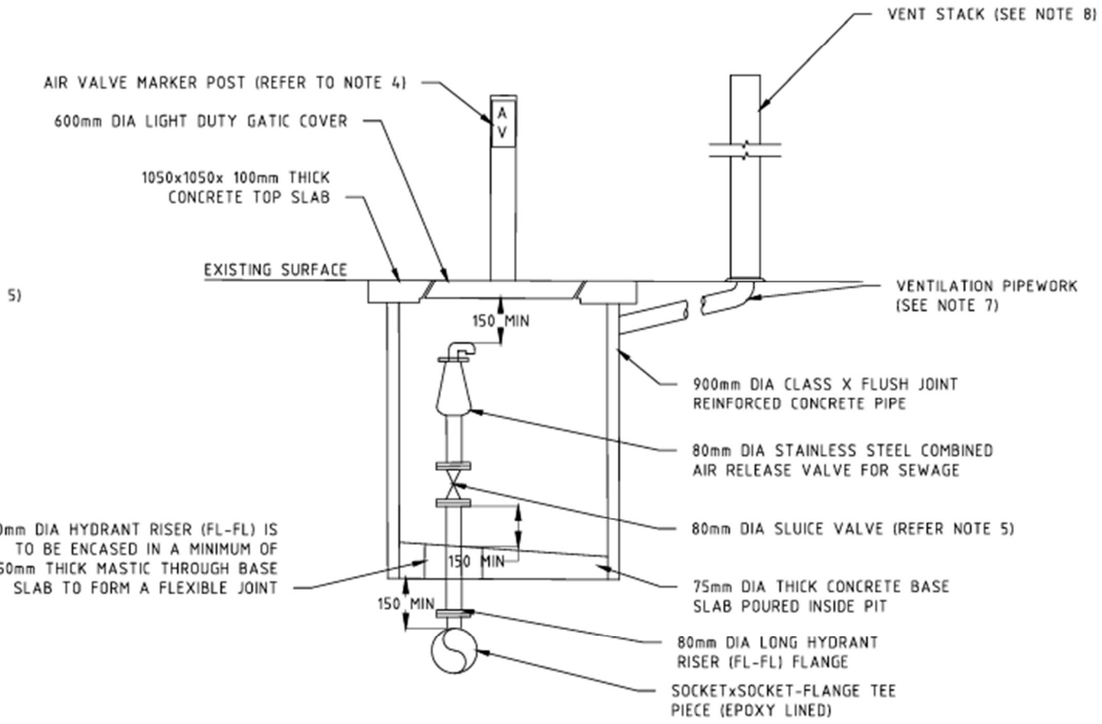
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AIR VALVE CHAMBER (BASIC ARRANGEMENT) - WITH NO ODOUR VENTILATION



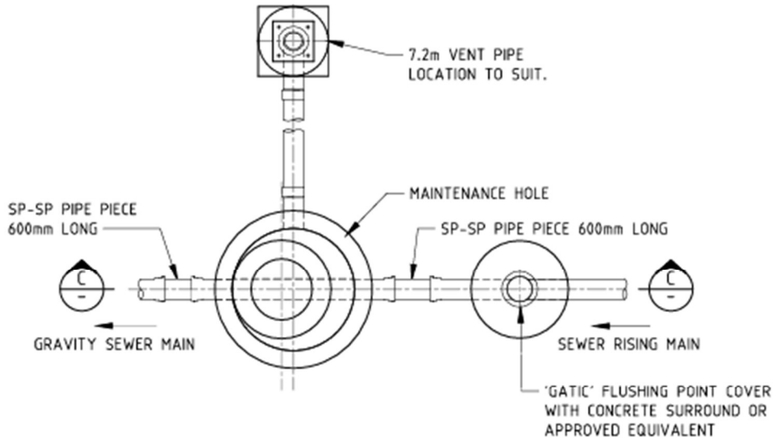
AIR VALVE CHAMBER - FITTED WITH A GROUND MOUNT ODOUR FILTER



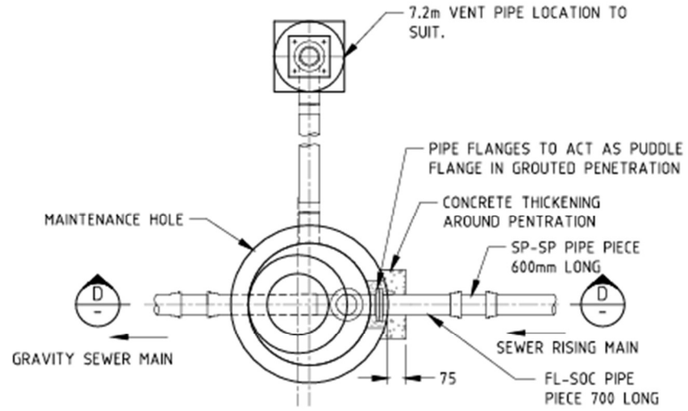
AIR VALVE CHAMBER - FITTED WITH A VENT STACK

NOTE:
1. ALL CONCRETE USED TO BE 20MPa.
2. FLOOR IS SLOPED TOWARDS ONE SIDE OF PIT.
3. MINIMUM THICKNESS OF FLOOR SLAB TO BE 75mm
4. 80mm DIA SLUICE VALVE TO BE CLASS 14 (FL-FL) & MANUFACTURED IN ACCORDANCE WITH AS 2638 FBC COATED.
5. ALL FLANGES TO BE DRILLED TO AS2129 TABLE 'D'
6. PROVIDE VENTILATION TO AIR VALVE CHAMBER.
7. FOR VENT STACK DETAILS REFER TO STANDARD DRAWING S1700 AND S1701

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES RISING MAINS – AUTOMATIC AIR VALVE INSTALLATION	SHEET No. SD 1201 REVISION: - SHEET Sheet 3 of 5



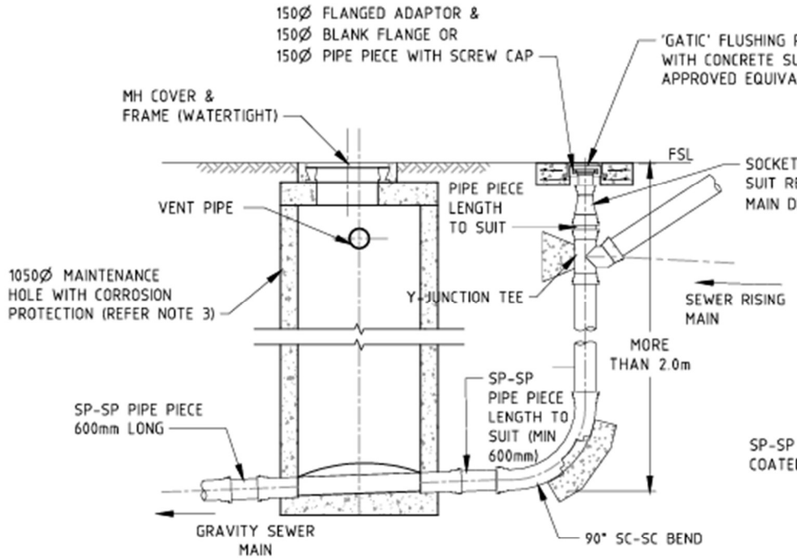
PLAN
TYPE 1



PLAN
TYPE 2

NOTES:

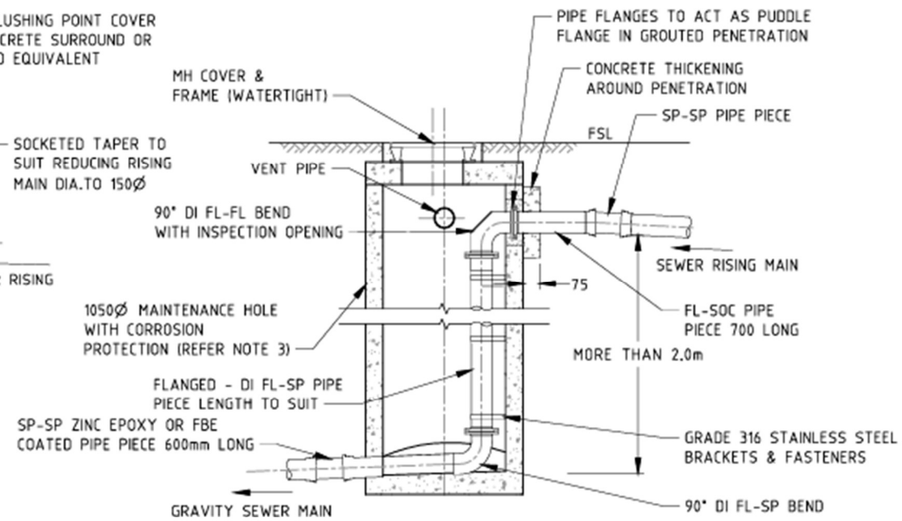
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. DISCHARGE CHAMBERS TO BE IN ACCORDANCE WITH TRC STANDARD DRAWING S1300
3. INTERNAL CONCRETE SURFACES TO BE COATED WITH SIKA SIKAGUARD 62 OR APPROVED EQUIVALENT. APPLICATION TO BE IN ACCORDANCE WITH PRODUCT SUPPLIER'S SPECIFICATIONS.
4. ANY CHAMBER WITHIN 100m DOWNSTREAM OF A RISING MAIN DISCHARGE CHAMBER TO BE PROTECTED IN A SIMILAR MANNER TO THE DISCHARGE CHAMBER.
5. BACKFILL IN VENT PIPE TRENCH SHALL BE COMPACTED TO AT LEAST THE SAME DENSITY AS THE SURROUNDING SOIL.
6. MASS CONCRETE THRUST BLOCKS ARE TO BE PLACED AT BENDS & PIPE JUNCTIONS ON THE SRM. REFER TO TRC STANDARD WATER DRAWINGS FOR LOCATION & SIZES OF THRUST BLOCKS.
7. THE SRM IS TO BE GRADED UP HILL AS IT APPROACHES THE DISCHARGE MANHOLE.
8. THE DIAMETER OF THE PIPE WORKS FROM THE MAINTENANCE HOLE TO THE VENT PIPE & WITHIN THE VENT PIPE SHOULD BE EQUAL TO OR LARGER THAN THE DIAMETER OF THE LARGEST MAIN IN THE MAINTENANCE HOLE. THE VENT PIPE STRUCTURE SHOULD BE CONSTRUCTED TO MATCH THE SIZE OF THE VENT PIPE WORKS.
9. ALL DICL FITTINGS TO BE FBE COATING OR APPROVED EQUIVALENT.
10. ALL PIPE TO BE PE WRAPPED
11. ALL FASTENERS TO BE ZINC EPOXY COATED.



SECTION C
TYPE 1

NOTE:

- ALL FITTINGS USED FOR EXTERNAL DROP CONSTRUCTION ARE TO BE mPVC OR DI EPOXY LINED INTERNALLY & EXTERNALLY

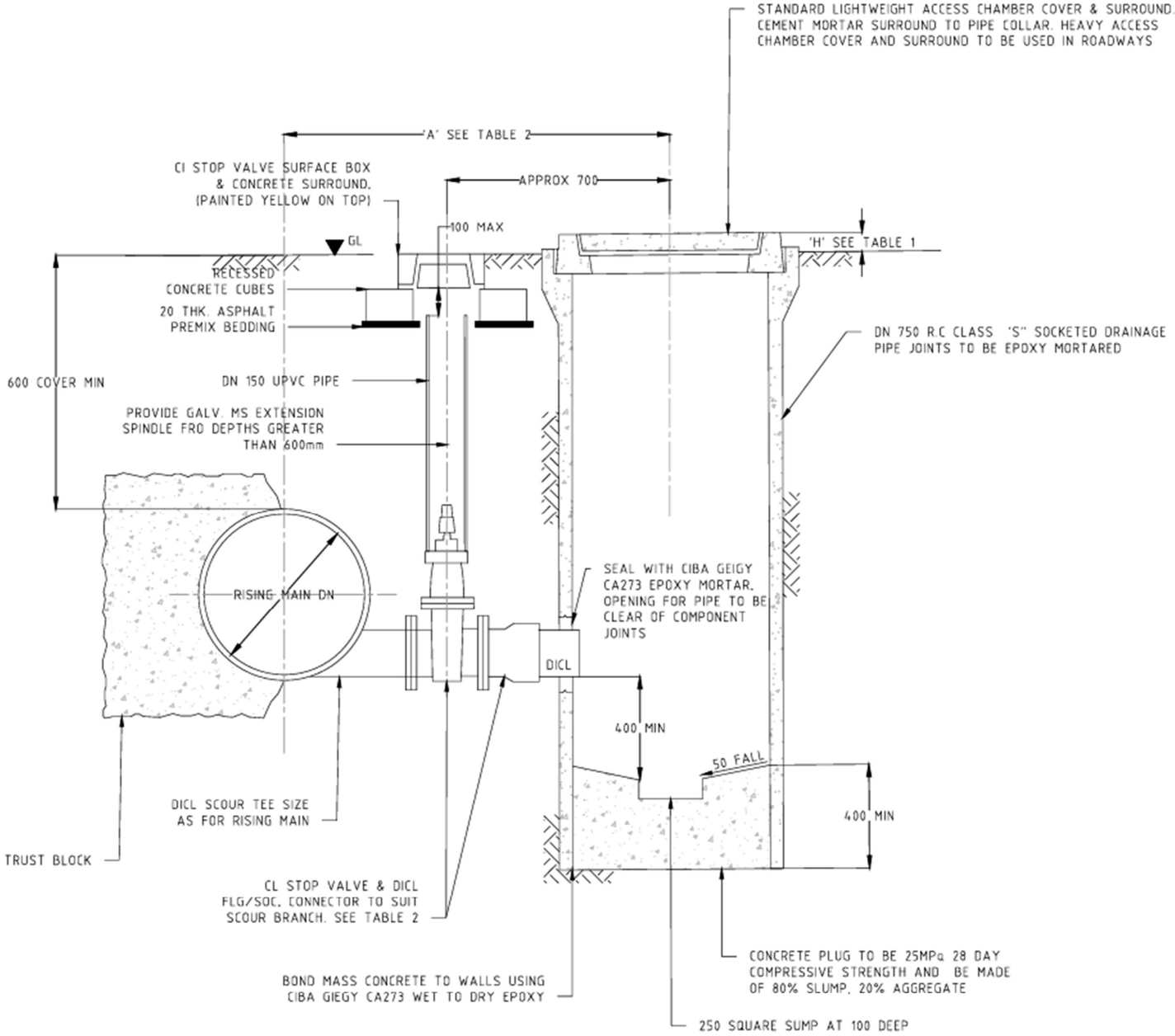


SECTION D
TYPE 2

NOTE:
ALL STAINLESS STEEL FITTINGS INSIDE MAINTENANCE HOLE TO BE EPOXY LINED INTERNALLY & EXTERNALLY OR APPROVED EQUIVALENT.

NOTE:
THE TYPE 2 OPTION IS ONLY TO BE USED FOR CONNECTION INTO AN EXISTING MANHOLE WHERE TYPE 1 IS NOT POSSIBLE. APPROVAL FOR USE MUST BE OBTAINED FROM TRC DURING DESIGN PHASE OF PROJECT.

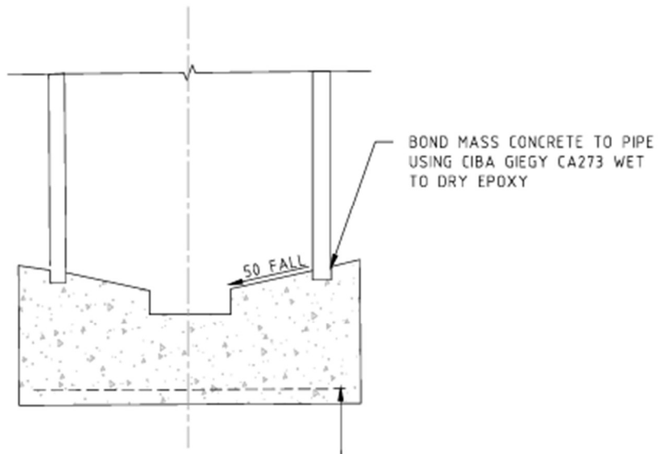
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PUMP OUT SCOUR ARRANGEMENT

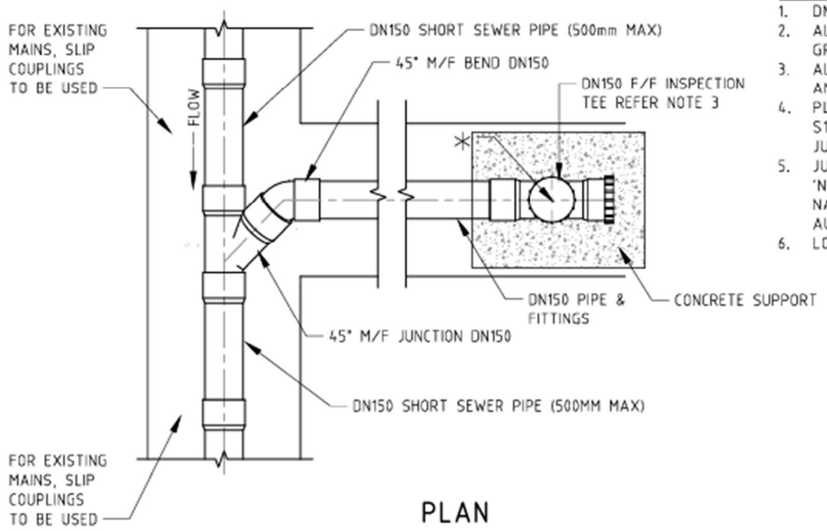
TABLE 1 - FINISHED LEVELS OF SCOUR COVER	
LOCATION	'H'
NON DEVELOPED AREAS	300
NEW SUBDIVISIONS	75
ROADS, LANEWAYS, FOOTPATHS AND DRIVEWAYS	FLUSH
EXISTING BUILT UP AREAS	25

TABLE 2 - SCOUR SIZE AND LOCATION		
RISING MAIN	BRANCH	'A'
DN 100	DN 100	1000
DN 150	DN 80	1050
DN 200	DN 80	1050
DN 225	DN 100	1100
DN 250	DN 100	1100
DN 300	DN 100	1100
DN 375	DN 150	1200
DN 450	DN 150	1250
DN 500	DN 150	1300
DN 600	DN 150	1300

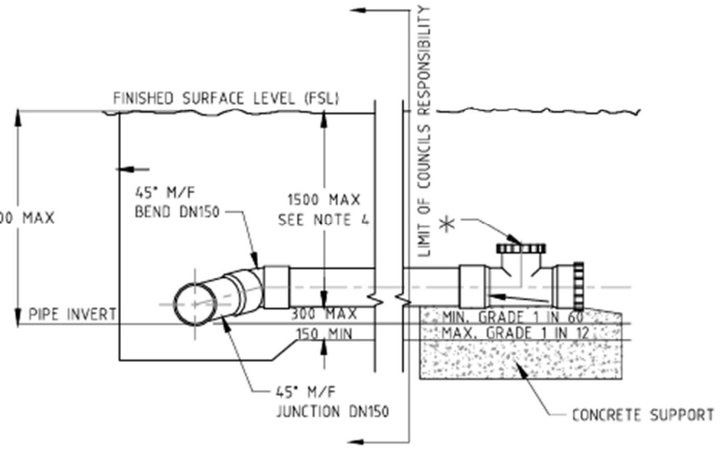


ALTERNATIVE BASE SLAB

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES RISING MAINS – PUMP OUT SCOUR FOR DN100 TO DN600	SHEET No. SD 1201 REVISION: - SHEET Sheet 5 of 5



PLAN



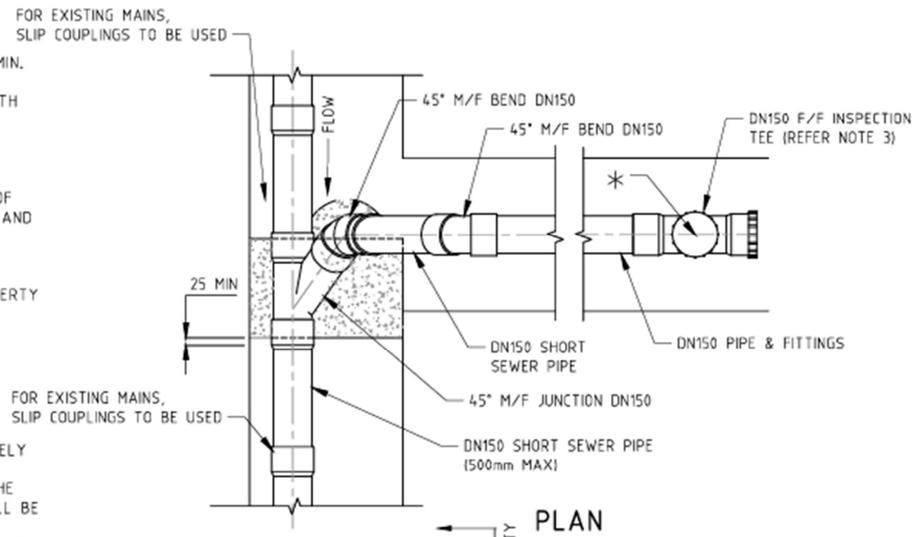
STANDARD BRANCH ELEVATION
TYPE A

TABLE 1 - PARTS LIST TYPE A

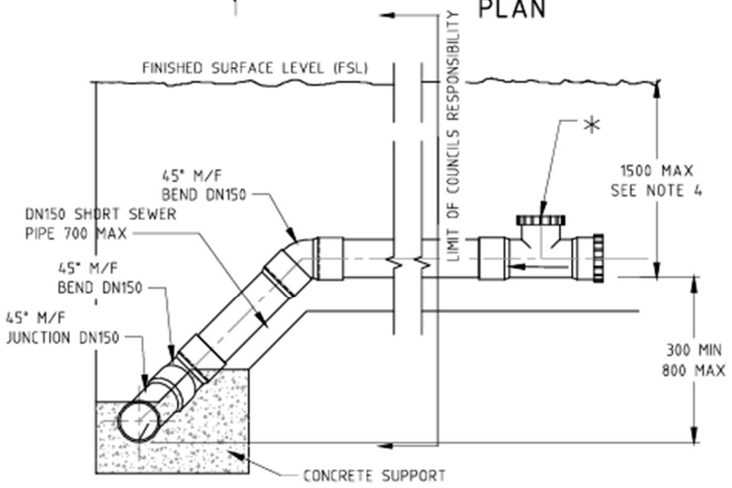
ITEM	DESCRIPTION	NO.
1	SEWER JUNCTION M/F DN150 45° R.R.J	1
2	SEWER BEND M/F DN150 45° R.R.J.	1
3	INSPECTION TEE DN150 F/F	1
4	DN150 SHORT SEWER PIPE 500mm MAX	2
5	DN150 SHORT SEWER PIPE CUT TO SUIT	1

NOTES

1. DN MEANS NOMINAL DIAMETER
2. ALL PROPERTY SEWER CONNECTION BRANCHES SHALL HAVE A MIN. GRADE OF 1 IN 60.
3. ALL PROPERTY SEWER CONNECTION BRANCHES SHALL FINISH WITH AN INSPECTION TEE WITH END & INSPECTION OPENING.
4. PLUMBER TO INSTALL SHAFT AS PER TRC STANDARD DRAWING S1102 WHEN CONNECTING PROPERTY. DEPTH OF END CAP OF JUNCTION SHALL BE NO GREATER THAT 1.5m.
5. JUNCTION MUST SATISFY CLAUSE 4.2.5 'SOFFIT REQUIREMENTS OF 'NSW VARIATIONS & ADDITIONAL PROVISIONS TO AS/NZS 3500 AND NATIONAL CONSTRUCTION CODE VOL 3- PLUMBING CODE OF AUSTRALIA.
6. LOCATION OF INSPECTION TEE SHALL BE;
   (A) WHERE PUBLIC SEWER IS LOCATED WITHIN THE PROPERTY BEING SERVED:
      - FOR EXISTING DWELLINGS. AT THE MOST PRACTICAL POINT INSIDE THE PROPERTY BOUNDARY TO FACILITATE THE CONNECTION.
      - FOR VACANT ALLOTMENTS, AT THE MOST PRACTICAL POINT INSIDE THE PROPERTY BOUNDARY TO FACILITATE THE CONNECTION, CONSIDERING TOPOGRAPHY & THE MOST LIKELY POSITION OF SEWER DRAINAGE OUTLETS
   (B). WHERE PUBLIC SEWERS ARE NOT LOCATED WITHIN THE PROPERTY BEING SERVED. THE INSPECTION TEE SHALL BE LOCATED 1.0m INSIDE THE PROPERTY BOUNDARY TO FACILITATE THE CONNECTION. CONSIDERING TOPOGRAPHY & THE MOST LIKELY POSITION OF SEWER DRAINAGE OUTLETS.
7. BEDDING MATERIAL SHALL COMPLY WITH REQUIREMENTS OF AS/NZS 2568 AND MANUFACTURERS REQUIREMENTS
8. CONCRETE SUPPORTS SHALL BE N20 & COMPACTED TO SUPPORT 45° JUNCTIONS & PIPES THE SUPPORTS SHALL EXTEND FROM THE TRENCH WALLS & FLOOR TO THE TOP OF PIPE AS SHOWN.
9. THESE DETAILS ARE APPLICABLE TO SEWER MAINS FROM DN150 TO DN300 INCLUSIVE.
10. ALL DIMENSIONS IN MILLIMETRES.
11. ALL PUBLIC PROPERTY SEWER CONNECTIONS ARE TO BE DN150 MIN.
12. ALL COUNCIL PIPEWORK & FITTINGS TO BE R.R.J
13. NO PROPERTY SEWER CONNECTION LINE SHALL BE LONGER THAN 10m.
14. PROPERTY SEWER CONNECTIONS ARE NOT PERMITTED ON SEWERS OF DN300 OR LARGER, AN ADDITIONAL SMALLER DIAMETER PUBLIC SEWER LINE IS TO BE PROVIDED FOR SUCH CONNECTIONS
15. ALL PIPEWORK TO BE S.N 8 OR GREATER IF OTHERWISE SPECIFIED.
16. WORKS AS EXECUTED IDENTIFICATION LOCATION SHOWN BY ✳



PLAN

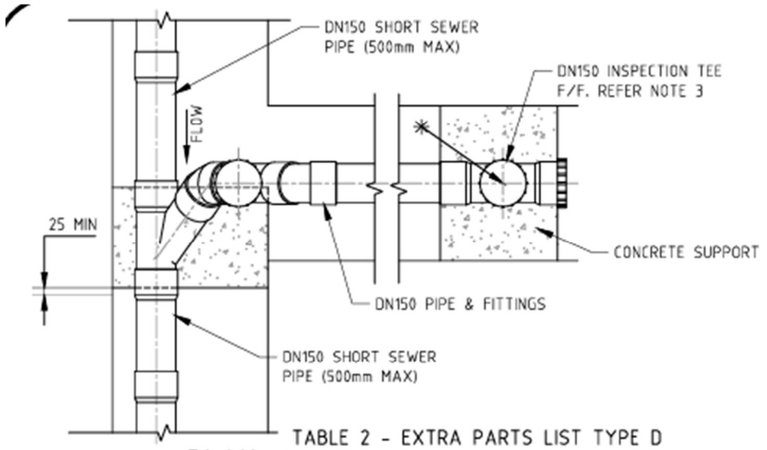


45° BRANCH ELEVATION
TYPE B

TABLE 2 - PARTS LIST TYPE B

ITEM	DESCRIPTION	NO.
1	SEWER JUNCTION M/F DN150 45° R.R.J	1
2	SEWER BEND M/F DN150 45° R.R.J.	2
3	INSPECTION TEE DN150 F/F	1
4	DN150 SHORT SEWER PIPE 500mm MAX	2
5	DN150 SHORT SEWER PIPE CUT TO SUIT	1

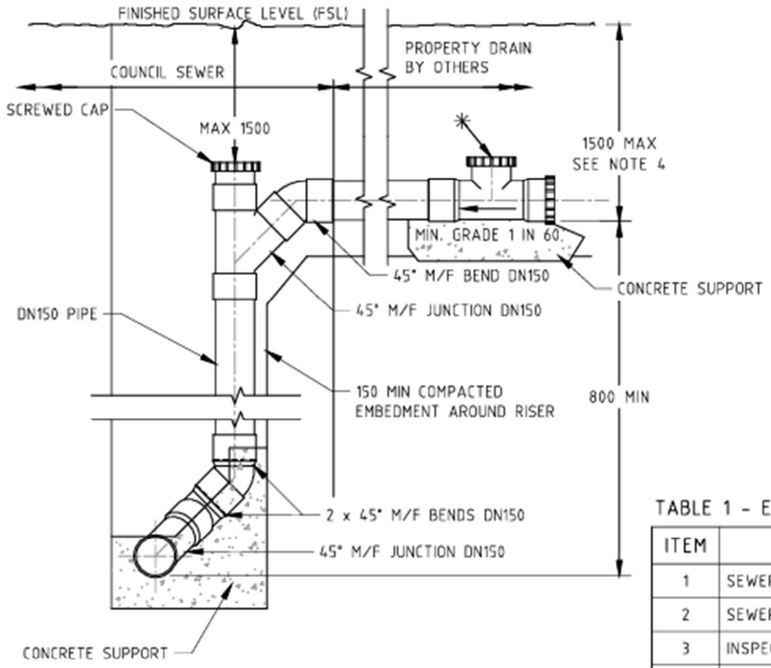
SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES PROPERTY – PROPERTY CONNECTION DETAILS TYPE A AND TYPE B	SHEET No. SD 1202 REVISION: - SHEET Sheet 1 of 6



PLAN

TABLE 2 - EXTRA PARTS LIST TYPE D

ITEM	DESCRIPTION	NO.
7	INSPECTION TEE DN150 F/F	1
8	SEWER JUNCTION M/F DN150 45° R.R.J	1
9	SEWER BEND M/F DN150 45° R.R.J.	1
10	DN150 SHORT SEWER PIPE CUT TO SUIT	1



VERTICAL BRANCH ELEVATION

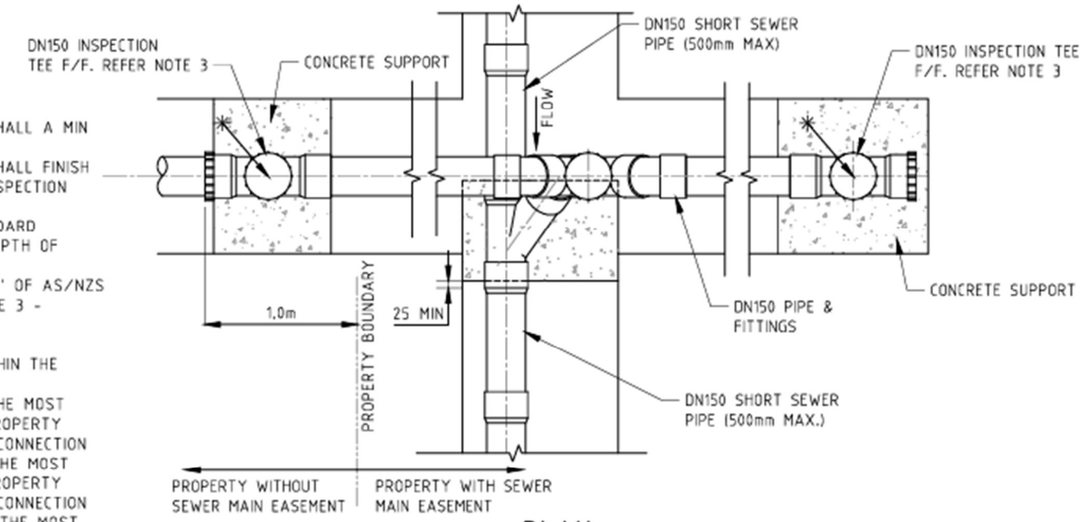
TYPE C - SINGLE CONNECTION

NOTES

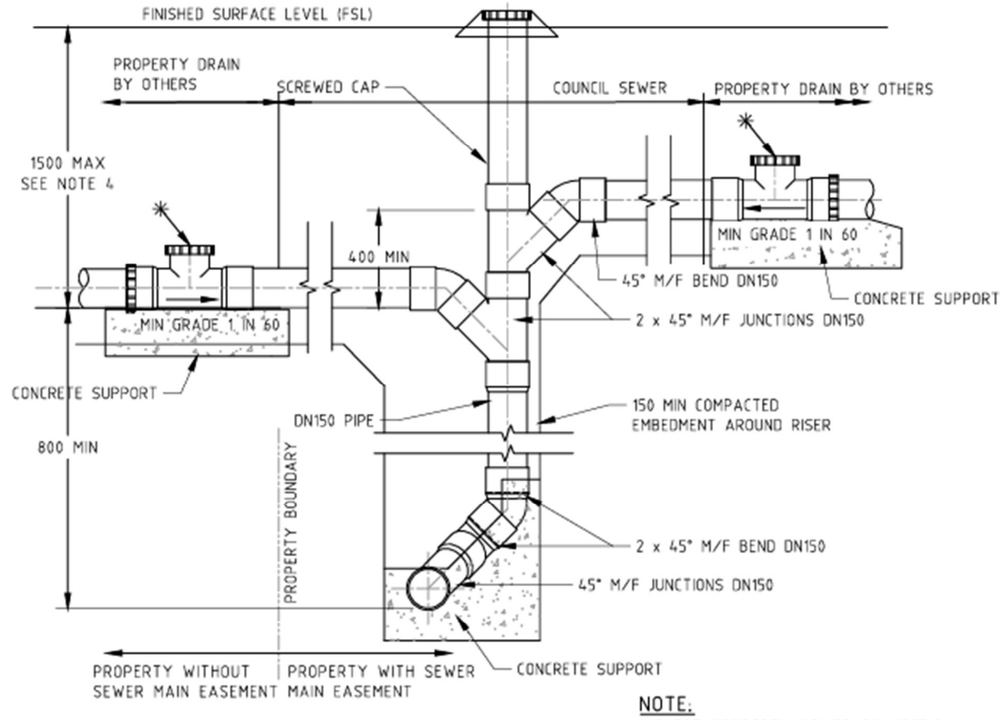
1. DN MEANS NOMINAL DIAMETER
2. ALL PROPERTY SEWER CONNECTION BRANCHES SHALL A MIN GRADE OF 1 IN 60
3. ALL PROPERTY SEWER CONNECTION BRANCHES SHALL FINISH WITH AN INSPECTION TEE WITH THE END AND INSPECTION OPENING
4. PLUMBER TO INSTALL SHAFT AS PER TRC STANDARD DRAWING S1102 WHEN CONNECTING PROPERTY. DEPTH OF JUNCTION SHALL BE NO GREATER THAN 1.5m
5. JUNCTION MUST SATISFY 'SOFFIT REQUIREMENTS ' OF AS/NZS 3500 AND NATIONAL CONSTRUCTION CODE VOLUME 3 - PLUMBING CODE OF AUSTRALIA
6. LOCATION OF INSPECTION TEE SHALL BE:
   A. WHERE PUBLIC SEWER IS LOCATED WITHIN THE PROPERTY BEING SERVED
      - FOR EXISTING DWELLINGS, AT THE MOST PRACTICAL POINT INSIDE THE PROPERTY BOUNDARY TO FACILITATE THE CONNECTION
      - FOR VACANT ALLOTMENTS AT THE MOST PRACTICAL POINT INSIDE THE PROPERTY BOUNDARY TO FACILITATE THE CONNECTION CONSIDERING TOPOGRAPHY AND THE MOST LIKELY POSITION OF SEWER DRAINAGE OUTLETS.
   B. WHERE PUBLIC SEWERS ARE NOT LOCATED WITHIN THE PROPERTY BEING SERVED, THE INSPECTION TEE SHALL BE LOCATED 1.0m INSIDE THE PROPERTY BOUNDARY TO FACILITATE THE CONNECTION, CONSIDERING TOPOGRAPHY AND THE MOST LIKELY POSITION OF SEWER DRAINAGE OUTLETS
7. BEDDING MATERIAL SHALL COMPLY WITH THE REQUIREMENTS OF AS/NZS 2568 AND MANUFACTURERS REQUIREMENTS
8. CONCRETE SUPPORTS SHALL BE N20 AND COMPACTED TO SUPPORT 45° JUNCTIONS AND PIPES. THE SUPPORTS SHALL EXTEND FROM THE TRENCH WALLS AND FLOOR TO THE TOP OF PIPE AS SHOWN.
9. THESE DETAILS ARE APPLICABLE TO SEWER MAINS FROM DN150 TO DN300 INCLUSIVE
10. ALL DIMENSIONS ARE IN MILLIMETRES
11. ALL PUBLIC PROPERTY SEWER CONNECTIONS ARE DN150 MIN
12. ALL COUNCIL PIPEWORK AND FITTINGS TO BE R.R.J
13. NO PROPERTY SEWER CONNECTION LINE SHALL BE LONGER THAN 10m.
14. PROPERTY SEWER CONNECTIONS ARE NOT PERMITTED ON SEWERS OF DN300 OR LARGER AN ADDITIONAL SMALLER DIAMETER PUBLIC SEWER LINE IS TO BE PROVIDED FOR SUCH CONNECTIONS
15. ALL PIPEWORK TO BE S.N. 8 OR GREATER IF OTHERWISE SPECIFIED
16. WORK AS EXECUTED IDENTIFICATION LOCATION SHOWN BY ✳

TABLE 1 - EXTRA PARTS LIST TYPE C

ITEM	DESCRIPTION	NO.
1	SEWER JUNCTION M/F DN150 45° R.R.J	2
2	SEWER BEND M/F DN 150 45° R.R.J.	3
3	INSPECTION TEE DN150 F/F	1
4	DWV ACCESS COUPLING DN150 R.R.J./SPGT WITH CAP	2
5	DN150 SHORT SEWER PIPE 500mm MAX	1
6	DN150 SHORT SEWER PIPE CUT TO SUIT	1



PLAN



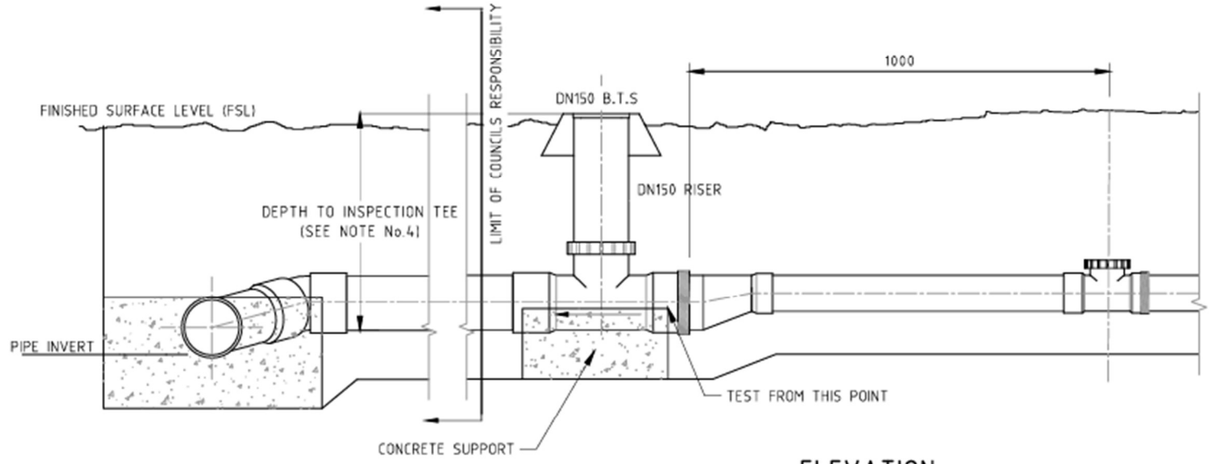
VERTICAL BRANCH ELEVATION

TYPE D- DOUBLE CONNECTION FOR REAR BOUNDARY SEWER ONLY

NOTE:

HIGHEST PROPERTY SEWER CONNECTION BRANCH SHOULD CONNECT TO THE PROPERTY CONTAINING THE SEWER MAIN EASEMENT. (THE LOWEST PROPERTY SEWER CONNECTION BRANCH SHOULD CONNECT TO THE PROPERTY NOT CONTAINING THE SEWER MAIN EASEMENT).

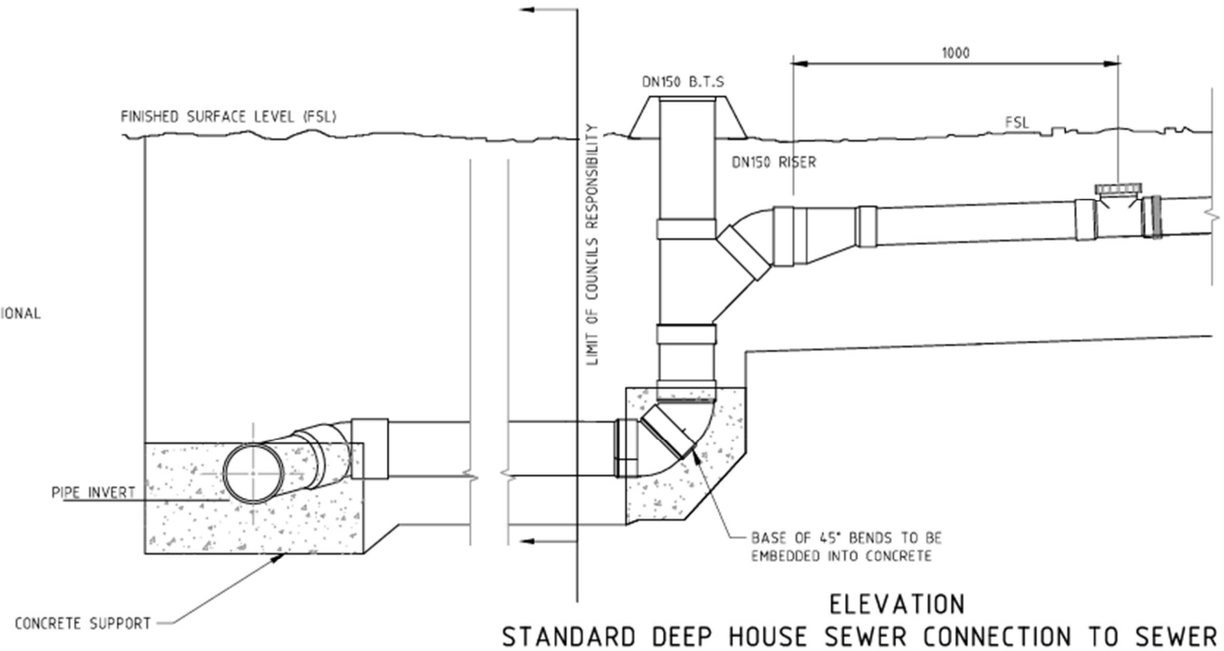
SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES PROPERTY – PROPERTY CONNECTION DETAILS (BURIED INTERFACE METHOD) TYPE C AND TYPE D	SHEET No. SD 1202 REVISION: - SHEET Sheet 2 of 6



ELEVATION
STANDARD SHALLOW HOUSE SEWER CONNECTION TO SEWER MAIN

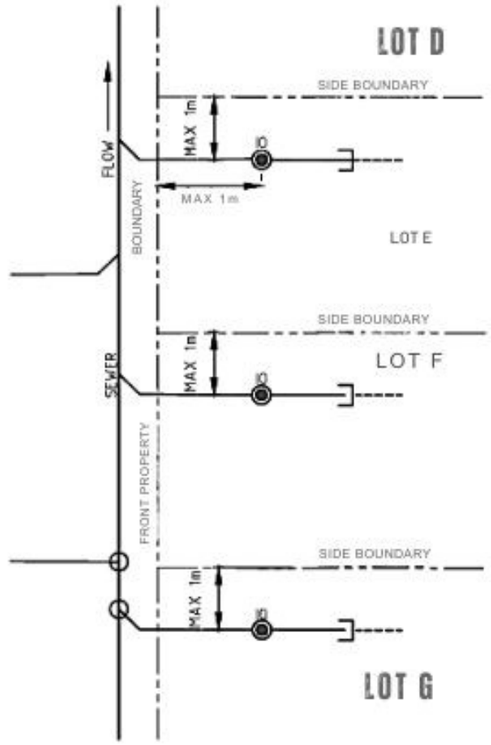
NOTES:

1. DRAINER TO TEST ALL DRAINAGE AT DN150 I.D. WITH 150mm PLUG
2. ONCE TEST IS COMPLETED, REMOVE PLUG, DO NOT RE-ATTACH SCREW CAP INSTALL DN150 SHAFT TO SURFACE & FIT DN150 B.T.S. & SURROUND
3. WHERE THE INSPECTION SHAFT OR BOUNDARY TRAP RISER IS LIKELY TO BE DAMAGED BY VEHICULAR TRAFFIC, THE CAP MAY BE INSTALLED BELOW SURFACE LEVEL. ACCESS SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING:
   A. A HEAVY-DUTY TRAFFICABLE COVER SHALL BE INSTALLED AT SURFACE LEVEL ABOVE AND INDEPENDENT OF THE CAP
   B. THE COVER SHALL BE SUITABLY SUPPORTED SO THAT NO LOAD CAN BE TRANSMITTED ONTO THE SHAFT
   C. THE SHAFT SHALL BE TERMINATED JUST BELOW THE UNDERSIDE OF THE COVER
4. THE DEPTH TO THE INSPECTION TEE SHALL BE NO GREATER THAN 1.5m UNLESS A GREATER DEPTH IS REQUIRED TO SERVICE A MINIMUM OF 90% OF EACH LOT & SATISFY 'SOFFIT REQUIREMENTS' TO AS/NZS 3500' AND THE NATIONAL CONSTRUCTION CODE VOLUME 3- THE PLUMBING CODE OF AUSTRALIA.
5. B.T.S DENOTES FOR BUILD TO SUIT



ELEVATION
STANDARD DEEP HOUSE SEWER CONNECTION TO SEWER MAIN

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES PROPERTY – PROPERTY DRAIN CONNECTION TO COUNCIL SEWER	SHEET No. REVISION: SD 1202 - SHEET Sheet 3 of 6



INSPECTION OPENING (10) INTERFACE METHOD

SEE S1106

NTS

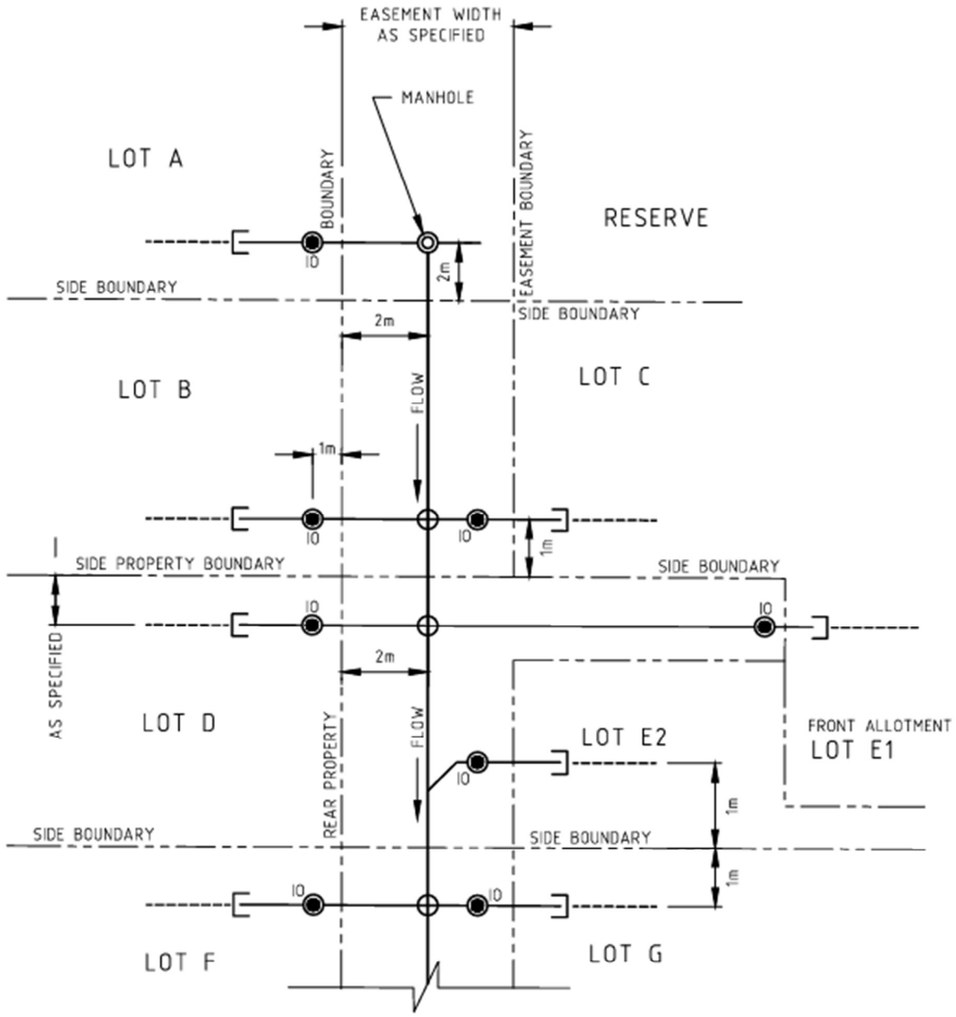
LEGEND:

- INSPECTION OPENING (RAISED TO SURFACE)
- ACCESS OPENING/RISER (RAISED TO SURFACE)
- SEALED BURIED CONNECTION POINT
- FUTURE PROPERTY DRAIN
- PROPERTY BOUNDARY

NOTES

1. LOCATE SEWERS AND IO'S AS SHOWN IN DESIGN DRAWINGS
2. LOCATION OF IO'S MAX 1m FROM FRONT SIDE BOUNDARY
3. REFER TO STANDARD DRAWINGS SD1202 SHEETS 1 TO 6 FOR PROPERTY CONNECTION DETAILS
4. RAISE IO TO SURFACE IN ACCORDANCE WITH HILLTOPS COUNCIL REQUIREMENTS
5. ALL IO'S TO BE LOCATED INSIDE PROPERTY BOUNDARIES
6. CONNECTIONS TO BE AT 45° TO SEWER
7. ALL PROPERTY CONNECTIONS THAT CROSS PROPERTY BOUNDARIES SHALL DO SO PERPENDICULAR TO THE BOUNDARY

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES PROPERTY – PROPERTY CONNECTION DETAILS SEWER IN ROAD RESERVE	SHEET No. SD 1202 REVISION: - SHEET Sheet 4 of 6



INSPECTION OPENING (IO) INTERFACE METHOD

TYPICAL CONNECTION METHODS FOR SEWERS
IN EASEMENTS (REAR OR SIDE BOUNDARIES)
NTS

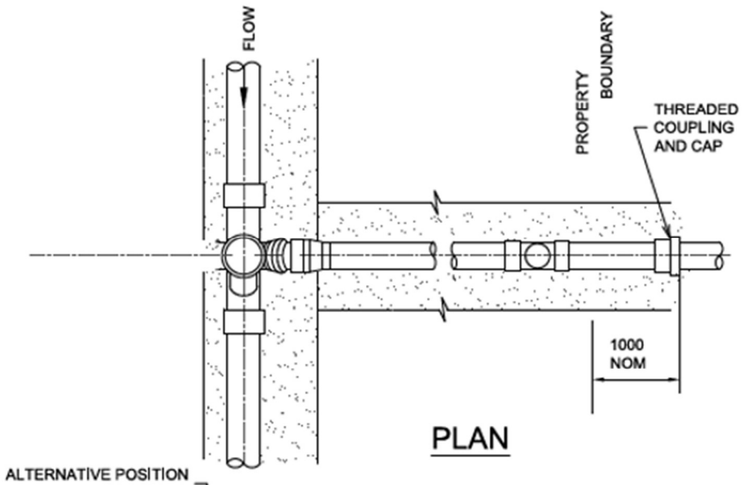
LEGEND:

- IO — INSPECTION OPENING (RAISED TO SURFACE)
- ACCESS OPENING/RISER/JUMP UP (NOT RAISED TO SURFACE)
- SEALED BURIED CONNECTION POINT
- FUTURE PROPERTY DRAIN
- PROPERTY BOUNDARY

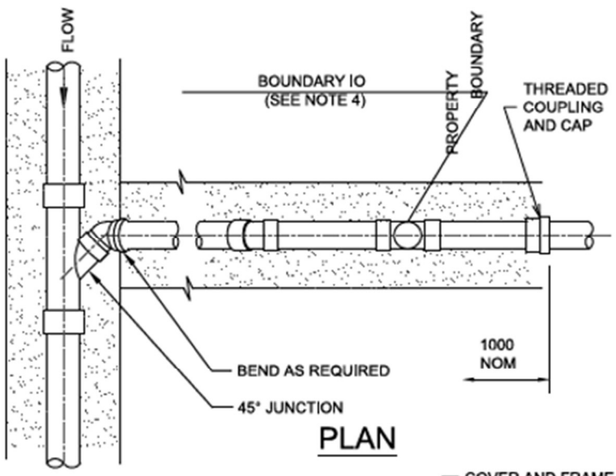
NOTES

1. LOCATE SEWERS AND IO'S AS SHOWN IN DESIGN DRAWINGS
2. REFER TO STANDARD DRAWINGS SD1202 SHEETS 1 TO 6 FOR PROPERTY CONNECTION DETAILS
3. RAISE IO TO SURFACE

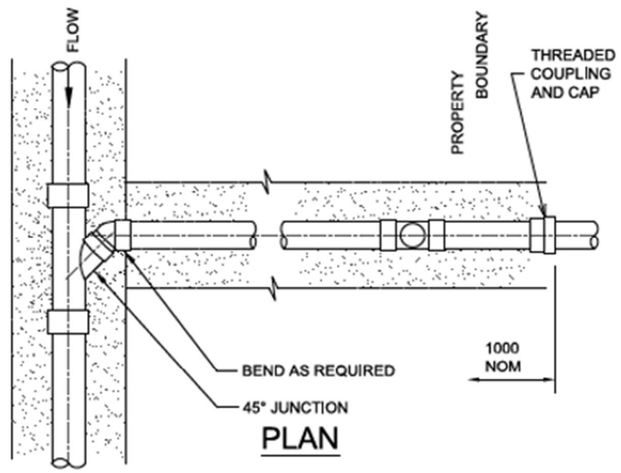
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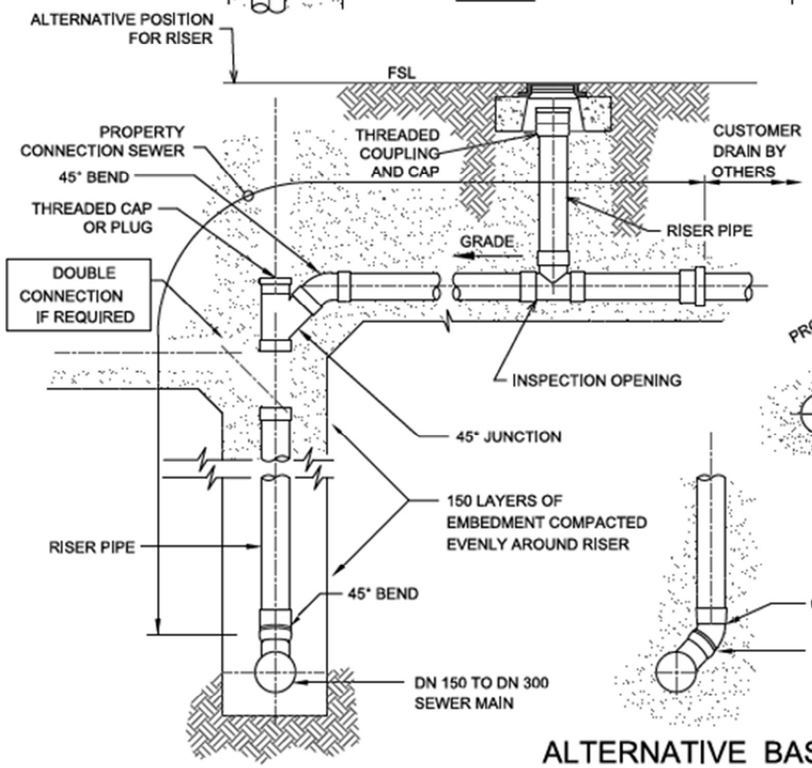
PLAN



PLAN



PLAN



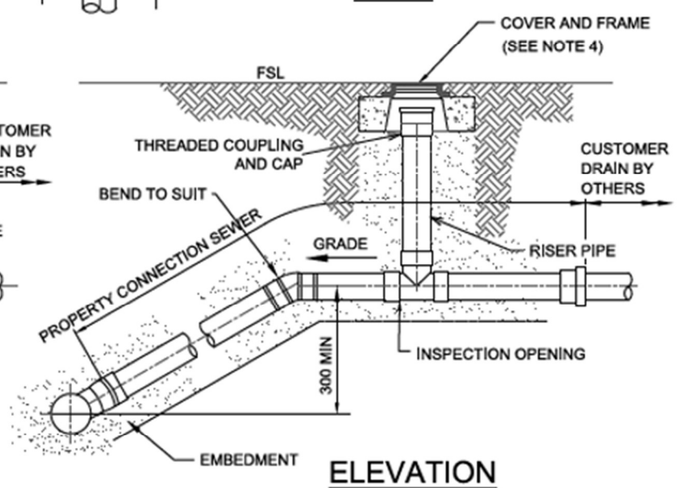
ELEVATION

VERTICAL RISER WITH

SINGLE OR DOUBLE CONNECTIONS

(MAY BE USED WHEN VERTICAL DROP >1200)

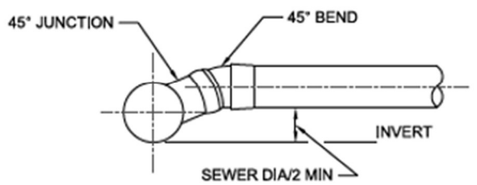
ALTERNATIVE BASE ARRANGEMENT



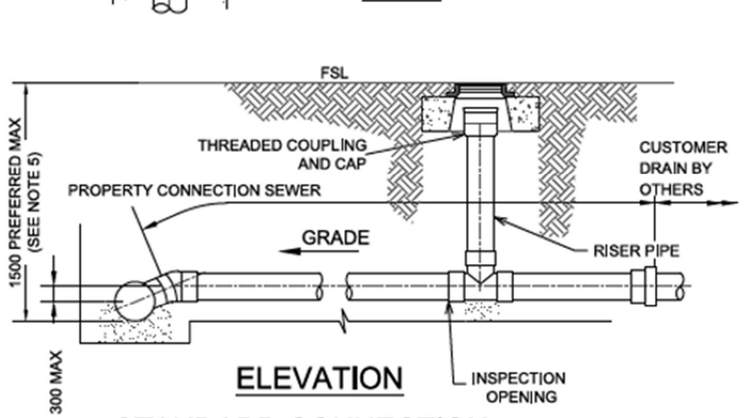
ELEVATION

SLOPED CONNECTION

(VERTICAL DROP >300 AND EMBANKMENTS)



MINIMUM LEVEL CONNECTION DETAIL



ELEVATION

STANDARD CONNECTION

(UP TO 300 VERTICAL DROP)

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. LOCATE INSPECTION OPENINGS IN ACCORDANCE WITH DESIGN DRAWINGS OR WATER AGENCY REQUIREMENTS.
3. ALL CONNECTION TYPES SHOWN ON THIS DRAWING ARE APPLICABLE TO VC, PVC (SWJ) AND PVC (RRJ) PIPES UNLESS OTHERWISE SHOWN. (PVC (SWJ) SHOWN).
4. BOUNDARY IO IS PART OF THE SEWER UNLESS SPECIFIED OTHERWISE. LOCATION, IO COVER, FRAME AND SUPPORT SLAB TO BE AS SPECIFIED BY WATER AGENCY.
5. CONNECTION POINT TO BE <1.5 m BELOW SURFACE.
6. GRADE OF PROPERTY CONNECTION SEWER TO BE NOT LESS THAN:
   DN 100 1.65%
   DN 150 1%

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES PROPERTY – PROPERTY CONNECTION DETAILS IO INTERFACE METHOD	SHEET No. SD 1202 REVISION: - SHEET Sheet 6 of 6

TABLE 1 - VEHICULAR LOADING

MATERIAL		ZONE	
ROAD SURFACE	VERGE & TRACK		
ROAD SURFACE LAYER	TO MATCH EXISTING	SURFACE COURSE	
TO MATCH EXISTING ROAD BASE OR TO TRC'S PAVEMENT REQUIREMENTS	TO HC'S REQUIREMENTS (SEE NOTE 7)	ROAD BASE	
TO HC PAVEMENT REQUIREMENTS		SELECT TRENCH FILL	
EMBEDMENT MATERIAL IN ACCORDANCE WITH DESIGN DRAWINGS AND HC REQUIREMENTS		OVERLAY	EMBEDMENT
		SIDE SUPPORT	EMBEDMENT
		BEDDING	EMBEDMENT
		OVER-EXCAVATION	

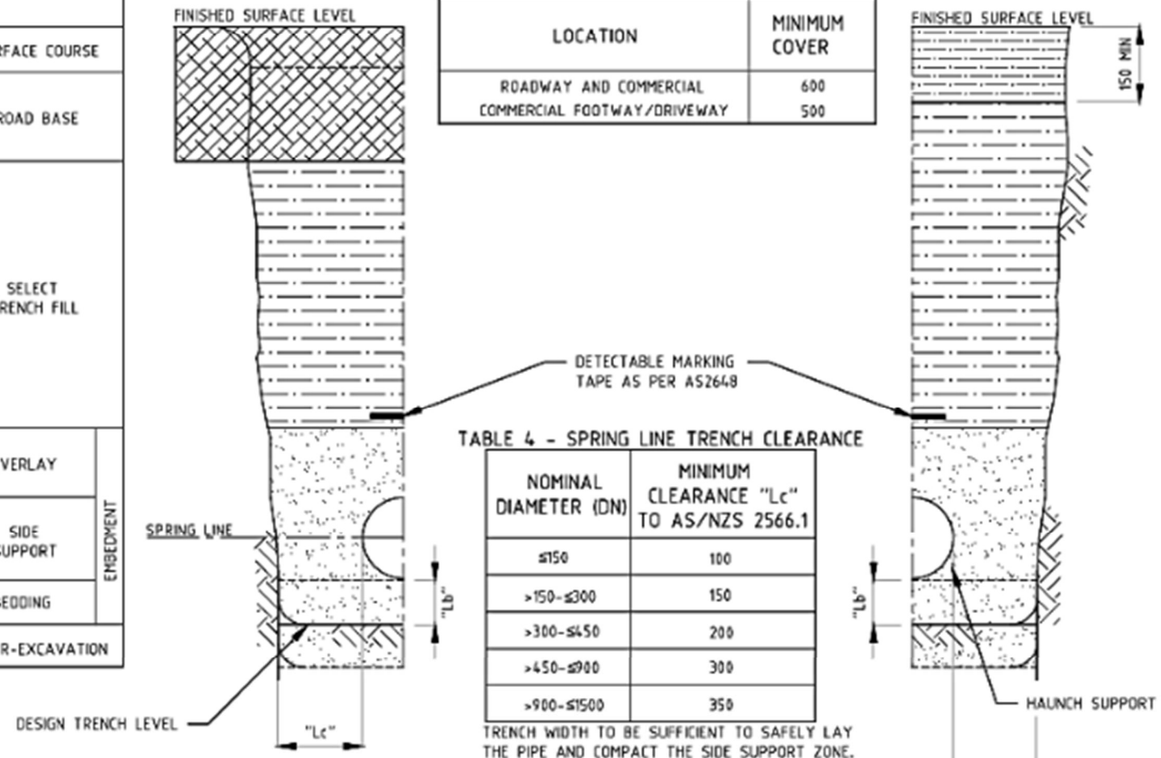


TABLE 3 - MINIMUM PIPE COVER

LOCATION	MINIMUM COVER
ROADWAY AND COMMERCIAL	600
COMMERCIAL FOOTWAY/DRIVEWAY	500

TABLE 4 - SPRING LINE TRENCH CLEARANCE

NOMINAL DIAMETER (DN)	MINIMUM CLEARANCE "Lc" TO AS/NZS 2566.1
≤150	100
>150-≤300	150
>300-≤450	200
>450-≤900	300
>900-≤1500	350

TRENCH WIDTH TO BE SUFFICIENT TO SAFELY LAY THE PIPE AND COMPACT THE SIDE SUPPORT ZONE.

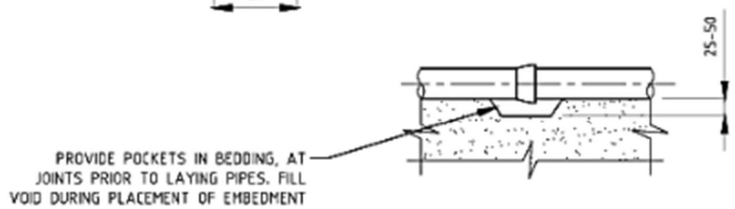
TABLE 2 - NON VEHICULAR LOADING

ZONE		MATERIAL
TOPSOIL OR FOOTWAY SURFACE		ORIGINAL MATERIAL OR IMPORTED MATERIAL OF EQUAL QUALITY
SELECT TRENCH FILL		INORGANIC SELECT FILL WITH 75 MAXIMUM STONE SIZE
EMBEDMENT	OVERLAY	EMBEDMENT MATERIAL IN ACCORDANCE WITH DESIGN DRAWINGS AND TRC REQUIREMENTS
EMBEDMENT	SIDE SUPPORT	
EMBEDMENT	BEDDING	
OVER-EXCAVATION		

NOTE
THIS TABLE INCLUDES LOCATIONS WHERE OCCASIONAL VEHICLE LOADING OCCIRS E.G PARKLANDS, FOOTWAYS

NOTES:

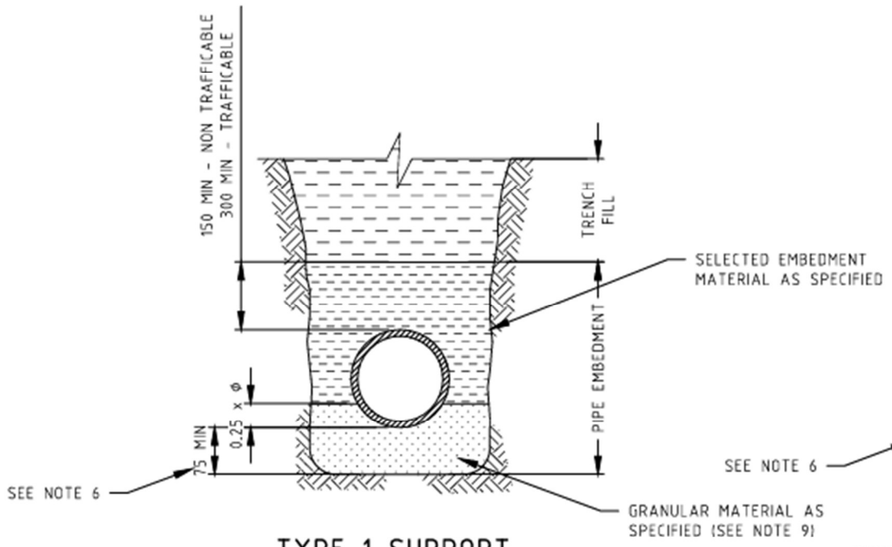
1. ALL DIMENSIONS IN MILLIMETRES.
2. BEDDING SPECIAL BEDDING SHALL BE SPECIFIED TO SUIT THE CONDITIONS IF THE TRENCH FLOOR HAS:
   IRREGULAR OUTCROPS OF ROCK.
   ALLOWABLE HORIZONTAL BEARING PRESSURE < 50kPa
   UNCONTROLLED GROUND WATER HAS DISTURBED THE FLOOR OF THE TRENCH
3. EMBEDMENT, TRENCH FILL AND COMPACTION TO MEET THE REQUIREMENTS OF HILLTOPS COUNCIL SPECIFICATIONS
   SIDES OF EXCAVATION TO BE KEPT VERTICAL TO AT LEAST 150
4. ABOVE THE PIPE.
5. USE GEOTEXTILE FILTER FABRIC WHERE SPECIFIED.
6. COMPACT AND EVENLY GRADE FINISHED TRENCH FLOOR
7. DEPTH OF TRENCH, ROAD DESIGN AND GROUND CONDITIONS WILL VARY FROM SITE TO SITE.



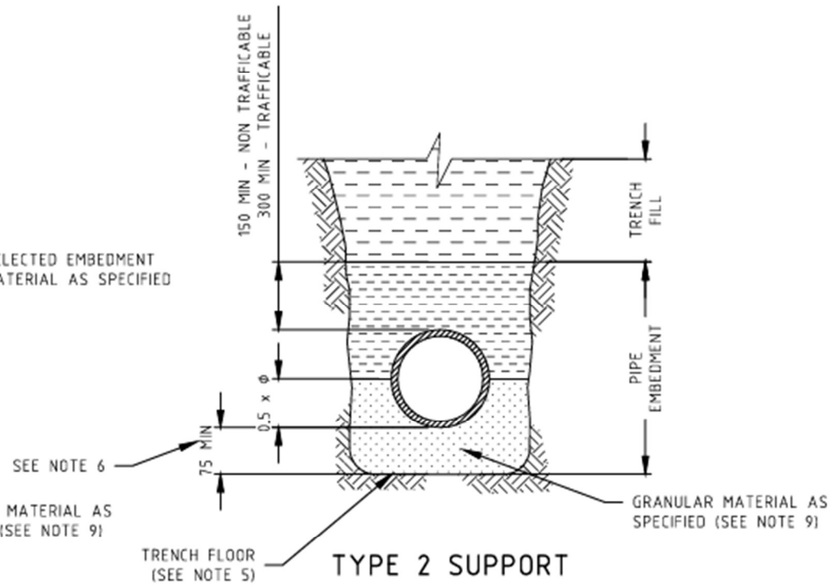
PIPE JOINT BEDDING POCKETS

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES TRENCH/EMBEDMENT – EMBEDMENT AND TRENCH FILL TYPICAL ARRANGEMENT	SHEET No. SD 1203 REVISION: - SHEET Sheet 1 of 3

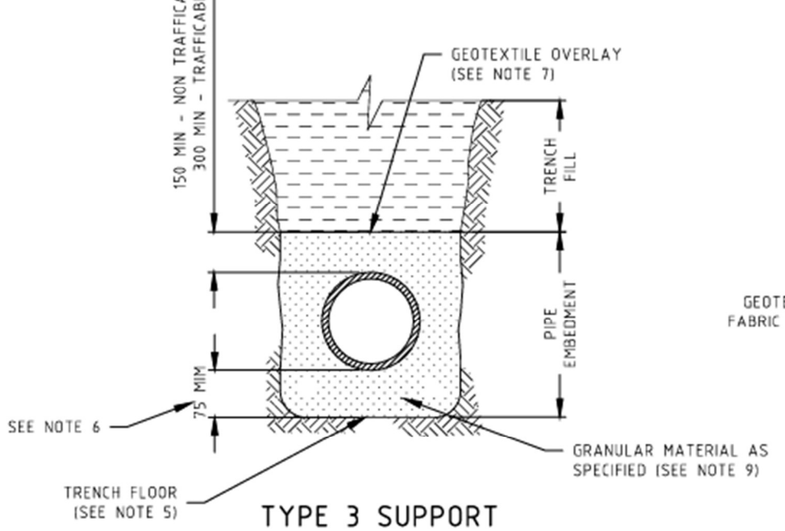
EMBEDMENT TYPES TO BE SPECIFIED IN DESIGN DRAWINGS



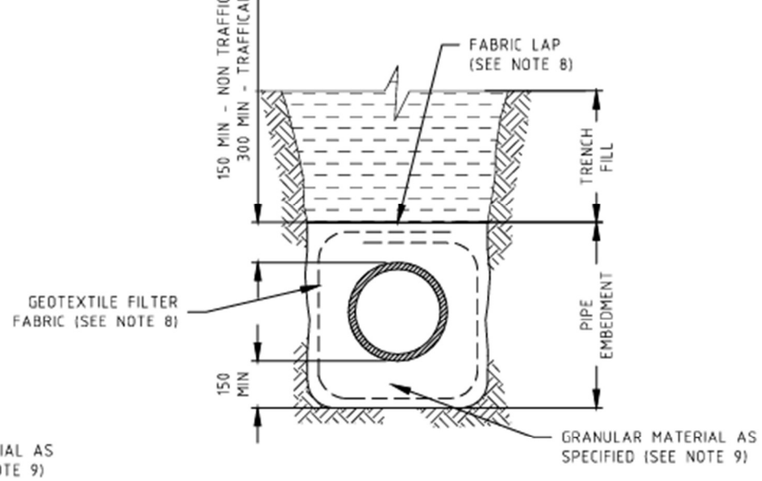
TYPE 1 SUPPORT
FOR RIGID PIPES ONLY
SEE NOTE 3



TYPE 2 SUPPORT
FOR RIGID PIPES ONLY
SEE NOTE 3



TYPE 3 SUPPORT
FOR FLEXIBLE & RIGID PIPES
SEE NOTE 3

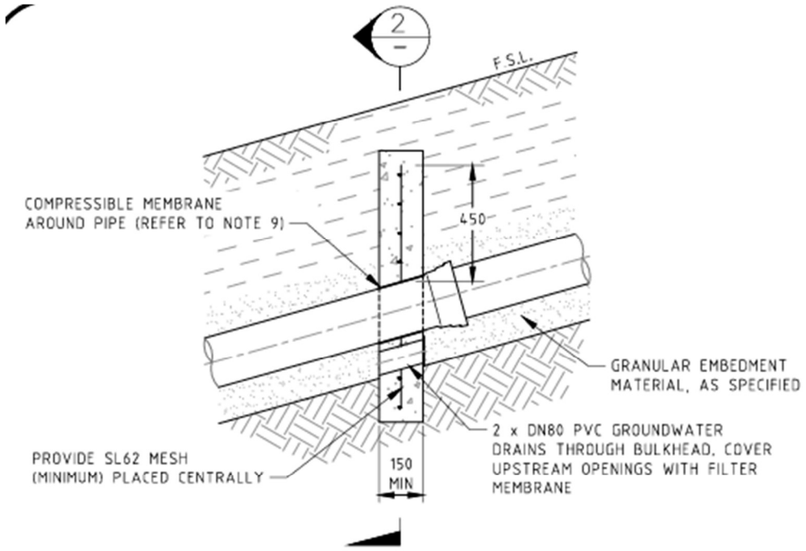


TYPE 4 SUPPORT
WITH GEOTEXTILE FOR FLEXIBLE & RIGID PIPES
SEE NOTE 3

NOTES:

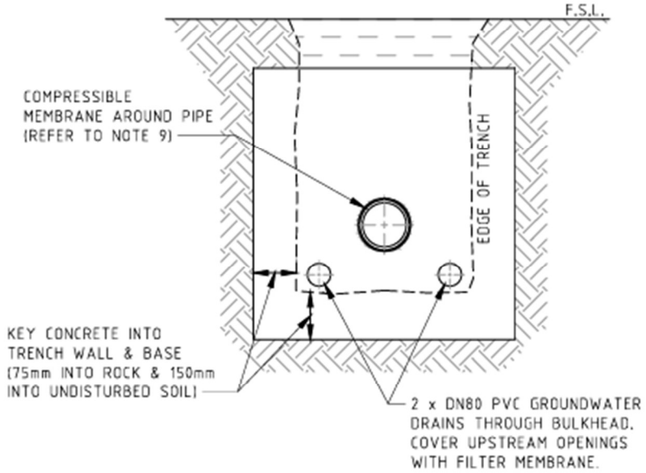
1. ALL DIMENSIONS IN MILLIMETRES.
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH TRC STANDARD DRAWING S1201
3. PIPE CLASSIFICATION
   - FLEXIBLE PIPES: PVC, GRP, DI AND PE.
4. PLACEMENT OF EMBEDMENT, TRENCH FILL & COMPACTION TO MEET THE REQUIREMENTS OF WSA 02 PART 3.
5. EXCAVATE OR COMPACT TRENCH FLOOR TO PROVIDE A FLAT FIRM BASE TO SUPPORT BEDDING MATERIAL AND MINIMISE PIPELINE SETTLEMENT. WHEN EXCAVATED, REPLACE WITH GRANULAR MATERIAL AS SPECIFIED FOR BEDDING
6. ENSURE BEDDING IS DEEP ENOUGH THAT PIPE JOINT PROJECTIONS (SOCKETS, FLANGES) DO NOT TOUCH TRENCH FLOOR. ADD MIN 50mm TO DEPTH OF BEDDING MATERIAL IN ROCK.
7. TYPE 4 SUPPORT TO BE USED WHERE MIGRATORY NATIVE SOILS (SANDS & CLAYS) ARE ENCOUNTERED ADJACENT TO THE EMBEDMENT ZONE AND SINGLE SIZE AGGREGATE IS USED.
8. GEOTEXTILE OVERLAY IS REQUIRED FOR COARSE AGGREGATE EMBEDMENT ≥ 5mm. LAY GEOTEXTILE FILTER FABRIC AGAINST TRENCH FLOOR AND WALLS SUCH THAT IT FULLY ENCASES THE EMBEDMENT.
   - PRESS FILTER FABRIC INTO THE VOIDS BEFORE INSTALLING EMBEDMENT TO PREVENT FABRIC TEARING.
   - PROVIDE A MINIMUM OF 250 OVERLAP AT ALL FILTER FABRIC JOINTS.
9. GRIT TO COMPLY WITH AS2566.2 & PIPELINE MANUFACTURERS GUIDELINES. GRIT TO BE COHESIONLESS AND NOT PRONE TO 'BULK' WHEN MOIST. BEDDING MATERIAL TO BE NON HOMOGENOUS TO EXISTING SOILS.

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES TRENCH/EMBEDMENT – STANDARD EMBEDMENT FOR FLEXIBLE AND RIGID PIPES	SHEET No. REVISION: SD 1203 - SHEET Sheet 2 of 3

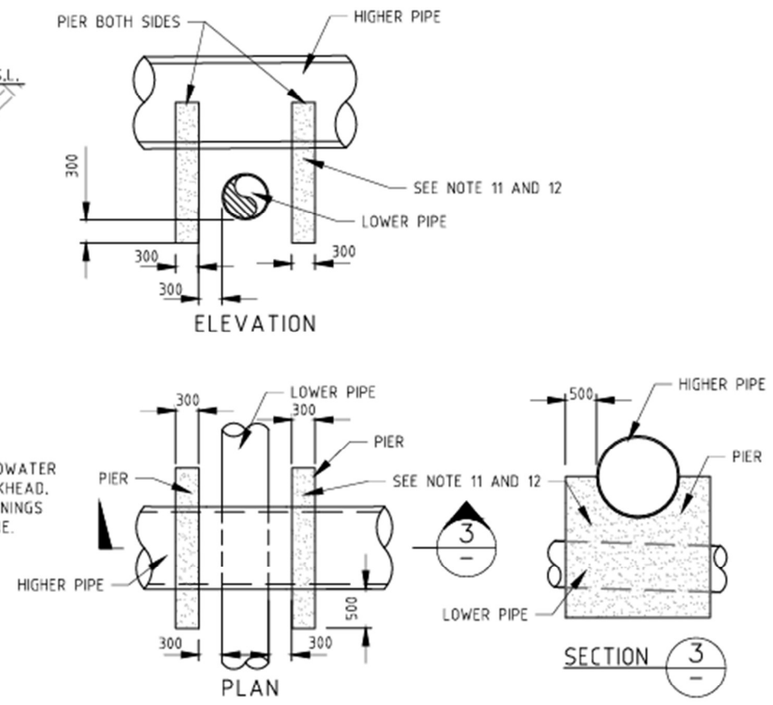


DETAIL
CONCRETE BULKHEAD

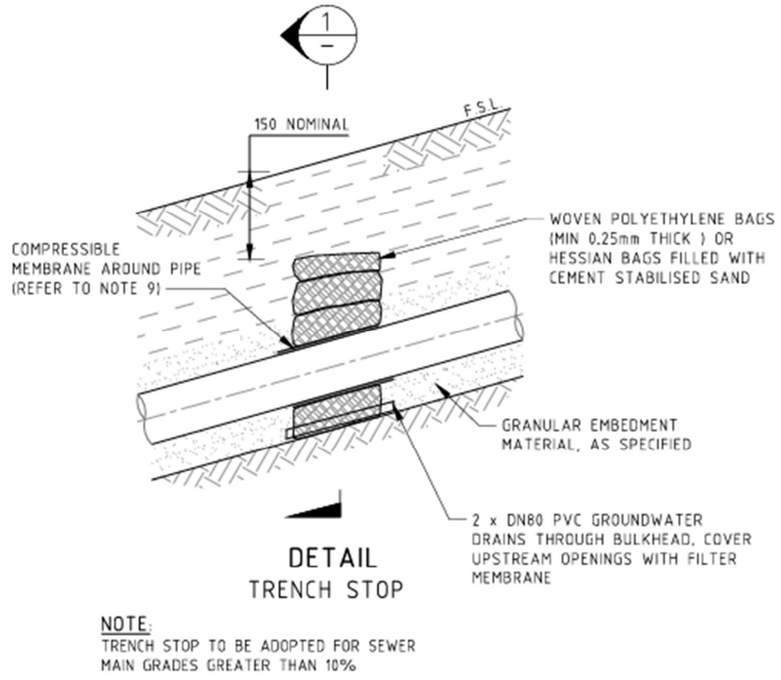
NOTE:
BULKHEAD TO BE ADOPTED FOR SEWER MAIN GRADES BETWEEN 15% TO 29%; FOR LPS AND RMS GRAVITY MAINS >10%



SECTION 2

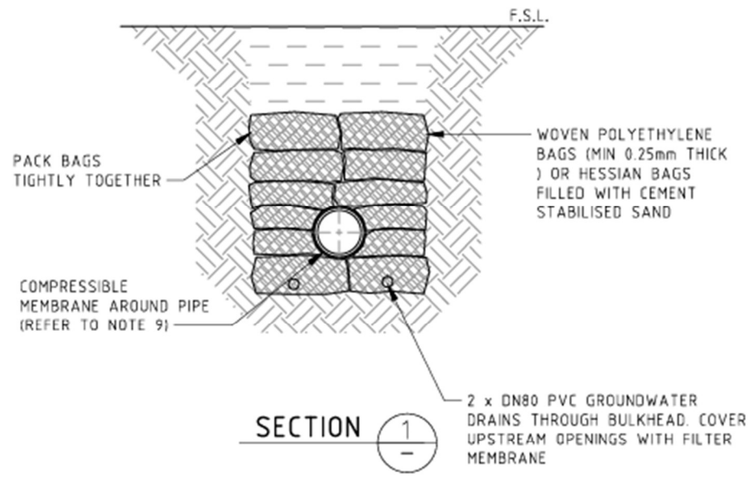


MASS CONCRETE PIER
TYPICAL DETAIL



DETAIL
TRENCH STOP

NOTE:
TRENCH STOP TO BE ADOPTED FOR SEWER MAIN GRADES GREATER THAN 10%

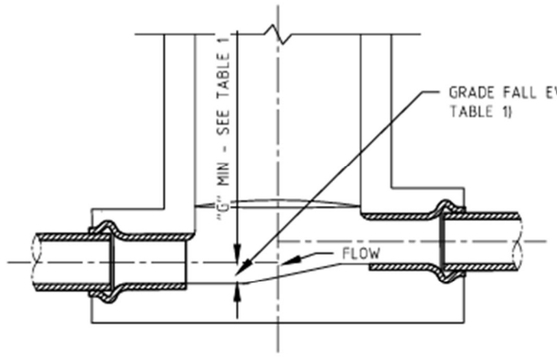


SECTION 1

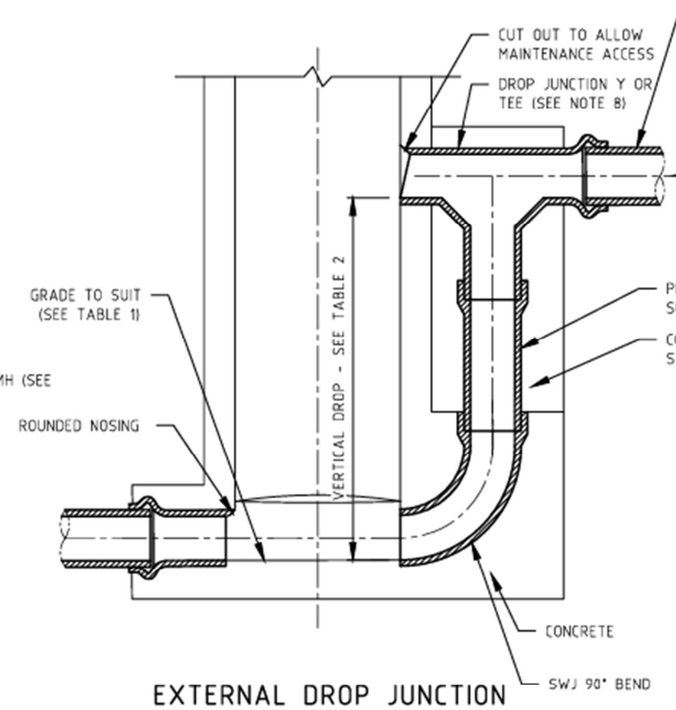
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES
2. CONSTRUCT CONCRETE BULKHEADS & TRENCH STOPS AT LOCATIONS SPECIFIED IN DESIGN DRAWINGS. REF WSA PART 3.
3. BULKHEAD AT RETAINING WALL TO BE UNDER WALL.
4. KEY CONCRETE BULKHEADS INTO SIDES & BOTTOM OF TRENCH AGAINST A BEARING SURFACE OF UNDISTURBED SOIL.
5. CONCRETE TO BE CLASS N25.
6. DO NOT DEFORM PIPES DURING PLACEMENT OF CONCRETE.
7. SEAL BAGS TO PREVENT LEAKAGE OF CONTAINED MATERIAL.
8. PROVIDE A CONTINUOUS DRAINAGE PATH.
   - THROUGH BULK HEADS AND TRENCH STOPS
   - AROUND VALVE CHMAMERS
   - IN TRENCH EXCAVATIONS ACROSS ROADWAYS TYRENCH DRAINAGE TO BE PROVIDED.
9. COMPRESSIBLE MEMBRANCE AROUND PIPE TO BE 3mm THICK RUBBER FOR BULKHEADS AND TRENCH STOPS ON SLOPES.
10. FOR SLOPES >30% CONTINUOISLY ENCASE THE PIPE TO PREVENT MOVEMENT & TRANSFER OF GROUND WATER.
11. MASS CONCRETE PIERS TO BE MINIMUM 20MPa.
12. THE REQUIREMENT FOR MASS CONCERTE PIER SHALL NE NOMINATED BY THE HC REPRESENTATIVE.

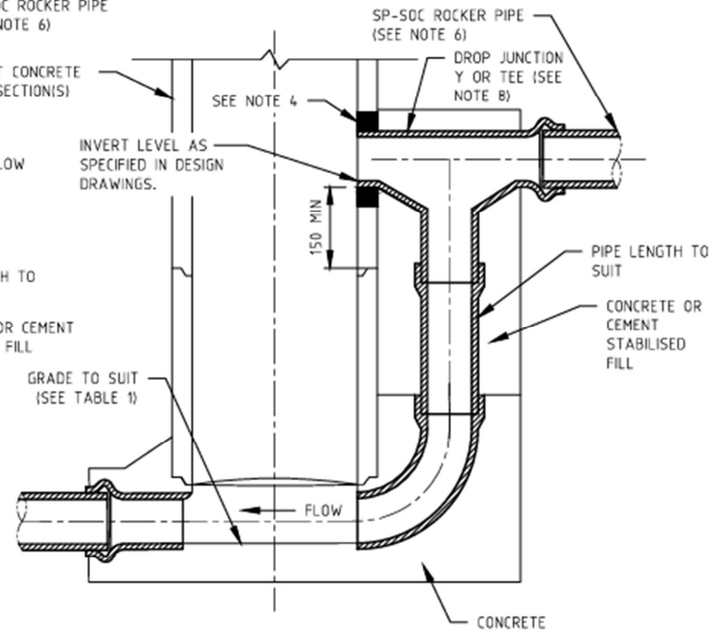
SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES TRENCH/EMBEDMENT – TRENCH DRAINAGE BULKHEADS, TRENCH STOPS AND MASS CONCRETE PIERS	SHEET No: SD 1203 REVISION: - SHEET Sheet 3 of 3



CHANGE IN LEVEL THROUGH MAINTENANCE HOLE
PVC (RRJ) PIPES SHOWN



EXTERNAL DROP JUNCTION
CAST IN-SITU MH (PVC PIPES SHOWN)
SEE S1301



EXTERNAL DROP JUNCTION
PRECAST MH (PVC PIPES SHOWN)
SEE SEW-1300

TABLE 1 - FALL ACROSS MH (INLET TO OUTLET INVERT)

DEFLECTION ANGLE	"G" MIN
0° - 45°	30
46° - 90°	50
91° - 135°	100

NOTE
DEFLECTIONS GREATER THAN 135° ARE NOT PERMITTED

TABLE 2 - VERTICAL DROP

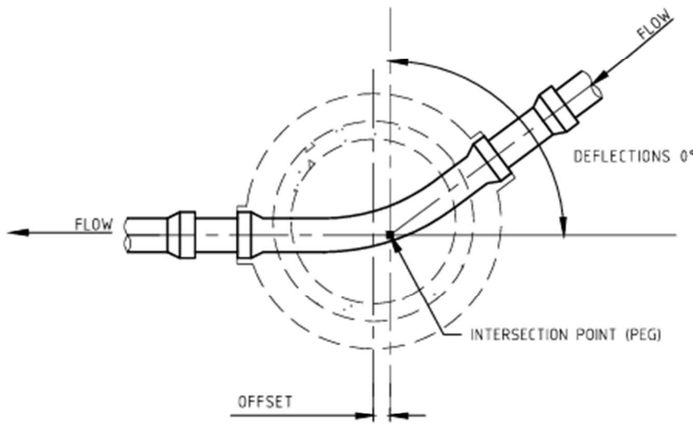
PIPE SIZE DN	MINIMUM #
150	460
225	710
300	880

BASED ON CURRENT FITTING AVAILABILITY

NOTES:

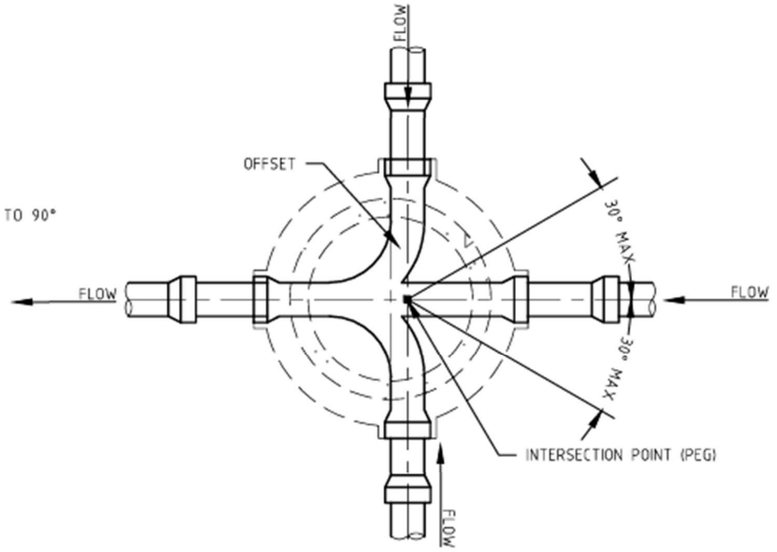
1. ALL DIMENSIONS IN MILLIMETRES
2. THIS DRAWING APPLICABLE TO PRECAST AND INSITU MH.
3. TO ENSURE BONDING COAT PVC PIPES CAST INTO MH WALL AND BASE WITH RESIN/SOLVENT & SAND OR ABRADE FOR THE LENGTH OF WALL PENETRATION
4. FILL JOINT AROUND INSERT PIPE WITH AUTHORISED EPOXY OR MASTIC SEALING MATERIAL.
5. FOR DETAILS OF PIPE CONNECTION TO MH SEE HC STANDARD DRAWING.
6. ROCKER PIPE LENGTHS AND CONNECTION SYSTEMS TO BE SHOWN IN HC STANDRARD DRAWINGS.
7. MAXIMUM FALL ACROSS MH TO BE 150 mm.
8. TEE TO BE USED FOR DN150- DN 300 & y TO BE USED FOR DN372-DN600.
9. SUPABOWL TO BE CONSIDERED ON REQUEST (CONDTION FOR PRE-DRILLED)

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES MAINTENANCE HOLES – PIPE DIAMETER ≤ DN300 CHANGE IN LEVEL DETAILS	SHEET No. SD 1204 REVISION: - SHEET Sheet 1 of 4



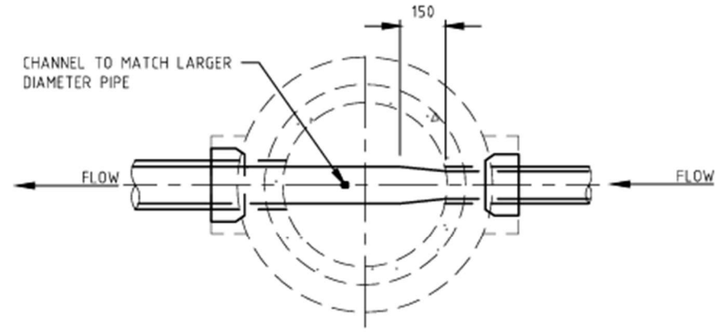
CHANGE IN DIRECTION OF SEWER

NTS



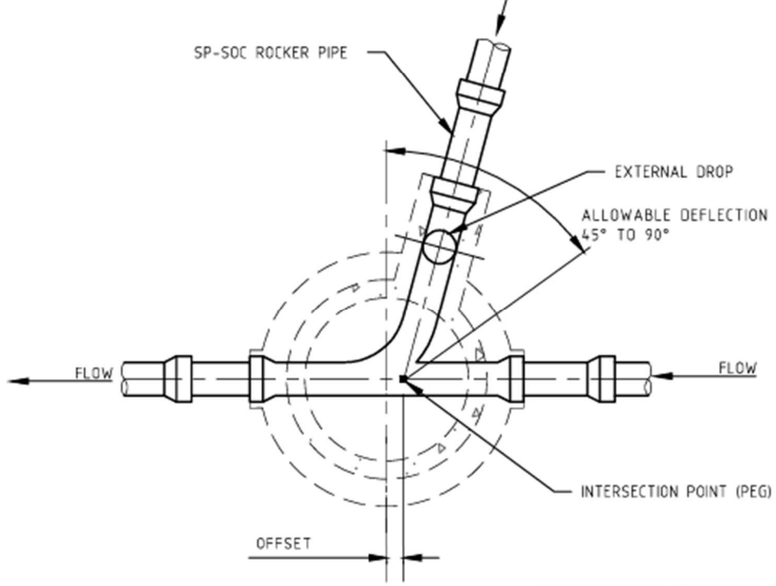
MULTIPLE INCOMING SEWERS

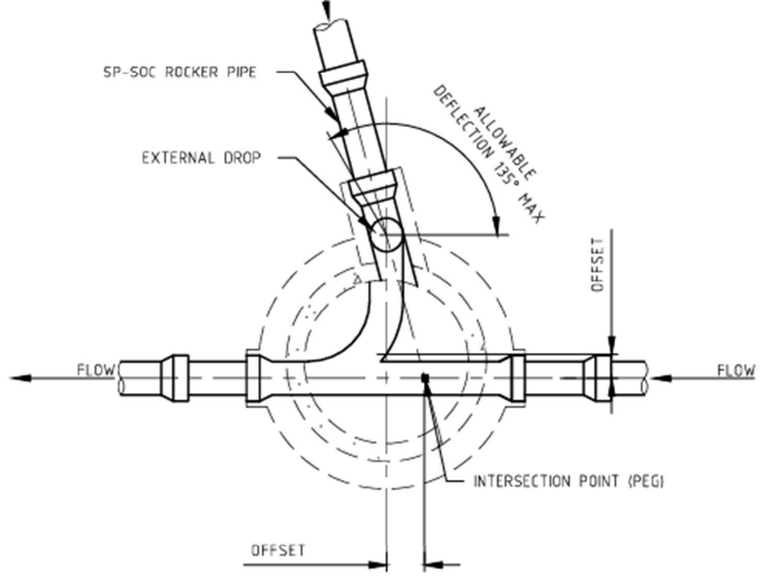
NTS



CHANGE IN DIAMETER OF SEWER

NTS





INCOMING SEWERS HAVING EXTERNAL DROP

NTS

LEGEND



NOTES

1. ALL DIMENSIONS IN MILLIMETRES.
2. INVERT LEVELS TO BE AS SHOWN IN DESIGN DRAWINGS.
3. FOR INLET - OUTLET ARRANGEMENTS SEE S1303.
4. PROVIDE BENCHING COMPRISING TWO UNOBSTRUCTED AREAS OF AT LEAST 250 DIAMETER, SUITABLY SPACED TO ALLOW A PERSON TO STAND WITHOUT OBSTRUCTION BY DROPS, STEP IRONS OR CHANNEL. PROVIDE A MINIMUM 750 X 750 WORKING AREA CLEAR OF ANY OBSTRUCTION.
5. ALL ROCKER PIPES TO BE > 600mm.

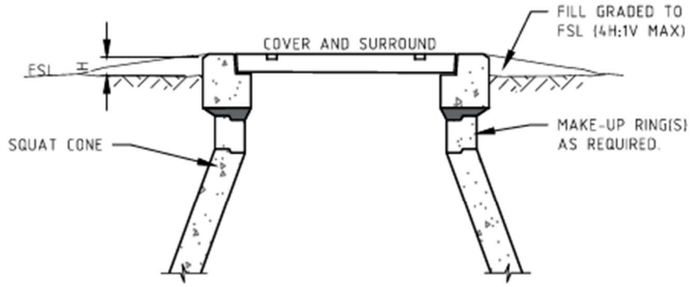
TABLE 1 - FALL ACROSS MH (INLET TO OUTLET INVERT)

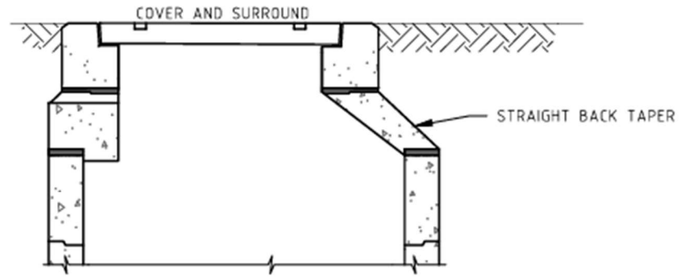
DEFLECTION ANGLE	"G" MIN
0° - 45°	30
46° - 90°	50
91° - 135°	100

NOTE

DEFLECTIONS GREATER THAN 135° ARE NOT PERMITTED

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES MAINTENANCE HOLES – PIPE DIAMETER ≤ DN300 TYPICAL CHANNEL ARRANGEMENTS	SHEET No. REVISION: SD 1204 - SHEET Sheet 2 of 4





PRECAST MAINTENANCE HOLES

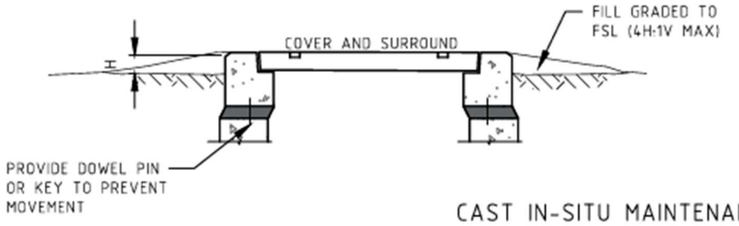
TABLE 1 - FINISHED LEVELS OF MH COVERS

LOCATION	H
UNDEVELOPED AREAS	25
NEW SUBDIVISIONS	25
ROADS, LANE WAYS, FOOTWAYS & DRIVEWAYS	FLUSH
EXISTING BUILT UP AREAS	25
OTHER AS SPECIFIED (EG ABOVE FLOOD LEVEL)	

TABLE 2 - SELECTION OF MH COVERS

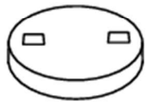
LOCATION	CLASS
RESERVES	B-NON-TRAFFICABLE
ROADWAYS	D - TRAFFICABLE
LOCATIONS SUBJECT TO FLOODING ETC.	D - TRAFFICABLE WITH BOLT- DOWN (SEE NOTE 3)

ALL COVERS TO BE WATER TIGHT AND IN GOOD REPAIR

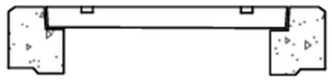




CAST IN-SITU MAINTENANCE HOLES

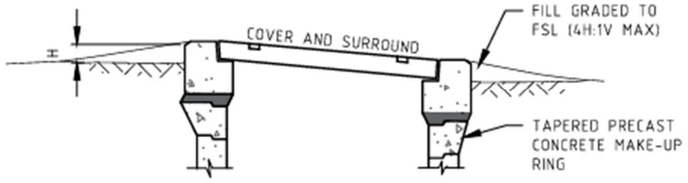


CONCRETE COVER
TWIN LIFT



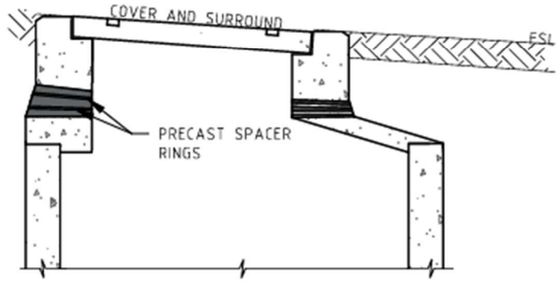
DETAIL A

LID AND SURROUND TYPICAL ARRANGEMENT



SLOPING GROUND
(SEE NOTE 2)

NON TRAFFICABLE COVERS

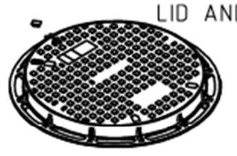


TRAFFICABLE COVERS



DETAIL B

LID AND SURROUND TYPICAL ARRANGEMENT (STEEL)

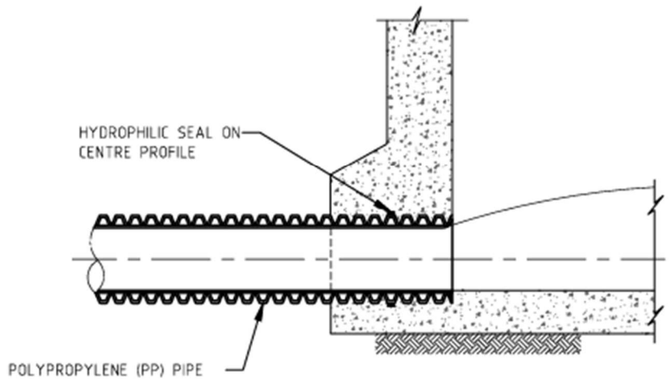


STEEL COVER

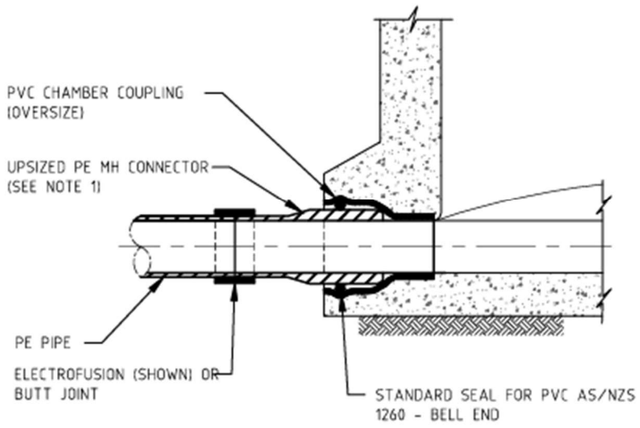
NOTES
1. ALL DIMENSIONS IN MILLIMETRES.
2. MAXIMUM PERMISSIBLE SLOPE OF COVERS:
   CLASS "B" 4H:1V
   CLASS "D" 10H:1V
3. LID AND SURROUND TO BE CONCRETE TWIN LIFT TYPE

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES MAINTENANCE HOLES – TYPICAL MANHOLE COVER ARRANGEMENT	SHEET No. REVISION: SD 1204 - SHEET Sheet 3 of 4

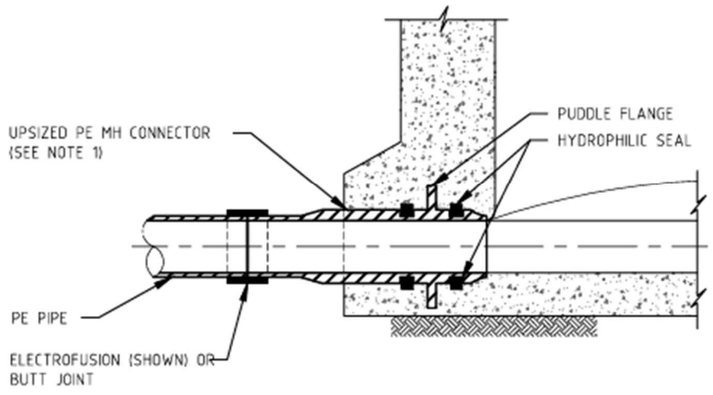
NOTES
1. USE UPSIZED PE SECTIONS TO PREVENT PE CONTRACTING DUE TO CONTINUED LOADING.



CONNECTION PROFILE WALL PP
(DN 225 TO DN 600)
NTS

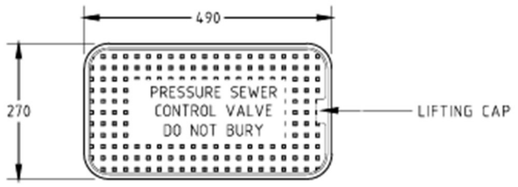


CONNECTION PE-PVC
(DN 110 TO DN 450)
NTS

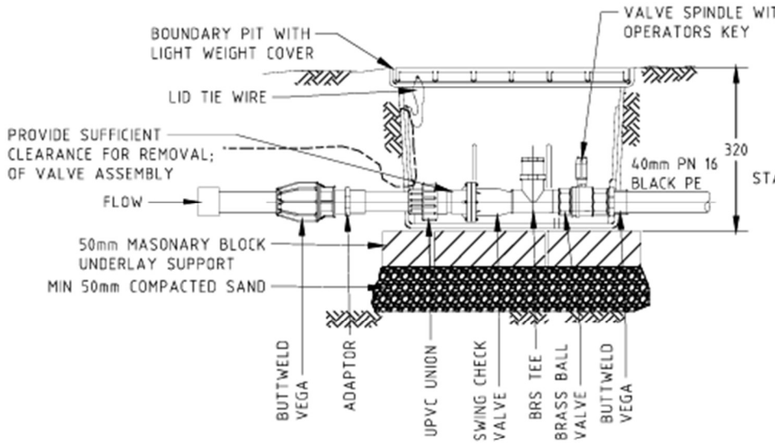


CONNECTION PE-PE
(DN110 TO DN450)
NTS

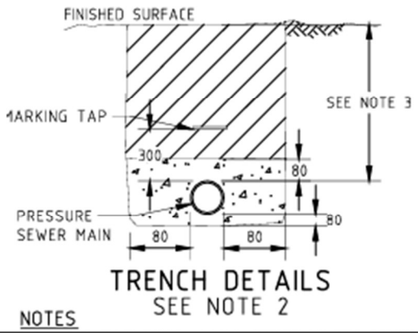
SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES MAINTENANCE HOLES – CONNECTION DETAILS TO PE AND PROFILE WALL PP PIPE	SHEET No. SD 1204 REVISION: - SHEET Sheet 4 of 4



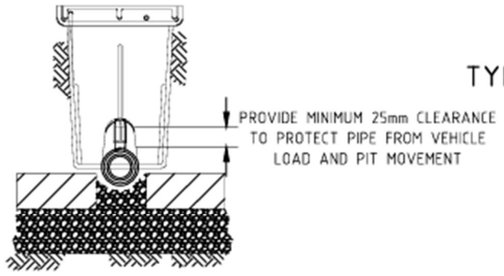
TOP VIEW



SIDE VIEW



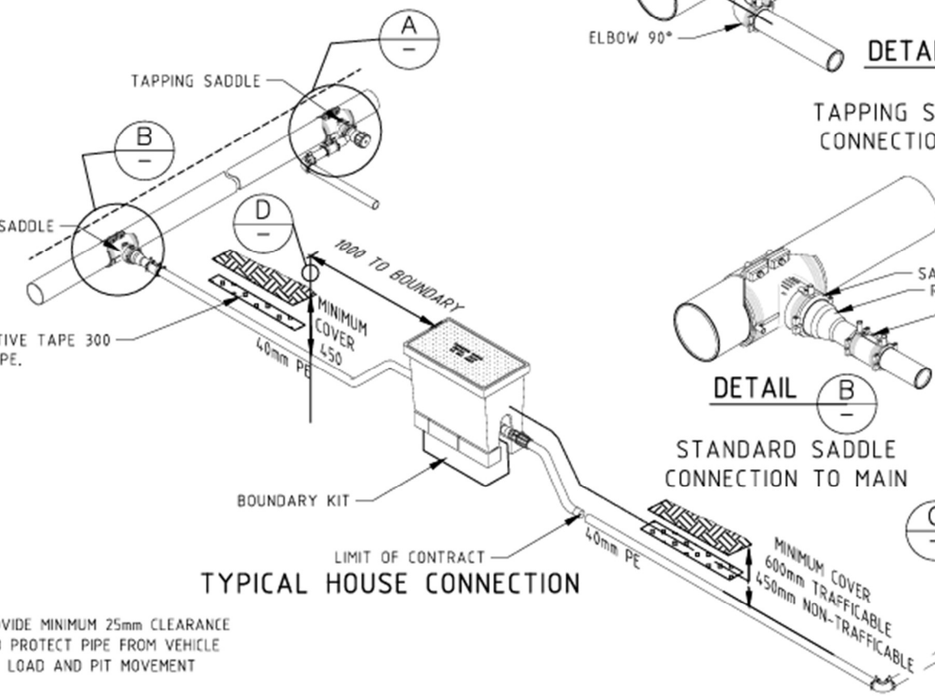
TRENCH DETAILS
SEE NOTE 2



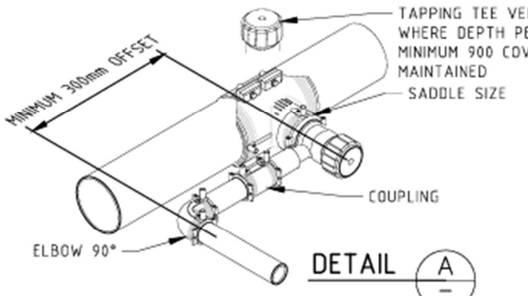
END VIEW
BOUNDARY KIT

INSTALLATION NOTES

1. ALLOW FOR 0.16mm/M/10°C EXPANSION FROM 20°C
2. ON SITE BENDS TO BE A MINIMUM RADIUS OF 20 x DIA

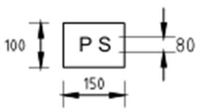


TYPICAL HOUSE CONNECTION



DETAIL A

TAPPING SADDLE LIVE
CONNECTION TO MAIN

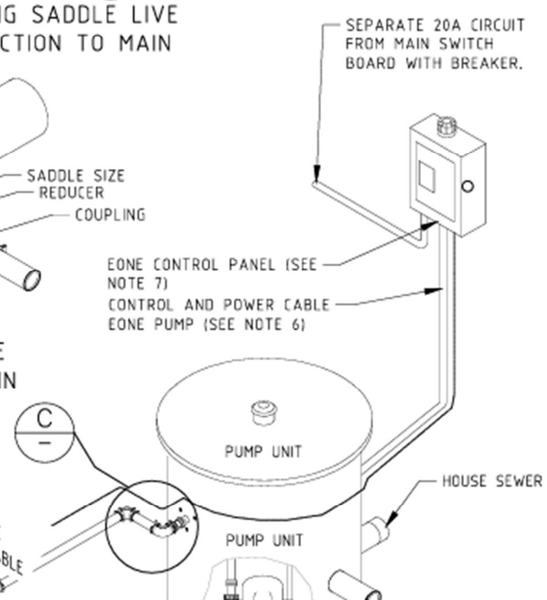


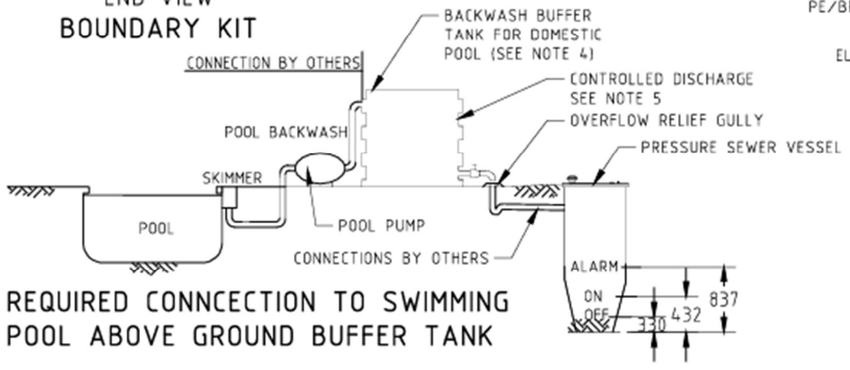
DETAIL D

MARKER AFFIXED TO
BOUNDARY FENCE

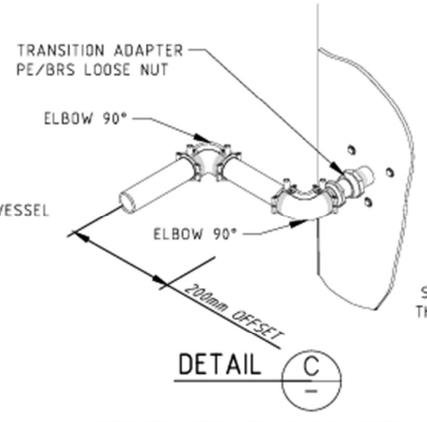
DETAIL B

STANDARD SADDLE
CONNECTION TO MAIN





REQUIRED CONNCECTION TO SWIMMING
POOL ABOVE GROUND BUFFER TANK



DETAIL C

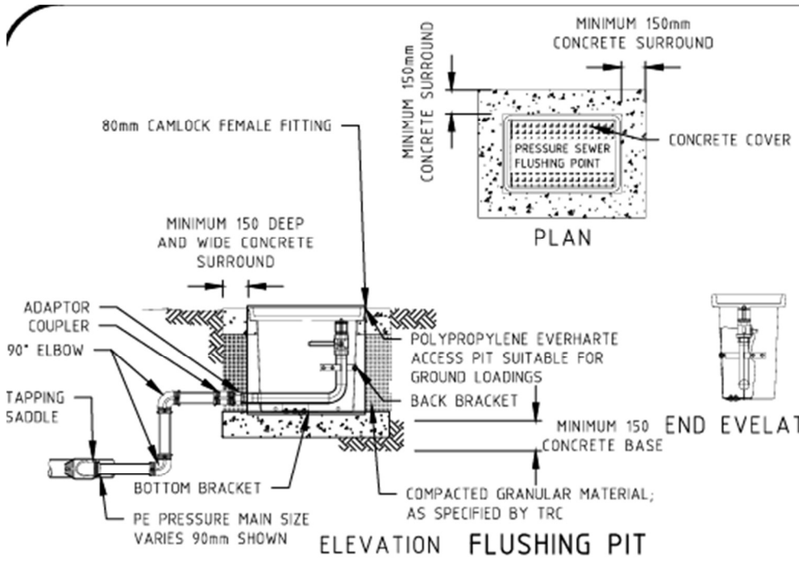
CONNECTION TO PUMP UNIT

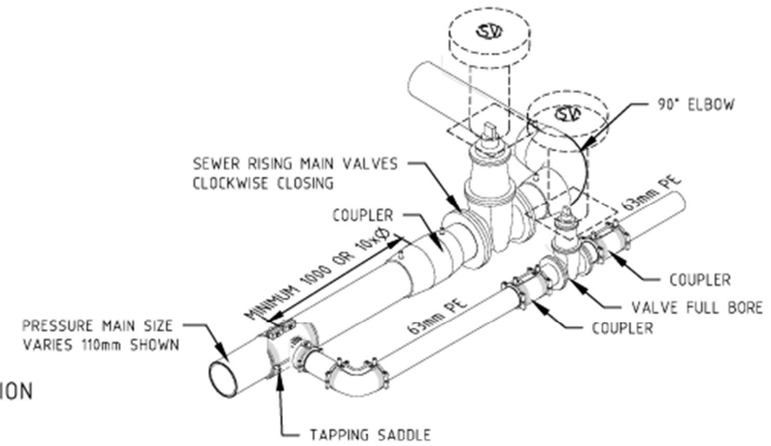
NOTES

NOTES:

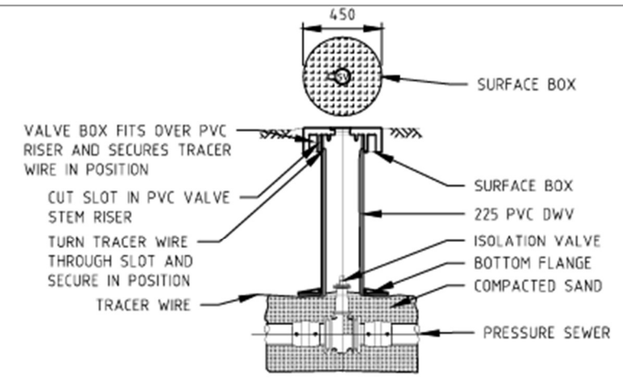
1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED
2. FOR TRENCH ARRANGEMENTS SEE HILLTOPS STANDRARD DRAWING.
3. DEPTH OF PIPE TO BE IN ACCORDANCE WITH HILLTOPS COUNCIL PRESSURE SEWER POLICY AND SPECIFICATION.
4. INSTALLATION OF BUFFER TANK IN ACCORDANCE WITH MANUFACTERERS SPECIFICATIONS, SIZE OF BUFFER TO BE DETERMINED ON SITE.
5. CONTROLLED DISCHARGE TO PRESSURE SEWER VESSEL (0.5 l/s).
6. CONTROL AND POWER CABLE TO PUMP OUT UNIT
   - ABOVE GROUND 32 mm DIA. GALVANISED STEEL CONDUIT
   - BELOW GROUND 25 mm H/D CONDUIT WITH

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES PRESSURE SEWER – TYPICAL PROPERTY INSTALLATION	SHEET No. SD 1205 REVISION: - SHEET Sheet 1 of 6

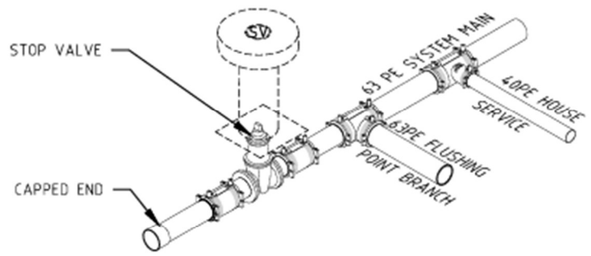




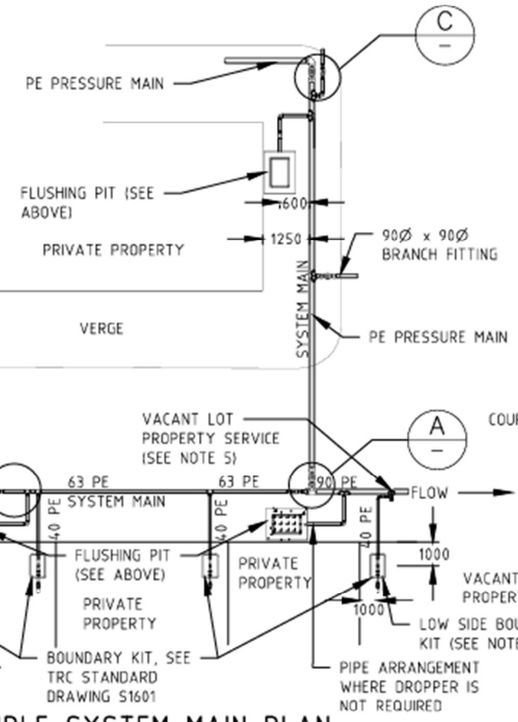
TYPICAL ALTERNATE 63mm TEE BRANCH



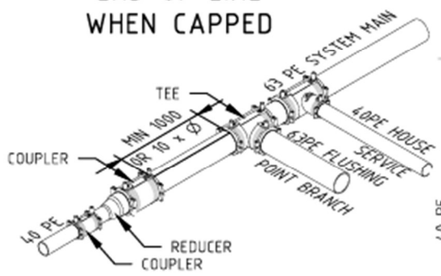
TYPICAL STOP VALVE



END OF LINE WHEN CAPPED

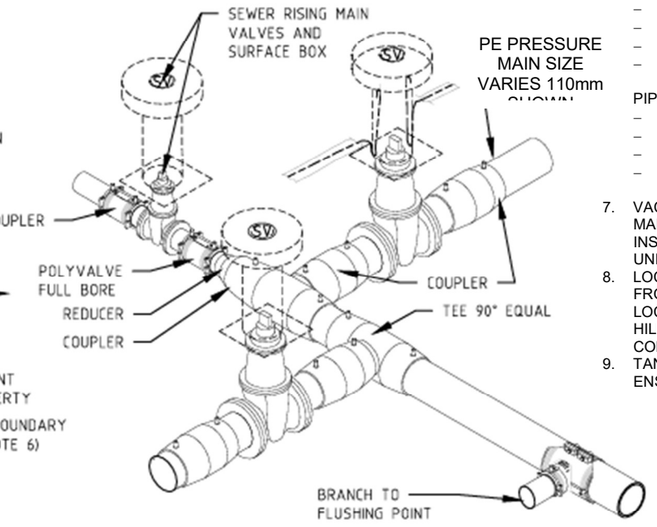


EXAMPLE SYSTEM MAIN PLAN



DETAIL B

TYPICAL END OF LINE ARRANGEMENT



DETAIL A

TYPICAL BRANCH ARRANGEMENT

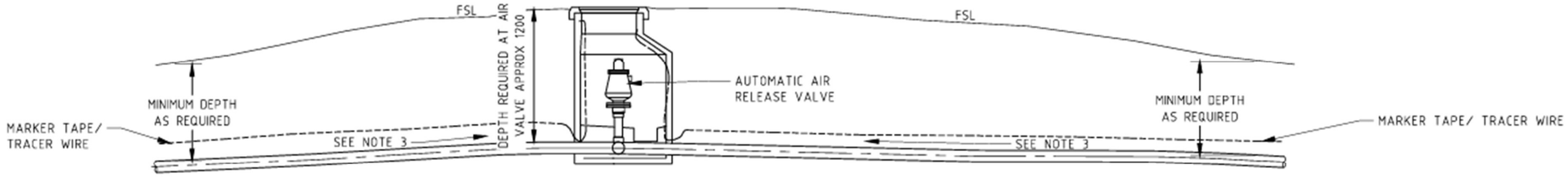
NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED
2. DO NOT SCALE
3. ALL INSTALLERS SHALL HOLD CURRENT MANUFACTURERS STATEMENT OF ATTAINMENT FOR INSPECTION ON SITE AT ALL TIMES
4. REQUIRED TOOLS FOR PE INSTALLATION TO INCLUDE BUT NOT LIMITED TO THE FOLLOWING
   - AUTOMATIC ELECTROFUSION UNIT SUITABLE FOR FITTINGS USED
   - POLY PEELING TOOL AND CORRECT INSERTS FOR PIPE SIZE
   - ROTARY SCRAPER
   - CLAMP FOR COILED PIPE
   - TAPPING TOOLS
   - SQUEEZE OFF AND ROUNDING TOOLS
   - PLASTIC PIPE CUTTER
5. PIPE AND FITTINGS TO FOLLOW STANDARDS BELOW
   - PE PIPE MANUFACTURE AS/NZS 4130
   - PE FITTING MANUFACTURE AS/NZS 4129
   - PE INSTALLATION AS/NZA 2033
   - PE FLEXIBLE PIPE DESIGN FOR BURIED PRESSURE PIPE AS/NZS 2566

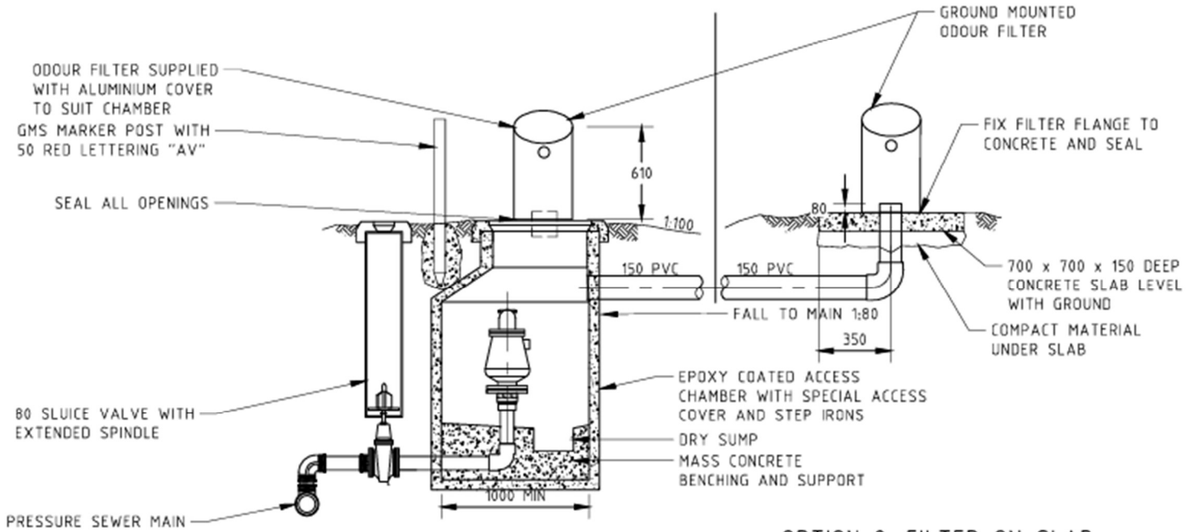
PIPE AND FITTINGS TO FOLLOW STANDARDS BELOW
- PE PIPE MANUFACTURE AS/NZS 4130
- PE FITTING MANUFACTURE AS/NZS 4129
- PE INSTALLATION AS/NZA 2033
- PE FLEXIBLE PIPE DESIGN FOR BURIED PRESSURE PIPE AS/NZS 2566

7. VACANT LOT PROPERTY SERVICE CONNECTION TO STREET MAIN TO BE MADE USING AN “UNCUT” TAPPING SADDLE INSTALLED ON SIDE OF PIPE, PIPE CUT WILL BE UNDERTAKEN WHEN VACANT LOT IS DEVELOPED
8. LOCATE BOUNDARY KIT ON LOW SIDE OF PROPERTY FRONTAGE ADJACENT TO STREET PRESSURE SEWER MAIN LOCATION. CONFIRM LOCATION OF BOUNDARY KIT WITH A HILLTOPS COUNCIL REPRESENTATIVE PRIOR TO CONSTRUCTION
9. TANK LOCATION MUST MAINTAIN VEHICLE ACCESS TO ENSURE MAINTENANCE OF THE ASSET CAN BE PROVIDED.

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES PRESSURE SEWER – SYSTEM MAIN DETAILS	SHEET No. SD 1205 REVISION: - SHEET Sheet 2 of 6



PIPE ARRANGEMENT AT AIR RELEASE VALVE



OPTION 1: FILTER AND COVER UNIT

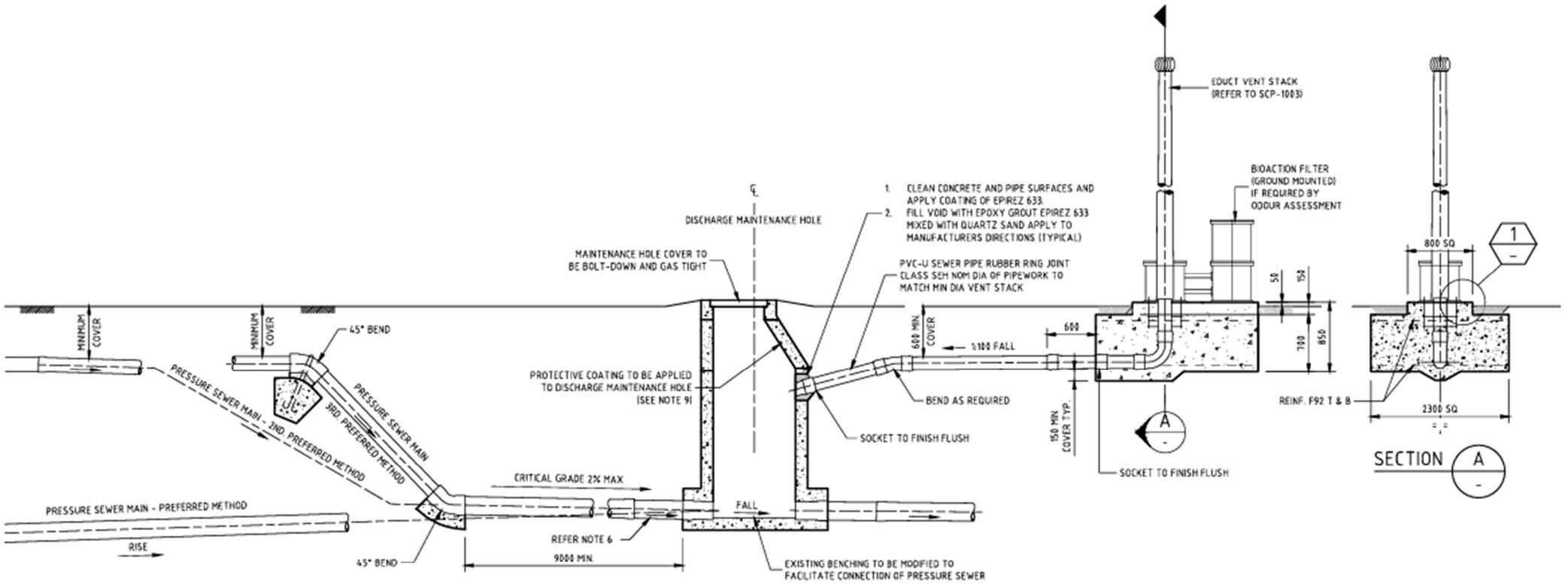
OPTION 2: FILTER ON SLAB WITH REMOTE VENT

COMBINATION AIR AND VACUUM VALVE WITH ODOUR SCRUBBER

NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. DO NOT SCALE
3. INCREASE DEPTH TO ACHIEVE CONSTANT FALL/RISE TO OFF TAKE FOR AIR RELEASE VALVE
4. CANISTER LOCATION TO BE DEFINED BY DESIGNER

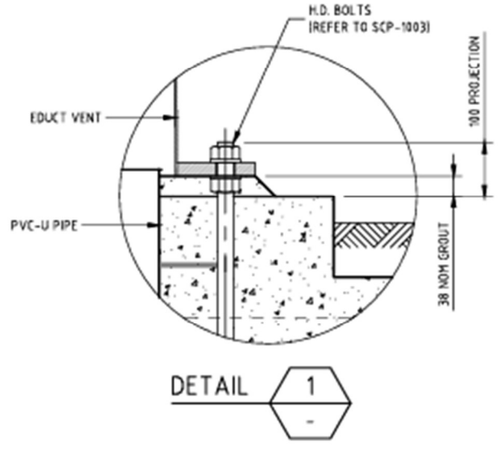
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SECTIONAL ELEVATION OF DISCHARGE MAINTENANCE HOLE

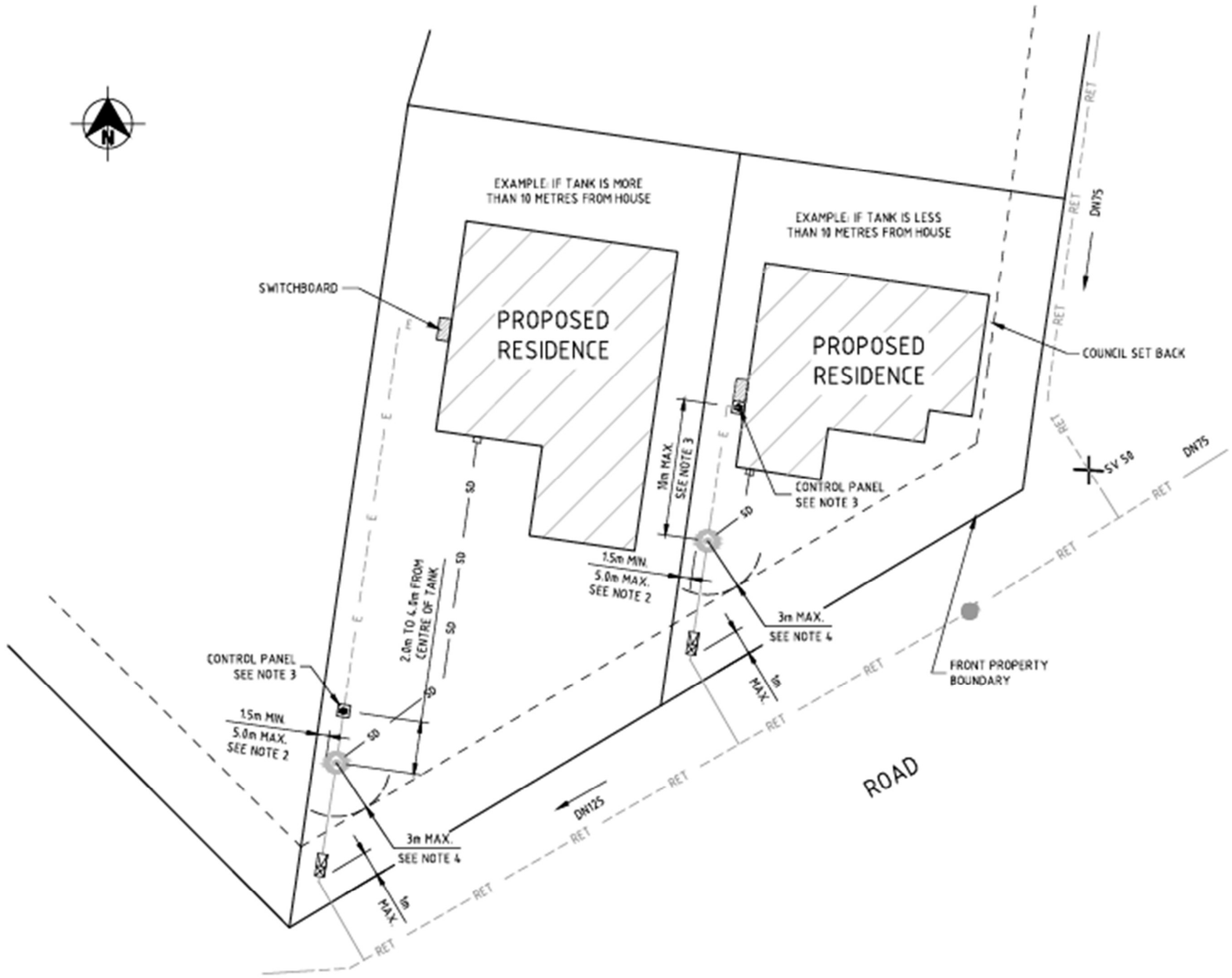
NOTES:

1. THIS DRAWING SHOWS A TYPICAL ARRANGEMENT OF A DISCHARGE MAINTENANCE HOLE WITH PRESSURE SEWER MAIN AND EDUCT VENT ONLY. REFER TO PROJECT DRAWINGS FOR SITE SPECIFIC DETAIL.
2. STRUCTURAL CONCRETE S32 TO AS 3600-1988.
   A. CEMENT TYPE SR.
   B. SLUMP 80mm (MAX)
   C. AGGREGATE SIZE 20mm (MAX)
3. MINIMUM COVER TO REINFORCEMENT TO BE 75 UNO.
4. EDUCT VENT CONNECTION TO PRECAST ACCESS CHAMBER:
   - EDUCT VENT PIPEWORK SHOULD NOT BE CONNECTED TO CHAMBER THROUGH THE STRAIGHT BACK TAPER.
   - THE DEPTH OF EDUCT VENT PIPEWORK SHOULD BE SUCH THAT THE TOP OR BOTTOM OF THE HOLE IN THE PRECAST COMPONENT IS AT LEAST 75 FROM A JOINT.
   - HOLES IN THE CHAMBER WALL SHALL BE MADE BY CUTTING THE PRECAST COMPONENT WITH A CONCRETE CUTTING SAW.
   - PROVISION FOR CARBON CANISTER TO BE INCLUDED IN DESIGN.
5. HDPE PIPE TO DISCHARGE TO MAINTENANCE HOLE IN ACCORDANCE WITH WSA 02 - SEW 1313-V.
6. THE PRESSURE RETICULATION PIPE INLET TO THE DISCHARGE MAINTENANCE HOLE MUST BE ALIGNED WITH THE DIRECTION OF FLOW OF THE OUTLET. IF ALIGNMENT IS NOT ACHIEVABLE, THE PRESSURE PIPE INLET MUST NOT DEVIATE MORE THAN 30° FROM THE OUTLET FLOW DIRECTION.
7. PRESSURE PIPE FOR A MINIMUM OF 9m UPSTREAM FROM INLET TO MAINTENANCE HOLE TO BE 2 DIAMETERS LARGER.
8. FLOWMETER TO BE LOCATED IN PIPE SECTION BEFORE PIPE GRADES DOWN TOWARDS MAINTENANCE HOLE.
9. PROCTECTIVE SURFACE COATING IS TO COMPLY WITH WSA 201 MANUAL FOR SELCTION AND DUPLICATION OF PROCTECTIVE COATING AND SYDNEY WATER'S SUPPLEMENT TO WSA 201.



DETAIL 1

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES DISCHARGE MAINTENANCE HOLE GENERAL ARRANGEMENT	SHEET No. SD 1205 REVISION: - SHEET Sheet 4 of 6



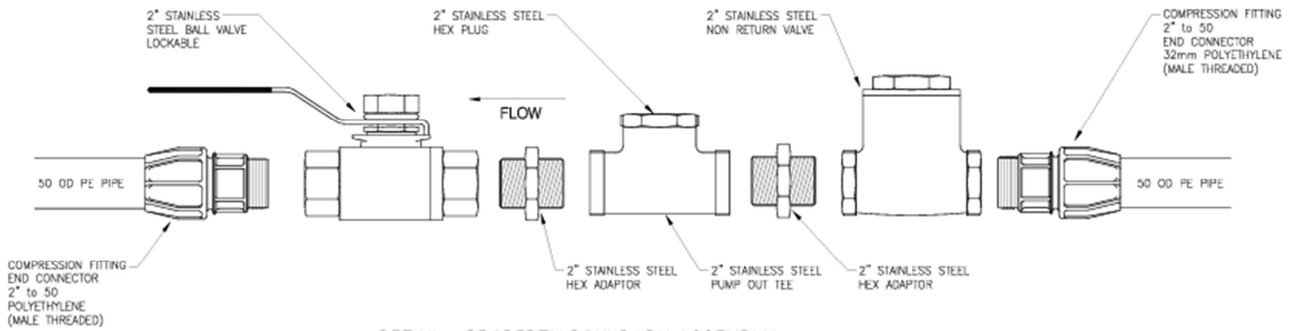
NOTES:

1. THIS PLAN SHOWS TWO TYPICAL LAYOUTS FOR ON PROPERTY PRESSURE SEWER INFRASTRUCTURE. IT ALSO SHOWS TYPICAL DETAILS TO BE SHOWN ON STREET RETICULATION PLANS.
2. THE COLLECTION TANK IS TO BE LOCATED ON THE LOWER SIDE OF THE PROPERTY AT A DISTANCE OF BETWEEN 1.5m TO 5.0m TO THE OUTER EDGE OF THE TANK LID FROM THE SIDE PROPERTY BOUNDARY.
3. CONTROL PANEL CAN BE MOUNTED TO DWELLING IF WITHIN 10.0m OF COLLECTION TANK WITH DIRECT LINE OF SIGHT (REFER TO DRAWING PSS-1101-V). WHERE THIS IS NOT POSSIBLE MOUNT ON A FREE STANDING POST POSITIONED WITHIN 2.0m TO 4.0m OF THE CENTRE OF THE COLLECTION TANK. REFER TO DRAWING PSS-1104-V FOR POST DETAILS.
4. THE COLLECTION TANK IS TO BE LOCATED AT THE FRONT OF THE PROPERTY AT A MAXIMUM DISTANCE OF 3.0m TO THE CENTRE OF THE TANK FROM THE COUNCIL APPROVED BUILDING SET BACK FROM THE PROPERTY BOUNDARY. REFER TO WSA07 CLAUSE 7.3 AND HWC WSA07 SUPPLEMENT 7.3.
5. PRESSURE SEWER RETICULATION PLANS TO SHOW ALL FITTINGS MARKED WITH THE FOLLOWING ABBREVIATIONS; STOP VALVES 'SV', FLOW METERS 'FM', FLUSHING POINT 'FP', AIR VALVES "AV".

LEGENDS:

- CONTROL PANEL
- FLUSHING POINT
- ISOLATION STOP VALVE
- PROPERTY BOUNDARY KIT
- COLLECTION TANK/PUMPING UNIT
- SWITCHBOARD
- E — PUMP CONTROL/POWER CABLE
- LAT 40.1 — PRESSURE RETICULATION SEWER CHAINAGE
- SP — PRESSURE LATERAL SEWER
- SP — PROPERTY DISCHARGE LINE
- TIES
- RET — PRESSURE SEWER RETICULATION
- SD — SANITARY DRAIN TO COLLECTION TANK

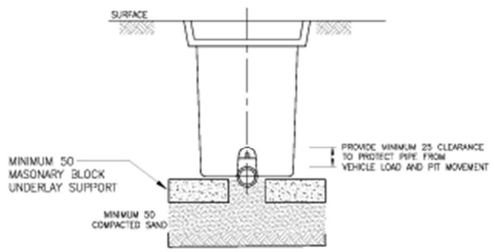
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DETAIL - PROPERTY BOUNDARY ASSEMBLY

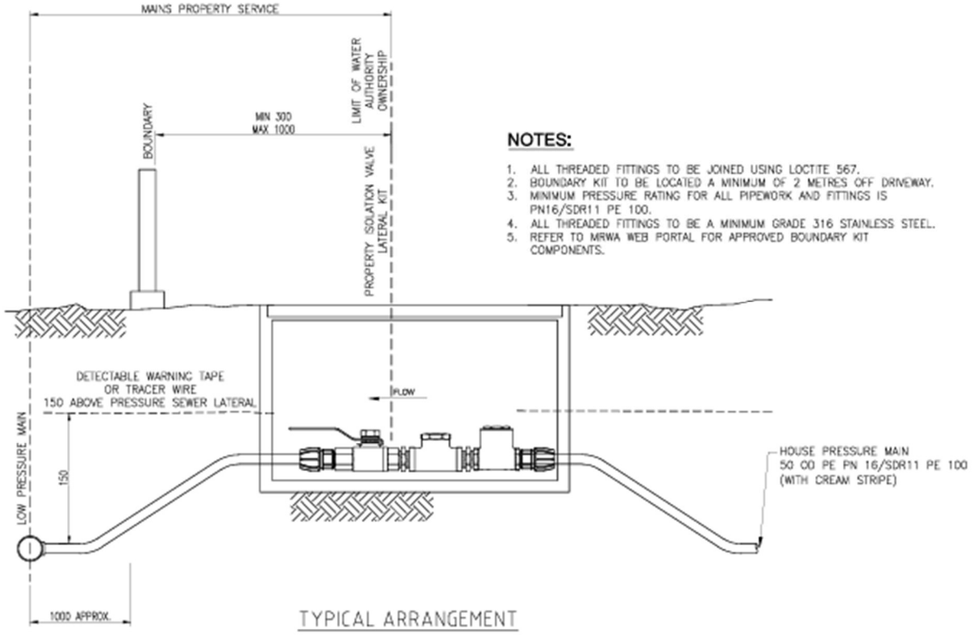


PLAN VIEW



BOUNDARY KIT

END VIEW



TYPICAL ARRANGEMENT

NOTES:

1. ALL THREADED FITTINGS TO BE JOINED USING LOCTITE 567.
2. BOUNDARY KIT TO BE LOCATED A MINIMUM OF 2 METRES OFF DRIVEWAY.
3. MINIMUM PRESSURE RATING FOR ALL PIPEWORK AND FITTINGS IS PN16/SDR11 PE 100.
4. ALL THREADED FITTINGS TO BE A MINIMUM GRADE 316 STAINLESS STEEL.
5. REFER TO MRWA WEB PORTAL FOR APPROVED BOUNDARY KIT COMPONENTS.

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Rev	Description	Date
A	General Draft	19.12.19

Status: **GENERAL DRAFT**

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Client: -

Project: -

Drawn	S. PATEL	Date	19.12.2019
Designed	M. URQUHART		
Checked	P. PRIDHAM	Sheet	1/1
Scale	N.T.S.	Size	A3

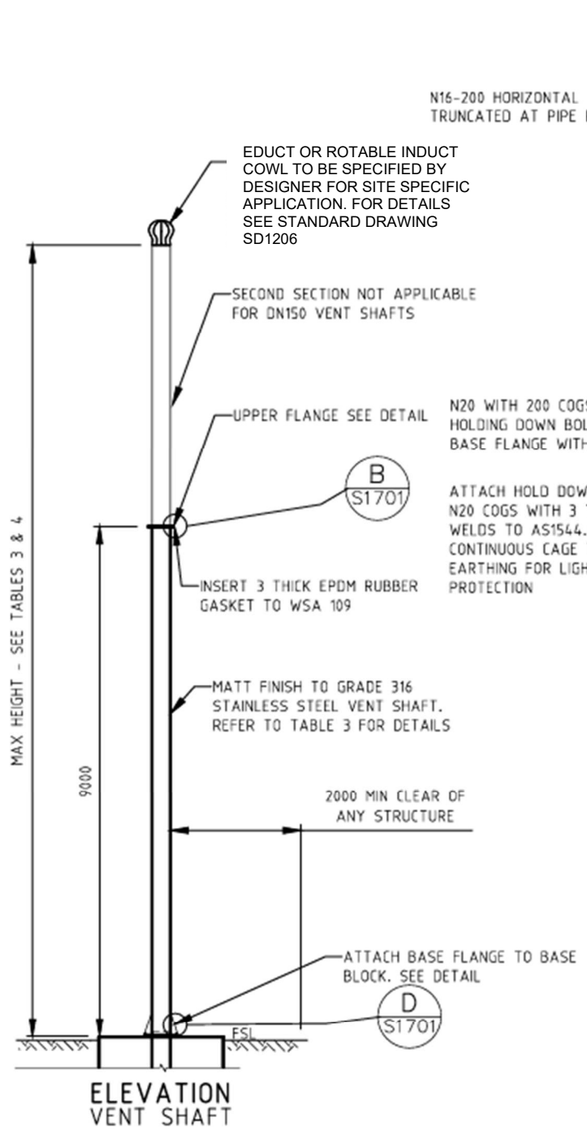
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Drg No: 191219/G1 — Rev: A

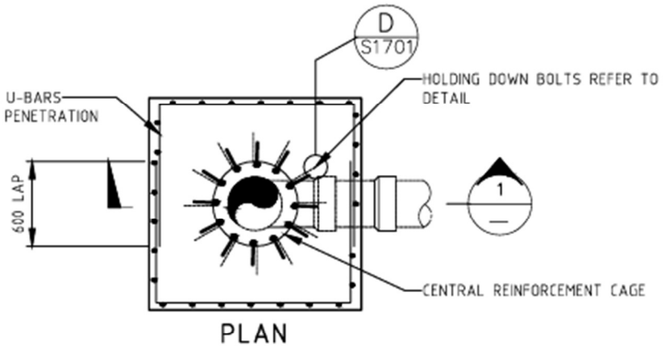
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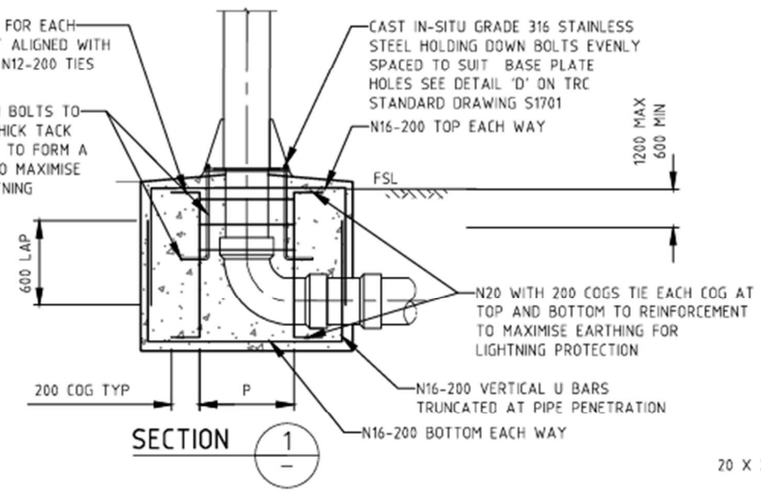
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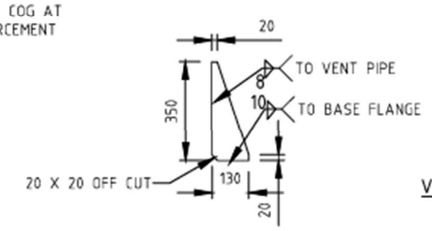
ELEVATION
VENT SHAFT

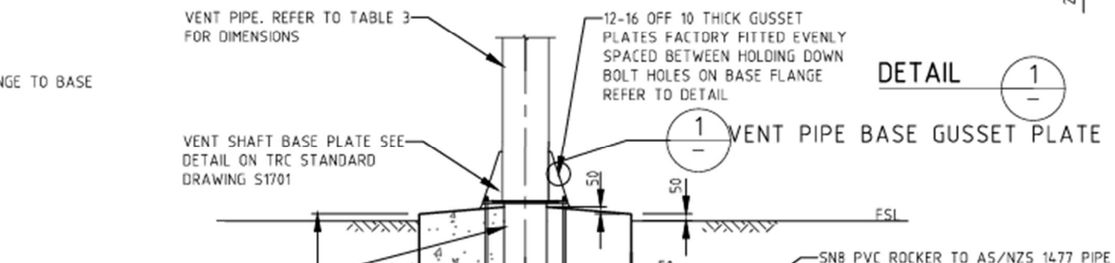


PLAN



SECTION 1





ELEVATION
VENT SHAFT BASE BLOCK

TABLE 1 - VENTILATION SHAFT FOOTING DIMENSIONS

SIZE	MIN 50kPa ALLOWABLE BEARING PRESSURE			MIN 100kPa ALLOWABLE BEARING PRESSURE		
	W	Dmin	P	W	Dmin	P
DN150	1900	1000	Ø450	1600	1000	Ø450
DN225	2600	1000	Ø550	2100	1000	Ø550
DN300	2700	1000	Ø600	2300	1000	Ø600

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. VENTILATION SHAFT DESIGN BASED ON AS/NZS 1170.2:2011 STRUCTURAL DESIGN ACTIONS PART 2 : WIND ACTIONS. REFER TO TABLES 3 AND 4 FOR APPLICABLE DESIGN WIND SPEED.
3. FOUNDATION MATERIALS TO BE INSPECTED AND APPROVED BY AN EXPERIENCED GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTION OF THE CONCRETE BASE BLOCK. ANY OTHER EXCAVATION OR VOIDS IN THE FOUNDATION MATERIALS TO BE FILLED WITH MASS CONCRETE BLINDING WITH MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 25MPa TO AS 1379
4. ALL REINFORCEMENT SHALL BE TO AS/NZS 4671 GRADE D500, DUCTILITY CLASS-N WITH 70 CLEAR COVER.
5. ALL CONCRETE SHOWN SHALL BE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 32MPa TO AS1379. SLUMP SHALL BE IN THE RANGE OF 80-120. MAXIMUM NOMINAL AGGREGATE SIZE SHALL BE 20.
6. VENT SHAFT SHOULD NOT BE ERECTED UNTIL THE CONCRETE BASE BLOCK HAS REACHED 25MPa COMPRESSIVE STRENGTH.
7. DESIGN IS NOT SUITABLE FOR APPLICATION IN AGGRESSIVE SOIL CONDITIONS
8. ALL STAINLESS STEEL PLATE SHALL BE GRADE 316L TO ASTM A240M. VENT PIPE SHALL BE TO ASTM A312. FLANGES ARE TO BE SEALED WITH A 3 THICK EPDM GASKET WITH LOCK NUTS AND BOLTS TO ASTM A276. BOLTS SHALL BE TIGHTENED 'SNUG TIGHT'. FLANGES SHALL BE FACTORY FILLET WELDED TO THE VENT PIPE TO AS 1544.6
9. ALL STAINLESS TO BE BEAD BLASTED
10. WHERE PROPRIETARY PRODUCTS ARE SPECIFIED , THE PRODUCT SHALL BE INSTALLED STRICTLY IN ACCORDANCE TO MANUFACTURER'S INSTRUCTIONS.
11. FINAL DIMENSION OF ALL ELEMENTS TO BE SHOWN ON WAE DRAWINGS.
12. EXTERNAL SURFACES FOR ALL STAINLESS STEEL ITEMS SHALL BE BEAD BLASTED TO ACHIEVE A NON-DIRECTIONAL LOW REFLECTIVE UNIFORM MATT FINISH WITH A SURFACE ROUGHNESS PROFILE OF RA 3.5 TO 4.5 MICRONS. BLAST MEDIA SHALL BE GLASS. THE BLASTING MEDIA SHALL BE FREE OF CONTAMINATION INCLUDING IRON AND STEEL. NO ADDITIONAL PICKLING OR PASSIVATION IS REQUIRED FOR BLASTED SURFACES.

VENTILATION SHAFT DESIGN NOTES:

1. THE FOOTINGS FOR THE VENTILATION SHAFT HAVE BEEN DESIGNED FOR AN ULTIMATE WIND SPEED OF 41m/s USING ULTIMATE LIMIT STATE DESIGN.
2. THE FOOTINGS FOR THE VENTILATION SHAFT HAVE BEEN SIZED TO ENSURE FULL CONTACT WITH THE GROUND UNDER ULTIMATE WIND LOADS.
3. A GEOTECHNICAL ENGINEER SHALL ASSESS THE SITE SOILS TO DETERMINE THE SOIL CLASSIFICATION AND ALLOWABLE BEARING PRESSURE.
4. IF THE GEOMETRY OF THE VENT SHAFT DIFFERS TO THE ASSUMED GEOMETRY SPECIFED IN TABLE 2, A PROJECT SPECIFIC DESIGN SHALL BE UNDERTAKEN

TABLE 2 - ASSUMED VENTILATION SHAFT GEOMETRY

NOMINAL DIAMETER	MAX HEIGHT	DIMENSIONS	
		OD	WALL THICKNESS
DN150	14,000	168.3	10.97
DN225	18,000	273.1	9.27
DN300	18,000	323.9	9.53

NOTE: SHAFT DIMENSIONS ARE ASSUMED BASED ON ONESTEEL CHS SECTION PROPERTIES

SCALE: AS SHOWN ORIGINAL A3
DATUM:
PROJECTION:
SURVEYED BY:

REV.	DESCRIPTION	DATE
	STANDARD DRAWING	

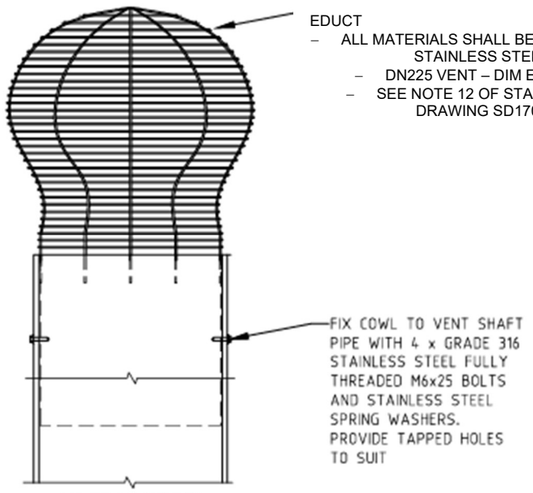
Hilltops COUNCIL

PROJECT:

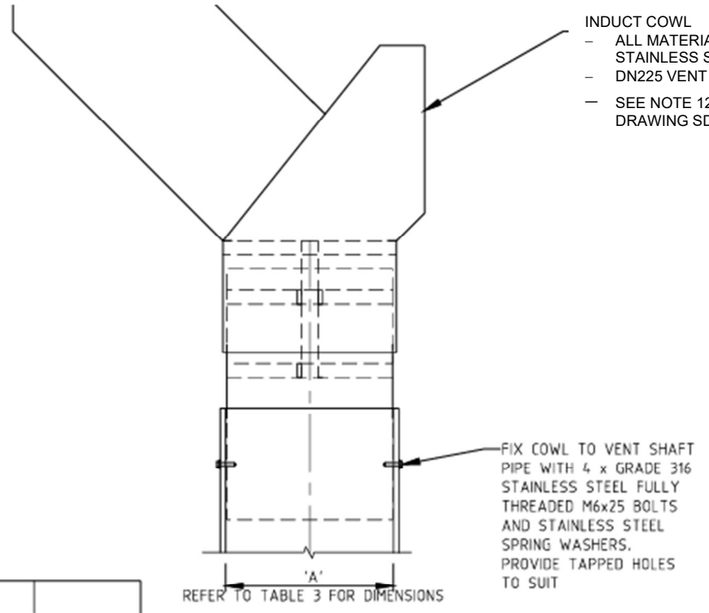
SHEET TITLE:
SEWER SERIES
VENTILATION – VENTILATION SHAFT STAINLESS STEEL 9-18M DN150 – DN300

SHEET No. SD 1206 REVISION: -

SHEET Sheet 1 of 8



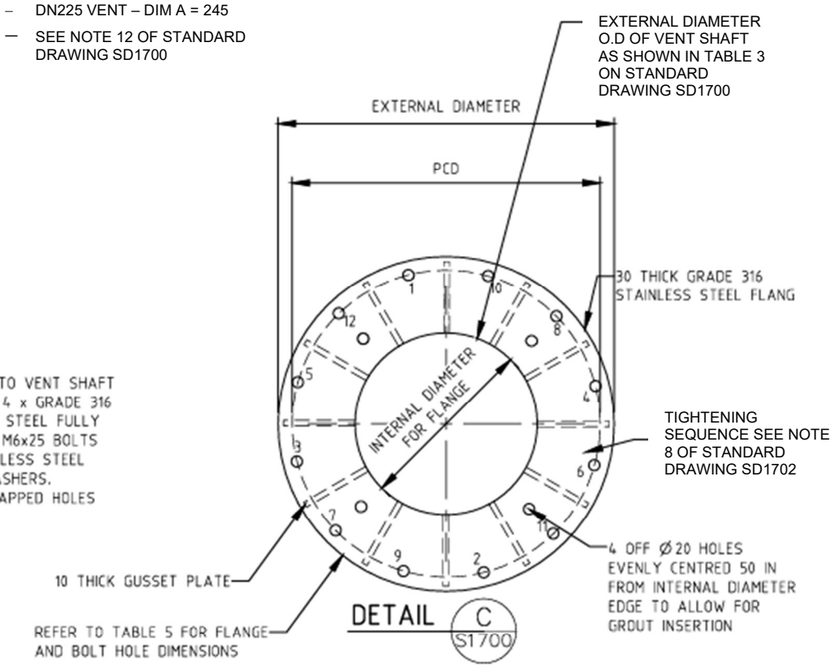
ELEVATION
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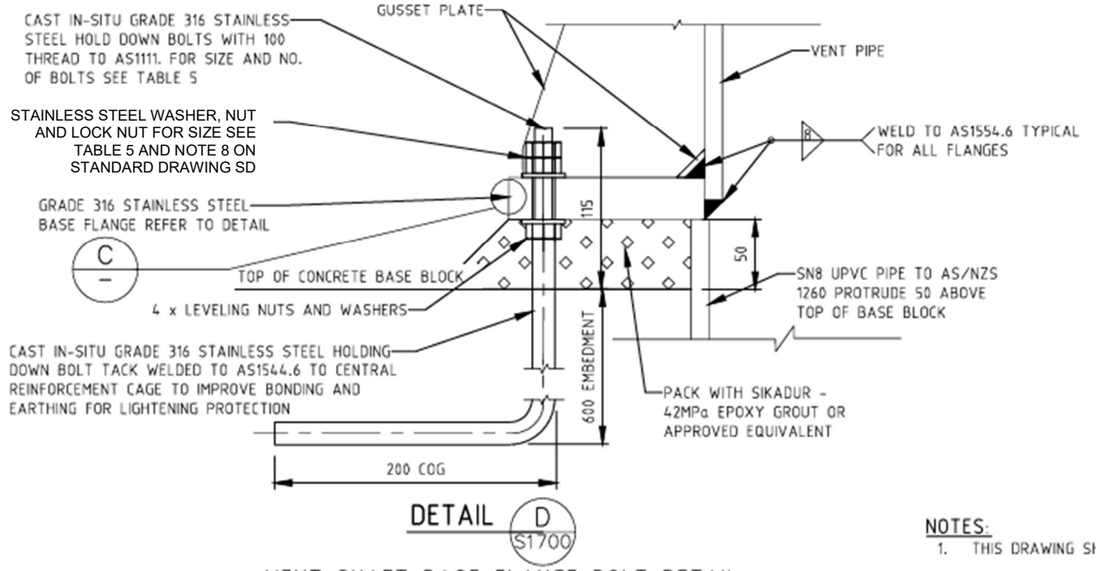
DETAIL
ROTATABLE INDUCT COWL

TABLE 5 - UPPER FLANGE AND BASE FLANGE DIMENSIONS

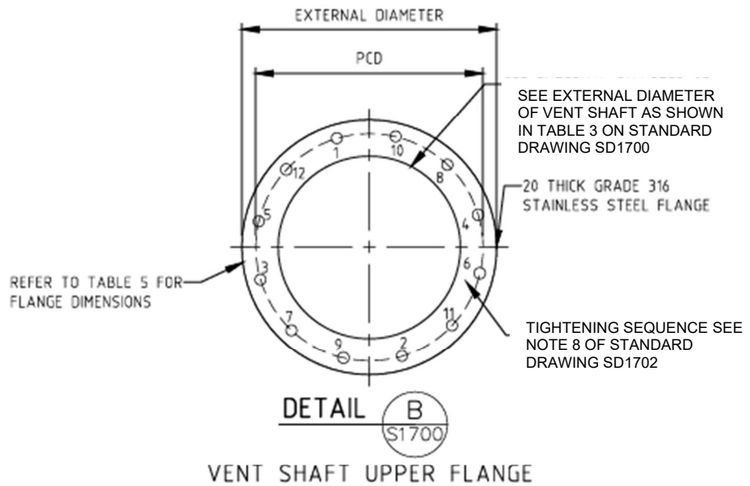
SIZE	UPPER FLANGE				BASE FLANGE				INTERNAL DIAMETER
	EXTERNAL DIAMETER	PITCH CIRCLE DIAMETER (PCD)	BOLTS NO. OFF AND SIZE	DIAMETER OF BOLT HOLES	EXTERNAL DIAMETER	PITCH CIRCLE DIAMETER (PCD)	BOLTS. NO OFF AND SIZE	DIAMETER OF BOLT HOLES	
DN150	280	235	8/M16	18	460	400	12/M20	24	170.5
DN225	405	356	8/M20	22	575	500	12/M24	28	270.0
DN300	455	406	12/M20	22	625	550	16/M24	28	325.0



VENT SHAFT BASE FLANGE



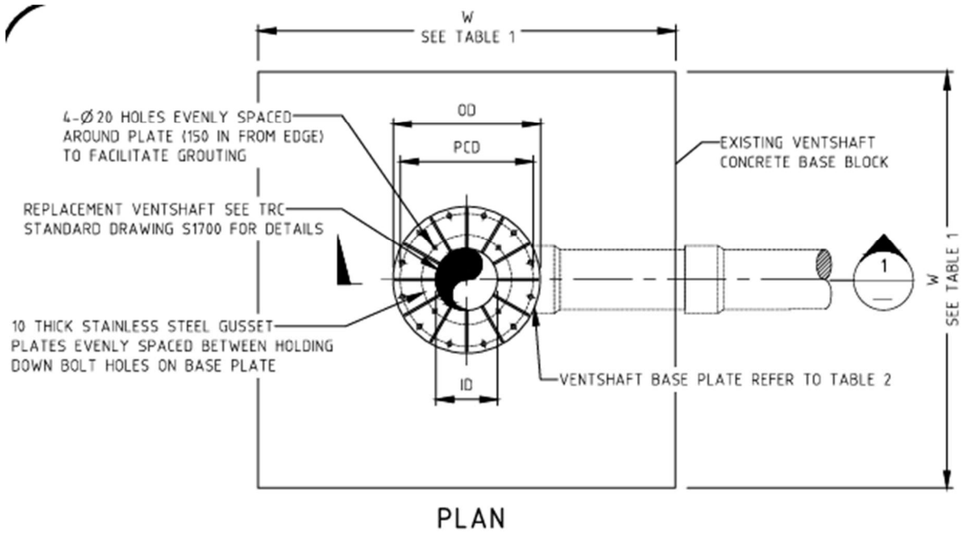
VENT SHAFT BASE FLANGE BOLT DETAIL



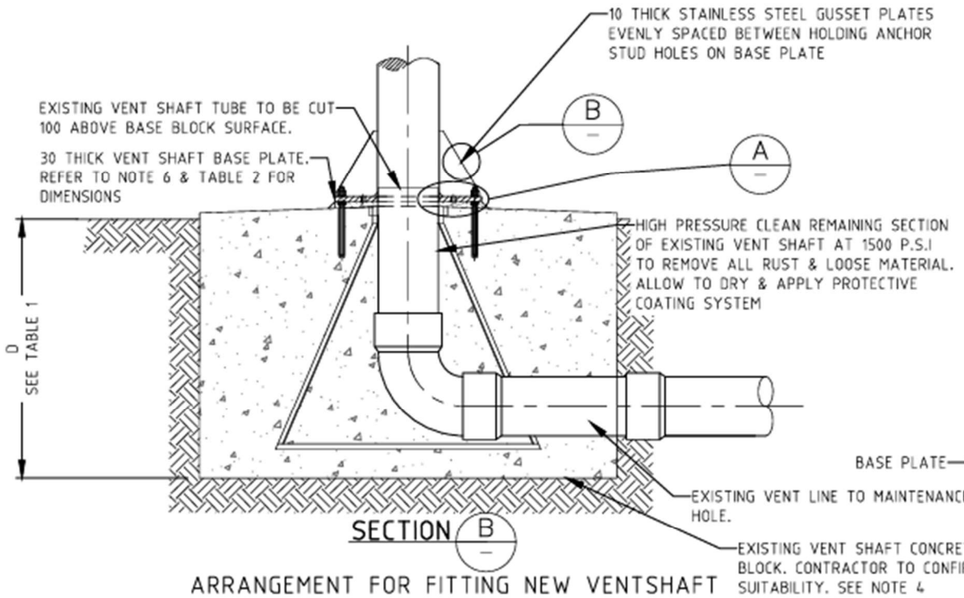
VENT SHAFT UPPER FLANGE
(NOT REQUIRED FOR DN150 VENT SHAFTS)

NOTES:
1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TRC STANDARD DRAWING S1700

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES VENTILATION – VENTILATION SHAFT STAINLESS STEEL 9-18M DN150 – DN300	SHEET No. SD 1206 REVISION: - SHEET Sheet 2 of 8

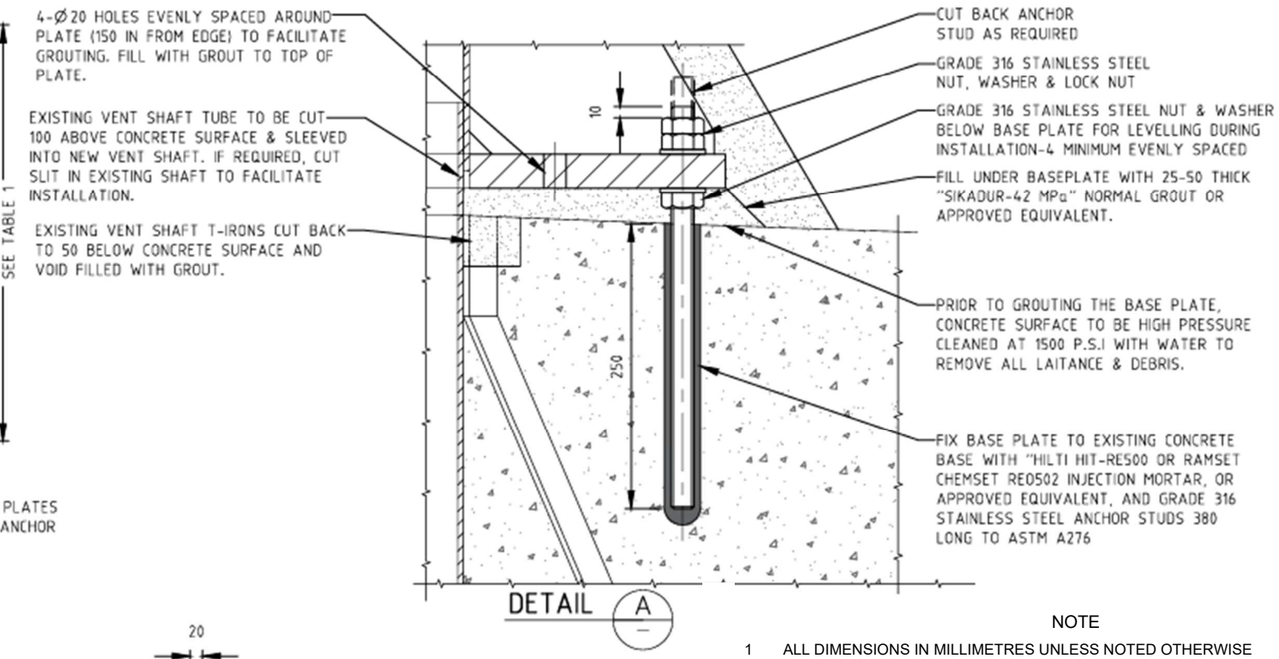


PLAN

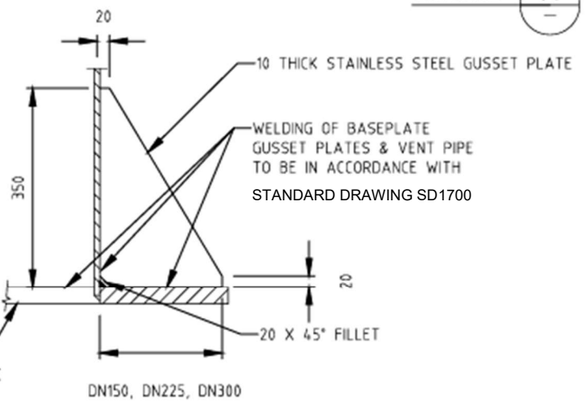


SECTION B

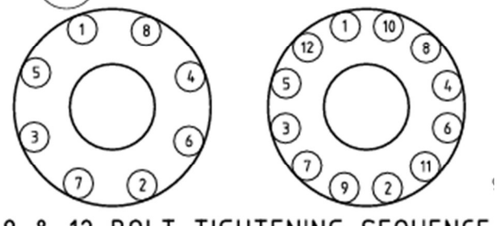
ARRANGEMENT FOR FITTING NEW VENTSHAFT TO EXISTING CONCRETE BASE BLOCK



DETAIL A



DETAIL B



8 & 12 BOLT TIGHTENING SEQUENCE

TABLE 1 - MINIMUM BASEBLOCK DIMENSIONS

SIZE	W	D
DN150	1500	1200
DN225	1900	1200
DN300	2200	1400

TABLE 2 - BASE PLATE DIMENSIONS

VENTSHAFT DIAMETER	BASEPLATE ID	BASEPLATE OD	PITCH CIRCLE DIAMETER (PCD)	NUMBER OF ANCHOR STUDS	DIAMETER OF BOLT HOLES **	ANCHOR STUD SIZE
DN150	168	675	600	8	20	M16
DN225	273	775	700	12	24	M20
DN300	324					

** BOLT HOLE DIAMETER IS FOR THE CONCRETE & THE BASE PLATE

NOTE

1 ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE

2 A SITE SPECIFIC RISK ASSESSMENT SHALL BE UNDERTAKEN TO DETERMINE IF ADDITIONAL CONTROL MEASURES (SUCH AS EARTHING, BONDING, INSULATION ETC) ARE REQUIRED FOR ELECTRICAL HAZARDS ASSOCIATED WITH LIGHTNING STRIKE OF THE VENT SHAFT

3 PRIOR TO INSTALLING REPLACEMENT VENTSHAFT THE CONTRACTOR SHALL UNDERTAKE A CONDITION ASSESSMENT OF THE EXISTING CONCRETE BASE TO CONFIRM THE FOLLOWING:
- A THE CONCRETE BASE SHALL BE FREE OF ANY DEFECTS OR SIGNS OF DISTRESS SUCH AS CRACKING OF MORE THAN 100mm IN LENGTH OR SPALLING, SCALING, SOFTENING, DRUMMINESS, ETC OF MORE THAN 25mm DEEP
- B THERE IS NO EXPOSED REINFORCEMENT
- C SETTLEMENT OR TILTING OF EXISTING BASE DOES NOT EXCEED THE LEAST DIMENSION OF THE BASE DIVIDED BY 100
- D DIMENSIONS OF THE BASE COMPLIES WITH TABLE 1

4 THE CONTRACTOR SHALL PROVIDE WRITTEN CONFIRMATION TO THE PRINCIPLE PRIOR TO ANY REPLACEMENT WORKS CONFIRMING SUITABILITY IN TERMS OF CONDITION AND DIMENSIONS OR OTHERWISE OF THE EXISTING CONCRETE BASE. THE CONTRACTOR IS RESPONSIBILITY FOR THE ASSESSMENT

5 ANCHORS SHALL BE ALLOWED TO CURE FOR A MINIMUM OF 48 HOURS PRIOR TO ATTACHING THE VENTSHAFT

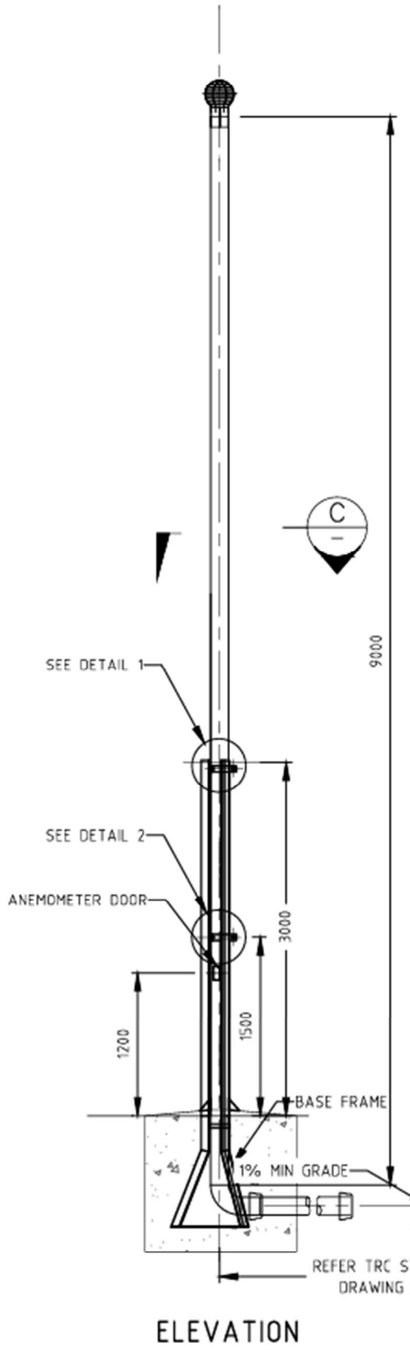
6 STAINLESS STEEL BASE PLATE AND GUSSET PLATES SHALL BE GRADE 316l TO ASTM A240M, BEAD BLASTING FOR MATT-FINISH SHALL BE AS HILLTOPS STANDARD DRAWING SD1700 ALL WELDING OF STAINLESS STEEL SHALL BE IN ACCORDANCE WITH AS/NZS 1554.6

7 ALL PROPRIETARY ITEMS SHALL BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION

8 HOLD DOWN NUTS SHALL BE TIGHTENED USING A TORQUE WRENCH IN THE TIGHTENING SEQUENCE BELOW. SEQUENCE SHALL COMPLETED FIRS FOR 50% AND REPEATED FOR 100% OF FINAL TIGHTENING TORQUE. FINAL TIGHTENING TORQUE SHALL BE 55N.m FOR M16 AND 100N.m FOR M20

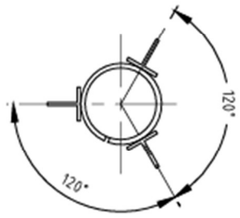
9 THIS SHEET IS TO BE READ IN CONJUNCTION WITH STANDARD DRAWING SD1700 AND SD1701

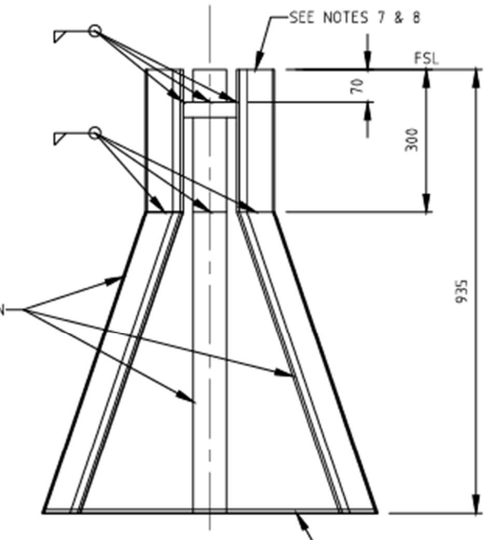
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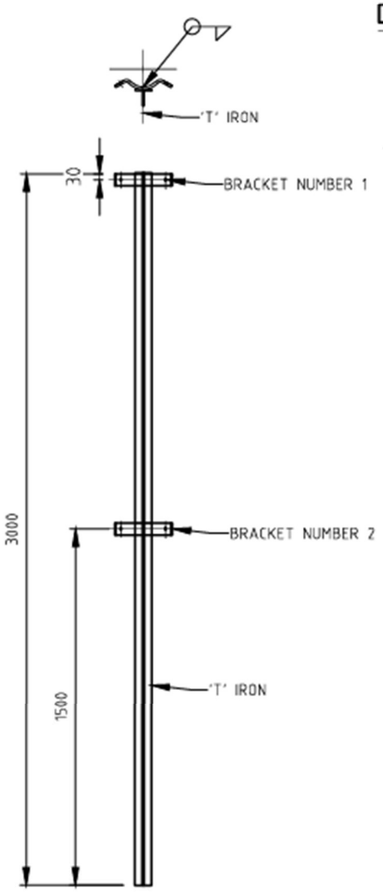
ELEVATION

MAINTENANCE HOLE



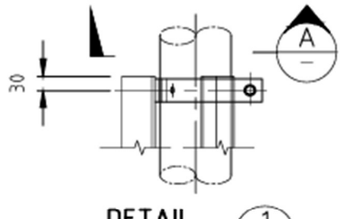


BASE FRAME

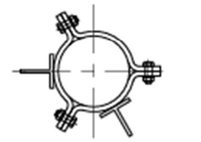


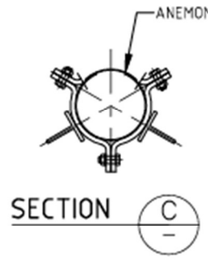
LEG DETAIL

NO.OFF -2 TWO EXTRA NO.1'S REQUIRED TO SECURE VENT SHAFT TUBE





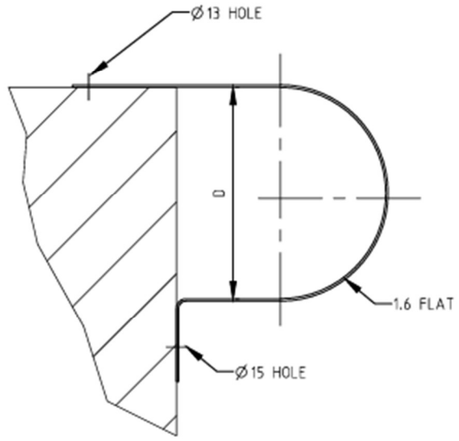




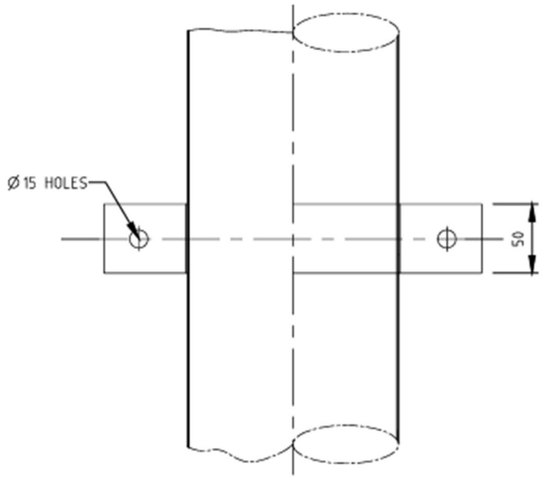
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED
2. VENT SHAFT TUBES TO BE DN150 GRADE 304 (MINIMUM) STAINLESS STEEL, EITHER EXTRUDED OR SPIRAL WELDED.
3. VENT SHAFT TUBING, STEEL SUPPORTS, BRACKETS & COWLS TO BE COATED AS PER TRC REQUIREMENTS
4. CONCRETE TO BE MINIMUM 28 DAY STRENGTH OF 32MPa IN ACCORDANCE WITH AS1379 AND AS3600 VENT SUPPORT LEGS TO BE 70 x 70 x 8 GALVANISED 'T' IRON.
5. ALL WELDS TO BE 7 SILICON BRONZE FULL DEPTH TO AS1167.
6. BASE FRAME TO BE SET IN THE CONCRETE BASE BLOCK & ALLOWED 5 DAYS TO CURE BEFORE LEGS ARE WELDED ON.
7. ALL BOLTS & WASHERS TO BE M12 GRADE 304 STAINLESS STEEL 75 LONG UNLESS NOTED OTHERWISE.
8. THE THIRD 'T' IRON BASE LEG IS LEFT UNUSED, BUT IT WILL BE USED IF THE VENT IS CHANGED TO A 14m GUYWIRE VENT.

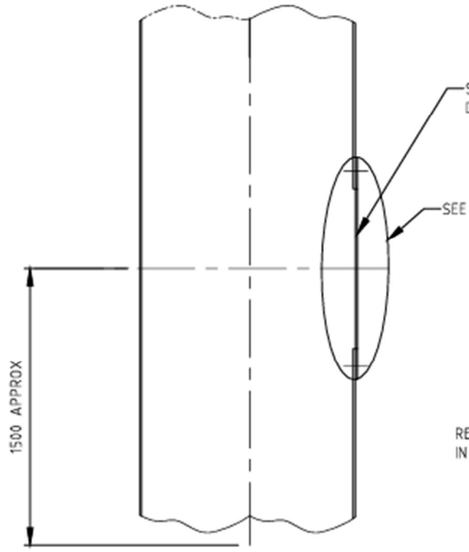
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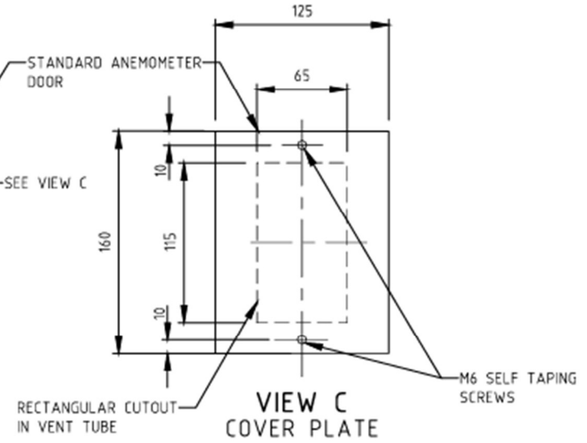
CORNER CLIP BAND



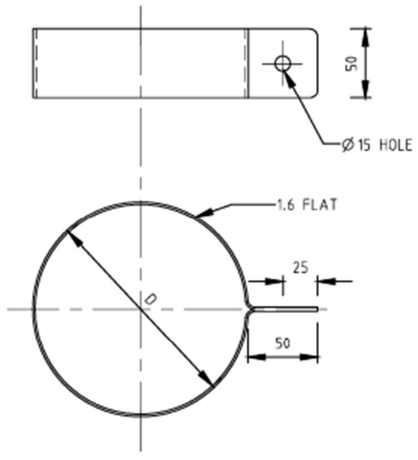
SECTION A



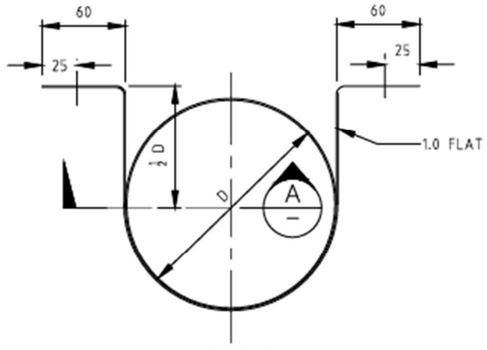
SECTION B



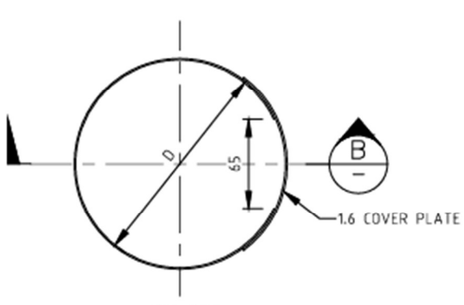
VIEW C
COVER PLATE



CIRCULAR CLIP BAND



PLAN
CLIP BAND FOR CYLINDRICAL SHAFTS



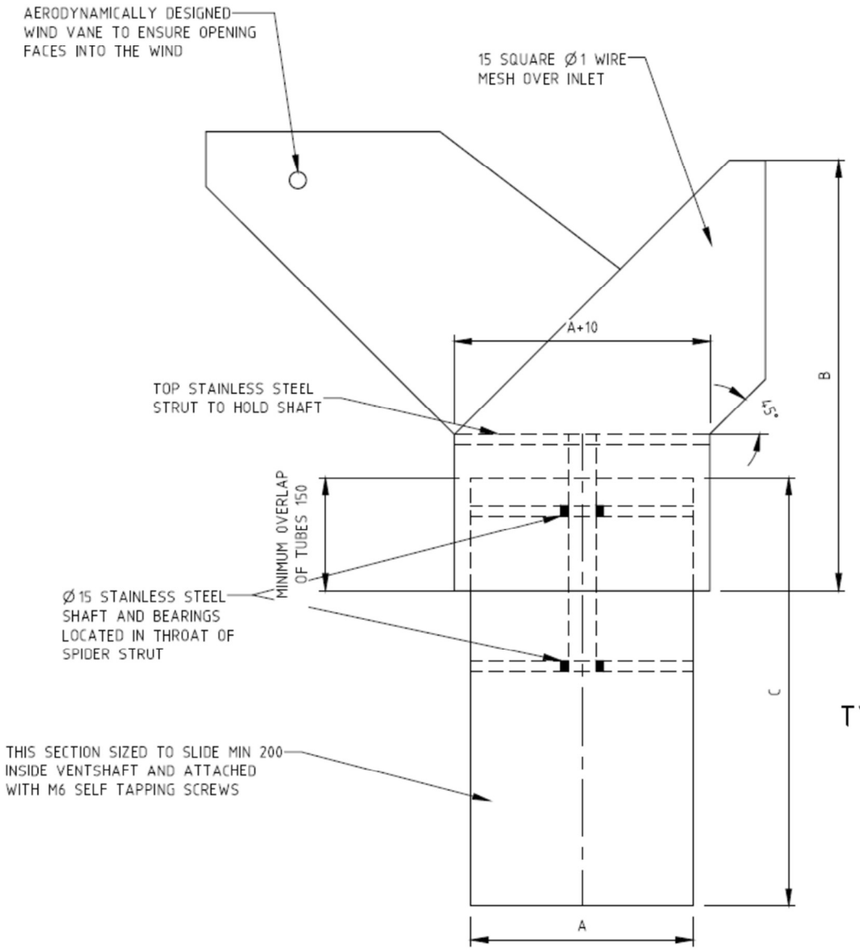
PLAN
ANEMOMETER DOOR

NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED
2. ALL MATERIAL TO BE GRADE 316 STAINLESS STEEL EITHER EXTRUDED OR SPIRAL WELDED

TABLE 1 - VENTSHAFT DIMENSIONS

VENTSHAFT NOMINAL DIAMETER	DIMENSION 'D'
150	152
225	228
300	304

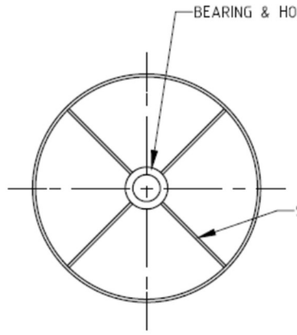
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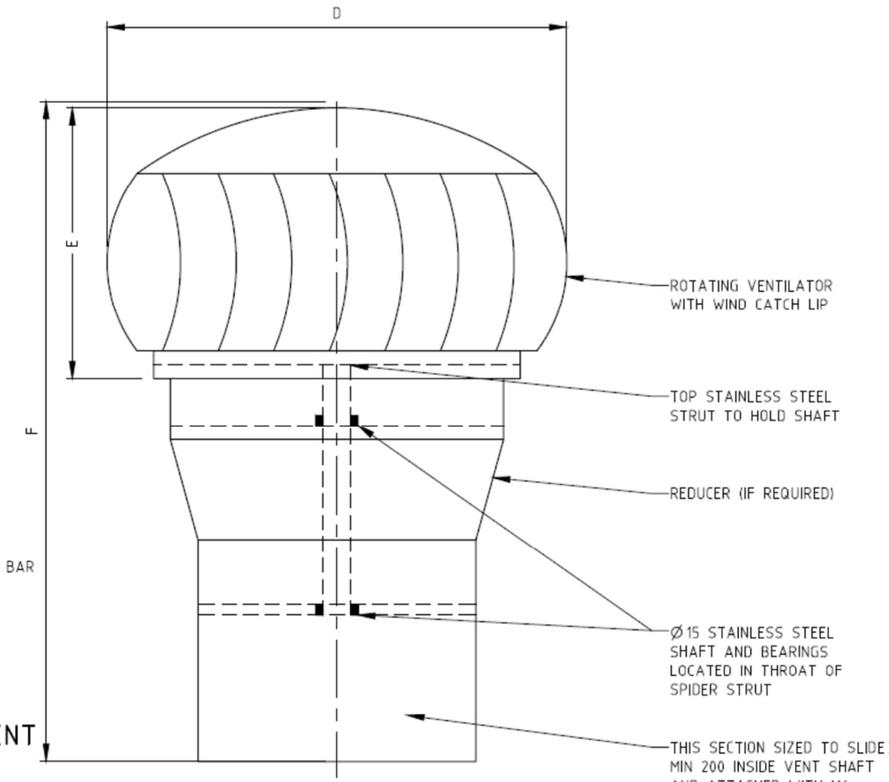
INDUCT COWL

TABLE 1 - INDUCT COWL

NOM SIZE	DIM A	DIM B	DIM C
150	145	320	250
225	220	480	350
300	300	600	400



TYPICAL SPIDER & BEARING ARRANGEMENT



ROTATING EDUCT COWL

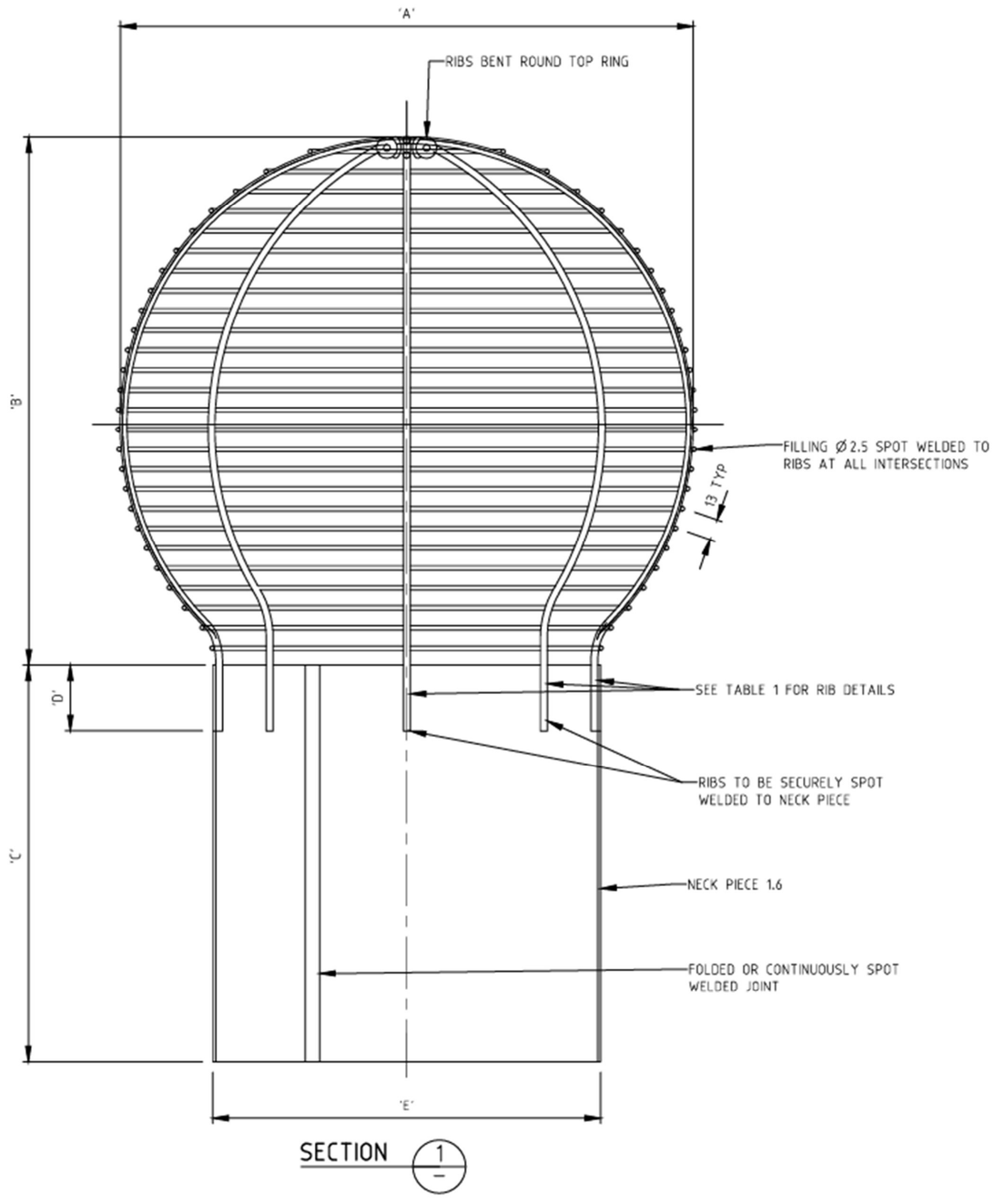
TABLE 2 - ROTATING COWL

NOM SIZE	DIM D	DIM E	DIM F
150	230	220	540
225	320	340	640
300	480	470	820

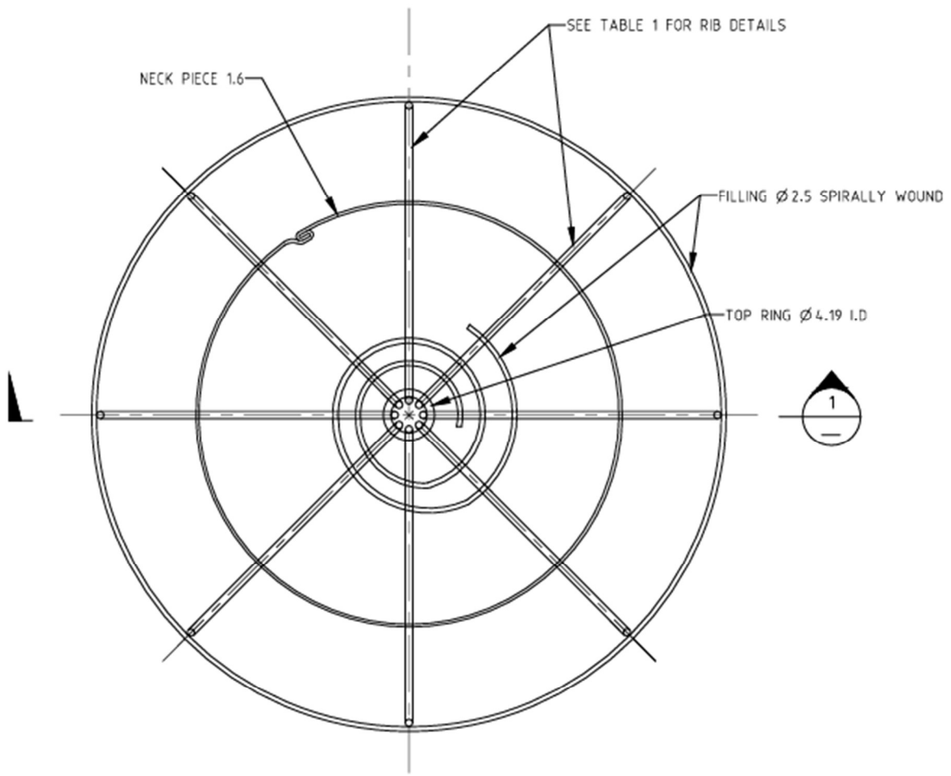
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES
2. ALL MATERIALS TO BE GRADE 316 STAINLESS STEEL UNLESS OTHERWISE SPECIFIED
3. ALL METAL SURFACES TO BE COATED IN ACCORDANCE WITH TRC REQUIREMENTS.
4. ROTATING SHAFTS TO BE STAINLESS STEEL
5. BEARINGS TO BE GRADE 308 STAINLESS STEEL
6. ROTOR VENTILATION BLADES TO BE ALUMINIUM OR UV INHIBITED ABS POLYCARBONATE

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES VENTILATION – VENT SHAFT INDUCT/EDUCT ROTATING COWL DETAILS	SHEET No. SD 1206 REVISION: - SHEET Sheet 6 of 8



SECTION 1/–



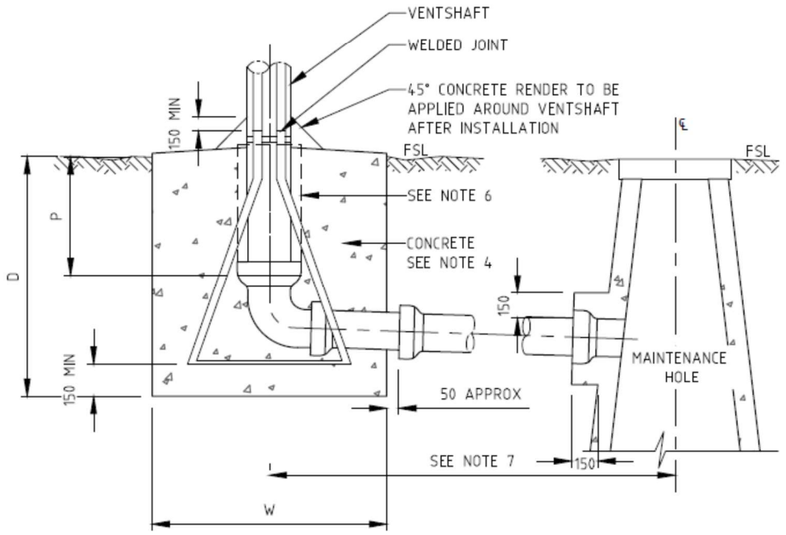
PLAN

TABLE 1- WIRE COWL RIB DETAILS

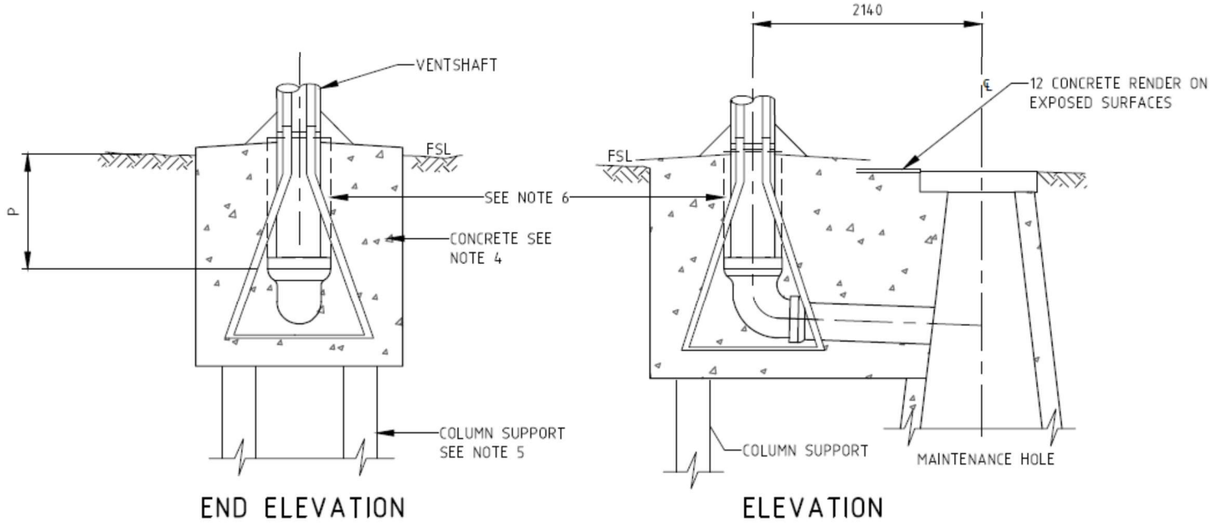
VENTSHAFT NOMINAL DIAMETER	DIMENSIONS					NO. OFF RIBS	RIB THICKNESS
	A	B	C	D	E		
150	240	230	200	38	145	6	3
225	330	305	230	38	220	6	4
300	440	405	305	50	295	8	4

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES
2. ALL MATERIAL TO BE GRADE 316 STAINLESS STEEL
3. COWL TO BE PAINTED AS IN CONTRACT SPECIFICATION

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES VENTILATION – VENT SHAFT EDUCT WIRE COWL DETAILS	SHEET No. SD 1206 REVISION: - SHEET Sheet 7 of 8



ELEVATION
VENTSHAFT BASE BLOCK (SEE NOTE 3)



END ELEVATION **ELEVATION**

COMPOSITE MAINTENANCE HOLE VENTSHAFT BASE BLOCK

TABLE 1 - VENTSHAFT AND BASE BLOCK DIMENSIONS FOR SHAFT HEIGHTS 9m TO 18m

VENTSHAFT NOMINAL DIAMETER	BASE DIMENSIONS		MINIMUM SHAFT PENETRATION P
	IN SAND WxWxD (mm)	IN SOLID ROCK WxWxD (mm)	
150	1500x1500X1200	900X900X900	300
225	1900x1900X1200	1100X1100X1100	450
300	2400x2200X1400	1200X1200X1200	600

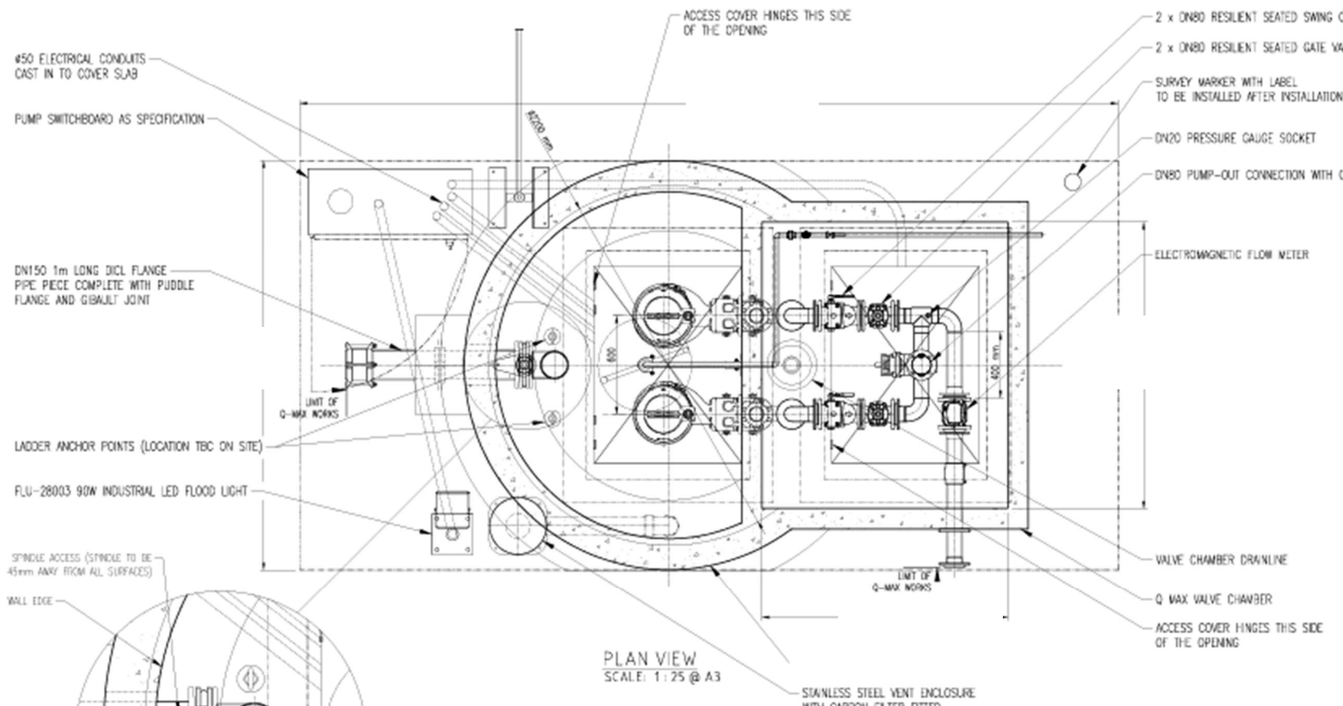
NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED
2. VENT SHAFTS TO COMPLY WITH HILLTOPS COUNCIL VENT SHAFT REQUIREMENTS
3. VENT SHAFTS TO BE EITHER
   - EDUCT GUY WIRE TYPE
   - POST TYPE
   LOCATION, HEIGHT AND SIZE OF BASE BLOCK TO BE AS SPECIFIED IN DESIGN DRAWINGS. SIZE OF BASE BLOCK MAY VARY TO SUIT PARTICULAR CONDITIONS PREVAILING ON SITE, BUT UNDER NO CIRCUMSTANCES IS BLOCK TO BE SMALLER THAN SHOWN IN TABLE 1
4. CONCRETE TO BE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 25MPa IN ACCORDANCE WITH AS1379 AND AS3600
5. COLUMN SUPPORT DETAILS TO BE SHOWN IN DESIGN DRAWINGS
6. POSITION A 20 OVERSIZED TUBE IN CONCRETE BLOCK TO ACT AS FORMWORK DURING INSTALLATION. SEAL BOTTOM EDGES OF SLEEVE BEFORE CONCRETE POUR
7. MAXIMUM LENGTH OF VENT LINE FROM MH TO TOP OF VENT (COWL) SHALL NOT EXCEED 25m OR 35m IF THE LINE IS INCREASED BY ONE NOMINAL SIZE

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES VENTILATION – VENT SHAFT EDUCT VENT BASE BLOCK DETAILS	SHEET No. SD 1206 REVISION: - SHEET Sheet 8 of 8

SPECIFICATIONS:

1. INTERNAL DIAMETER – Ferris 2200mm nominal.
2. METHOD OF MANUFACTURE – steel mould ferried with intense mechanical vibration.
3. CONCRETE TYPE – sulfate resistant using calcareous aggregate.
4. STRENGTH – 32 MPa at 28 days. Internal finish to meet AS3610 Class 3.
5. WALL THICKNESS – 150mm with 65mm internal cover over reinforcement. Design conforms to AS 3735.
6. REINFORCEMENT – complies with AS3600 and AS4671.
7. VALVE CHAMBER – full size 1753mm X 1500mm X 1125 mm – ferried as one section.
8. VALVES – 3 x DN80 Lever and weight resilient seated check valves.
   – 2 x DN80 resilient seated Gate valves.
9. PIPEWORK – DN90 PN16 PE100 I pipework/fits.
10. PUMPS – 2 x Grundfos SLV.80.80.75.3.BC submersible Pumps guide rail mounted.
11. ACCESS COVERS – austral internal/retail lockable hinged aluminium access covers with hinged safety grates.
12. LEVEL CONTROLS – 2 x Backup float level switches,1 x Level transducer.
13. PUMP CONTROLLER – pump Control As Specifications.
14. LIFTING DETAILS – 4 x 5.0t 'Swift-Lifts in base, increments, valve chamber & coverslab.



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Project:

Drawn:
Designed:
Checked:

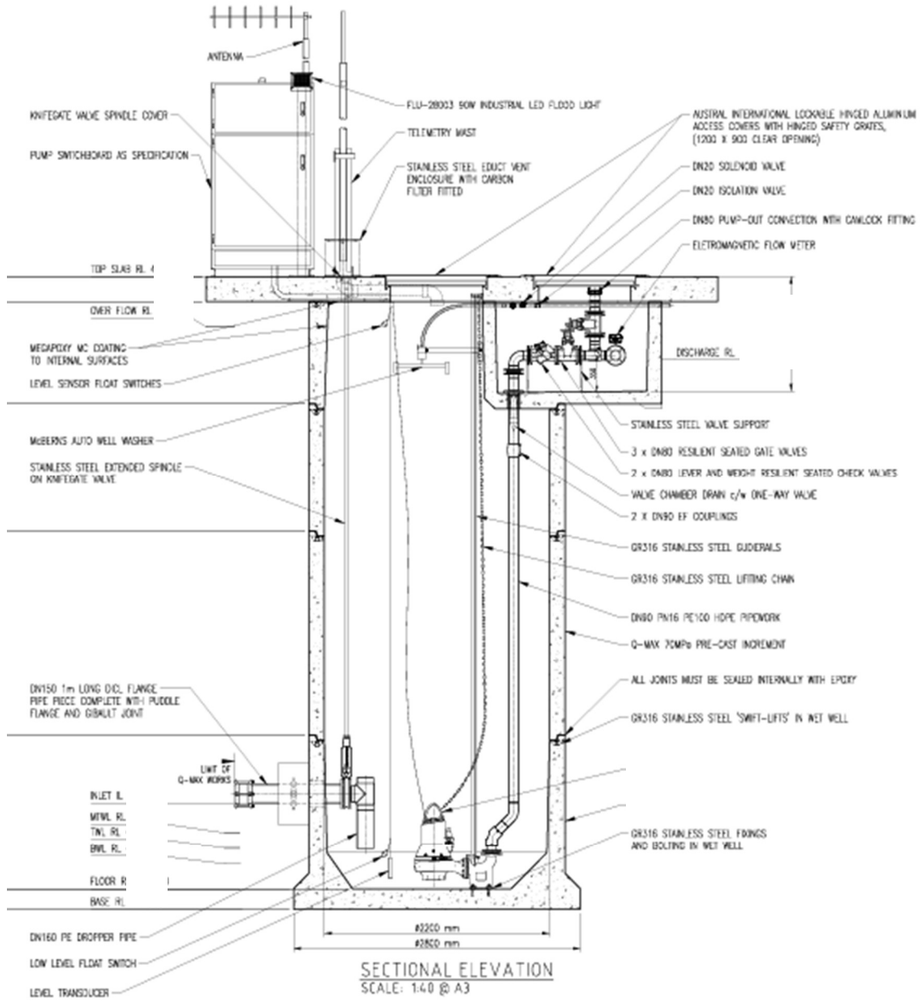
Title: **GENERAL LAYOUT (SECTIONAL PLAN VIEW)**

Scale: 1 : 25 | Rev: B

Drg No:

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SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES TYPICAL SEWER PUMP STATION DETAILS GENERAL LAYOUT	SHEET No. SD 1207 REVISION: - SHEET Sheet 1 of 7



SECTIONAL ELEVATION
SCALE: 1:40 @ A3

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EXCAVATION SPECIFICATIONS

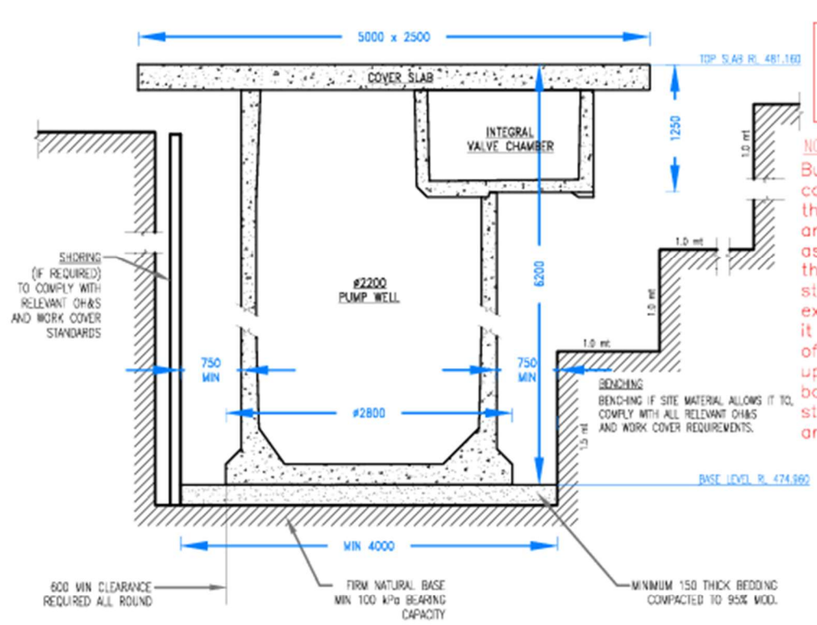
1. Excavation should extend minimum of 150mm below underside of base section or deeper where required to achieve an approved firm natural base of not less than 100 kPa bearing capacity.

2a. Prepare level base using min. 130 of DGB 20 or equivalent compacted to 95% M.O.D. with 20mm Bedding sand screeded level.

2b. In wet conditions 100mm blinding slab may be required, then 50mm of bedding sand.

3. Ensure correct RL of base prior to installation of pump station.

NOTE:
DRAWING SHOWN HERE IS A TYPICAL EXCAVATION ONLY.
SHOWING OPTIONS FOR EITHER BENCHING OR SHORING.
BUT PROVIDING CRITICAL DIMENSIONS REQUIRED FOR ACCESS.



ALLOWABLE BEARING PRESSURE BELOW 40 kPa
BUOYANCY FORCE 453 kN
MASS ACHIEVED 468 kN (INCLUDING COVER SLAB, INCLUDING 10 DEGREE SOIL WEDGE OVER AT DENSITY OF 18 kN/m3)
BUOYANCY FOS 1.03

NOTE:
Buoyancy calculations of precast concrete pump station considers the pump station being backfilled and compacted to the specifications as per this drawing. In the event that the precast concrete pump station remains installed in an open excavation without being backfilled, it is advisable to ballast the inside of pump station with fresh water up to the inlet pipe height or ballast the outside toe of the pump station base with mass concrete all around.

EXCAVATION DETAIL FOR Q-MAX FORTIS 2200 PUMP STATION
(Not to Scale)

NOTE: **DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.**

BACKFILL SPECIFICATIONS

1. Place the backfill in layers not exceeding 200mm thickness and compact each layer to not less than 95% of its Standard Max Dry Density (SMDD), as 1289.5.1.1. Bring the compacted fill level up to a height of at least 800mm above the external toe of the pump station base section.

2. Place the remainder of the fill in layers not exceeding 400mm and compact each layer to not less than 95% SMDD.

3. Ensure compacting machine does not come any closer than 150mm from tank.

4. Ensure no silts or clays which are prone to loss of strength when saturated, are used.

I,_____, have read and agreed to comply with these specifications.

Role in Company_____

Signed _____ Date ___/___/___

Please note: Any variations to these requirements are to be documented and signed by a qualified and authorised person.

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Checked:

Title: **EXCAVATION & BACKFILL SPECIFICATIONS FOR Q-MAX PUMP STATION**

Scale:

Rev: B

Drg No.:

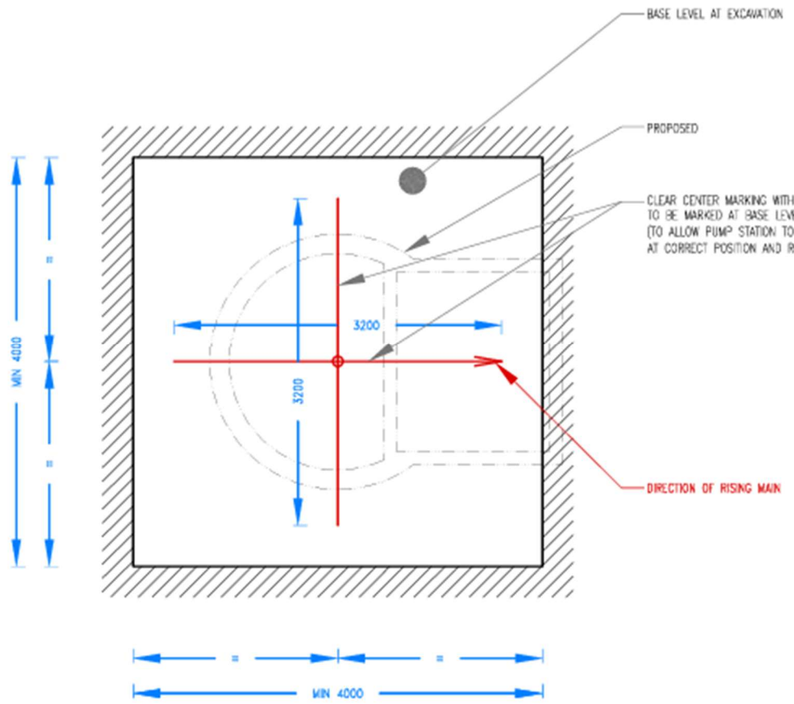
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ALL DIMENSIONS SHOWN ARE DIAGRAMTIC, ACTUAL DIMENSIONS TO BE SHOWN FOR EACH SITE

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CENTRE MARKING

1. Mark clear centre Mark with at least 3.2m long cross-hairs at prepared level base.
2. Ensure correct direction of Rising main.



PUMP STATION
EXCAVATION BASE LEVEL MARKING DETAIL - PLAN VIEW
(Not to Scale)

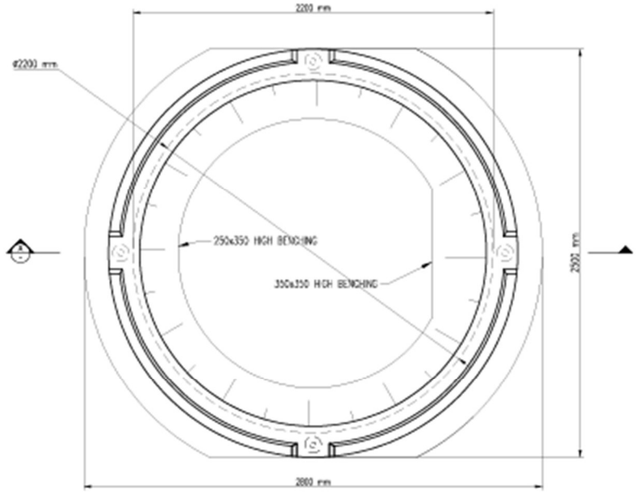
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ALL DIMENSIONS SHOWN ARE DIAGRAMTIC, ACTUAL DIMENSIONS TO BE SHOWN FOR EACH SITE

I,_____, have read and agreed to comply with these specifications.
Role in Company_____
Signed _____ Date ___/___/___

Please note: Any variations to these requirements are to be documented and signed by a qualified and authorised person.

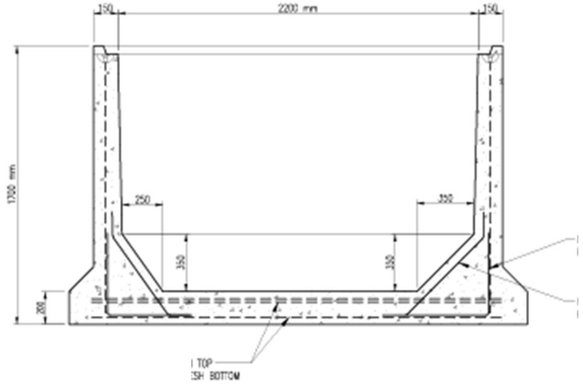
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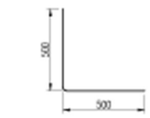
TYP BASE CASTING PLAN
SCALE: 1:25 @ A3



SECTION THROUGH STANDARD INCREMENT
SCALE: 1:25 @ A3



A SECTION THROUGH BASE CASTING
SCALE: 1:25 @ A3

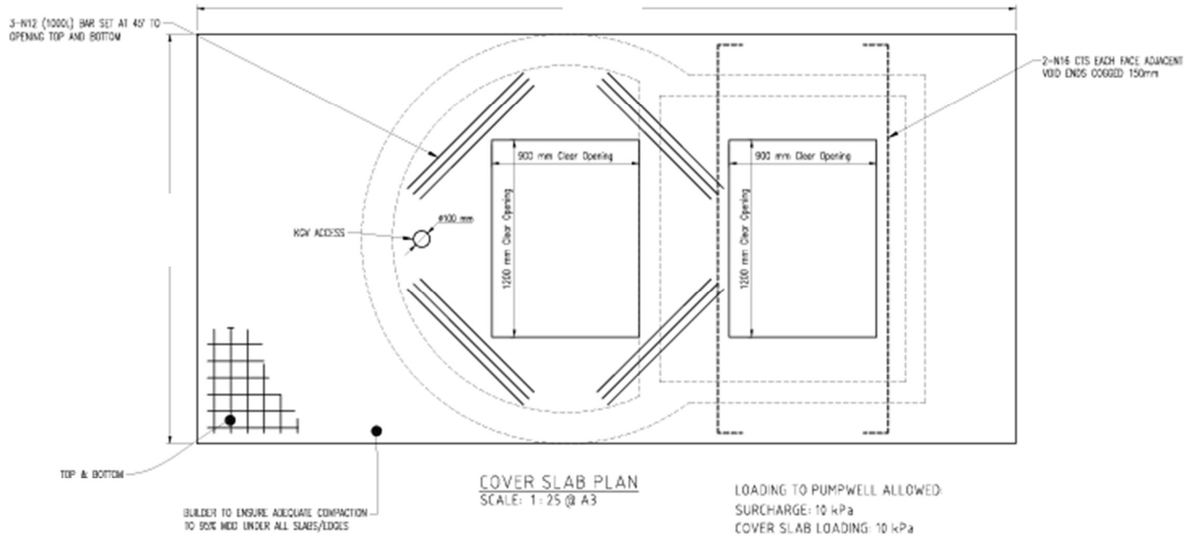


TYP LAPPING ROD DETAIL
SCALE: 1:25 @ A3

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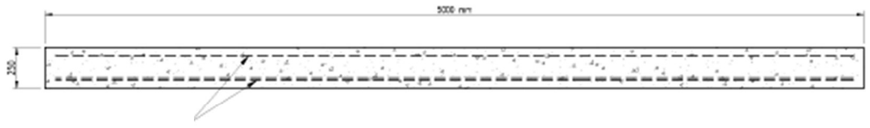
ALL DIMENSIONS SHOWN ARE DIAGRAMTIC, ACTUAL DIMENSIONS TO BE SHOWN FOR EACH SITE

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES VENTILATION – VENT SHAFT EDUCT VENT BASE BLOCK DETAILS	SHEET No. SD 1207 REVISION: - SHEET Sheet 5 of 7



COVER SLAB PLAN
SCALE: 1:25 @ A3

LOADING TO PUMPWELL ALLOWED:
SURCHARGE: 10 kPa
COVER SLAB LOADING: 10 kPa



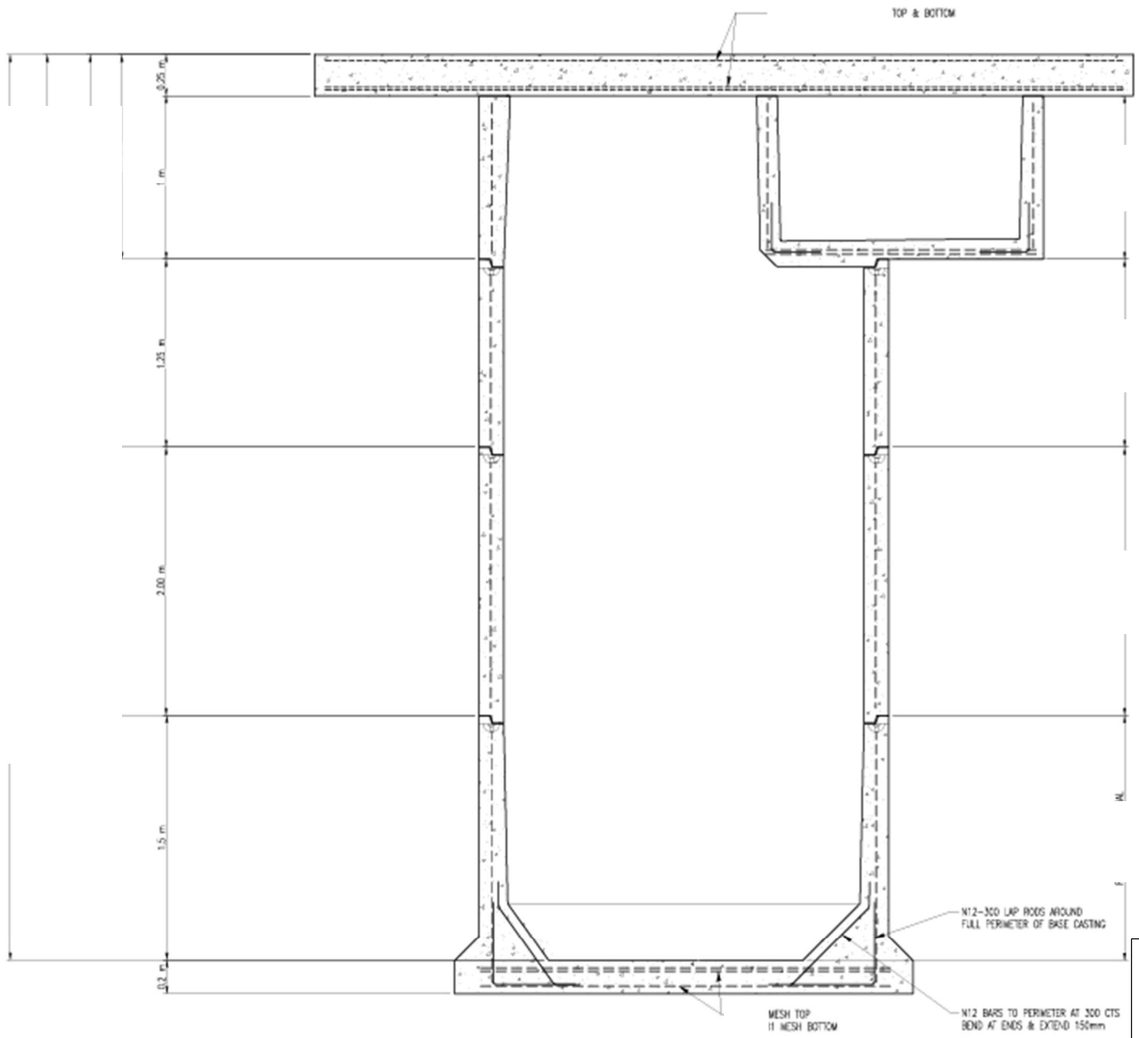
COVER SLAB SECTION
SCALE: 1:25 @ A3

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Structural design certification location.

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES VENTILATION – VENT SHAFT EDUCT VENT BASE BLOCK DETAILS	SHEET No. REVISION: SD 1207 - SHEET Sheet 6 of 7



TYP WELL SECTION
SCALE: N.T.S.

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Structural design certification location

SCALE: AS SHOWN ORIGINAL A3 DATUM: PROJECTION: SURVEYED BY:	REV.	DESCRIPTION STANDARD DRAWING	DATE	Hilltops COUNCIL	PROJECT:	SHEET TITLE: SEWER SERIES VENTILATION – VENT SHAFT EDUCT VENT BASE BLOCK DETAILS	SHEET No. SD 1207 REVISION: - SHEET Sheet 7 of 7