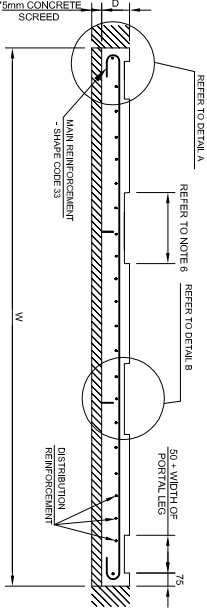


TABLE 1: CULVERT SCHEDULE FOR SEATLALENG STREET PAVING

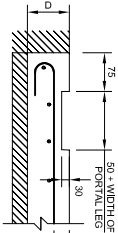
CULVERT AND ROAD ELEMENTS:				WORK PACKAGE B										WORK PACKAGE C										WORK PACKAGE A									
PHUMULA STORMWATER CONTROL:																																	
ITEM/NUMBER	ROAD KILOMETER DISTANCE	TYPE	km	S1/1	S1/2	S1/3	S3/1	S3/2	S4/1	S6/1	S6/2	S6/3	S6/4a	S6/4b	S6/4c	S6/4d	S6/6	S9/1	S9/2	S9/3	S9/4	S10/1	S11/1	S11/2	S11/3	S11/4	S11/5	S13/1	S14/1	S14/2	S14/3	S16/1	S17/1
CULVERT																																	
DESCRIPTION																																	
TYPE	BARRELS / TOTAL UNITS	Number	1	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
SPAN / DIA	mm	900	900	1200	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
HEIGHT	mm	600	900	1200	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
PIPE & BEDDING CLASS	mm	175 S	175 S	150 S	200 S	200 S	200 S	200 S	200 S	200 S	200 S	200 S	175 S	175 S	175 S	175 S	175 S	200 S	200 S	175 S	175 S	200 S	150 S	150 S	150 S	200 S	200 S	200 S	200 S	200 S	200 S	200 S	200 S
SKEW ANGLE	deg	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
WINGWALL REFERENCE																																	
FLOOR SLOPE (MM)	S	(%)	1.0	1.0	1.0	1.0	3.7	2.9	2.0	1.0	2.0	1.0	1.7	4.0	4.0	1.0	4.2	1.0	1.0	1.0	1.0	1.0	1.9	1.2	1.0	0.5	0.7	2.2	1.0	1.0	1.0	4.3	
INVERT LEVEL - LEFT																																	
INVERT LEVEL - ROAD C/L (MEDIAN)	M	m	1378.950	1374.250	1372.047	1382.550	1371.550	1375.750	1386.496	1387.600	1379.700	1378.190	1378.000	1376.580	1375.000	1374.700	1366.820	1366.020	1365.480	1365.005	1341.197	1361.970	1363.125	1364.517	1365.463	1363.414	1351.000	1347.050	1337.898	1332.741	1357.110	1365.355	
INVERT LEVEL - RIGHT																																	
INVERT LEVEL - RIGHT	M	m	1378.952	1374.152	1371.950	1382.440	1371.440	1361.440	1375.140	1386.387	1387.430	1382.356	1379.600	1378.000	1376.584	1375.160	1375.000	1374.041	1366.710	1365.910	1365.380	1365.130	1341.149	1362.159	1363.245	1365.416	1363.382	1350.880	1346.995	1337.849	1332.692	1357.049	
FILL HEIGHT - LEFT																																	
FILL HEIGHT - LEFT	M	m	± 0.350	± 0.350	± 0.350	± 0.350	± 0.350	± 0.350	± 0.350	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.250	± 0.300	± 0.350	± 0.350	± 0.350	± 0.350	± 0.350	± 0.350	± 0.350	± 0.300	± 0.300	± 0.300	
FILL HEIGHT - ROAD C/L (MEDIAN)																																	
FILL HEIGHT - RIGHT	M	m	± 0.350	± 0.350	± 0.350	± 0.350	± 0.350	± 0.350	± 0.350	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.300	± 0.250	± 0.300	± 0.350	± 0.350	± 0.350	± 0.350	± 0.350	± 0.350	± 0.350	± 0.300	± 0.300	± 0.300	
LENGTH - LEFT TO ROAD C/L																																	
LENGTH - LEFT TO ROAD C/L	M	m	4.880	4.880	4.880	5.480	5.480	6.100	6.100	6.100	6.100	6.100	6.100	6.100	6.100	6.100	6.100	6.100	6.100	6.100	4.880	4.880	4.880	4.880	4.880	4.880	4.880	4.880	6.100	3.050	6.100		
TOTAL LENGTH TO INLET OR OUTLET																																	
TOTAL UNITS	Number	(8 x 1.22)	(8 x 1.22)	(8 x 1.22)	(9 x 1.22)	(9 x 1.22)	(9 x 1.22)	(9 x 1.22)	(14 x 1.22)	(10 x 1.22)	(10 x 1.22)	(8 x 1.22)	(8 x 1.22)	(29 x 1.22)	(8 x 1.22)	(8 x 1.22)	(13 x 1.22)	(29 x 1.22)	(8 x 1.22)	(9 x 1.22)	(9 x 1.22)	(10 x 1.22)	(10 x 1.22)	(10 x 1.22)	(10 x 1.22)	(8 x 1.22)	(8 x 1.22)	(8 x 1.22)	(8 x 1.22)	(8 x 1.22)	(10 x 1.22)	(5 x 1.22)	

TABLE 2: PORTAL CULVERT FLOOR SLAB REINFORCEMENT

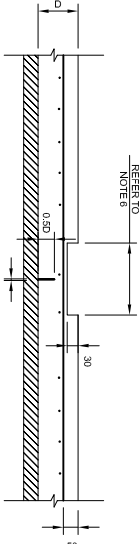
Box Culvert Floor slab Rebar: Phumula stormwater control		WORK PACKAGE B										WORK PACKAGE C										WORK PACKAGE A									
Culvert item number	S1/1	S1/2	S1/3	S3/1	S3/2	S4/1	S6/1	S6/2	S6/3	S6/4a	S6/4b	S6/4c	S6/4d	S6/5	S6/1	S6/2	S6/3	S6/4	S10/1	S11/1	S11/2	S11/3	S11/4	S11/5	S13/1	S14/1	S14/2	S14/3	S16/1	S17/1	
Kilometer distance	175S	175S	150S	175S	175S	175S	175S	175S	175S	175S	175S	175S	175S	175S	175S	175S	175S	175S	150S	150S	175S	175S	175S	175S	175S	175S	175S	175S	175S	175S	
Class precast culvert	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Number of spans	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Span	900	900	1200	600	600	600	600	600	600	600	900	900	900	900	900	900	900	900	600	1200	1200	600	600	600	600	600	600	900	900	600	
Height	600	900	1200	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	
Fill height	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	
Culvert leg thickness (l)	110	110	125	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	125	125	110	110	110	110	110	110	110	110	110	
Thickness of floor slab	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	160	160	150	150	150	150	150	150	150	150	150	
Width of floor slab	W <td>mm</td> <td>1100</td> <td>4460</td> <td>800</td> <td>800</td> <td>800</td> <td>800</td> <td>800</td> <td>800</td> <td>1100</td> <td>1100</td> <td>1100</td> <td>1100</td> <td>1100</td> <td>1100</td> <td>1100</td> <td>1100</td> <td>800</td> <td>1400</td> <td>1400</td> <td>800</td> <td>800</td> <td>800</td> <td>800</td> <td>800</td> <td>800</td> <td>1100</td> <td>1100</td> <td>800</td>	mm	1100	4460	800	800	800	800	800	800	1100	1100	1100	1100	1100	1100	1100	1100	800	1400	1400	800	800	800	800	800	800	1100	1100	800	
Length of panel	Lp <td>mm</td> <td>3253</td> <td>3253</td> <td>3660</td> <td>3660</td> <td>3660</td> <td>3457</td> <td>3660</td> <td>3660</td> <td>3450</td> <td>3253</td> <td>3660</td> <td>3660</td> <td>3660</td> <td>3660</td> <td>3660</td> <td>4067</td> <td>3253</td> <td>3253</td> <td>3253</td> <td>3660</td> <td>3660</td> <td>3253</td> <td>3253</td> <td>3253</td> <td>3253</td> <td>3253</td> <td>3253</td> <td>3253</td>	mm	3253	3253	3660	3660	3660	3457	3660	3660	3450	3253	3660	3660	3660	3660	3660	4067	3253	3253	3253	3660	3660	3253	3253	3253	3253	3253	3253	3253	
Total length of floor slab	Lt <td>mm</td> <td>9760</td> <td>9760</td> <td>9760</td> <td>10980</td> <td>10980</td> <td>10980</td> <td>10980</td> <td>10980</td> <td>10980</td> <td>9760</td> <td>10980</td> <td>15860</td> <td>10980</td> <td>10980</td> <td>10980</td> <td>12200</td> <td>9760</td> <td>9760</td> <td>10980</td> <td>10980</td> <td>9760</td> <td>9760</td> <td>9760</td> <td>9760</td> <td>9760</td> <td>9760</td> <td>9760</td> <td>9760</td>	mm	9760	9760	9760	10980	10980	10980	10980	10980	10980	9760	10980	15860	10980	10980	10980	12200	9760	9760	10980	10980	9760	9760	9760	9760	9760	9760	9760	9760	
Number of floor slab panels	3	3	3	3	3	3	4	4	3	4	10	10	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	
Class concrete	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	30/19	
Total volume of concrete per culvert	m³	1.6	1.6	7.0	1.3	1.3	2.5	1.3	2.5	1.3	2.0	1.5	1.2	1.8	1.3	1.8	1.8	2.0	1.2	2.2	2.2	1.3	1.2	1.2	1.3	1.3	1.2	1.6	1.6	0.7	
Main reinforcement		Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	Y12	
Spacing		100	100	100	150	150	150	150	150	150	100	100	100	100	100	100	100	100	100	150	150	150	150	150	150	150	150	100	100	150	
M		34	34	34	25	25	25	24	25	29	21	23	38	36	34	41	25	38	42	23	34	34	25	23	25	23	25	34	34	21	
0.88% Cut length		mm	1000	1000	4360	700	700	700	700	700	1000	1000	1000	1000	1000	1000	1000	1000	1300	1300	1300	700	700	700	700	700	1000	1000	1000	700	
		mm	1210	1210	4570	910	910	910	910	910	1210	1210	1210	1210	1210	1210	1210	1210	1210	1510	1510	1510	910	910	910	910	1210	1210	910	1210	
Mass		kg	109.6	109.6	413.9	60.6	60.6	60.6	60.6	60.6	116.4	60.6	93.7	67.9	55.8	386.8	386.8	109.6	176.2	60.6	122.5	122.5	135.4	55.8	136.8	136.8	60.6	55.8	60.6	55.8	109.6
Vertical wapping		(2) Diameter	mm	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	200	200	250	250	250	250	250	250	250	250	250
		No. per panel	5	5	23	4	4	4	4	4	4	4	5	5	5	4	5	5	4	8	8	4	4	4	4	4	4	5	5	4	4
		0.617/ Cut length	mm	3170	3170	3170	3580	3580	3580	3580	3370	3170	3170	3580	3580	3580	3580	3580	3170	3170	3170	3580	3170	3170	3580	3580	3170	3170	3170	2970	
		Mass	kg	29.3	29.3	136.0	26.5	26.5	26.5	26.5	49.9	26.5	26.5	26.5	26.5	26.5	26.5	26.5	23.5	46.9	46.9	26.5	23.5	23.5	26.5	26.5	23.5	23.5	29.3	14.7	
Munimbers		(3) Diameter	mm	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	
		Spacing	mm	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	
		M	14	14	14	16	16	16	14	16	14	14	16	16	16	16	16	18	14	14	14	16	14	14	16	14	14	14	14	14	
		0.617/ Cut length	mm	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	
		Mass	kg	10.4	10.4	10.4	11.8	11.8	10.4	11.8	20.7	11.8	17.8	13.8	10.4	11.8	11.8	13.3	10.4	10.4	10.4	11.8	10.4	10.4	11.8	11.8	10.4	10.4	10.4	6.9	



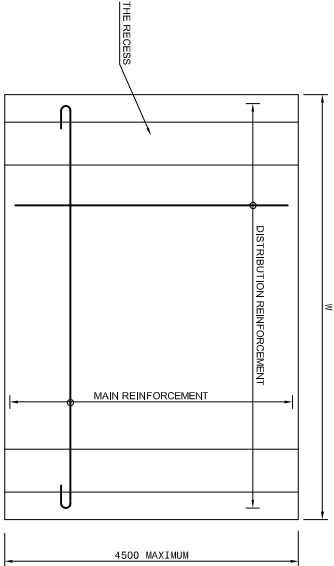
TYPICAL SECTION THROUGH CULVERT
SHOWING FLOOR SLAB REINFORCEMENT
NTS



DETAIL A
NTS

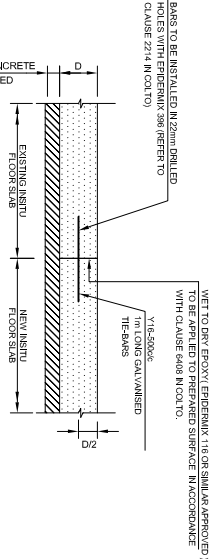


DETAIL B
NTS

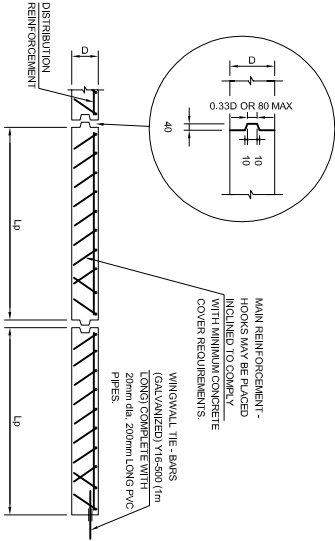


PLAN VIEW FOR SLAB REINFORCEMENT
NTS

JOINT DETAILS BETWEEN EXISTING
INSITU FLOOR SLAB AND NEW INSITU FLOOR SLAB
NTS



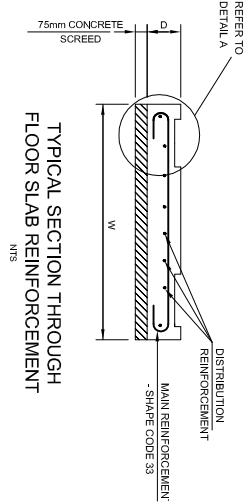
JOINT DETAILS BETWEEN FLOOR SLAB SECTIONS
NTS



- NOTES:
1. CONCRETE CLASS 20/18.
 2. MINIMUM COVER TO REINFORCEMENT IS 50mm.
 3. ALL MAIN REINFORCEMENT TO BE FULLY ANCHORED BOTH SIDES.
 4. STOLLS SHALL BE PROVIDED TO SUPPORT THE REINFORCEMENT WHERE THE SPAN OF THE PORTAL IS GREATER THAN 1.20mm.
 5. THE COMBINATIONS OF FOUNDATION AND INSTALLATION CONDITIONS USED ARE DEFINED AS FOLLOWS:

CONDITION 1: CULVERTS IN TRENCH ON UNWELEDG FOUNDATION WITH NO PROJECTION.
CONDITION 2: CULVERTS UNREINCHED ON YIELDING FOUNDATION.
CONDITION 3: CULVERTS UNREINCHED ON UNWELEDG FOUNDATION FOR h > 1.7 x b.
CONDITION 4: CULVERTS UNREINCHED ON UNWELEDG FOUNDATION FOR h < 1.7 x b.
- WHERE h = TALL HEIGHT IN METRES
b = OVERALL TRENCH WIDTH OR, IF UNREINCHED, OVERALL CULVERT WIDTH IN METRES.
6. FOR h < 1.5m, THE WIDTH = 130mm + 2 x WIDTH OF PORTAL LEG.
 - FOR h > 1.5m, THE WIDTH = 150mm + 2 x WIDTH OF PORTAL LEG.

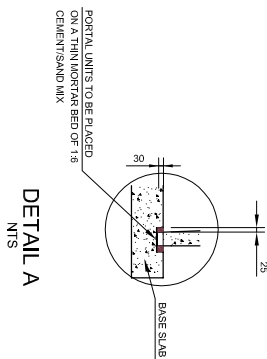
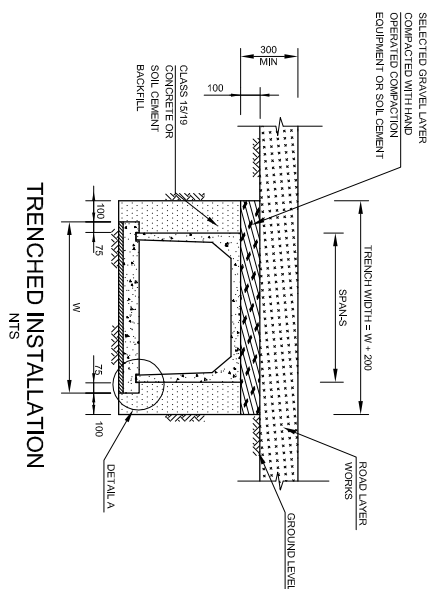
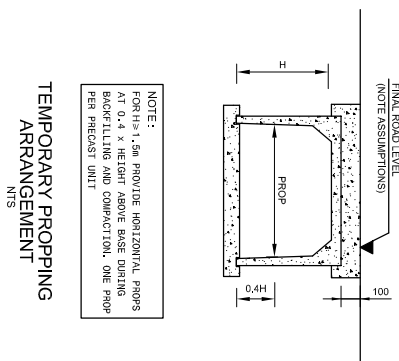
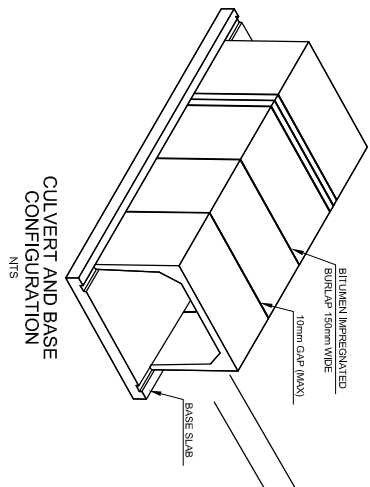
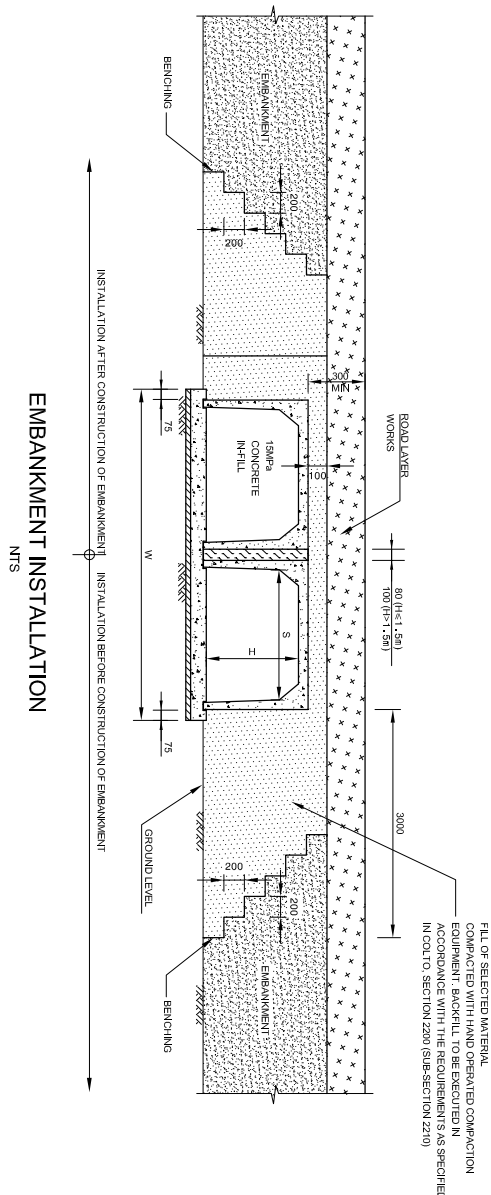
FOUNDATION CONDITIONS 1 & 2				FOUNDATION CONDITIONS 3 & 4			
TRENCHED ON UNWELEDG AND UNREINCHED ON YIELDING				UNREINCHED ON UNWELEDG			
SPAN (mm)	FLOOR CLASS	THICKNESS REINFORCEMENT	DATA REINFORCEMENT	DISTRIBUTION REINFORCEMENT	FLOOR CLASS	THICKNESS REINFORCEMENT	DATA REINFORCEMENT
600	200 S	150	Y12-150	Y10-250	200 S	150	Y10-250
750	175 S	150	Y12-150	Y10-250	175 S	150	Y10-250
900	150 S	150	Y12-150	Y10-250	150 S	150	Y10-250
1200	150 S	150	Y12-150	Y10-250	150 S	150	Y10-250
1500	150 S	150	Y12-150	Y10-250	150 S	150	Y10-250
1800	150 S	150	Y12-150	Y10-250	150 S	150	Y10-250
2100	150 S	150	Y12-150	Y10-250	150 S	150	Y10-250
2400	150 S	150	Y12-150	Y10-250	150 S	150	Y10-250
3000	150 S	150	Y12-150	Y10-250	150 S	150	Y10-250
3600	150 S	150	Y12-150	Y10-250	150 S	150	Y10-250



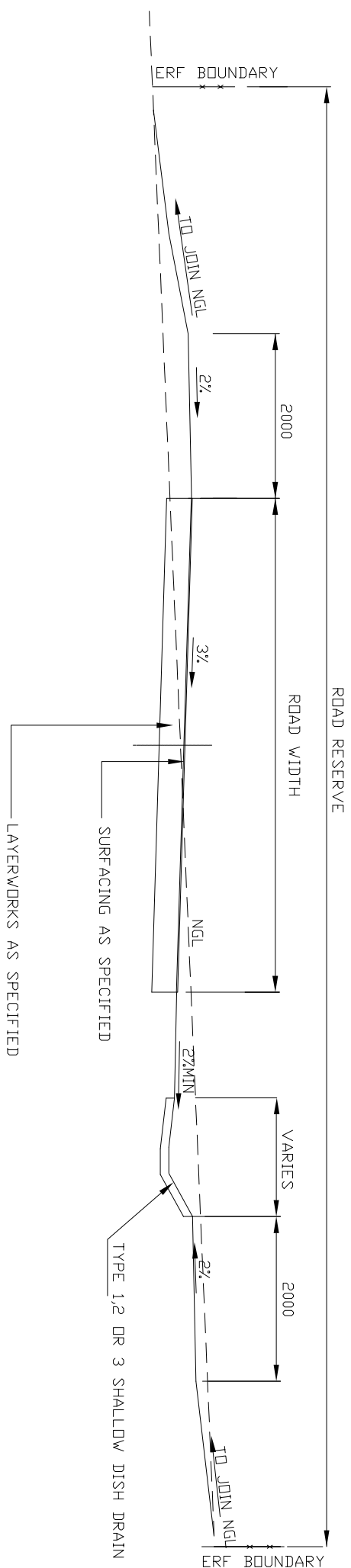
TYPICAL SECTION THROUGH
FLOOR SLAB REINFORCEMENT
NTS

- THIS DRAWING MUST BE READ IN CONJUNCTION WITH DRAWINGS:
1. CULVERT SCHEDULE
 2. PRECAST PORTAL CULVERT INSTALLATION DETAILS

DESIGNED BY		SEJAGOB ENGINEERS		T.R		SEJAGOB ENGINEERS		DEPARTMENT OF ROADS AND STORMWATER		CLIENT ADDRESS:		CLIENT		CONTRACT No.		TYPE OF PLANNING	
41 HIGGON D AVENUE		POLONOWANE		DESIGNED		ISSUED BY:		RECEIVED BY:		NKANGALA DISTRICT MUNICIPALITY		PROJECT TITLE		3392/17		PRELIMINARY	
0699		T.R		DRAWN		DATE:		DATE:		1050		CONSTRUCTION OF STORMWATER CONTROL AT PHUMULA IN THE		CONSULTANT:		DRAWING	
TEL : (081) 286 0625		DM		CHECKED		DATE:		DATE:		TEL : (081) 286 0625		THEMBISILE HANI LOCAL MUNICIPALITY		00		3362 / 17 / D/19	
FAX : (081) 514 7458		BY		BY		BY		BY		FAX : (081) 514 7458		DRAWING TITLE		SEL-2016 /D/19		DRAWING	
EMAIL : info@sejagob.co.za		REVISIONS		REVISIONS		REVISIONS		REVISIONS		1050		PRECAST PORTAL CULVERT BASE SLAB DETAILS		SHEET 1 OF 2		DRAWING	
DATE		DATE		DATE		DATE		DATE		TEL : (081) 286 0625		Revision		00		DRAWING	
BY		BY		BY		BY		BY		FAX : (081) 514 7458		CONSULTANT		3362 / 17 / D/19		DRAWING	
CHECKED		CHECKED		CHECKED		CHECKED		CHECKED		1050		Revision		00		DRAWING	
DESIGNED		DESIGNED		DESIGNED		DESIGNED		DESIGNED		TEL : (081) 286 0625		CONSULTANT		3362 / 17 / D/19		DRAWING	
DRAWN		DRAWN		DRAWN		DRAWN		DRAWN		FAX : (081) 514 7458		CONSULTANT		3362 / 17 / D/19		DRAWING	
DATE		DATE		DATE		DATE		DATE		1050		Revision		00		DRAWING	
BY		BY		BY		BY		BY		TEL : (081) 286 0625		CONSULTANT		3362 / 17 / D/19		DRAWING	
CHECKED		CHECKED		CHECKED		CHECKED		CHECKED		FAX : (081) 514 7458		Revision		00		DRAWING	
DESIGNED		DESIGNED		DESIGNED		DESIGNED		DESIGNED		1050		CONSULTANT		3362 / 17 / D/19		DRAWING	
DRAWN		DRAWN		DRAWN		DRAWN		DRAWN		TEL : (081) 286 0625		Revision		00		DRAWING	
DATE		DATE		DATE		DATE		DATE		FAX : (081) 514 7458		CONSULTANT		3362 / 17 / D/19		DRAWING	
BY		BY		BY		BY		BY		1050		Revision		00		DRAWING	
CHECKED		CHECKED		CHECKED		CHECKED		CHECKED		TEL : (081) 286 0625		CONSULTANT		3362 / 17 / D/19		DRAWING	
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DATE		DATE		DATE		DATE		DATE		TEL : (081) 286 0625		Revision		00		DRAWING	
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DESIGNED																	

[illegible][illegible]

THIS DRAWING MUST BE READ IN CONJUNCTION WITH DRAWINGS:
1. CULVERT SCHEDULE
2. PRECAST PORTAL CULVERT BASE SLAB DETAILS

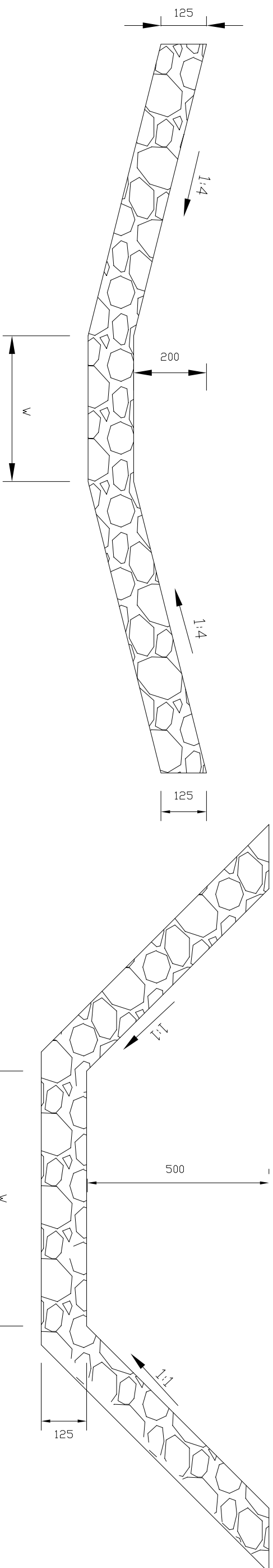


THIS DRAWING MUST BE READ IN CONJUNCTION WITH DRAWINGS:

1. DRAIN SCHEDULE
2. SURFACE DRAINAGE CROSSING DETAILS

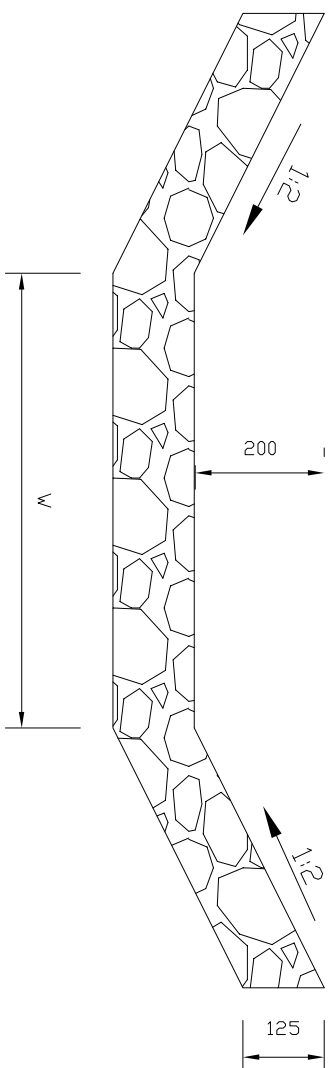
TYPICAL ROAD SECTION

SCALE: SCHEMATIC



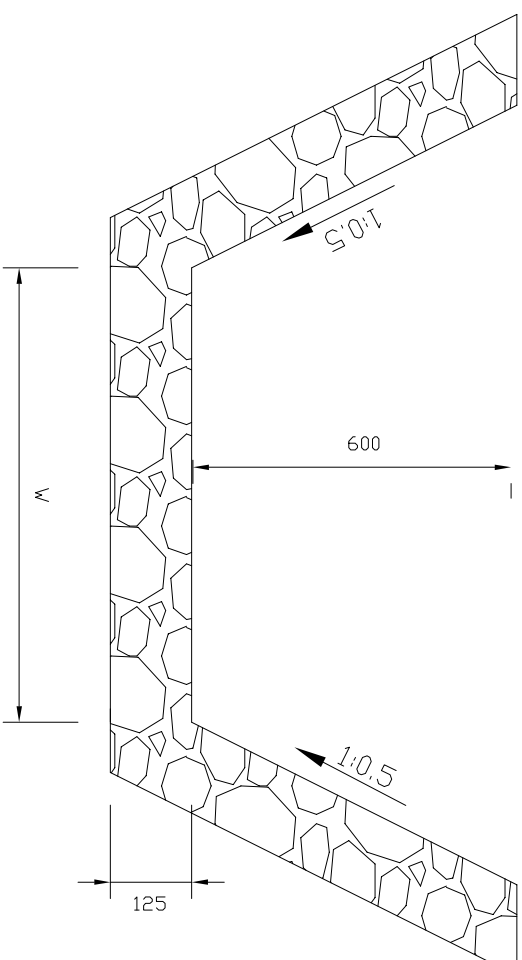
TYPE 1: SHALLOW DISH DRAIN (W: 0.2m - 0.6m)

SCALE: SCHEMATIC



TYPE 3: TRAPEZOIDAL CANAL (W: 0.4m - 0.9m)

SCALE: SCHEMATIC



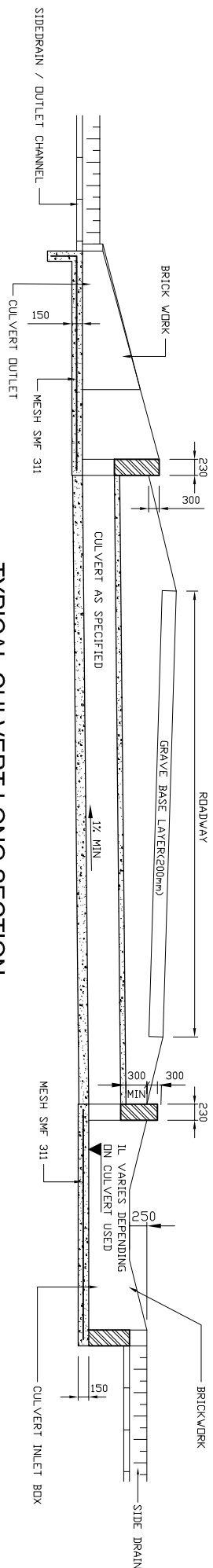
TYPE 2: SHALLOW DISH DRAIN (W: 0.2m - 0.7m)

SCALE: SCHEMATIC

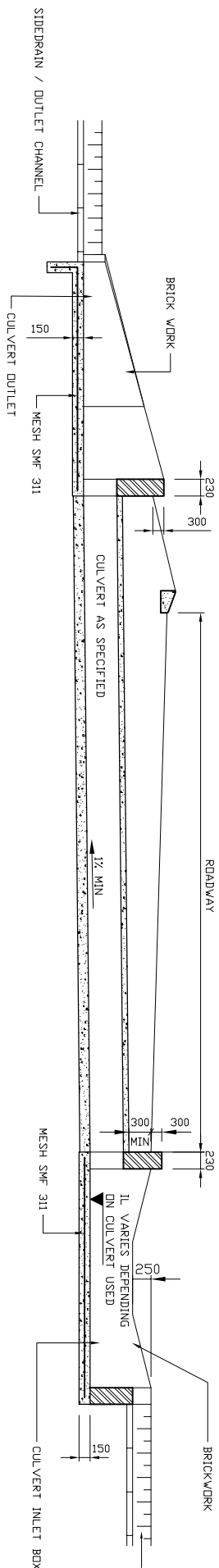
TYPE 4: TRAPEZOIDAL CANAL (W: 0.5m - 0.9m)

SCALE: SCHEMATIC

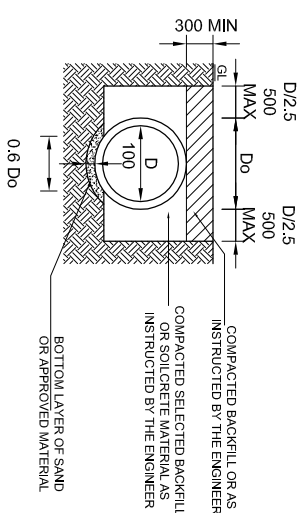
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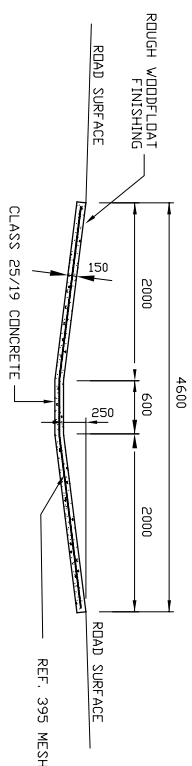
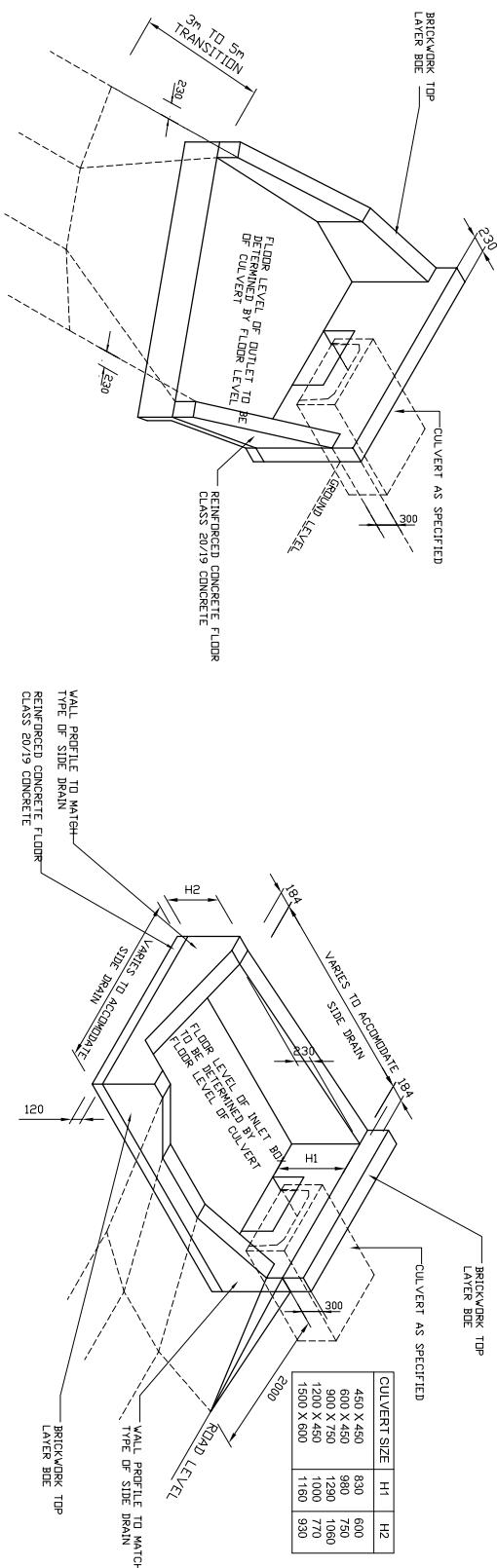
TYPICAL CULVERT LONG SECTION (GRAVEL ROADS)



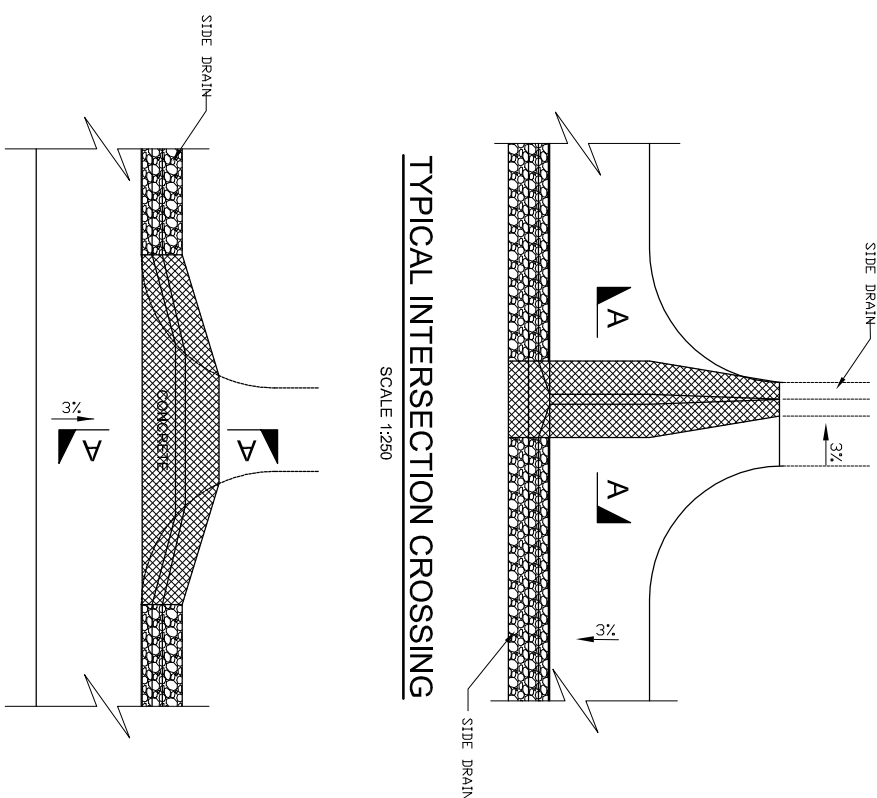
TYPICAL CULVERT LONG SECTION (SURFACED ROADS)



CLASS "B" BEDDING
FOR SOFT EXCAVATION (SINGLE PIPE)



SECTION A-A



TYPICAL INTERSECTION CROSSING

SCALE 1:250

TYPICAL INTERSECTION CROSSING

LEGEND:

H = TOTAL COVER OVER THE PIPE BELOW THE FINAL ROAD LEVEL
D = INTERNAL BARREL DIMENSION
Do = OUTSIDE BARREL DIMENSION
G1 = GROUND LEVEL MEANING EITHER OF THE FOLLOWING:
A) INTERMEDIATE FILL LEVEL IN ORDER TO PROVIDE THE MINIMUM COVER OVER THE PIPE FOR A TRENCH CONDITION OR
B) THE UNDERSIDE OF THE SELECTED SUBGRADE OR SUBBASE.

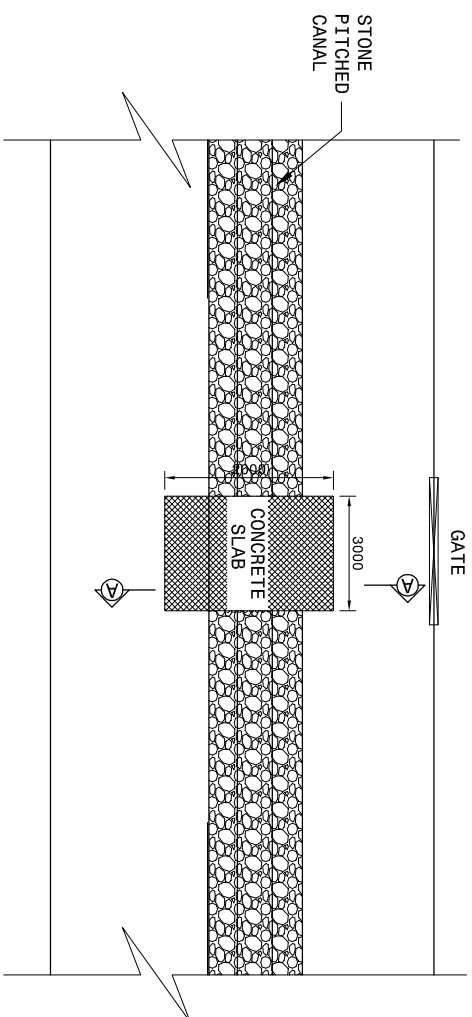
NOTES:

1. ALL CONCRETE PIPES SHALL COMPLY WITH THE REQUIREMENTS OF SANS 687 - 1986, STANDARD SPECIFICATIONS FOR NON-PRESSURE PIPES.
2. THE BEDDING TYPE SHALL BE DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE SPECIFICATION FOR CONCRETE PIPE AND PORTAL CULVERT HANDBOOK (2005 REVISION) OF THE CONCRETE MANUFACTURERS.
3. THE PIPE CLASS MUST BE DETERMINED FROM THE WEIGHT OF THE PRISM OF TILT ABOVE THE CULVERT PLUS THE SURFACE LOADINGS IN ACCORDANCE WITH TABLE 1 & 2 CODE OF PRACTICE FOR CONCRETE STRUCTURES.
4. THE MAXIMUM WHEEL LOAD ALLOWED ON TOP OF THE PIPE, WITH A MINIMUM TILT OF 30MM ON TOP OF THE PIPE.
5. CONCRETE IN CLASS A BEDDING AND IN CONCRETE EMBASEMENT SHALL BE CLASS 20/19.
6. CONCRETE IN CLASS A BEDDING CAN EITHER BE REINFORCED OR UNREINFORCED DEPENDING ON THE PRELIMINARY CONDITIONS.
7. MINIMUM 300MM SELECTED BACKFILL OR SOIL CURE MATERIAL OVER PIPES.
8. IN CASES WHERE H = 600MM THE PIPE SHALL BE ENCASED IN CLASS 20/19 CONCRETE AS SHOWN

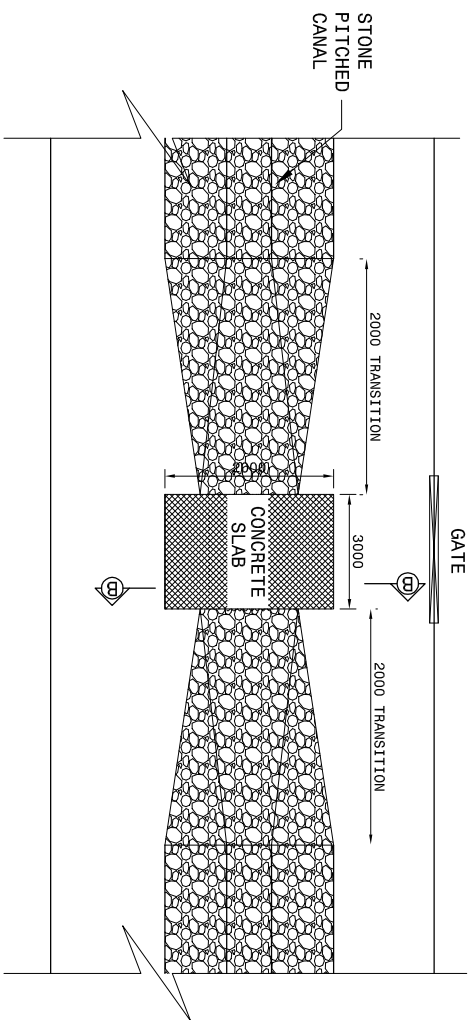
NOMINAL PIPE DIA (D) Ø	DIA OUTSIDE (Do) (approx)	SIDE ALLOWANCE PER SIDE	
		BEDDING	
		EMCASE 150mm	CLASS B Do2.5 150mm
600	700	150	275

TYPICAL CULVERT OUTLET

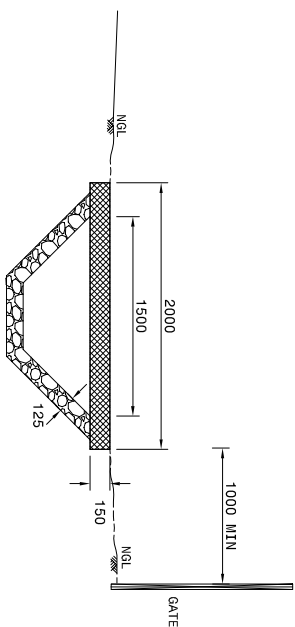
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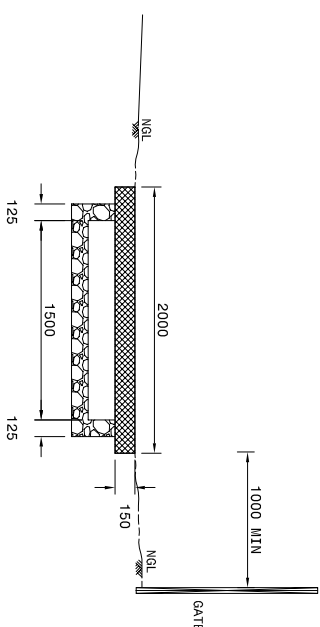
TYPICAL GATE DRIVEWAY CROSSING
(1500mm WIDE CANAL)



TYPICAL GATE DRIVEWAY CROSSING
(2000mm WIDE SHALLOW DRAIN)

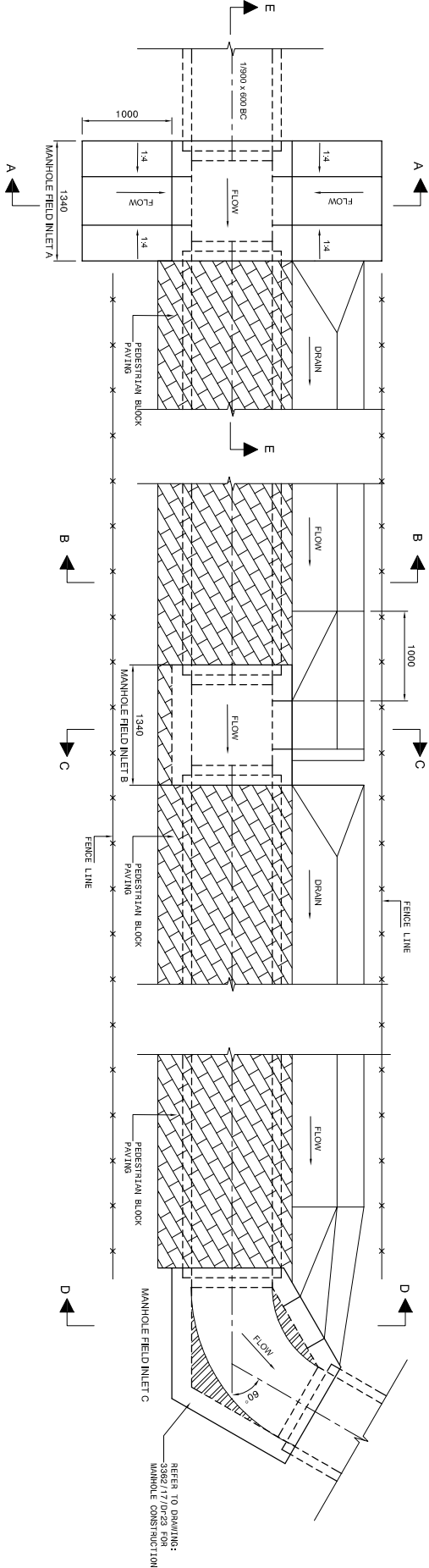


SECTION A-A



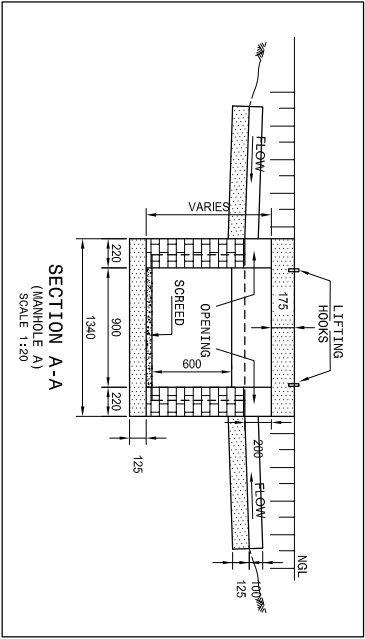
SECTION B-B

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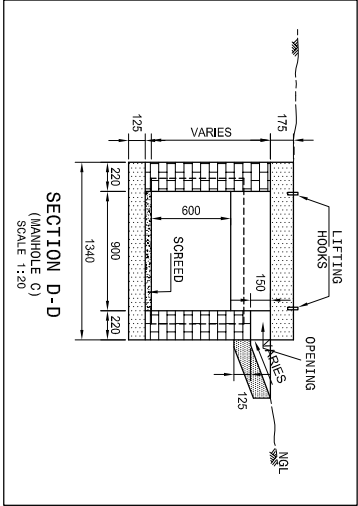


PLAN VIEW OF CULVERT S8/4

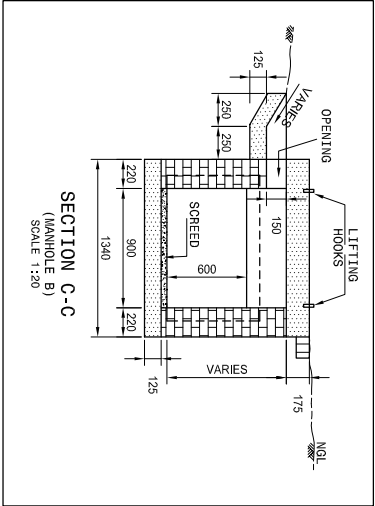
SCALE 1:20



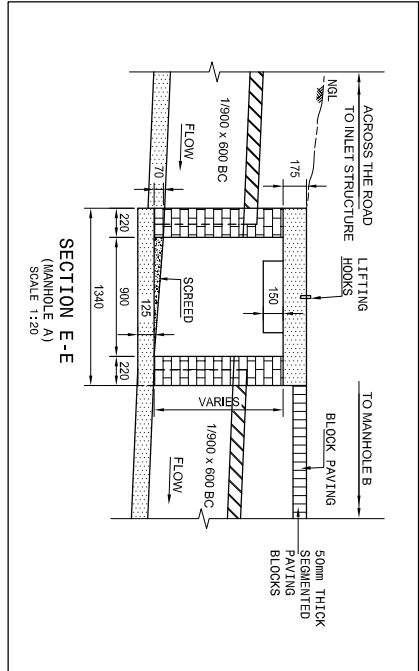
SECTION A-A
(MANHOLE A)
SCALE 1:20



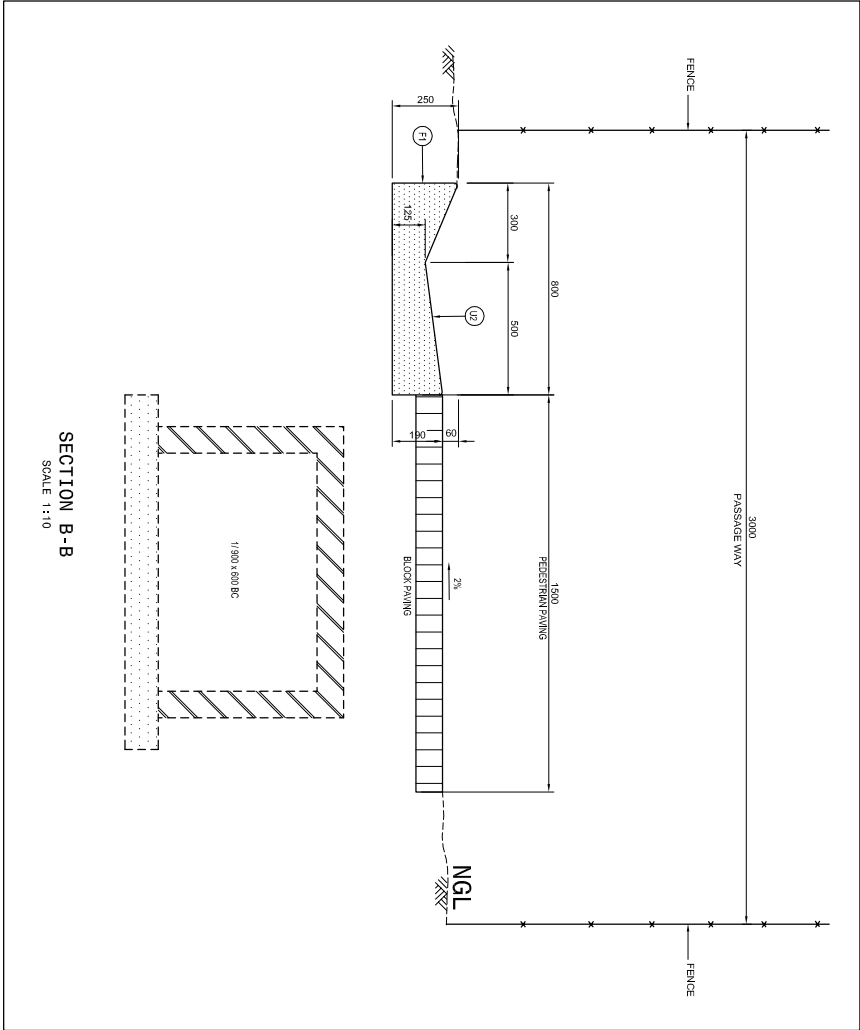
SECTION D-D
(MANHOLE C)
SCALE 1:20



SECTION C-C
(MANHOLE B)
SCALE 1:20



SECTION E-E
(MANHOLE A)
SCALE 1:20

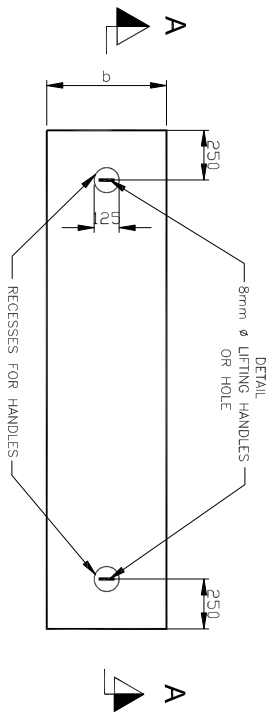


SECTION B-B
SCALE 1:10

- NOTES:
1. ALL CONCRETE CHANNELS AND OTHER DRAINAGE STRUCTURES ON THIS PLAN TO BE CAST USING CLASS 20/19 CONCRETE.
 2. CONCRETE DRAIN MUST BE CAST IN ALTERNATIVE LENGTHS OF 2000mm OR 3000mm (MINIMUM LENGTH 3000mm).
 3. ALL EXPOSED CORNERS MUST BE ROUNDED TO A MINIMUM RADIUS OF 10mm.
 4. THE TYPE OF SURFACE FINISH IS INDICATED AS F1 & U2.
 5. F - FORMED SURFACES
 6. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING 3382/17/D/24
 7. CONCRETE TO BE CAST AGAINST TRIMMED EXCAVATIONS
 8. ALL PRECAST CONCRETE SEGMENTED BLOCKS SHALL COMPLY WITH THE REQUIREMENTS OF SANS 1058 AND SHALL BE SUPPLIED BY A MANUFACTURER APPROVED BY THE ENGINEER

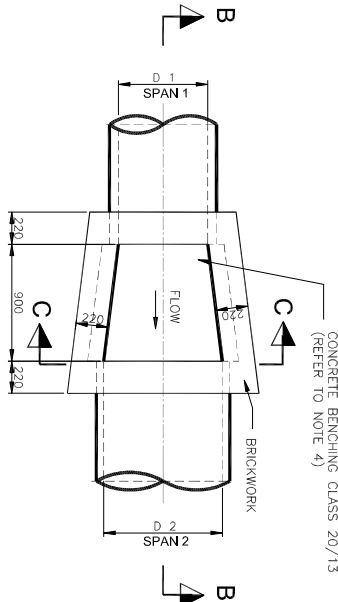
DESIGNED BY		SEJAGOBÉ ENGINEERS		CLIENT ADDRESS:		CLIENT		CONTRACT NO.		SCALE		TYPE OF PLANNING	
41 MCCONNELL AVENUE		DESIGNED		P O BOX 437		NIKANGALA DISTRICT MUNICIPALITY		3382/17		AS SHOWN		PRELIMINARY	
0699		T.R		1000		PROJECT TITLE		Revision		CONSULTANT:		CLIENT	
		DRAWN		TEL: (011) 292 2000		CONSTRUCTION OF STORMWATER CONTROL AT PHUMULA IN THE		NUMBER		SEJAGOBÉ		NUMBER:	
		CHECKED		FAX: (011) 255 2445		THEMBISILE HANI LOCAL MUNICIPALITY		00		SEJAGOBÉ		3382 / 17 / D/24	
		DATE				CULVERT S8/4 CONSTRUCTION DETAILS		SHEET 1 OF 1					
		BY											
		CHECKED BY											
		REVISIONS											

PRECAST COVER SLAB FOR JUNCTION BOXES



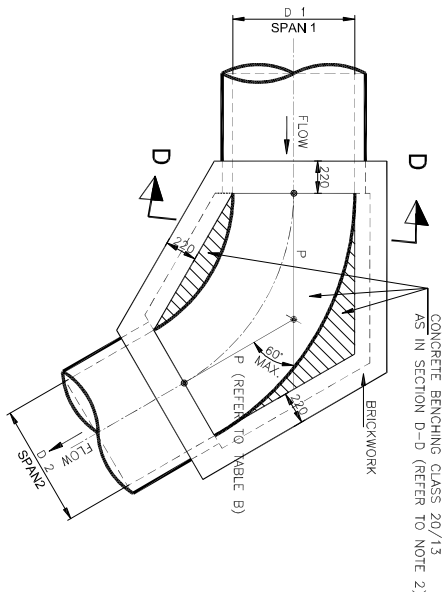
PLAN OF PRECAS COVER SLAB

SCALE:1:20



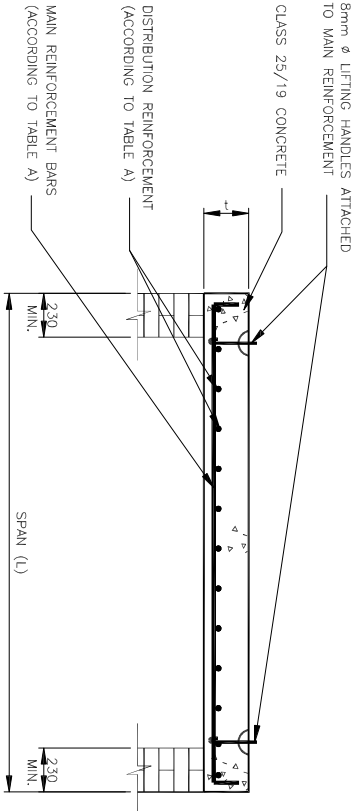
PLAN OF TYPE D JUNCTION BOX (WITHOUT COVER SLAB)

D1 D2



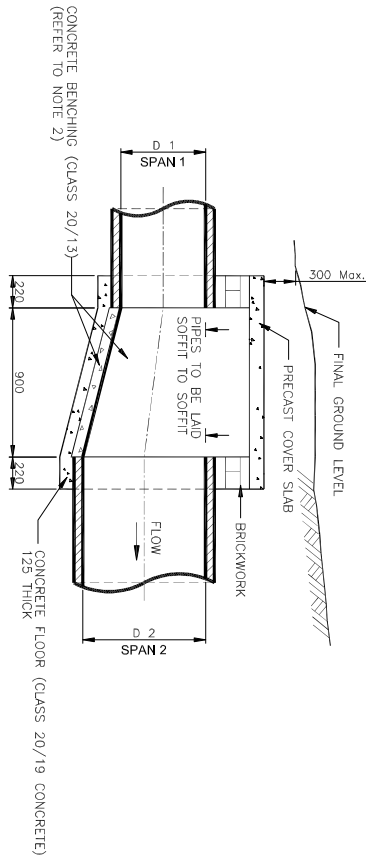
PLAN OF TYPE D JUNCTION BOX (WITHOUT COVER SLAB)

D1 = D2 OR D1 D2

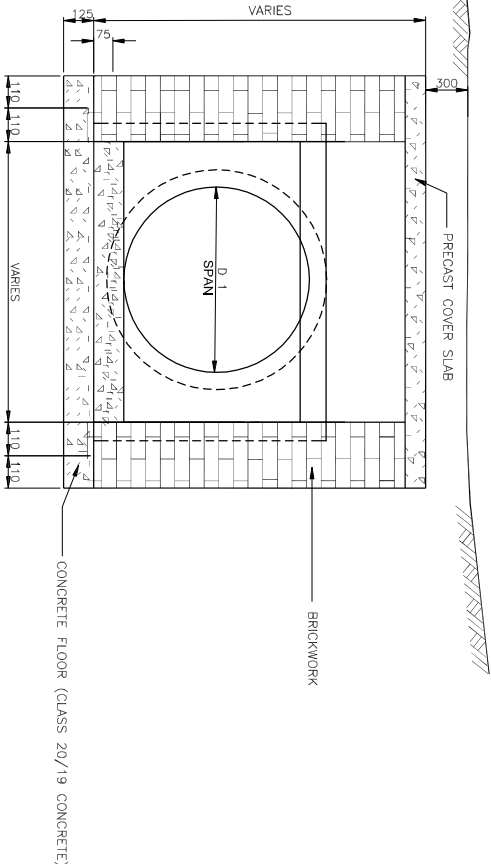


SECTION A-A

SCALE:1:20



SECTION B-B



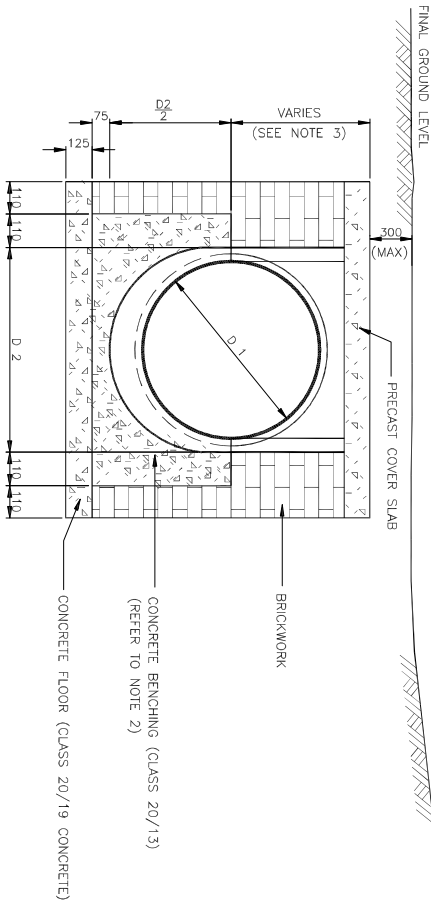
SECTION D-D

TABLE A: PRECAST COVERSLAB REINFORCEMENT DETAILS

Span (mm)	Thickness (mm)	Main Reinforcement	
		b=450	b=600
Up to 500	125	4Y12-125	5Y12-125
Up to 1000	150	5Y12-100	5Y12-125
Up to 1250	150	4Y16-125	5Y12-125
Up to 1500	175	4Y16-125	5Y12-125
Up to 1750	175	4Y16-125	5Y16-125
Up to 2000	200	4Y16-125	5Y16-125
Up to 2250	200	4Y16-125	5Y16-125
Up to 2500	200	5Y16-100	5Y16-125
Up to 2750	225	5Y16-100	5Y16-125
Up to 3000	225	5Y16-100	6Y16-125

Distribution reinforcement: Y10bars@125cc for all spans

Refer to notes for bending details.



SECTION C-C

TABEL B

D2/SPAN2 DIAMETER OF DOWNSTREAM PIPE	DISTANCE P
450	700
525	700
600	750
675	780
750	800
825	825
900	850
1050	870
1200	925
1350	1000
1500	1100

NOTES:

1. JUNCTION BOX CONFIGURATION

1.1 Symbols used to indicate the junction box layout are only for purposes of this drawing, and not applicable to working drawings.

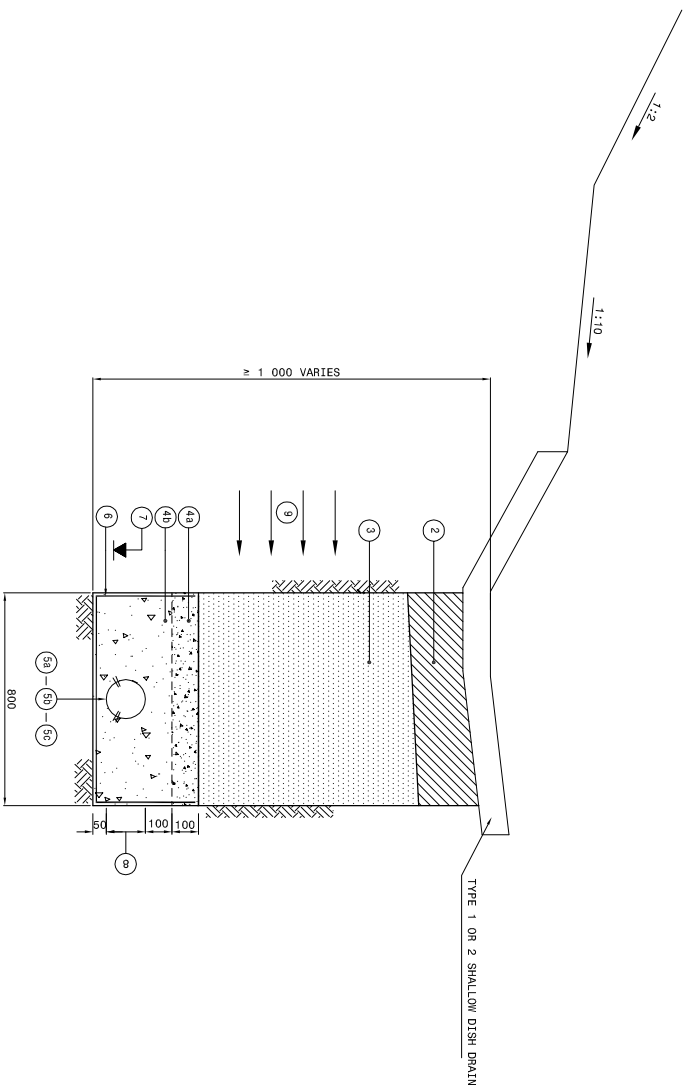
2. PRECAST COVER SLABS

- Concrete to be class 25/19 (25MPa)
- Minimum cover to reinforcement = 25mm
- Minimum cover to reinforcement = 25mm
- Reinforcement
- Reinforcement to be class 25/19 (25MPa) with hook length (X diameter) 100mm, where no hooks are required and shape code 20 is used.
- Also refer to sections 502, 702, 703 and 704 of the Standard Specification for Municipal Civil Engineering Works, 5th Edition, 2005.

NOTES:

- Maximum angle between adjoining pipes is 60°
- Where a pipe wall is at least 75mm from the nearest adjacent pipe, the junction box may be designed as a standard junction box.
- Where the total depth of the junction box (from level to finished ground level) exceeds 2.0m, a structural design shall be submitted for approval by the Engineer.
- All bricks shall comply with SABS227 and shall be engineering bricks of class F85 (two pipe standard) with a nominal compressive strength of 12.0MPa.
5. All junction boxes shall be designed and approved by the Engineer.
6. All drawings must be checked and approved and site

DESIGNED BY		T.R		SELAGOBE ENGINEERS	
DRAWN		DM		41 MADONALD AVENUE	
CHECKED		DATE		0999	
REVISIONS		BY		SELAGOBE ENGINEERS	
				P.O. BOX 437	
				WILLOWMOOR	
				TEL: (011) 298 0625	
				FAX: (011) 255 2145	
				EMAIL: info@selagobe.co.za	
				NANGALA DISTRICT MUNICIPALITY	
				CONSTRUCTION OF STORMWATER CONTROL AT PHUMULA IN THE	
				THEMBISILE HANI LOCAL MUNICIPALITY	
				MANHOLE AND JUNCTION BOX DETAILS	
				SHEET 1 OF 1	
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				3362 / 17 /D/25	



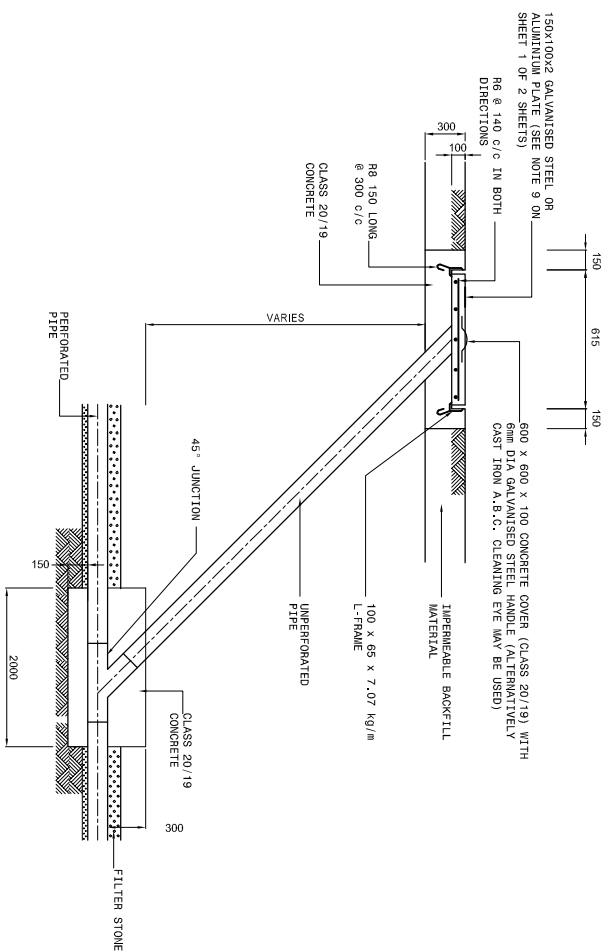
SUBSOIL DRAIN WITH POLYETHYLENE LINING (DETAIL A)

SCALE 1:10

NO	DESCRIPTION
(1)	THIS DIMENSION MAY BE REDUCED TO A MINIMUM OF PIPE DIAMETER + 200mm PROVIDED THAT THE CROSS-SECTIONAL AREA IS ADEQUATE (SEE SUBCLAUSE 2104(d) OF THE STANDARD SPECIFICATIONS).
(2)	IMPERMEABLE BACKFILL MATERIAL, (MIN 200mm THICK) TAKEN TO TOP OF WATER BEARING LAYER IN CASES WHERE NO CONCRETE SIDE DRAIN IS PROVIDED.
(3)	FILTER SAND OF APPROVED SOURCE AND GRADE.
(4a)	FINE FILTER STONE: 9.5 mm SINGLE SIZED CRUSHED AGGREGATE.
(4b)	COARSE FILTER STONE: 19.0 mm SINGLE SIZED CRUSHED AGGREGATE. (SEE COLTO TALE 4302/8)
(5a)	PERFORATED / SLOTTED SUBSILT DRAINAGE PIPES, (POSITION OF PERFORATIONS INDICATED).
(5b)	
(5c)	
(6)	SYNTHETIC FIBRE FILTER FABRIC WITH 200mm OVERLAP (GRADE 2 OR APPROVED EQUIVALENT).
(7)	LEVEL TO WHICH SURROUNDING AREA IS TO BE DRAINED.
(8)	INTERNAL PIPE DIAMETER: 110mm OR 150mm, (150mm FOR THIS PROJECT)
(9)	WATER BEARING STRATA.

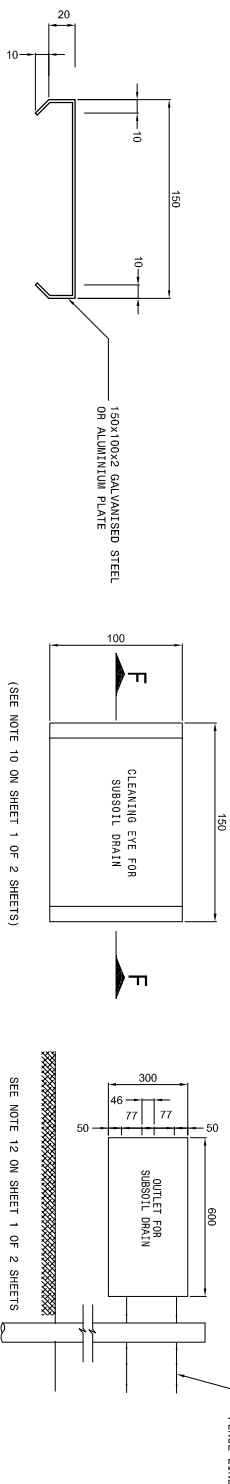
NOTES:	
1. ALL CRITERIA ASSUMES THAT FILTER SAND AND FILTER STONE ARE CONTINUOUSLY GRADED FROM COARSE TO FINE. 2. USE THE ENVELOPE CURVES FOR THE WATER BEARING STRATA, FILTER SAND AND FILTER STONE GRADINGS AND APPLY TO MOST CRITICAL COMBINATIONS. 3. IF REQUIRED BY THE ENGINEER, SUBSOIL DRAINAGE MUST ALSO BE PROVIDED ON THE INSIDE OF BENCHING, WHERE USED. 4. WHERE SUBSOIL DRAINAGE IS INSTALLED IN SOLID ROCK THE POLYETHYLENE LINING MAY BE OMITTED. 5. TYPE A OUTLET TO BE USED WHERE THE NATURAL GROUND LEVELS ALLOW IT. OUTLETS MAY ALSO BE COMBINED WITH CULVERT IN- OR OUTLETS. 6. ALL CONCRETE SHALL BE CLASS 20/19. 7. SPACING OF CLEANING EYES TO BE AS FOLLOWS: (a) 100m MAX ON STRAIGHT SECTIONS. (b) AT ALL BENDS. (c) OR AS DIRECTED BY THE ENGINEER. 8. TRANSVERSE SUBSOIL DRAINAGE TO BE PROVIDED AT ALL CUT TO FILL TRANSITIONS. 9. PLATE WITH THE INSCRIPTION "CLEANING EYE FOR SUBSOIL DRAIN" STAMPED ON TO BE AFFIXED TO CONCRETE COVER. 10. LETTER SIZE ON PLATE: 10mm SERIES C, CAPITAL LETTERS. 11. SYNTHETIC FIBRE FILTER FABRIC TO BE REPLACED WITH POLYETHYLENE LINING IN ALL THE FOLLOWING INSTANCES: (a) WHERE THE SURROUNDING SOIL IS VERY PERVIOUS. (b) WHERE THE SURROUNDING SOIL HAS A HIGH FINES CONTENT WHICH COULD LEAD TO CLOGGING OF FILTER FABRICS. 12. STEEL PLATE TO BE FIXED TO TOP PORTION OF FENCE LINE OPPOSITE THE SUBSOIL OUTLET STRUCTURE. 13. BACKGROUND : MATT-WHITE TEXT : DIN A, MATT-BLACK ALL LOCATIONS WHERE THE PROPOSED LONGITUDINAL SLOPE OF THE ROAD IS < 0.5 % THE SUBSURFACE DRAINS SHOULD BE GRADED DIFFERENTLY TO CREATE A SLOPE IN THE DRAIN ADJOINING TO THE FOLLOWING: a. PREFERABLE MIN SLOPE : 0.5 % b. ABSOLUTE MINIMUM SLOPE : 0.3 % IF THE INVERT LEVEL OF THE SUBSURFACE DRAIN IS FIXED, THE UPSTREAM DEPTH OF THE DRAIN MAY BE REDUCED TO ACHIEVE THE MINIMUM SLOPE REQUIREMENTS. 14. 15.	A. "D _x " IS THE SIZE OF SIEVE THROUGH WHICH x % OF THE FILTER MATERIAL WILL PASS. D (60%) = AVERAGE SIZE OF THE OPENINGS THE SYNTHETIC FIBRE FILTER FABRIC. B. FILTER SAND (FS) IN RELATION TO WATER BEARING STRATA (WS) 1. FOR D (WS) > 0.05mm: (a) TO PREVENT BLOCKING OF FILTER SAND: D (FS) < 5 x D (WS) D (FS) < 25 x D (WS) (b) FOR PERMEABILITY OF FILTER SAND: D (FS) > 5 x D (WS) 2. FOR D (WS) < 0.05mm: (a) TO PREVENT BLOCKING OF FILTER SAND: D (FS) < 0.25mm D (FS) > 0.075mm (b) PERMEABILITY REQUIREMENTS NOT NECESSARY C. FILTER STONE (FSN) IN RELATION TO FILTER SAND (FS) (a) TO PREVENT BLOCKING OF FILTER STONE: D (FSN) < 5 x D (FS) D (FSN) < 25 x D (FS) (b) PERMEABILITY: FILTER STONE MUST BE COARSER THAN SAND AT ALL PERCENTAGES D. FILTER STONE (FSN) IN RELATION TO PERFORATIONS IN PIPES: (a) TO PREVENT BLOCKING OF PERFORATIONS IN PIPES: D (FSN) > 1.2 x DIAMETER OF ROUND PERFORATIONS D (FSN) > 1.2 x WIDTH OF SLOTS E. SYNTHETIC FIBRE FILTER FABRIC (SF) IN RELATION TO FILTER SAND (FS) (a) TO PREVENT CLOGGING OF SYNTHETIC FIBRE FILTER FABRIC: D (SF) < D (FS) (b) FOR PERMEABILITY OF SYNTHETIC FIBRE FILTER FABRIC: D (SF) > D (FS)

DESIGNED BY		SEJAGOBÉ ENGINEERS		DEPARTMENT OF ROADS AND STORMWATER		CLIENT ADDRESS:		CONTRACT NO.		TYPE OF PLANNING	
41 MCOMMAD AVENUE 0099		T.R DESIGNED		ISSUED BY:		NKANGALA DISTRICT MUNICIPALITY 1050 MIDDELBURG		3392/17		AS PRELIMINARY DRAWING	
SEJAGOBÉ ENGINEERS		T.R DRAWN			TEL: (015) 246 2000 Fax: (015) 246 2040		PROJECT TITLE		CONSULTANT:	
TEL : (015) 246 0025 EMAIL : sejagobe@sejagobe.com		DM		DATE:		CONSTRUCTION OF STORMWATER CONTROL AT PHUMULA IN THE THEMBISILE HANI LOCAL MUNICIPALITY		REVISION	
MA. DATE		BY		CHECKED		DRAWING TITLE		SUBSURFACE DRAINAGE		SHEET 1 OF 2	
								00		SEL-2016 /D/26	
								3362 / 17 /D/26			



CLEANING EYE IN SUBSOIL DRAIN

SCALE 1:20



SECTION F-F

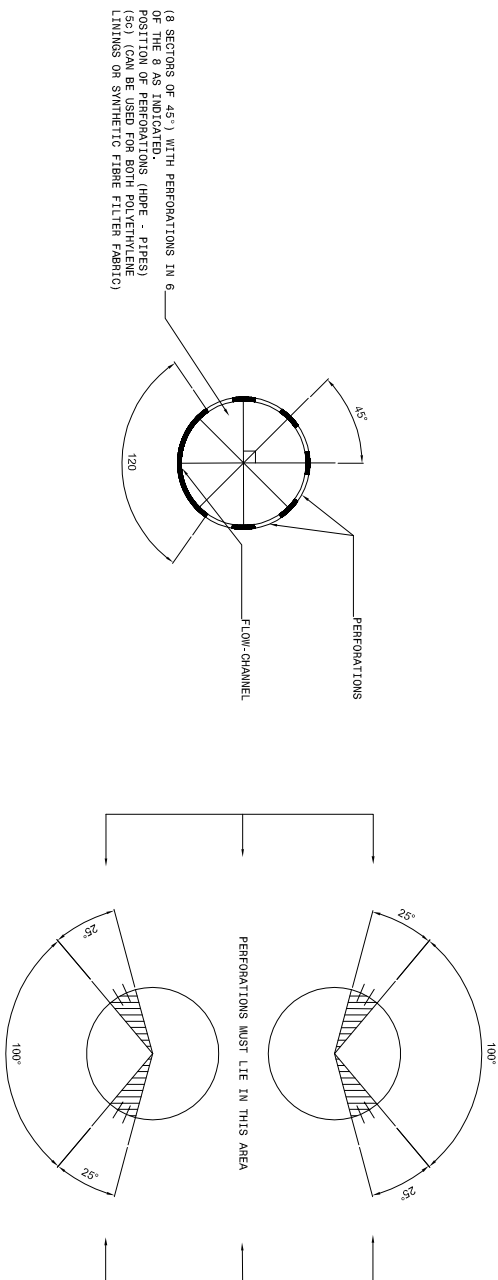
SCALE 1:2

PLAN

SCALE 1:2

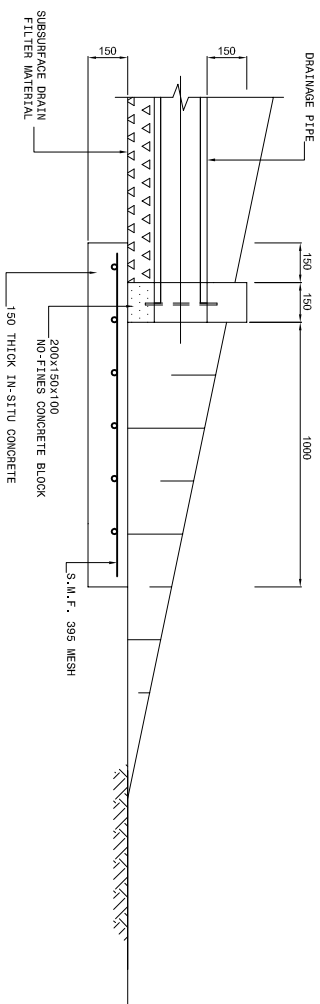
SUBSOIL OUTLET MARKER BOARD

SCALE 1:10



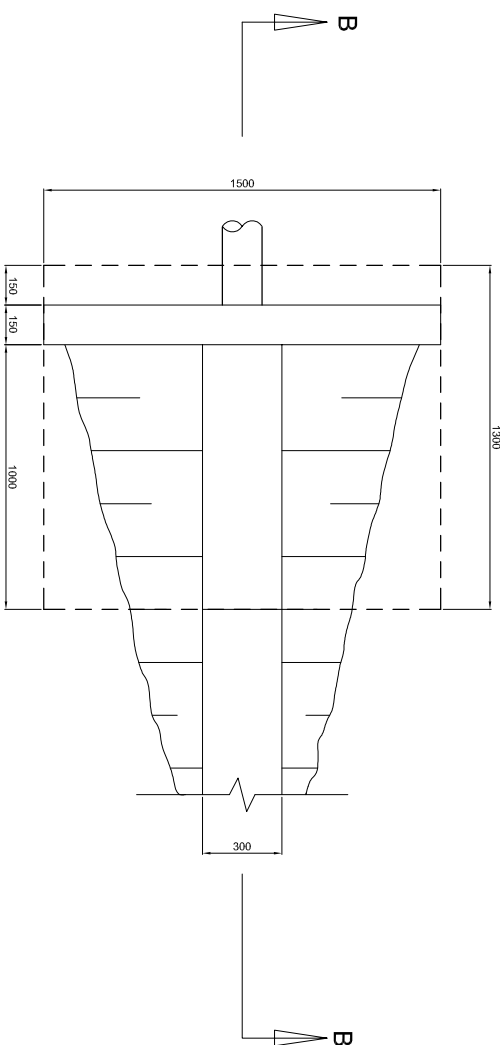
POSITION OF PERFORATION IN SUBSOIL DRAINAGE PIPES

SCALE 1:2

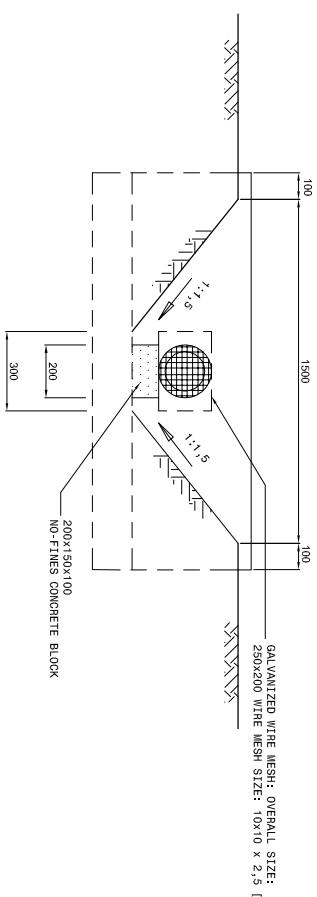


SECTION B-B

SCALE 1:10




PLAN



FRONT ELEVATION

TYPE "A" OUTLET

SCALE 1:10

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T.R		DEPARTMENT OF ROADS AND STORMWATER		SCALE AS SHOWN		TYPE OF PLANNING PRELIMINARY DRAWING	
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BY		DATE:		SHEET 2 OF 2		SEJ-2016 /D/27	
REVISIONS		DATE:		DRAWING TITLE		3362 / 17 /D/27	
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