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No	AMENDMENTS	BY	APPROVED	DATE

APPROVED ON BEHALF OF THE CONSULTING ENGINEER

ENGINEER : _____

REG. No. : _____

DATE : _____

SIGNATURE : _____

REFERENCE

TENDER NO: xxxxx

AVON AND INDERMAK STORMWATER CONTROL

INDERMAL LAYOUT

CONTRACT:

DATE: SEPTEMBER 2022

DRAWING: ML/BLB2/LAY-04

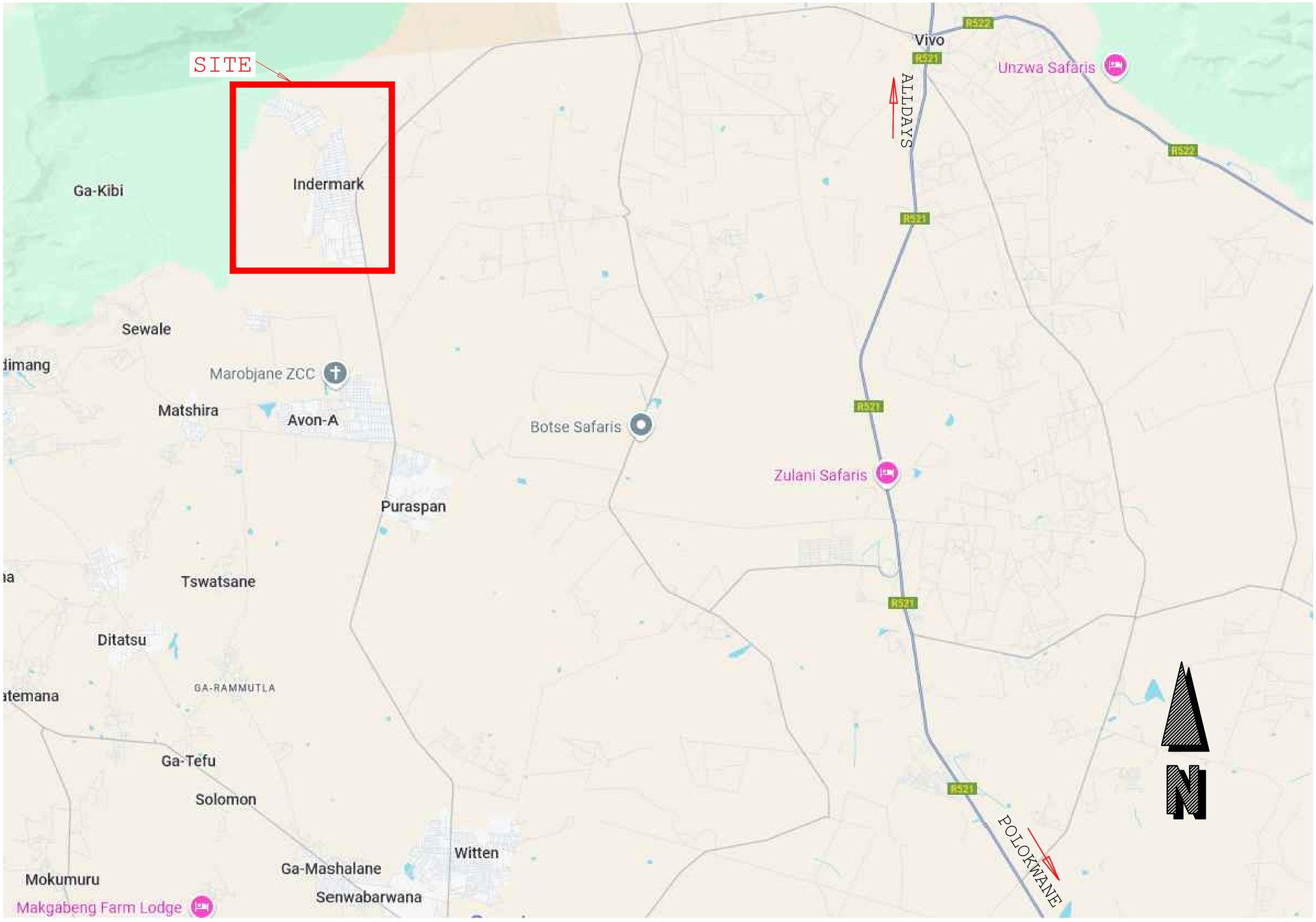
REVISION: △

DESIGNED

DRAWN

REVIEWED

PROJECT ENGINEER



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SIGNATURE :

REFERENCE

TENDER NO: xxxxx

AVON AND INDERMAK STORMWATER CONTROL

INDERMAK - LOCALITY PLAN

CONTRACT:
DATE: SEPTEMBER 2022
DRAWING: ML/BLB2/LAY-01B
REVISION: △

DESIGNED
DRAWN
REVIEWED
PROJECT ENGINEER

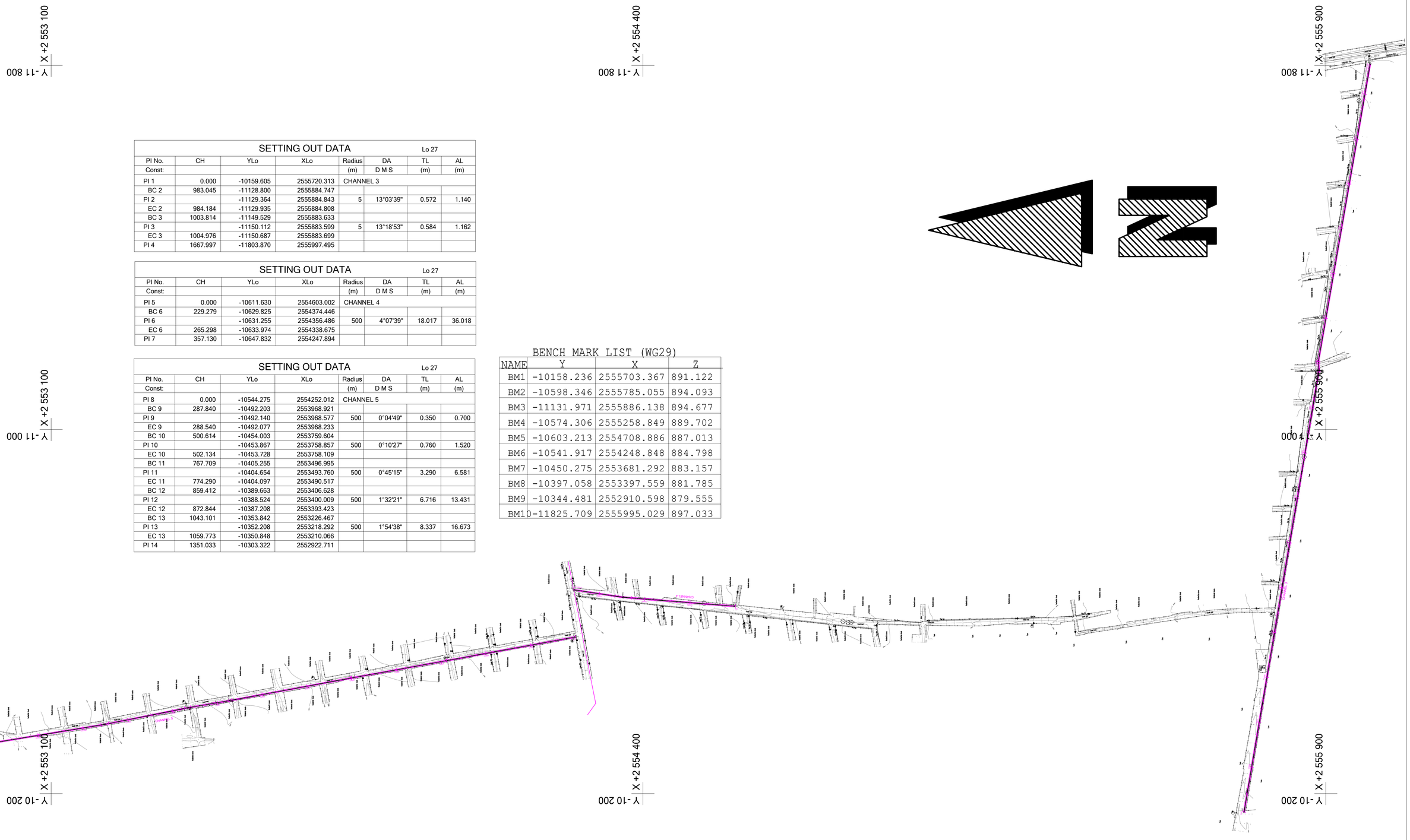
SETTING OUT DATA						Lo 27	
PI No.	CH	YLo	XLo	Radius	DA	TL	AL
Const:				(m)	D M S	(m)	(m)
PI 1	0.000	-10159.605	2555720.313	CHANNEL 3			
BC 2	983.045	-11128.800	2555884.747				
PI 2		-11129.364	2555884.843	5	13°03'39"	0.572	1.140
EC 2	984.184	-11129.935	2555884.808				
BC 3	1003.814	-11149.529	2555883.633				
PI 3		-11150.112	2555883.599	5	13°18'53"	0.584	1.162
EC 3	1004.976	-11150.687	2555883.699				
PI 4	1667.997	-11803.870	2555997.495				

SETTING OUT DATA						Lo 27	
PI No.	CH	YLo	XLo	Radius	DA	TL	AL
Const:				(m)	D M S	(m)	(m)
PI 5	0.000	-10611.630	2554603.002	CHANNEL 4			
BC 6	229.279	-10629.825	2554374.446				
PI 6		-10631.255	2554356.486	500	4°07'39"	18.017	36.018
EC 6	265.298	-10633.974	2554338.675				
PI 7	357.130	-10647.832	2554247.894				

SETTING OUT DATA						Lo 27	
PI No.	CH	YLo	XLo	Radius	DA	TL	AL
Const:				(m)	D M S	(m)	(m)
PI 8	0.000	-10544.275	2554252.012	CHANNEL 5			
BC 9	287.840	-10492.203	2553968.921				
PI 9		-10492.140	2553968.577	500	0°04'49"	0.350	0.700
EC 9	288.540	-10492.077	2553968.233				
BC 10	500.614	-10454.003	2553759.604				
PI 10		-10453.867	2553758.857	500	0°10'27"	0.760	1.520
EC 10	502.134	-10453.728	2553758.109				
BC 11	767.709	-10405.255	2553496.995				
PI 11		-10404.654	2553493.760	500	0°45'15"	3.290	6.581
EC 11	774.290	-10404.097	2553490.517				
BC 12	859.412	-10389.663	2553406.628				
PI 12		-10388.524	2553400.009	500	1°32'21"	6.716	13.431
EC 12	872.844	-10387.208	2553393.423				
BC 13	1043.101	-10353.842	2553226.467				
PI 13		-10352.208	2553218.292	500	1°54'38"	8.337	16.673
EC 13	1059.773	-10350.848	2553210.066				
PI 14	1351.033	-10303.322	2552922.711				

BENCH MARK LIST (WG29)

NAME	Y	X	Z
BM1	-10158.236	2555703.367	891.122
BM2	-10598.346	2555785.055	894.093
BM3	-11131.971	2555886.138	894.677
BM4	-10574.306	2555258.849	889.702
BM5	-10603.213	2554708.886	887.013
BM6	-10541.917	2554248.848	884.798
BM7	-10450.275	2553681.292	883.157
BM8	-10397.058	2553397.559	881.785
BM9	-10344.481	2552910.598	879.555
BM10	-11825.709	2555995.029	897.033



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REG. No. : _____

DATE : _____

SIGNATURE : _____

REFERENCE

TENDER NO: xxxxx

AVON AND INDERMAK STORMWATER CONTROL

INDERMAK CHANNEL LAYOUT

CONTRACT:

DATE: SEPTEMBER 2022

DRAWING ML/BLB2/LAY-05

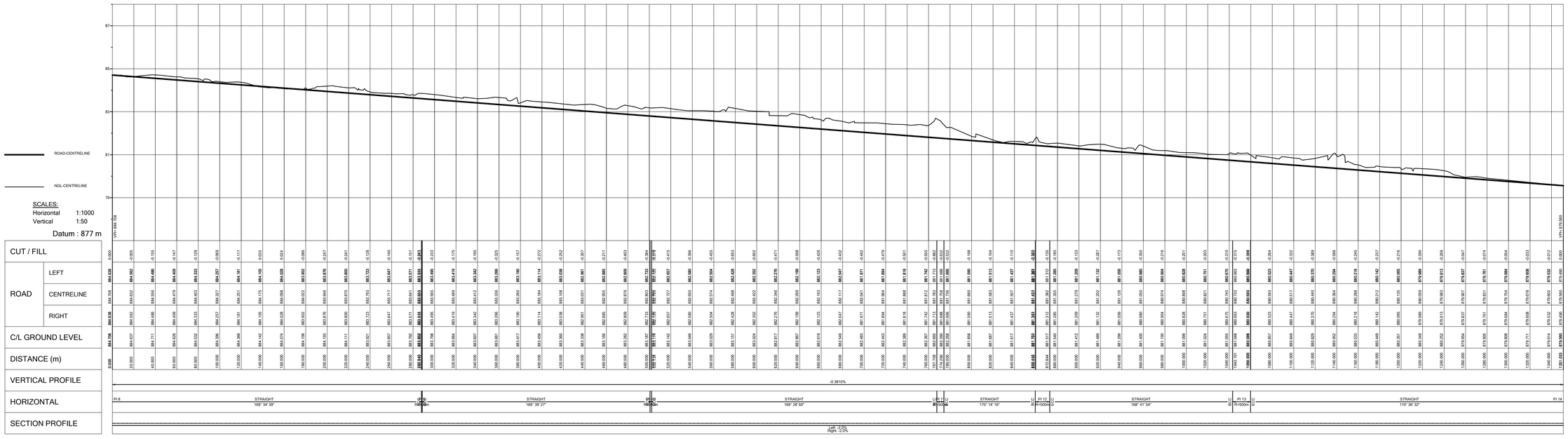
REVISION

DESIGNED

DRAWN

REVIEWED

PROJECT ENGINEER



CHANNEL 5

DESIGN SPEED: 60

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APPROVED ON BEHALF OF THE CONSULTING ENGINEER

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REG. No. : _____

DATE : _____

SIGNATURE : _____

REFERENCE

TENDER NO: xxxxx

AVON AND INDERMAK STORMWATER CONTROL

INDERMAK CHANNEL LONG SECTION

CONTRACT:

DRAWING: ML/BLB2/LS-03

REVISION

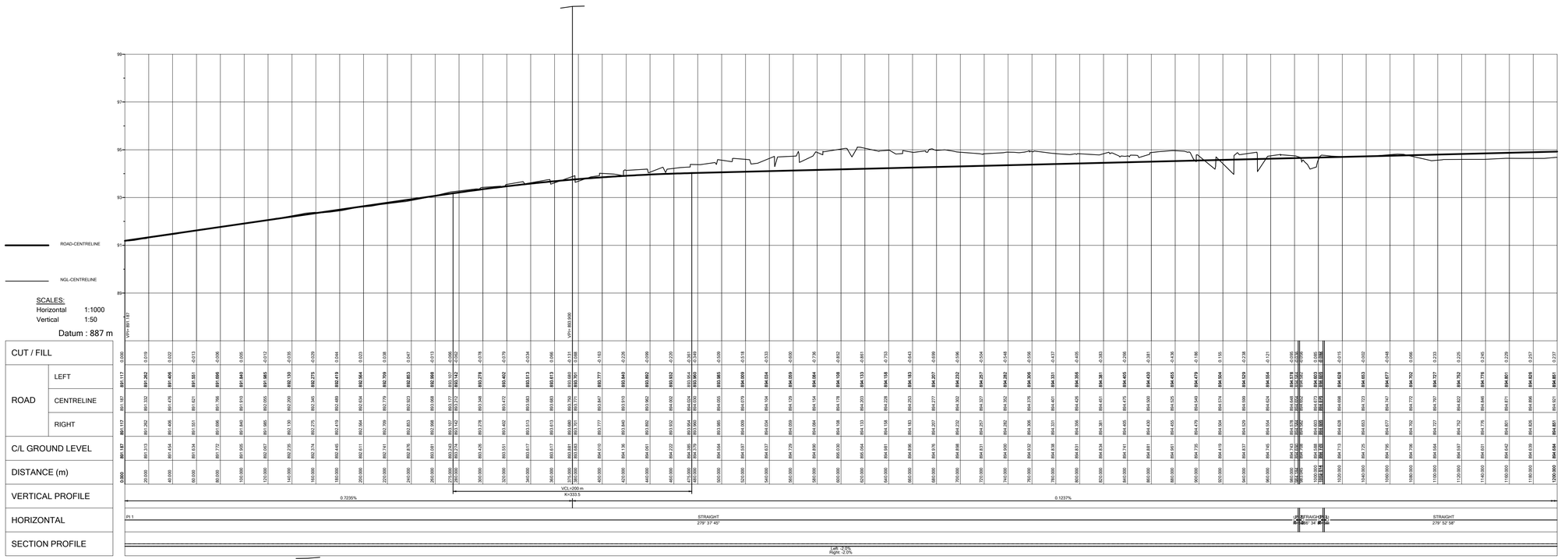
DATE: SEPTEMBER 2022

DESIGNED

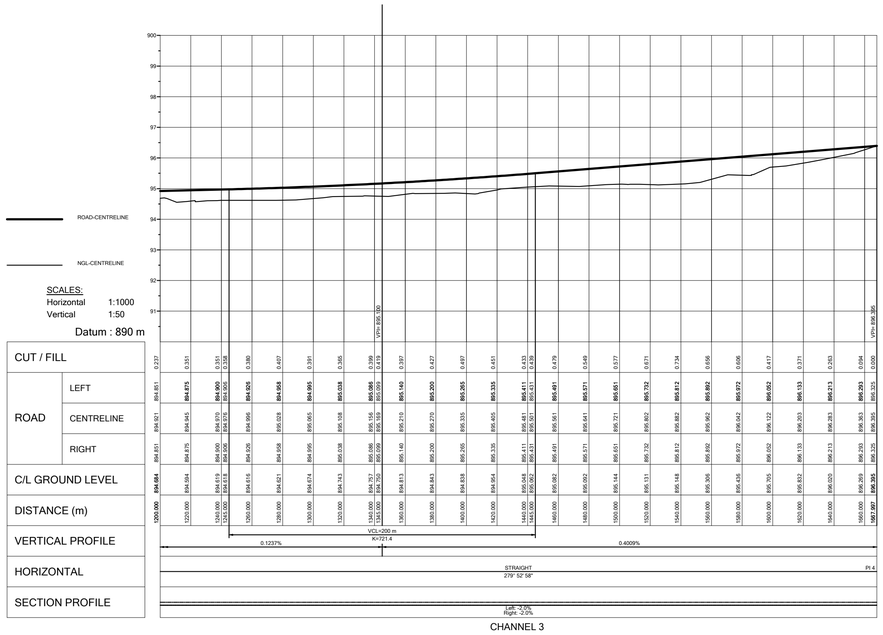
DRAWN

REVIEWED

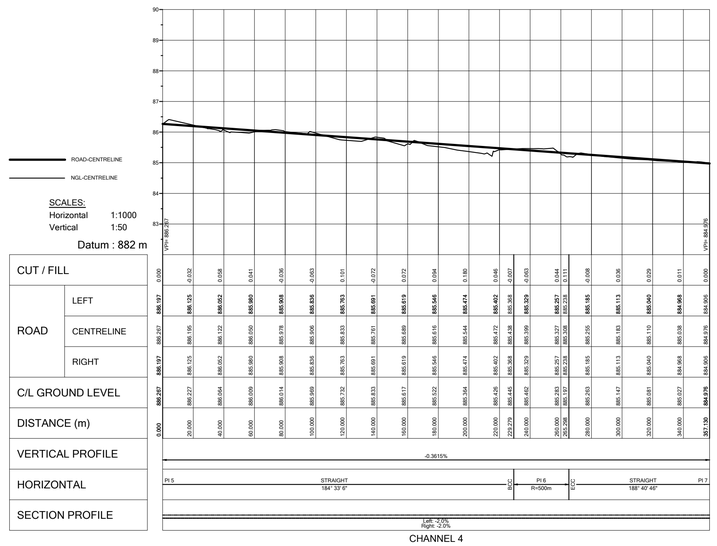
PROJECT ENGINEER



CHANNEL 3



CHANNEL 3



CHANNEL 4

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No	AMENDMENTS	BY	APPROVED	DATE

APPROVED ON BEHALF OF THE CONSULTING ENGINEER

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REG. No. : _____

DATE : _____

SIGNATURE : _____

REFERENCE

TENDER NO: xxxxx

AVON AND INDERMAK STORMWATER CONTROL

INDERMAK CHANNEL LONG SECTION

CONTRACT:

DATE: SEPTEMBER 2022

DRAWING: ML/BLB2/LS-02

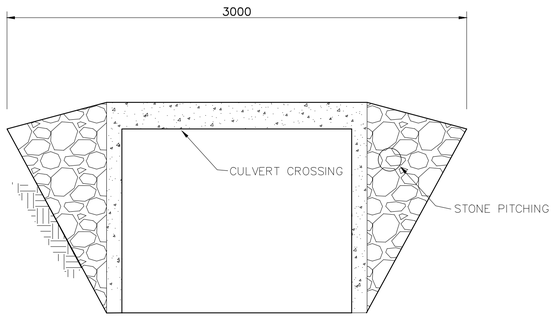
REVISION

DESIGNED

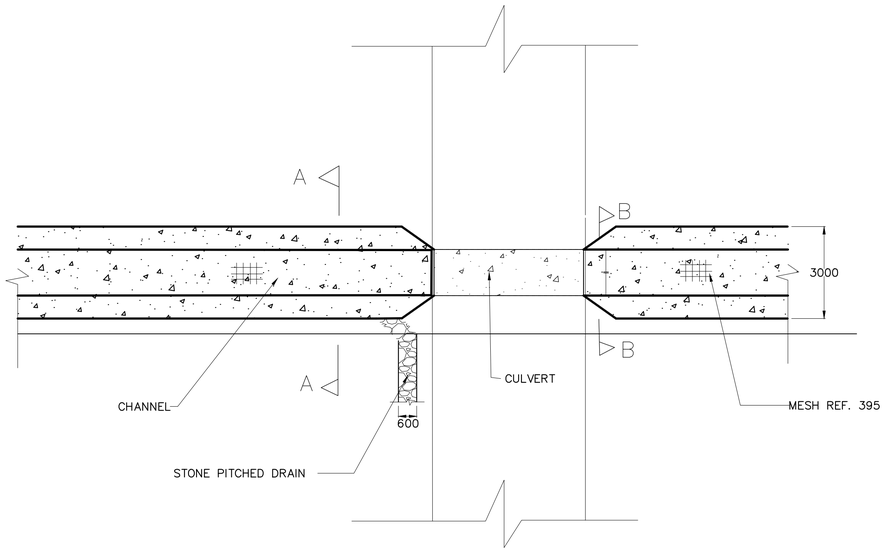
DRAWN

REVIEWED

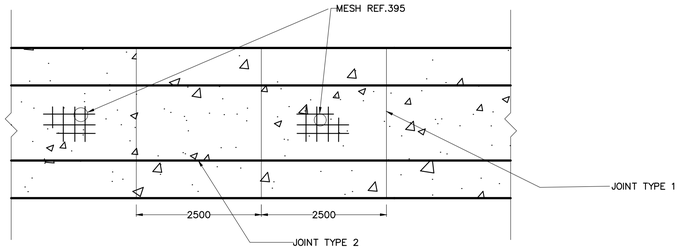
PROJECT ENGINEER



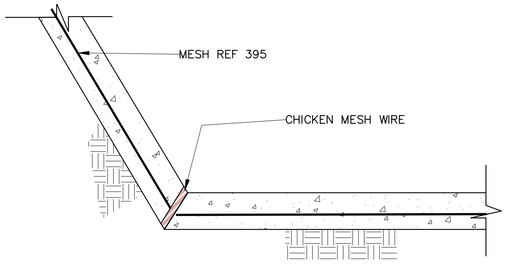
SECTION B–B
SCALE 1:20



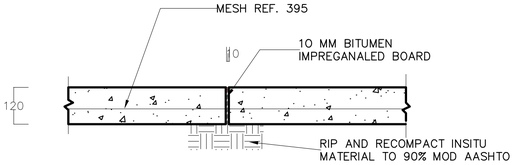
ROAD CROSSING
SCALE 1:100



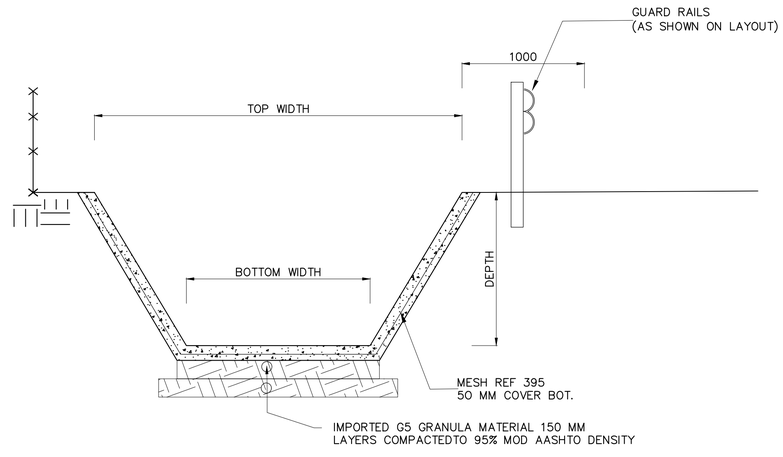
CHANNEL LAYOUT



JOINT TYPE 2
SCALE 1:10



JOINT TYPE 1
SCALE 1:10



SECTION A–A

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No	AMENDMENTS	BY	APPROVED	DATE

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ENGINEER :
REG. No. :
DATE :
SIGNATURE :

REFERENCE

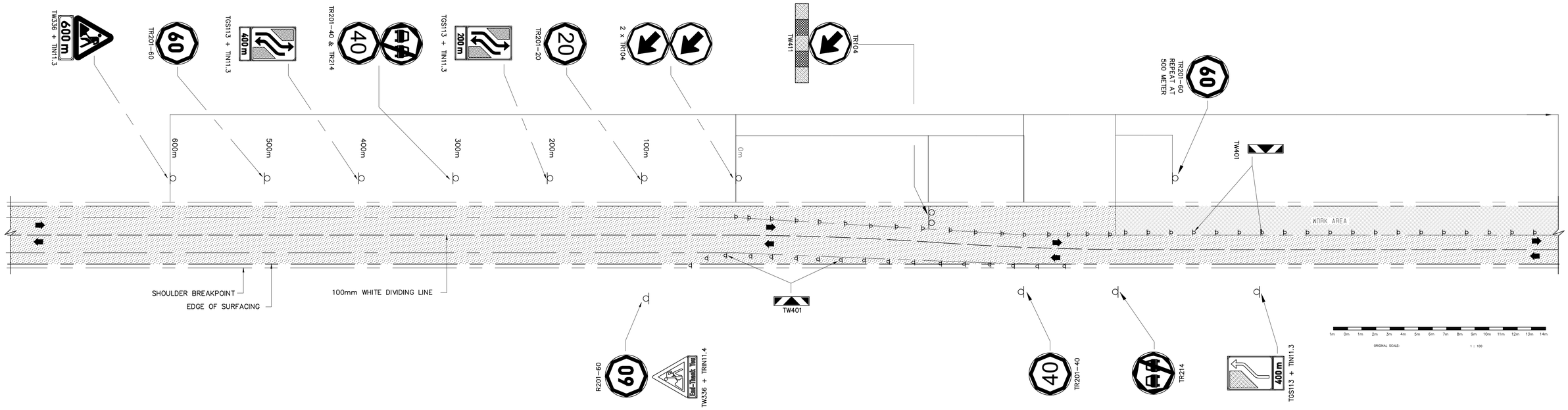
TENDER NO: xxxxx

AVON AND INDERMAK STORMWATER CONTROL

CHANNEL AND CROSSING DETAILS

CONTRACT:
DATE: SEPTEMBER 2022
DRAWING ML/BLB2/STD-05
REVISION

DESIGNED
DRAWN
REVIEWED
PROJECT ENGINEER



TYPICAL ROAD SIGN SEQUENCE FOR HALF-WIDTH CONSTRUCTION

N.T.S

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DATE :
SIGNATURE :

REFERENCE

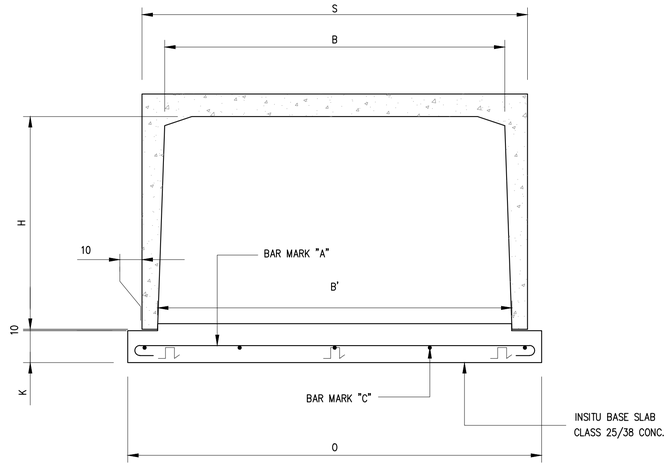
TENDER NO: xxxxx

AVON AND INDERMAK STORMWATER CONTROL

ACCOMMODATION OF TRAFFIC DETAILS

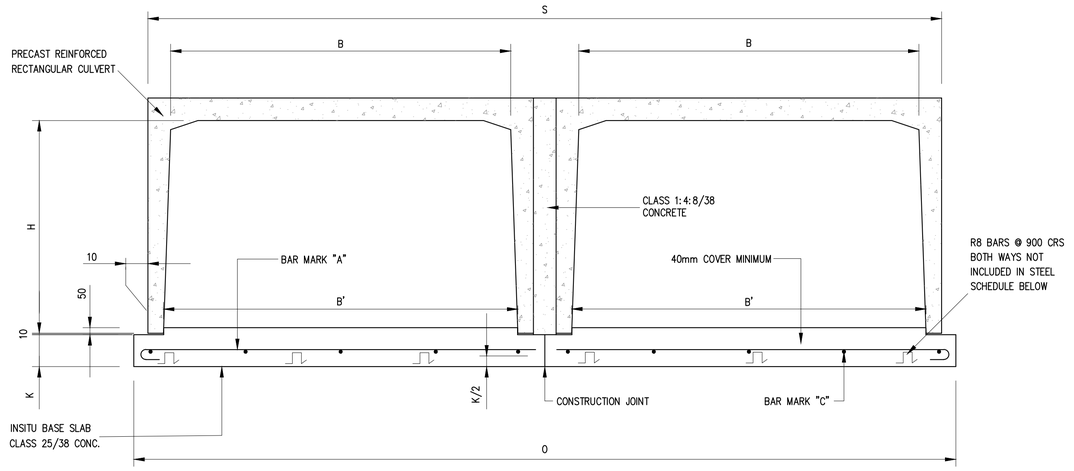
CONTRACT:
DATE: SEPTEMBER 2022
DRAWING ML/BLB2/STD-01
REVISION

DESIGNED
DRAWN
REVIEWED
PROJECT ENGINEER



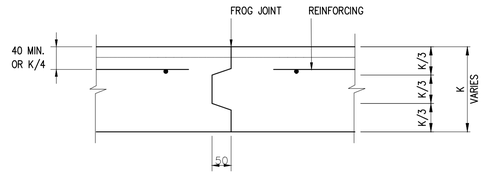
TYPICAL CROSS SECTION : SINGLE UNIT

SCALE 1:20



TYPICAL CROSS SECTION : MULTIPLE UNITS

SCALE 1:20



CONSTRUCTION JOINT

SCALE 1:5

DIMENSIONS					REINFORCEMENT					
B	H	S ●	O ●	K	BAR A	L	CUT LENGTH	BENDING	BAR C	BENDING
1 X 600	300	775	980	150	Y12–225	900	1100	HOOKS PLACED ALTERNATELY	4Y10–250	LENGTH VARIES WITH CULVERT LENGTH UNIT LENGTH NOT TO EXCEED 10000
2 X 600	450	1630	1840	150	Y12–225	1760	1950		8Y10–250	
3 X 600	600	2480	2690	150	Y12–225	2610	2800		11Y10–250	
1 X 750	300	940	1150	150	Y12–180	1060	1250		5Y10–250	
2 X 750	450	1960	2170	150	Y12–180	2090	2300		9Y10–250	
3 X 750	600	2980	3190	150	Y12–180	3110	3300		13Y10–250	
1 X 900	300	1100	1310	150	Y12–160	1230	1450		5Y10–250	
2 X 900	450 600	2280	2490	150	Y12–160	2410	2600		10Y10–250	
3 X 900	900	3460	3670	150	Y12–160	3590	3800		15Y10–250	
1 X 900	300	1100	1310	150	Y12–160	1230	1450		5Y10–250	
2 X 900	450 600	2280	2490	150	Y12–160	2410	2600		10Y10–250	
3 X 900	900	3460	3670	150	Y12–160	3590	3800		15Y10–250	
1 X 1200	450	1420	1630	175	Y12–160	1550	1750		8Y10–200	
2 X 1200	600 900	2920	3130	175	Y12–160	3050	3150		15Y10–200	
3 X 1200	1200	4420	4630	175	Y12–160	4550	4750		22Y10–200	
1 X 1500	600	1770	1980	175	Y12–130	1900	2100		9Y10–200	
5 X 1500	900 1200	3620	3830	175	Y12–130	3750	3950		18Y10–200	
3 X 1500	1500	5470	5680	175	Y12–130	5600	5800		22Y10–200	
1 X 1800	600–900	2080	2290	200	Y12–125	2210	2450		13Y10–180	
2 X 1800	1200 1500–1800	4230	4440	200	Y12–125	4360	4600		28Y10–150	
1 X 2400	900–1200	2710	2920	225	Y16–170	2840	3200		19Y10–150	
2 X 2400	1500 1800–2400	5500	5710	225	Y16–170	5630	6000		37Y10–150	
1 X 3000	900–3000	3320	3530	250	Y16–150	3450	3800		23Y10–150	

● SEE NOTE 10

GENERAL NOTES:

1. ALL CONCRETE TO BE CLASS 25/38 UNLESS OTHERWISE INDICATED.
2. REINFORCEMENT SHALL COMPLY TO THE REQUIREMENTS OF S.A.B.S 920 TYPE C, CLASS 2, GRADE 1.
3. PITCHING ON INLET SIDE TO BE TO DESIGN HIGH FLOOD LEVEL. (SEE CULVERT SCHEDULE)
4. CONCRETE COVER TO STEEL 40mm MINIMUM OR K/4
5. DESIGN MASS OF FILL = 1900 kg/m^3
6. LOAD FACTOR FOR PROOF LOAD OF S.A.B.S. 986 = 1,5.
7. HIGH TENSILE (Y) REINFORCEMENT WORKING STRESS : 3890 kPa.
8. PRECAST REINFORCED CULVERTS SHALL COMPLY WITH THE REQUIREMENTS OF S.A.B.S. 986 AND ADDITIONAL TEST LOADING AS SPECIFIED.
9. DIMENSIONS AND REINFORCEMENT DETAILS FOR IN–SITU BASE SLABS ARE VALID ONLY IF :
   A) THE HEIGHT OF FILL ABOVE THE CULVERT IS LESS THAN SPECIFIED BELOW

DIMENSION B	HEIGHT OF FILL
600mm	6m
750mm	5m
900mm	4m
1200mm	3m
1500mm	2.5m
1800mm	2.0m
2400mm	1.5m
3000mm	0.9m

   B) THE TYPE OF MATERIAL UNDER THE BASE SLAB IS NOT ROCK.
10. THE DIMENSIONS IN THE TABLE MAY NOT CONFORM TO ALL MARKED UNITS; IT MAY BECOME NECESSARY TO REVISE TABULATED DIMENSIONS.

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AVON AND INDERMAK STORMWATER CONTROL

PORTAL CULVERT DETAILS

CONTRACT:

DATE: SEPTEMBER 2022

DRAWING: ML/BLB2/STD-03

REVISION: △

DESIGNED

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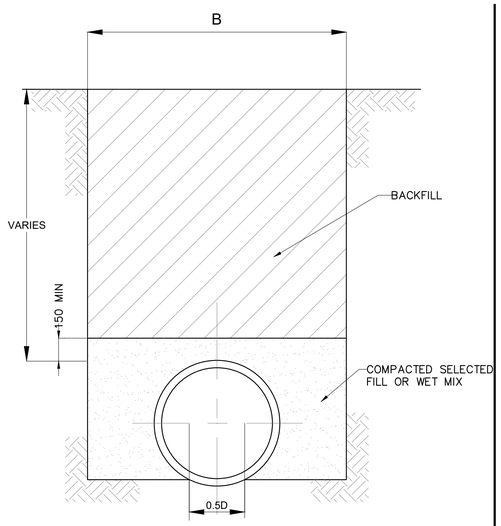
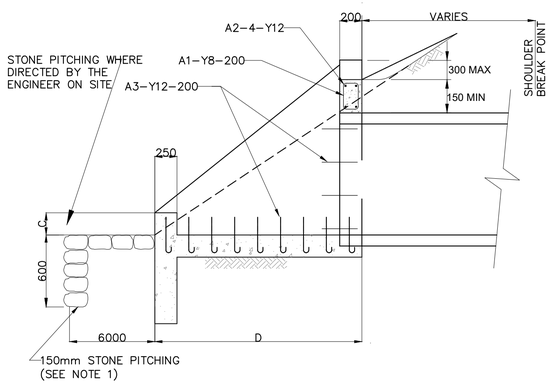


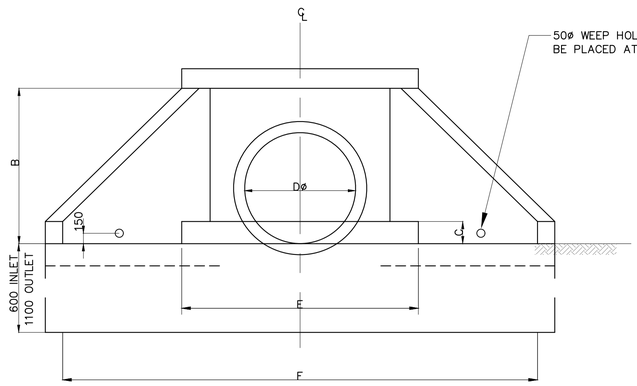
CLASS C PIPE BEDDING IN SOIL

SCALE 1:20



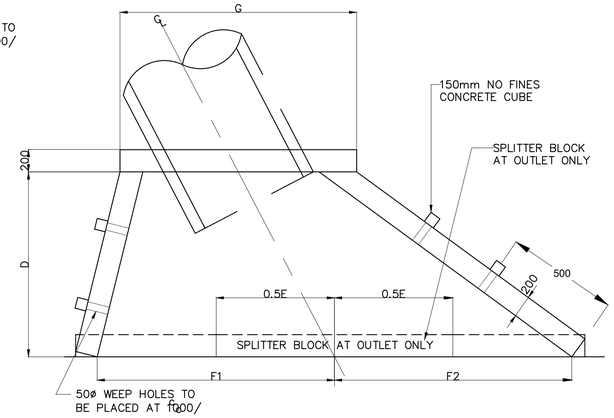
SECTION A-A

(FOR DIMENSIONS SEE TABLE 1)
(FOR REINFORCEMENT SEE TABLE 2)
SCALE 1:20



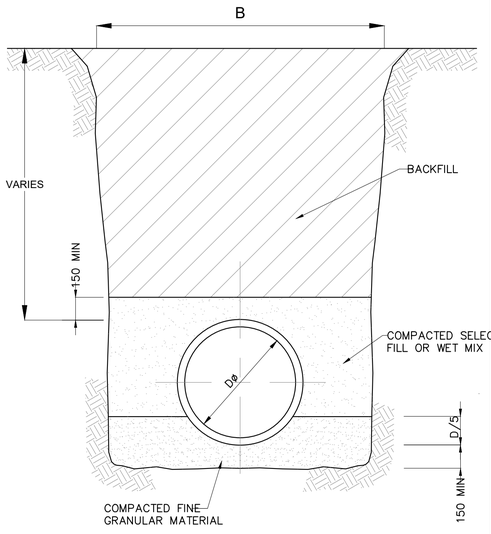
FRONT ELEVATION – SINGLE PIPE

(FOR DIMENSIONS SEE TABLE 1)
SCALE 1:20



SKEW PIPE CULVERT

(FOR DIMENSIONS SEE TABLE 3)
SCALE 1:20

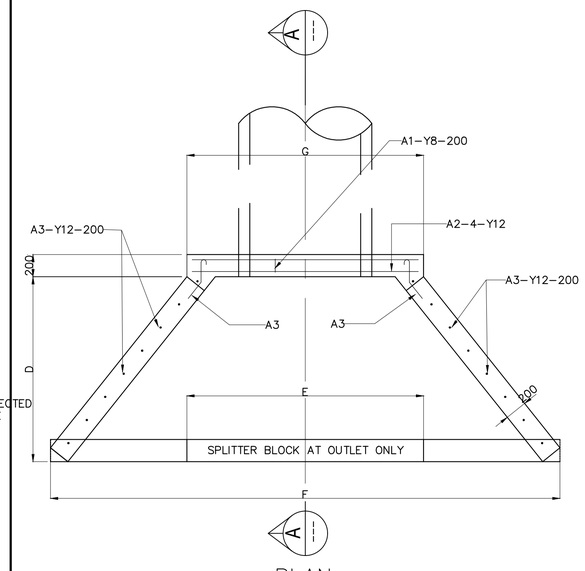


CLASS C PIPE BEDDING IN ROCK

SCALE 1:20

	WIDTH 'B'	
Dø	SINGLE PIPE	DOUBLE PIPE
600	1600	2500
750	1750	2875
900	1900	3250

PIPE BEDDING DETAILS



PLAN

SCALE 1:20

(FOR DIMENSIONS SEE TABLE 1)
(FOR REINFORCEMENT SEE TABLE 2)

TABLE 1

NOMINAL DIAMETER	DIMENSIONS					
A	B	C	D	E	F	G
450	660	270	790	1140	2050	1140
600	810	320	990	1300	2420	1300
750	970	390	1160	1470	2810	1470
900	1120	450	1340	1630	3180	1630
1050	1280	510	1540	1810	3570	1800
1200	1440	580	1730	1960	3960	1960

FRONT ELEVATION – MULTIPLE PIPES

(FOR DIMENSIONS SEE TABLE 1)
SCALE 1:20

TABLE 2

ITEM	NUMBER	DIAMETER	CUT LENGTH	CODE	SHAPE
A1	VARIES	Y8	600	60	150 / 110
A2	4	Y12	VARIES	20	STRAIGHT
A3	VARIES	Y12	500	32	

TABLE 3

NOMINAL DIAMETER	DIMENSIONS						
A	B	C	D	E	F1	F2	G
450	660	270	790	1140	1025	1025	1140
600	810	320	990	1300	1210	1210	1300
750	970	390	1160	1470	1410	1410	1470
900	1120	450	1340	1630	1590	1590	1630
1050	1280	510	1540	1800	1800	1800	1800
1200	1440	580	1730	1960	980	980	1960

NOTES:

1. INLET/OUTLET APPROACHES IN FILL CONDITION TO BE STONE PITCHED WHERE EROSION IS LIKELY TO OCCUR.
2. SPLITTER BLOCK MAY BE OMITTED IF DISCHARGE VELOCITY IS LESS THAN 1.50m/s AND PROVIDED AT OUTLETS ONLY.
3. CUT OFF WALLS MAY BE OMITTED IF STRUCTURE IS FOUNDED ON ROCK.
4. FOR MULTIPLE PIPE CULVERTS INCREASE DIMENSIONS "E" AND "F" BY (n-1(A+450))mm
   WHERE n = NUMBER OF PIPES
   WHERE A = NOMINAL DIAMETER OF PIPES
5. FOR SKEW PIPE CULVERTS THE HEADWALL SHALL BE PARALLEL TO THE CENTER LINE OF THE ROAD.
6. IF CORRUGATED METAL PIPES ARE USED 4 x 20mm x 150mm LONG GALVANISED ANCHOR BOLTS IN THE HOLLOWS OF THE CORRUGATIONS ARE TO BE USED.
7. ALL CONCRETE TO BE 20MPa. MIN COVER TO STEEL IS 40mm UNLESS OTHERWISE STATED.
8. SQUARE MESH FABRIC (REFERENCE S.M.F 311) TO BE PLACED CENTRALLY
9. DIMENSIONS IN TABLE 1 AND 3 ARE AS PER MANUFACTURING STANDARD OF ROCLA PIPE CULVERT TYPE SC TO SABS .

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No.	AMENDMENTS	BY	APPROVED	DATE

APPROVED ON BEHALF OF THE CONSULTING ENGINEER
ENGINEER :
REG. No. :
DATE :
SIGNATURE :

REFERENCE

TENDER NO: xxxxx

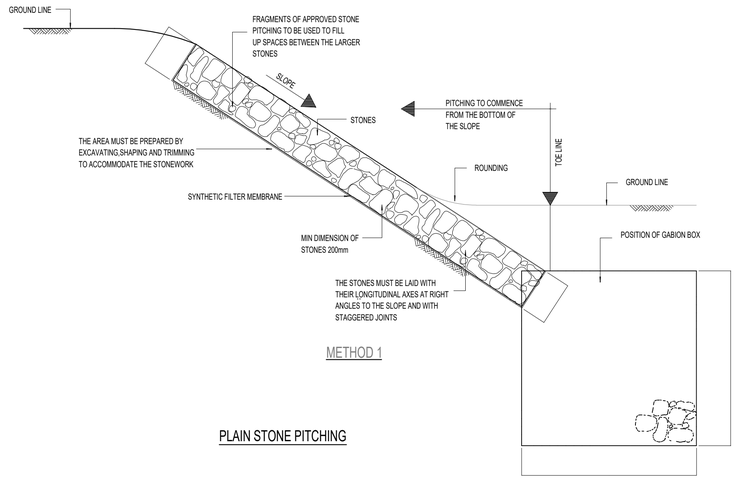
AVON AND INDERMAK STORMWATER CONTROL

HEADWALL AND BEDDING DETAILS

CONTRACT:
DRAWING: ML/BLB2/STD-02
REVISION
DATE: SEPTEMBER 2022

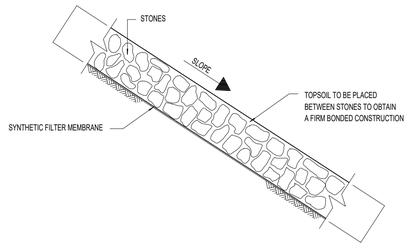
DESIGNED
DRAWN
REVIEWED
PROJECT ENGINEER

STONE PITCHING



METHOD 1

PLAIN STONE PITCHING

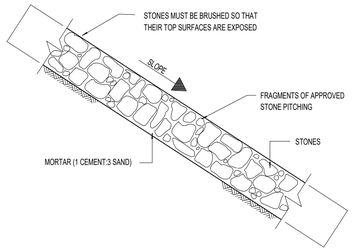


METHOD 2

NOTES:

THE TECHNIQUE AND REQUIREMENTS LAID DOWN IN METHOD 1 SHALL APPLY WITH THE FOLLWING EXCEPTIONS:

1. NO SMALL STONES SHALL BE USED TO FILL THE SPACES BETWEEN THE LARGER STONES.
2. TOPSOIL SHALL BE INTRODUCED BETWEEN INDIVIDUAL STONES SIMULTANEOUSLY WITH PLACING OF STONES.
3. ROOTED GRASS OR GRASS TUFTS SHALL THEN BE PLACED IN THE TOPSOIL.

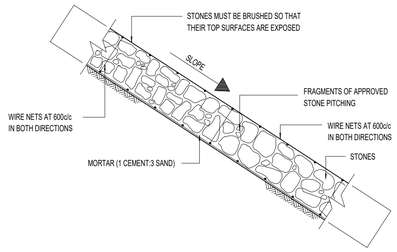


GROUTED STONE PITCHING

NOTES:

THE TECHNIQUE AND REQUIRMENTS LAID DOWN IN METHOD 1 SHALL APPLY WITH THE FOLLOWING EXCEPTION:

1. THE SPACES BETWEEN THE STONES SHALL BE FILLED WITH MORTAR.



WIRE AND GROUTED STONE PITCHING

NOTES:

THE TECHNIQUE AND REQUIRMENTS LAID DOWN IN METHOD 1 SHALL APPLY WITH THE FOLLOWING EXCEPTIONS.

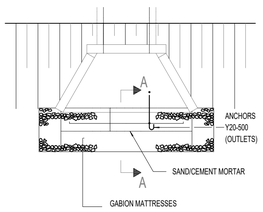
1. PITCHING IN ACCORDANCE WITH GROUTED STONE PITCHING.
2. CONSTUCTION SHALL BE AS FOLLOWS:

a) PLACING OF BOTTOM WIRE NET.
b) ATTACHING OF WIRE TIES TO BOTTOM MESH.
c) PITCHING.
d) PLACING THE TOP WIRE NET AND FASTENING WIRE TIES.
e) GROUTING.

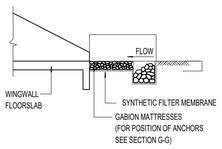
GABIONS

PLAN OF DOWN CHUTE AND ENERGY BREAKER
1:40

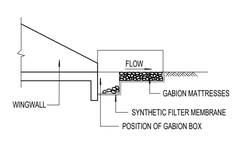
ELEVATION OF INLET/OUTLET



PLAN OF INLET/OUTLET

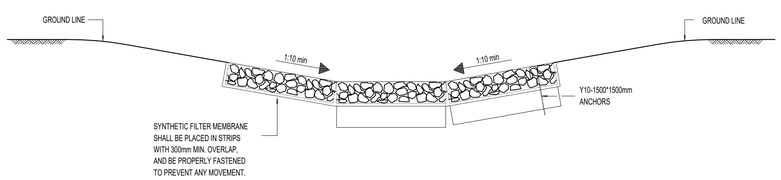


SECTION A-A (INLET)

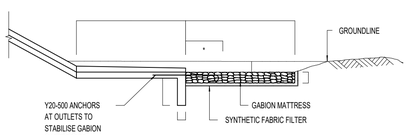


SECTION A-A (OUTLET)

DETAIL OF GABION MATTRESSES AND BOXES AT INLETS AND OUTLETS



SECTION OF MATTRESS IN CANAL



SECTION G-G
1:40

BOXES

STANDARD SIZES OF BOXES
LENGTH 1000mm, 2000mm, 3000mm, 4000mm
WIDTH 1000mm
DEPTH 500mm, 1000mm
DIAPHRAGM SPACING 1000mm

ROCK USED FOR THE FILLING OF CAGES		
DEPTH OF CAGES	ROCK SIZE (DIMENSIONS)	
	MIN. (mm)	MAKS. (mm)
230	100	125
300	100	200
500	100	250
1000	100	300

MESH SIZE AND WIRE DIAMETER FOR CAGES		
DEPTH OF GABION	MESH SIZE (mm)	WIRE DIA. (mm)
500mm AND OVER	80 x 100	2,7
200mm TO 300mm	80 x 100	2,5

ANCHORS FOR GABION MATTRESSES

MATTRESSES

STANDARD SIZES	
LENGTH	6000mm
WIDTH	2000mm
DEPTH	170mm, 230mm, 300mm

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No	AMENDMENTS	BY	APPROVED	DATE

APPROVED ON BEHALF OF THE CONSULTING ENGINEER

ENGINEER : _____

REG. No. : _____

DATE : _____

SIGNATURE : _____

REFERENCE

TENDER NO: xxxxx

AVON AND INDERMAK STORMWATER CONTROL

STONE PITCHING AND GABION DETAILS

CONTRACT:

DATE: SEPTEMBER 2022

DRAWING: ML/BLB2/STD-04

REVISION

DESIGNED

DRAWN

REVIEWED

PROJECT ENGINEER

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m

ORIGINAL SCALE: 1 : 100