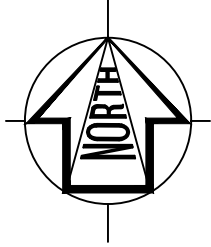
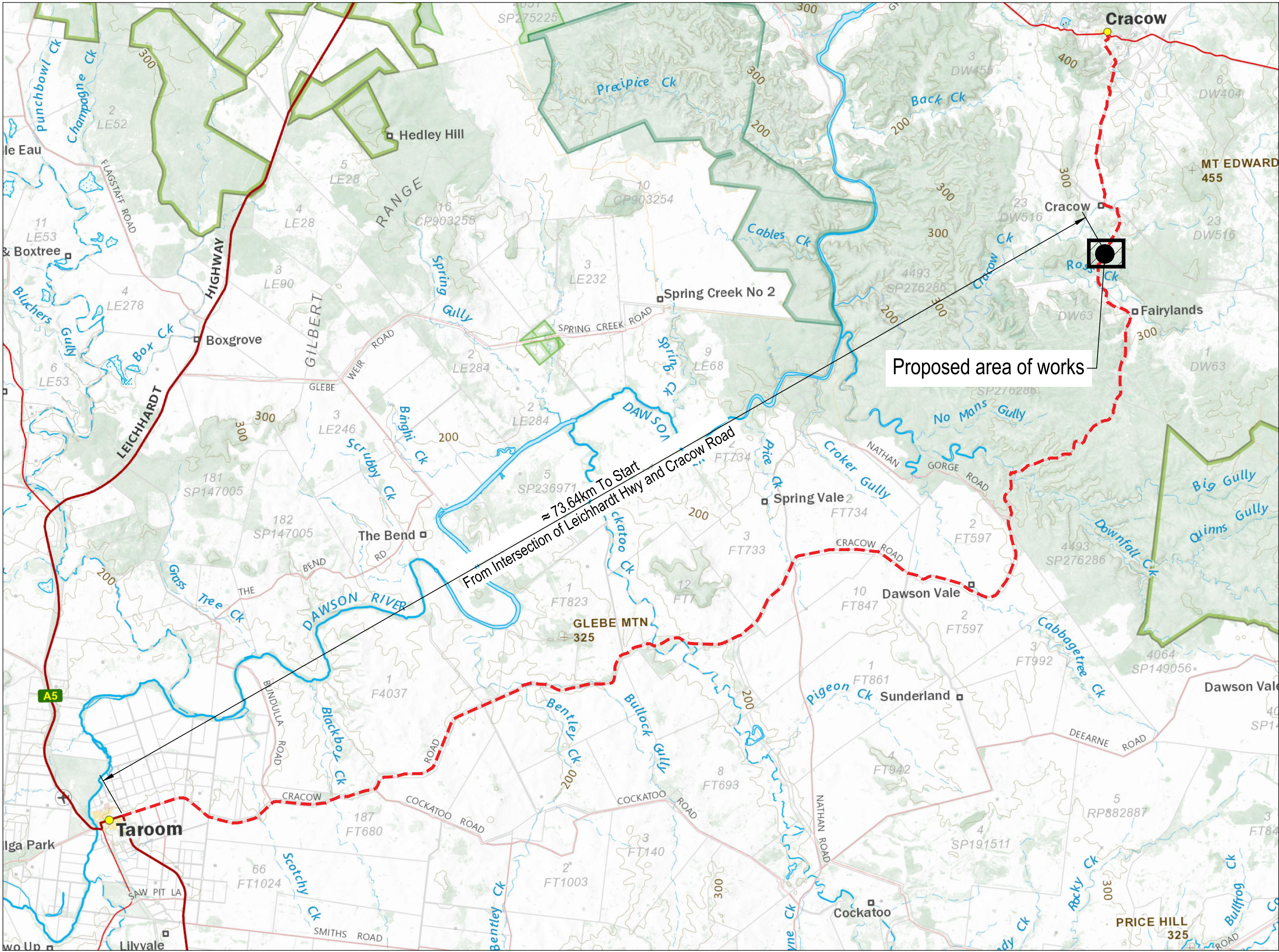


# CRACOW ROAD, SITE 7 - STABILISATION

## ROAD UPGRADE



LOCALITY PLAN  
(Not to scale)

### DRAWING INDEX

Drawing Number	Date	Drawing Description
001	Sep-23	Project Cover Sheet
002	Sep-23	General Notes
300	Sep-23	Survey Control and Services Plan
400	Sep-23	Roadworks and Setout Plan Sheet 1
500	Sep-23	Pavement Plan
600	Sep-23	Longitudinal Section Sheet 1
601	Sep-23	Longitudinal Section Sheet 2
700	Sep-23	Typical Cross Sections - Sheet 1
800	Sep-23	Annotated Cross Sections Sheet 1

### DRAWING INDEX

Drawing Number	Date	Drawing Description
801	Sep-23	Annotated Cross Sections Sheet 2
802	Sep-23	Annotated Cross Sections Sheet 3
803	Sep-23	Annotated Cross Sections Sheet 4
804	Sep-23	Annotated Cross Sections Sheet 5
1200	Sep-23	Stormwater Details
1250	Sep-23	Stormwater Longitudinal Section
1600	Sep-23	Limit of Clearing Plan
1700	Sep-23	Temporary Erosion and Sediment Control Sheet 1
1701	Sep-23	Temporary Erosion and Sediment Control Sheet 2

### STANDARD DRAWINGS:

Dwg.	Rev.	Description
ROADWORKS		
CMDG-R-081	E	Sign Location and Installation Details
DRAINAGE		
CMDG-D-022	F	Field Inlet Details
DEPARTMENT OF TRANSPORT AND MAIN ROADS - STANDARD DRAWINGS:		
DRAINAGE		
1243	D	Headwall Connections Drawing 3 of 3 - Alternative for small culverts diameter or height $\leq$ 1200
1359	E	Installation, Bedding and Filling / Backfilling Against / Over Culverts
GENERAL EARTHWORKS AND PROPERTY ACCESS		
1178	E	Diversion of Water from Roadway and Table Drains

XREFS - X\_CRC\_BSC\_TITLE.dwg  
Last Modified - Oct 27, 2023 - 4:45pm

A	Issued for Construction				
20.01	Revisions/Descriptions	Drawn	Approved	Date	

Scales (sheet size A1)
Dimensions shown in metres except where shown otherwise


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Client

SHIRE OF OPPORTUNITY

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Title CRACOW ROAD UPGRADE (Ch. 73650m - 74002m) SITE 7 - STABILISATION PROJECT COVER SHEET						Job No.	CRC00291
						Drawing No.	001
Drawn	ENGINEERING CERTIFICATION (RPEQ)					Revision	A
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE		
Designed	Civil	T Penrose		24087	28/09/23	Series No.	1 of 18
	B Doherty						



Last Modified :- Oct 27, 2023 - 4:45pm  
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SAFETY IN DESIGN NOTES:

1. Potential safety hazards identified by the Designer have been assessed for this project in accordance with Safe Design of Structures - Code of Practices by Safe Work Australia, 2012. Refer to the **Safety In Design Report** for the potential safety hazards.
2. Disclaimer: It must be acknowledged that new and/or different risks may become apparent during each project phase.The designer has ensured, so far as reasonably practicable, that the structure/municipal work is designed to minimise risk to the health and safety of persons involved in construction or use related activities. Further, in Appendix A - Safety in Design Risk Register of the **Safety In Design Report**, assumptions may have been made within the different project phases as to how the project and/or project elements will be constructed and maintained. This may differ from the end methods adopted.
3. Any person who undertakes alterations, variations or modifications to these design drawings, without consultation and approval from the original or subsequent designer, will assume the duties of a designer and will be held responsible for the safety in design for this project.
4. All works must comply with W.H. & S. Act, 2011.

GENERAL NOTES:

1. Works shall be undertaken generally in accordance with the relevant CMDG construction specifications except where specific DTMR specification requirements are detailed within these Project specific Drawings. The most current version shall be adopted, unless noted otherwise.
2. Works to be measured in accordance with project specific *Supplementary Specification for Measurement and Work Operations for Work Items*.
3. If any archaeological or cultural material is exposed on the work site all works shall cease. The D.E.H.P., Aboriginal Land Council and I.C.C. are to be notified.
4. All works are to comply with the requirements of the Environmental Protection Act, 1994.
5. Disposal/movement of material in areas of Red Imported Fire Ants are to comply with the D.A.F.F. regulations. Refer the Department's website: [www.daff.qld.gov.au/fireants](http://www.daff.qld.gov.au/fireants) for the current information.
6. Prior to commencement of work a Risk Management Plan to minimise the chance of spreading Fire Ants is to be completed.
7. The positions shown on drawings for public utilities services are based on the B.Y.D.A. information supplied at time of design and are indicative only. Prior to construction the current Service Authority information is to be obtained from B.Y.D.A. (website: [www.byda.com.au](http://www.byda.com.au)). The position and depth of each service is to be verified by the relevant Service Authority on site before the start of any construction.
8. Where these drawings make reference to the Administrator or Contract Administrator it shall mean the Superintendent managing the works.
9. Prior to commencement of work contact the Superintendent if any PSM's are in the vicinity of the work site.
10. Order of Precedence of Documents, Ambiguities or Discrepancies - The following order of precedence shall apply where there is any ambiguity, discrepancy or inconsistency between the design documents comprising the Contract, with the higher in the list having a higher priority:
  - a. These Project Specific Drawings
  - b. Technical Specifications
  - c. Standard Drawings

The several documents forming the Contract are to be taken as mutually explanatory of one another. If either party discovers any ambiguity or discrepancy in any document prepared for the purpose of executing the Work Under the Contract, that party shall notify the Superintendent in writing of the ambiguity or discrepancy as soon as possible,

11. The Scheme Drawings listed on the Project Cover Sheet are to be read as a whole and not in isolation. Any isolated drawing separated from the control set will be considered voided and is not to be used.

12. All drawings are to be read in conjunction with the project's specification and all relevant Standard Drawings.

13. All drawings are to be read in conjunction with the Abbreviation Table shown.

14. Materials and workmanship - Where materials, material components, workmanship and procedures are not specifically described by the Contract, they shall be in accordance with the relevant Australian Standard. Where no Australian Standard is available, other specifications shall be used in the following order of priority:

- a. manufacturer's recommendations, and
- b. accepted industry standards.

At a minimum materials and workmanship shall be the best of their respective kinds and fit for the purpose for which they are intended.

Any product trade names have been used to establish a quality requirement. Written approval to be obtained prior to using any substitutions.

15. Dimensions / Levels - All levels and setout points shall be confirmed on site by a registered surveyor prior to construction. The Contractor shall seek clarification from the Superintendent for any discrepancy prior to proceeding with works. Dimensions shall not be scaled from drawings.
16. Set Out of Individual Installations - The Contractor shall set out an installation as shown on the Drawings in sufficient detail to identify the location, length and levels of the proposed installation. Once the initial set out is complete the Superintendent will determine the design appropriateness of the set out with regard to the actual site conditions. The Superintendent may direct amendments to the set-out details. Payment for such amendments will be made at appropriate rates in the Schedule of Rates or, where such rates are not deemed by the Superintendent to be appropriate, as determined by the Superintendent. Installations to be set out in accordance with the above requirements include:
  - a. drainage pipes, culverts, slabs and structures
  - b. landscaping
  - c. traffic control
17. Existing Services - Locate service prior to commencing works. Services are shown on these drawings for information only. No responsibility is taken for the accuracy or completeness of the information supplied. Take care to protect services from damage, and report any hits or damage to the service authority immediately.

EROSION AND SEDIMENT CONTROL NOTES:

1. During construction all necessary precautions shall be taken to control erosion and downstream sedimentation. Monitor the prevailing weather conditions and protect any downstream construction and gully inlets.
2. All sediment control devices, sediment fences, check dams, straw bales, stone traps and entry/exit sediment traps are to be in accordance with the E&SC plans within these project drawings or amended as required by the Contractor's suitably qualified professional.

EARTHWORK NOTES:

1. All unsuitable material is to be stripped prior to placement of structural fill.
2. All unsuitable material is to be removed in accordance with the specification or as directed by the Superintendent.
3. All contaminated soil to be removed in accordance with the specification or as directed by the Superintendent.
4. Earthwork quantities include existing road pavement excavated where applicable.
5. Earthwork quantities include unsuitable and or contaminated material except where noted otherwise.
6. Earthwork quantities in cut are bank (nett) volumes and in fill are compacted volumes.
7. Class A1 or B material to comply with the requirements of TMR MRTS04, and specific requirements within these project drawings.

LINEMARKING NOTES:

1. All linemarking, signs and traffic devices shall comply with the M.U.T.C.D. - current edition.
2. Ensure that signage has clear sight distance, otherwise adjust location accordingly.
3. Superseded linemarking and signage to be removed.

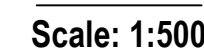
SERVICE ADJUSTMENT NOTES:

1. Service Authority infrastructure adjustments are to be performed by contractors approved by the relevant service authority.



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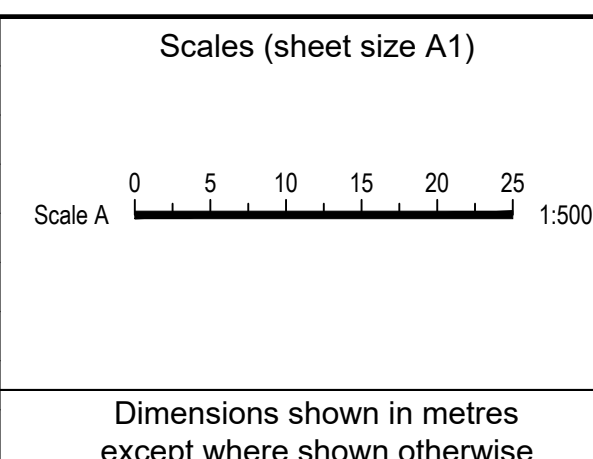
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STATION	EASTING	NORTHING	LEVEL	REMARKS
702	227990.504	7188015.984	295.363	PBMK
703	228085.623	7188142.434	307.689	PBMK
704	228102.702	7188272.785	317.283	PBMK

PSM	EASTING	NORTHING	LEVEL	LOCATION
PM32320	227987.370	7187505.508	283.945	PPMK $\approx$ Ch. 73100m

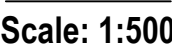
The location of underground services has been compiled from engineering survey and interpolated from Dial Before You Dig as provided by the Service Authorities. No responsibility is taken for the accuracy of the interpolated information supplied. Ensure all services are accurately located prior to commencement of work.

A	Issued for Construction			
20.01	Revisions/Descriptions	Drawn	Approved	Date



Title						Job No.	CRC00291
CRACOW ROAD UPGRADE (Ch. 73650m - 74002m)						Drawing No.	300
SITE 7 - STABILISATION							
SURVEY CONTROL AND SERVICES PLAN						Revision	A
Drawn		ENGINEERING CERTIFICATION (RPEQ)					
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Series No.	3 of 18
Designed	Civil	T Penrose		24087	28/09/23		
B Doherty							



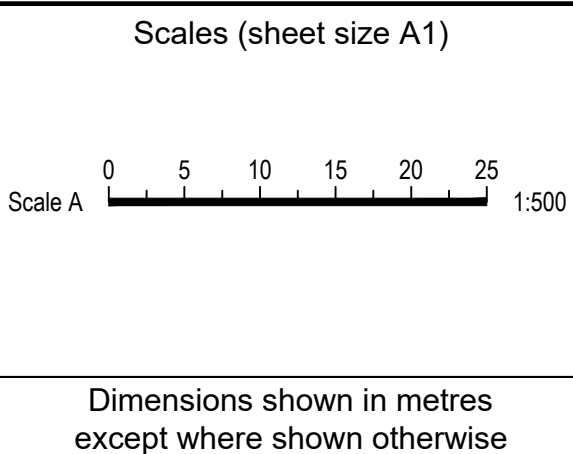


POINT	CHAINAGE	EASTING	NORTHING	LEVEL	BEARING	RAD/SPIRAL	A.LENGTH	D.ANGLE
IP 1	73439.314	227940.207	7187842.331	286.605	0°32'08.74"			
TC	73534.424	227941.097	7187937.437	288.927	0°32'08.74"			
IP 2	73586.918	227941.628	7187994.313	291.597		R = 110.000	104.987	54°41'04.77"
CT	73639.411	227988.345	7188026.757	294.590	55°13'13.51"			
TC	73664.371	228008.847	7188040.995	296.493	55°13'13.51"			
IP 3	73691.402	228031.507	7188056.732	298.921		R = -110.000	54.062	28°09'33.59"
CT	73718.433	228044.058	7188081.300	300.542	27°03'39.92"			
TC	73776.681	228070.557	7188013.171	304.549	27°03'39.92"			
IP 4	73819.410	228090.129	7188171.482	307.579		R = -300.000	85.458	16°19'16.50"
CT	73862.139	228098.145	7188213.749	311.551	10°44'23.42"			
TC	73887.158	228102.808	7188238.329	313.980	10°44'23.42"			
IP 5	73917.690	228108.632	7188269.039	315.501		R = 116.000	61.063	30°09'38.62"
CT	73948.221	228129.098	7188292.664	314.748	40°54'02.04"			
IP 6	74065.298	228205.753	7188381.156	311.170	40°54'02.04"			

- Red - Flexible Guidepost
- White
- New Sign Location
- Existing Sign Location
- 403 - Survey Mark and Label

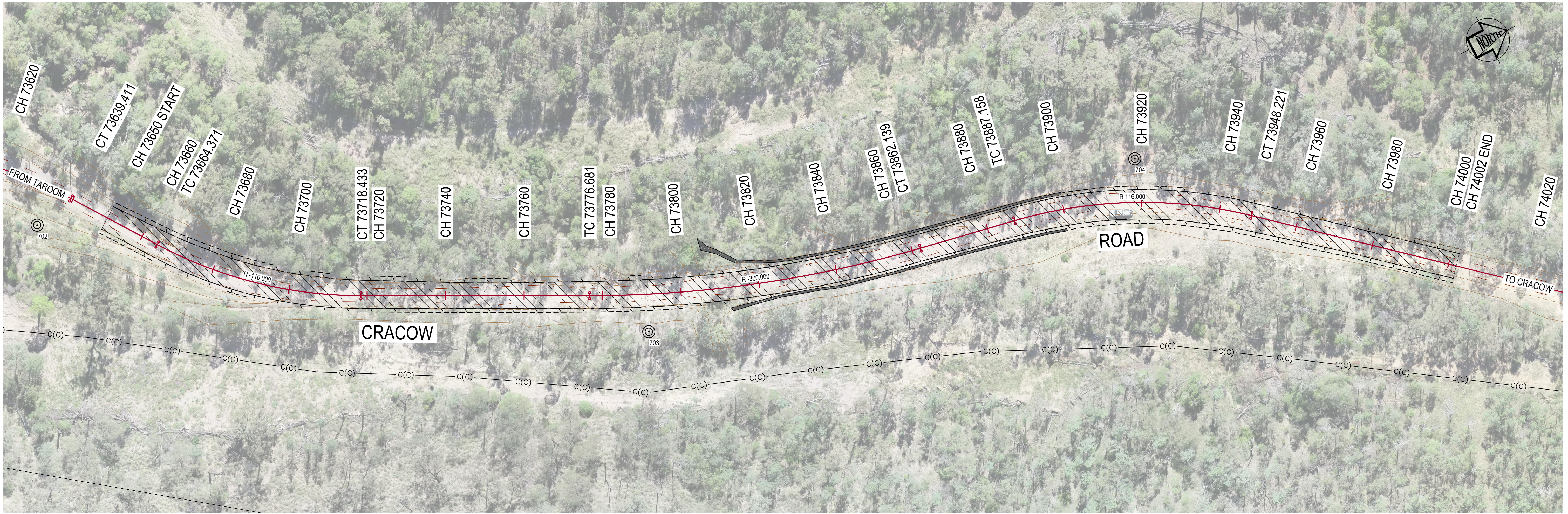
The location of underground services has been compiled from engineering survey and interpolated from Dial Before You Dig as provided by the Service Authorities. No responsibility is taken for the accuracy of the interpolated information supplied. Ensure all services are accurately located prior to commencement of work.

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20.01	Revisions/Descriptions	Drawn	Approved	Date



<b>CRACOW ROAD UPGRADE (Ch. 73650m - 74002m)</b> <b>SITE 7 - STABILISATION</b> <b>ROADWORKS AND SETOUT PLAN SHEET 1</b>						Job No.	CRC00291
						Drawing No.	400
Drawn	ENGINEERING CERTIFICATION (RPEQ)					Revision	A
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE		
Designed	Civil	T Penrose		24087	28/09/23	Series No.	4 of 18
B Doherty							





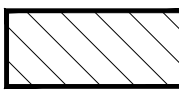
**PLAN**

Scale: 1:500

**LEGEND**

 New pavement to be constructed. Refer Pavement Type 1 Details.

**PAVEMENT TYPE 1 DETAILS**

 New pavement to be constructed

155mm Stabilised Base, Full Width,

Imported Unsealed Pavement Material \*\*

Insitu stabilised, GB binder (Cement/Fly Ash)  
Target UCS value 1 - 2 MPa at 7 Days. Contractor to undertake additive testing to confirm percentage of stabilising agent by mass. A nominal 3% by mass used for estimating purposes only.

Design Subgrade CBR 5 (soaked)

155mm Total thickness

**PAVEMENT DESIGN**  
(Lower Order Roads Design Guide)

Design Period: 20 Years  
Design Traffic: 5.1 x 10<sup>4</sup> DESA  
Design Subgrade CBR: 5 (Soaked)

All works to be carried out in accordance with the relevant CMDG Construction Specifications.

**\*\***  
**UNSEALED PAVEMENT SPECIFICATION**  
(Lower Order Roads Design Guide)

Imported Unsealed Pavement Material to satisfy the following specifications

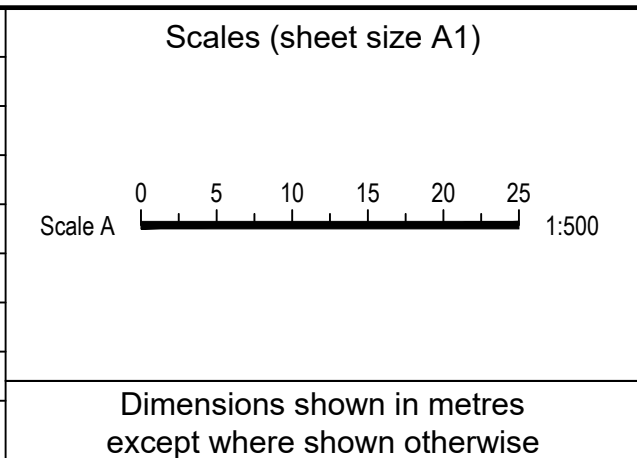
Grading Coefficient (Gc):	16 - 34
Shrinkage Product (Sp):	100 - 240
WPI:	< 1200
PI:	> 7%
Passing 0.075mm Sieve:	≥ 15%

**WARNING!**  
**BEWARE OF UNDERGROUND SERVICES**  
The location of underground services has been compiled from engineering survey and interpolated from Dial Before You Dig as provided by the Service Authorities. No responsibility is taken for the accuracy of the interpolated information supplied. Ensure all services are accurately located prior to commencement of work.

XREFS - X\_CRC\_BSC\_TITLE.dwg : X\_CONTROL.dwg : X\_DESIGN.dwg : X\_HATCH.dwg : X\_IMAGE.dwg : X\_SURVEY.dwg

Last Modified :- Oct 27, 2023 - 4:46pm

A	Issued for Construction			
20.01	Revisions/Descriptions	Drawn	Approved	Date




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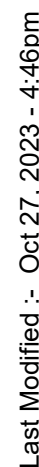
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Title CRACOW ROAD UPGRADE (Ch. 73650m - 74002m) SITE 7 - STABILISATION PAVEMENT PLAN						Job No.	CRC00291
						Drawing No.	500
Drawn B Doherty	ENGINEERING CERTIFICATION (RPEQ)					Revision	A
Designed B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE		
	Civil	T Penrose		24087	28/09/23		
						Series No.	5 of 18




## BEWARE OF UNDERGROUND SERVICES

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**Scales (sheet size A1)**


Scale A



0      5      10      15      20      25

1:500

Scale B




0      0.5      1.0      1.5      2.0      2.5

1:50

Dimensions shown in metres  
except where shown otherwise



<b>CRACOW ROAD UPGRADE (Ch. 73650m - 74002m)</b> <b>SITE 7 - STABILISATION</b> <b>LONGITUDINAL SECTION SHEET 1</b>						Job No.	CRC00291
						Drawing No.	600
Drawn	ENGINEERING CERTIFICATION (RPEQ)					Revision	A
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE		
Designed	Civil	T Penrose		24087	28/09/23	Series No.	6 of 18
B Doherty							



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Horizontal Scale A  
Vertical Scale B

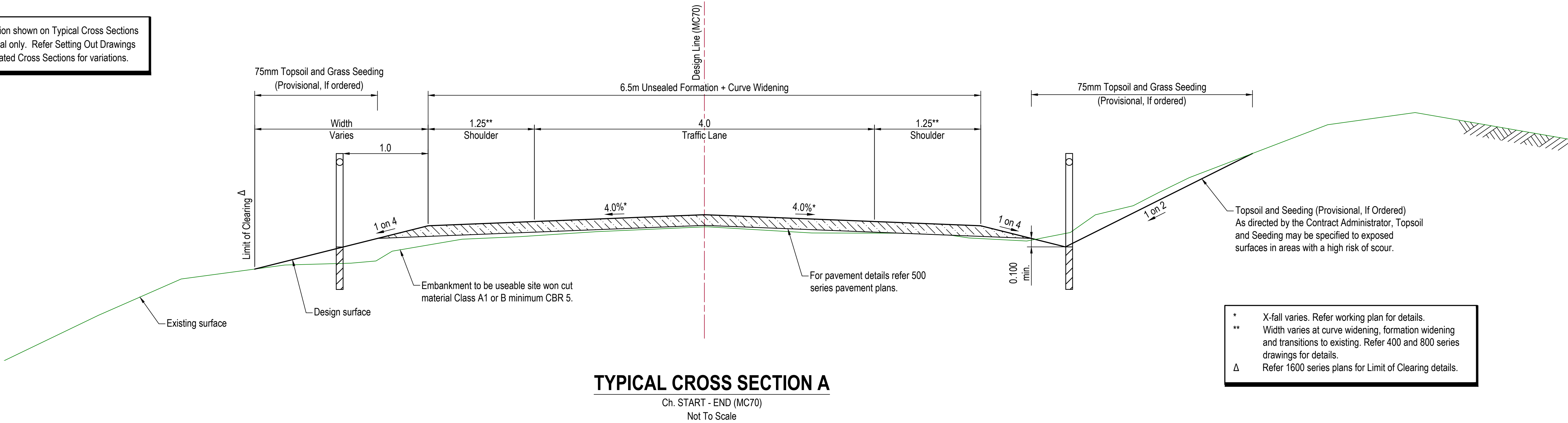
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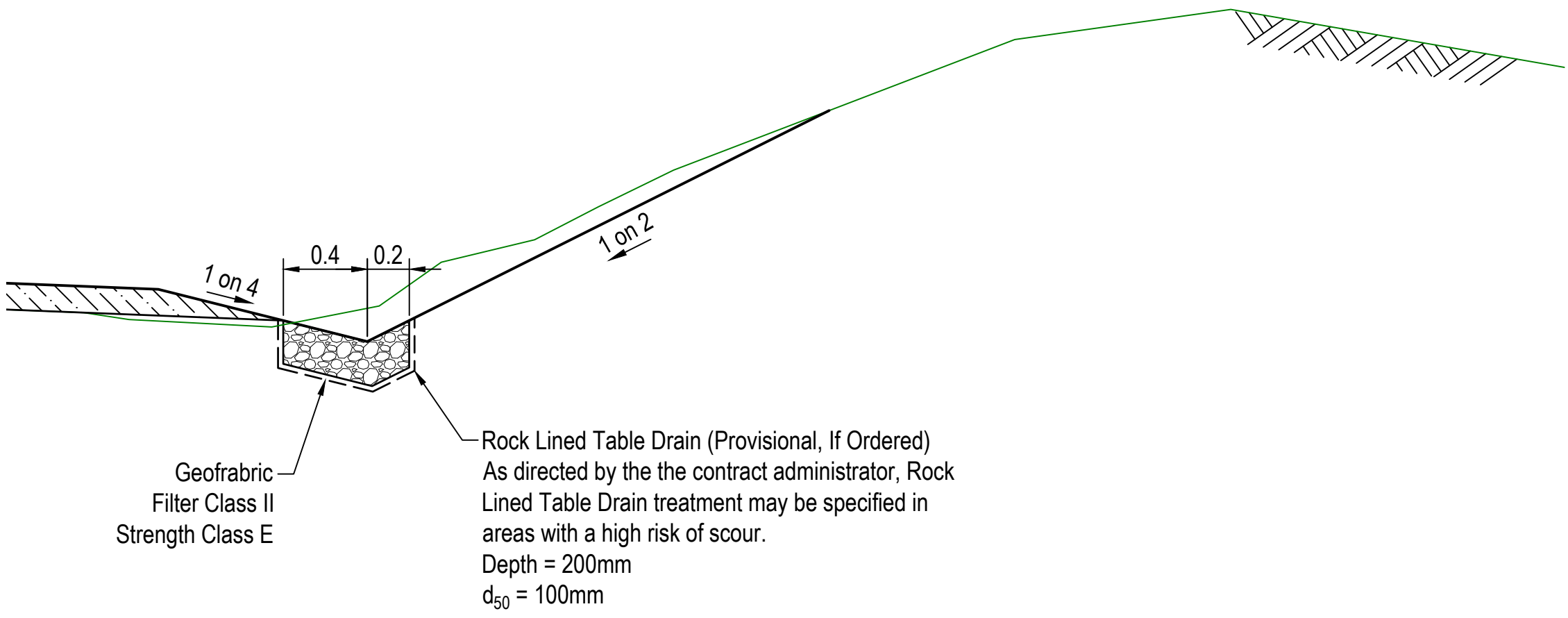
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Information shown on Typical Cross Sections is nominal only. Refer Setting Out Drawings & Annotated Cross Sections for variations.



\* X-fall varies. Refer working plan for details.  
\*\* Width varies at curve widening, formation widening and transitions to existing. Refer 400 and 800 series drawings for details.  
Δ Refer 1600 series plans for Limit of Clearing details.



**ROCK LINED TABLE DRAIN**  
Not to Scale

XREFS - X\_CRC\_BSC\_TITLE.dwg  
Last Modified :- Oct 27, 2023 - 4:46pm

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Scales (sheet size A1)
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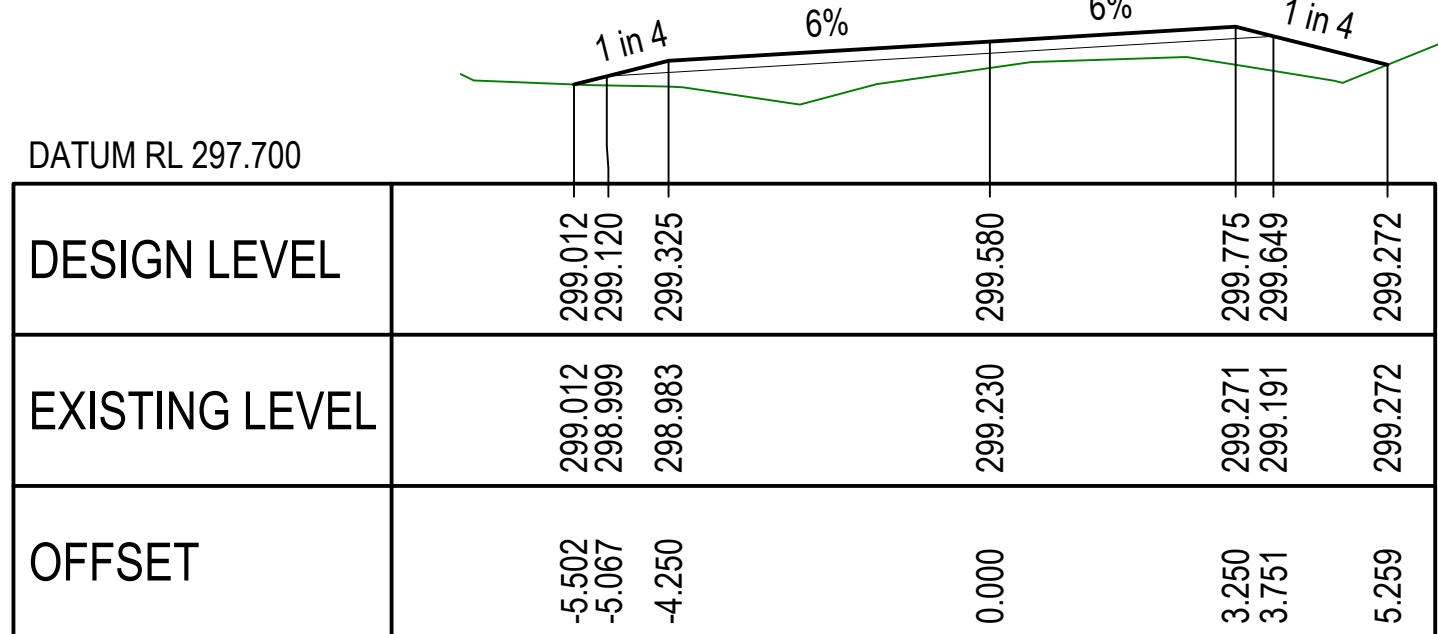
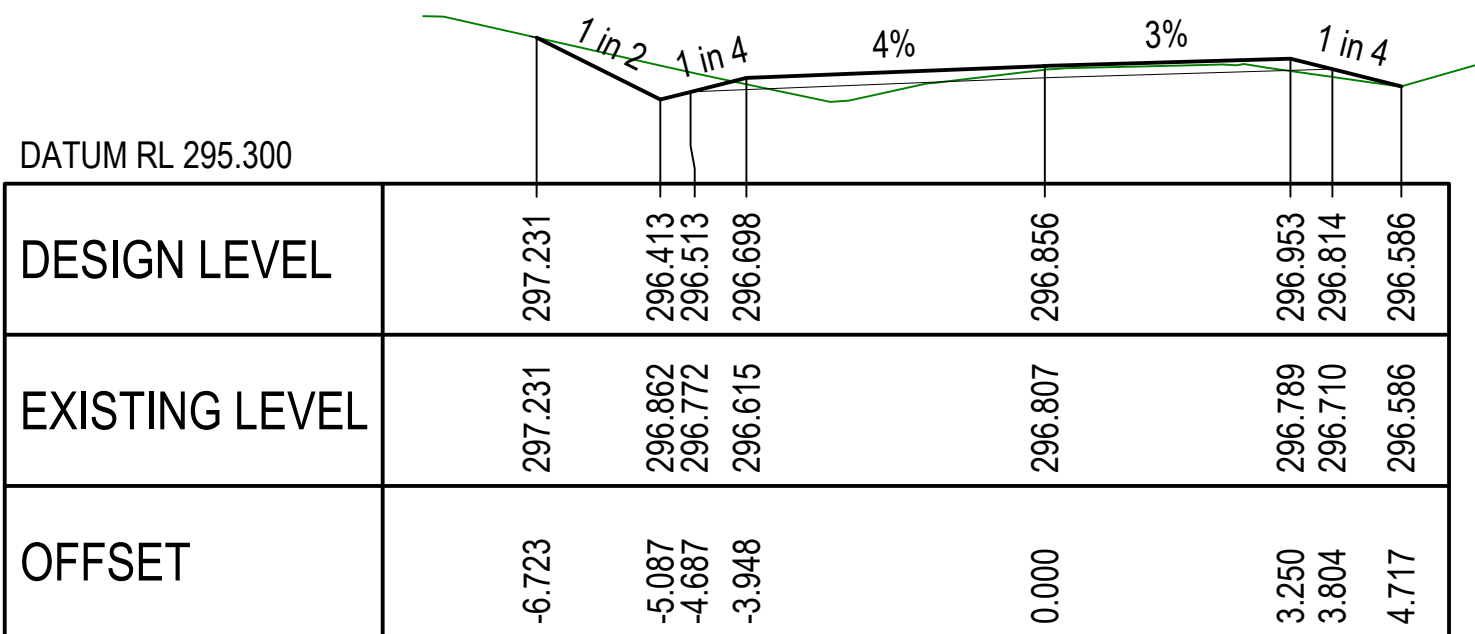
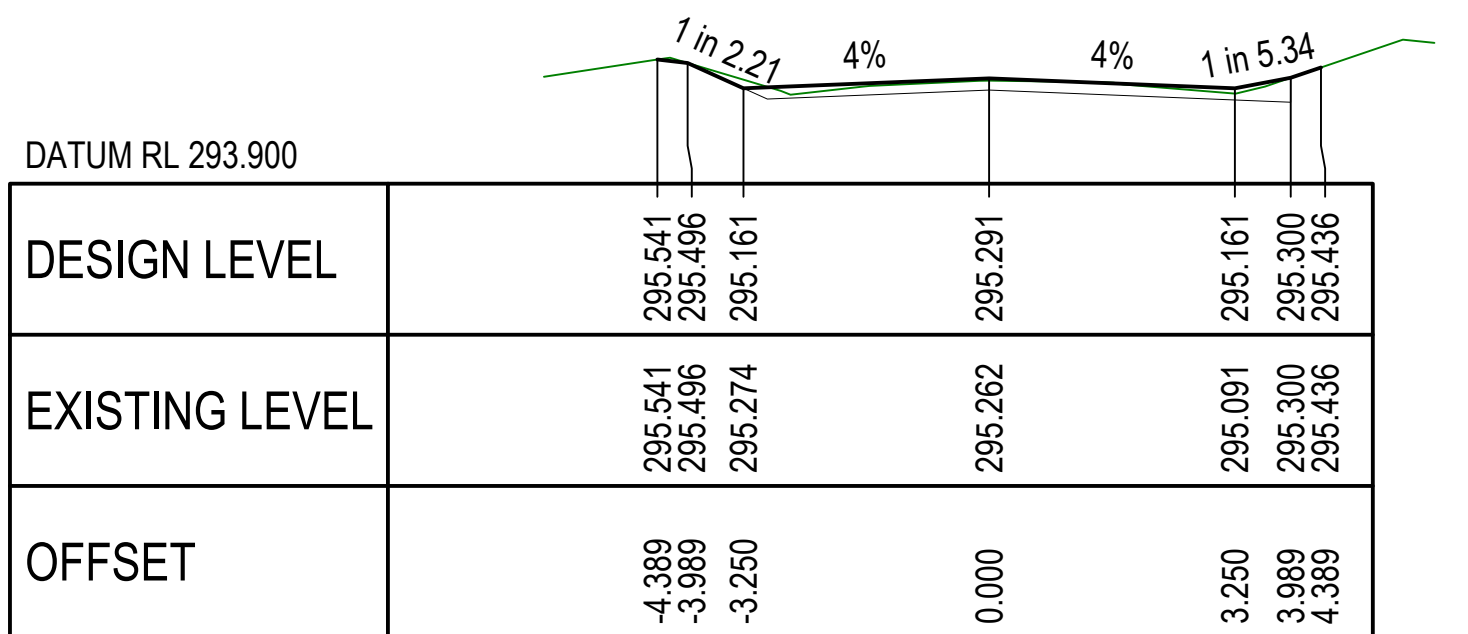
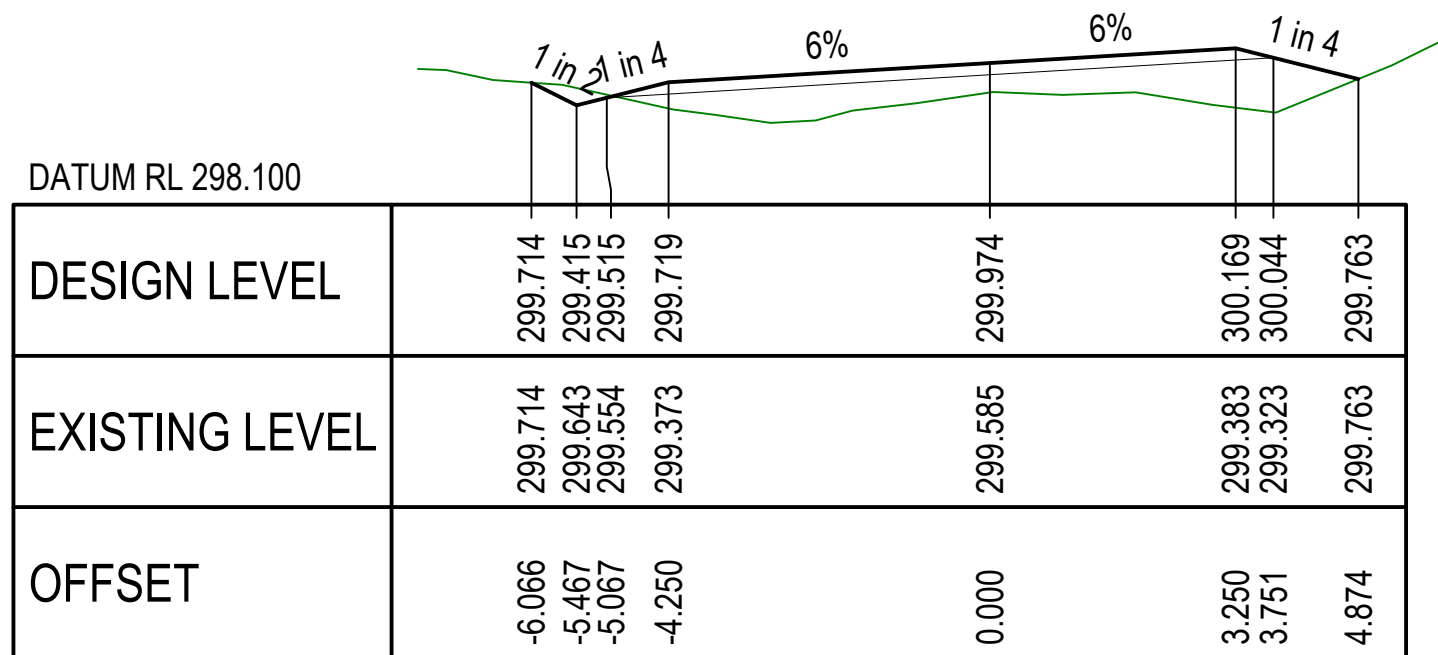
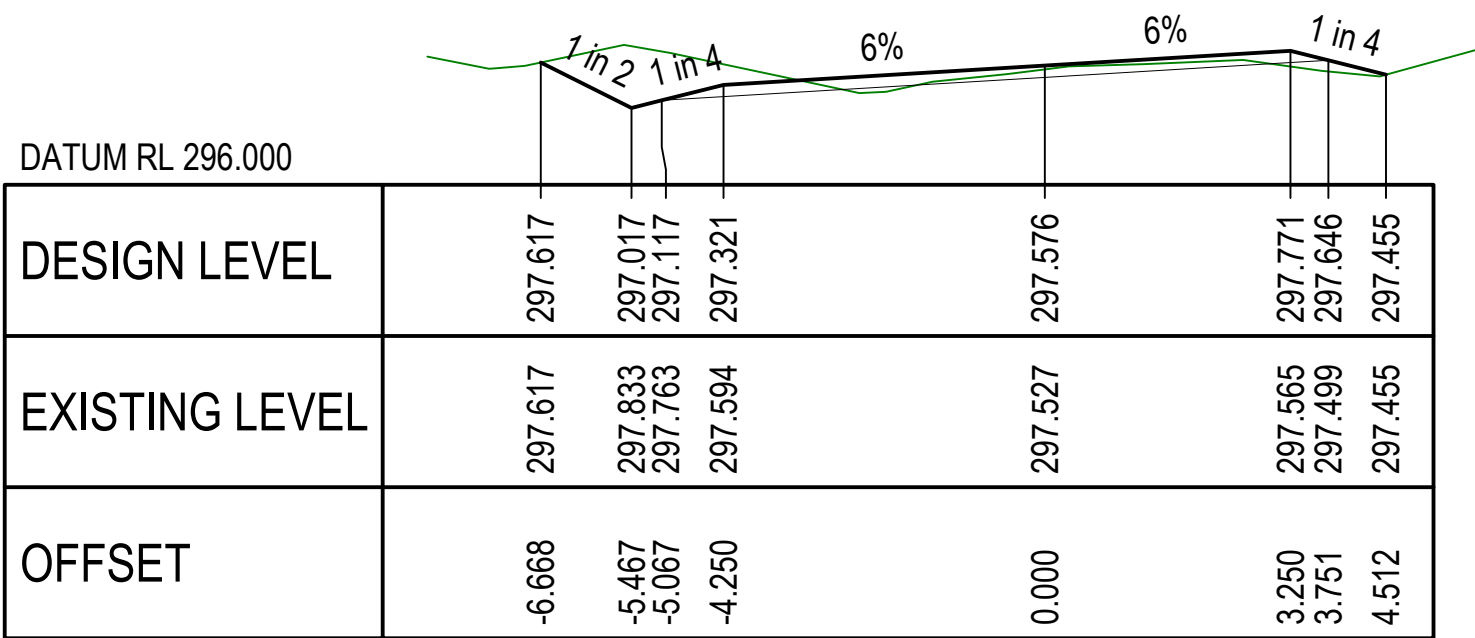
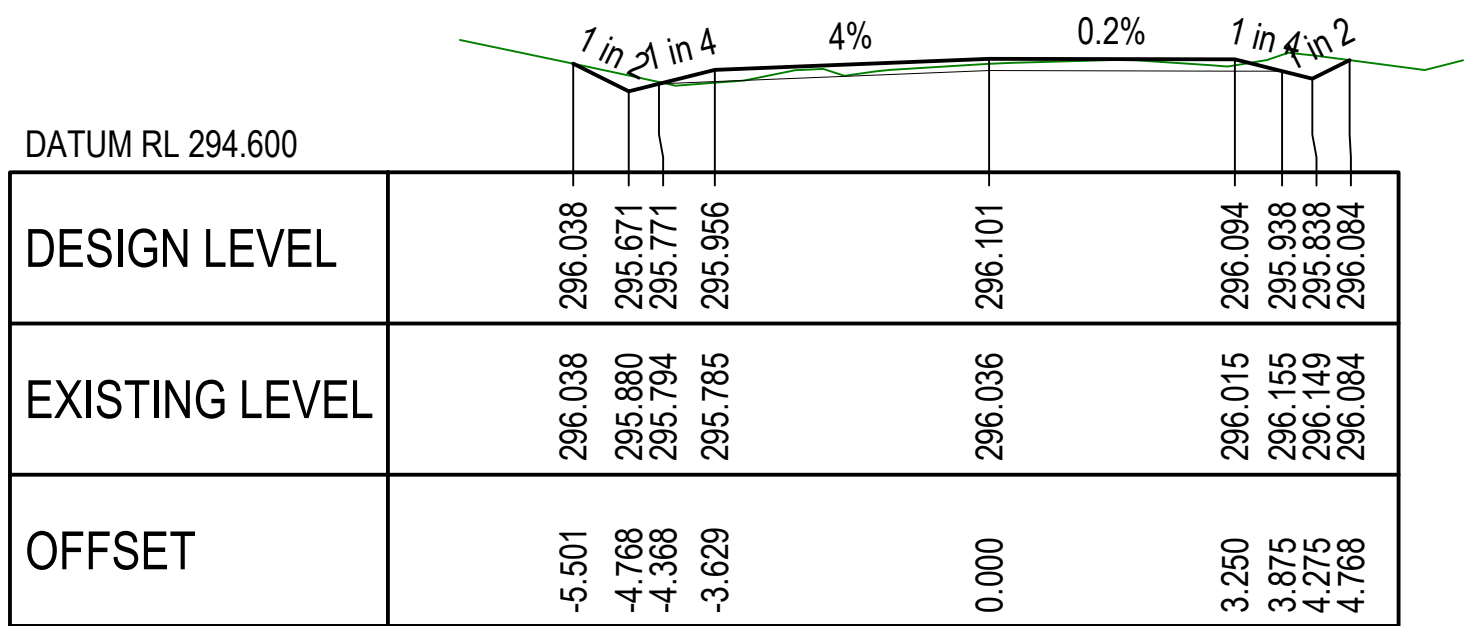
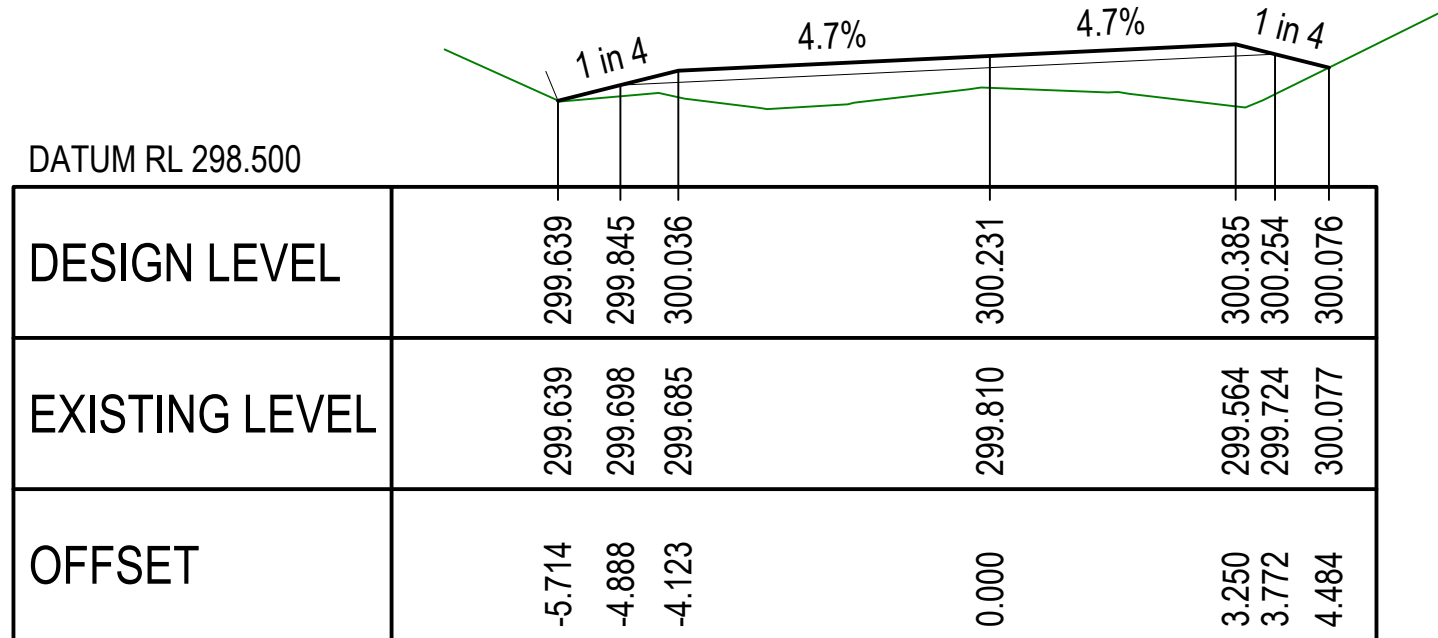
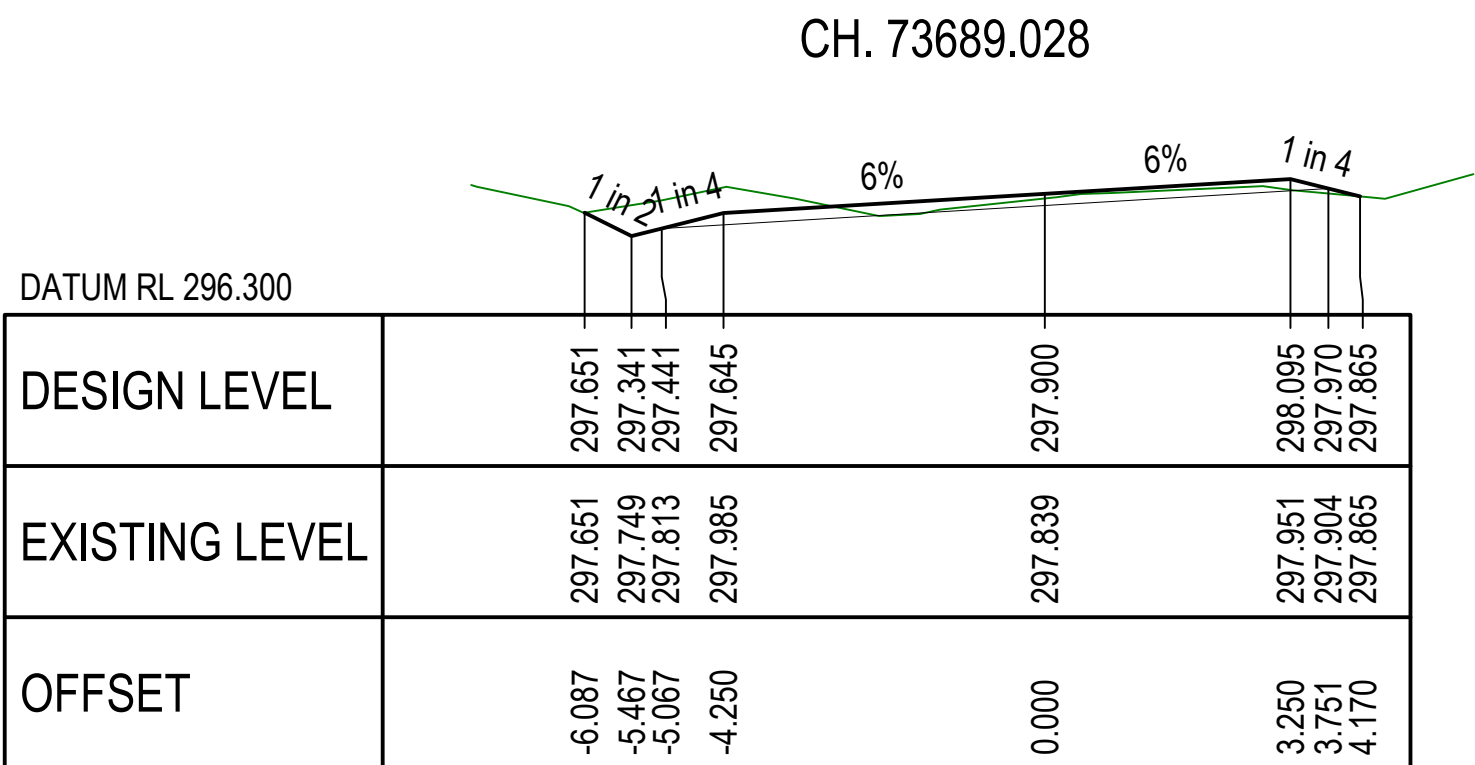
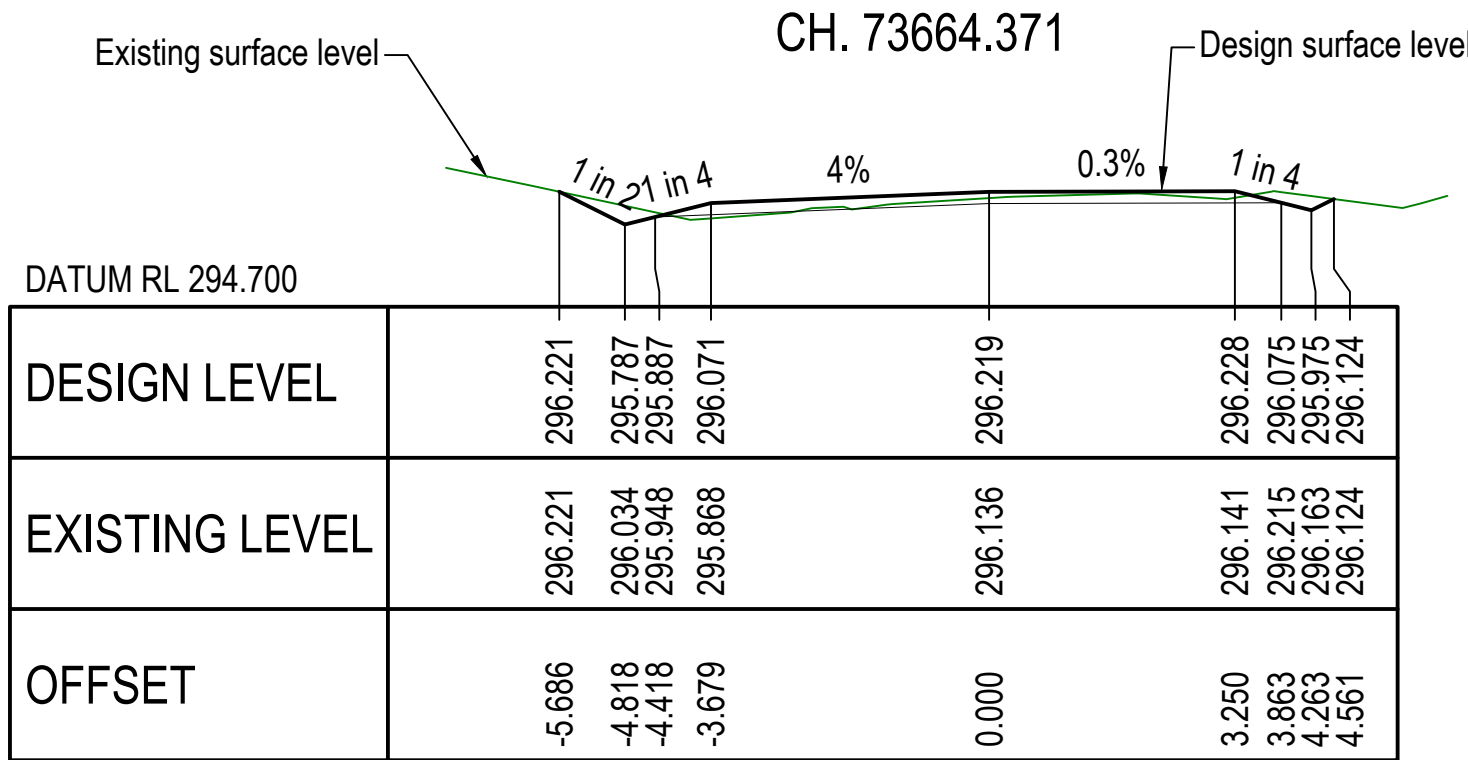
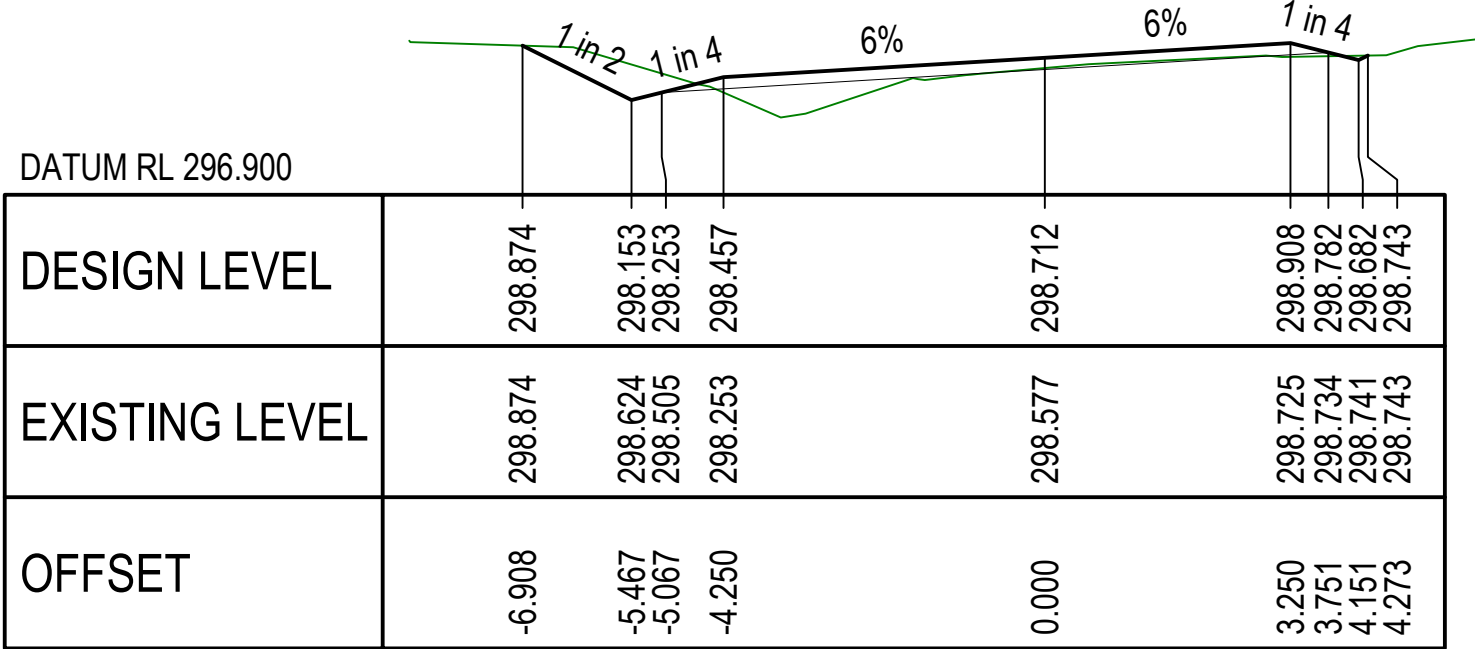
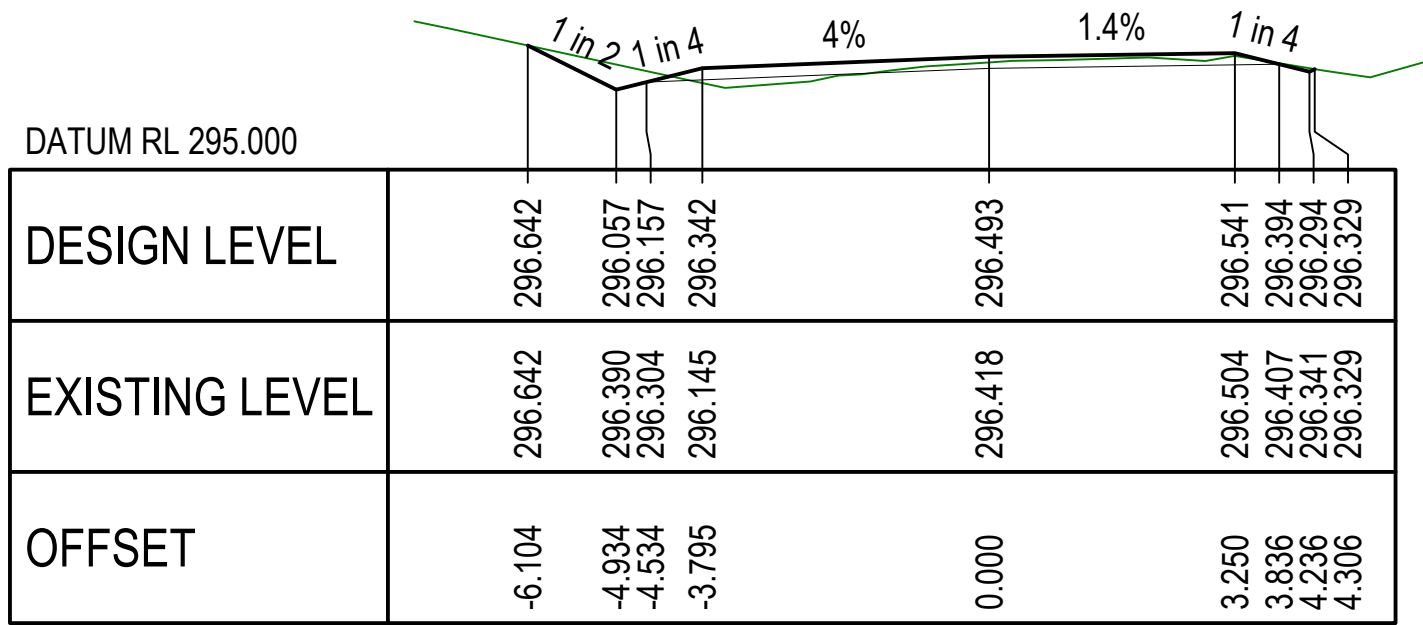
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Title CRACOW ROAD UPGRADE (Ch. 73650m - 74002m) SITE 7 - STABILISATION TYPICAL CROSS SECTIONS						Job No.	CRC00291
						Drawing No.	700
Drawn	ENGINEERING CERTIFICATION (RPEQ)					Revision	A
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE		
Designed	Civil	T Penrose		24087	28/09/23	Series No.	8 of 18
	B Doherty						





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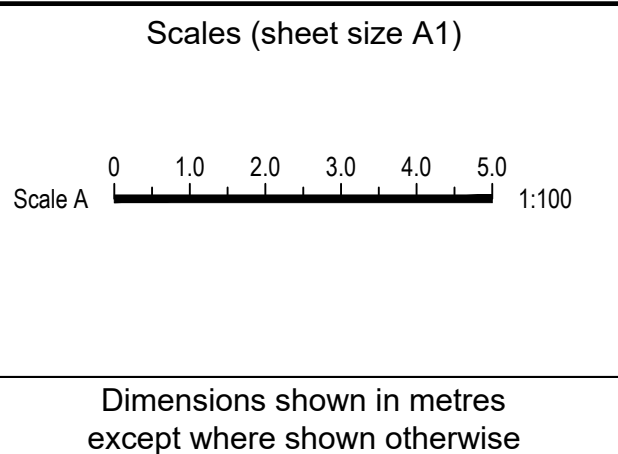
CROSS SECTIONS

Scale A

XREFS - X\_CRC\_BSC\_TITLE.dwg - X\_MC70\_XSECT\_01.dwg

Last Modified :- Oct 27, 2023 - 4:46pm

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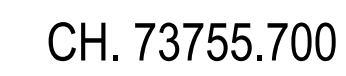
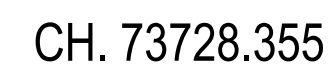
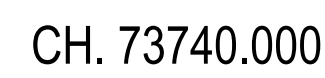
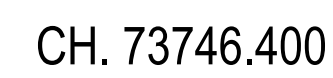
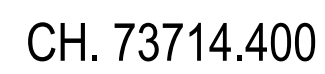
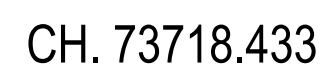
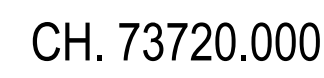
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Title CRACOW ROAD UPGRADE (Ch. 73650m - 74002m) SITE 7 - STABILISATION ANNOTATED CROSS SECTIONS SHEET 1					Job No.	CRC00291
Drawn B Doherty					Drawing No.	800
ENGINEERING CERTIFICATION (RPEQ)					Revision	A
Designed B Doherty		ENG. AREA Civil	NAME T Penrose	SIGNATURE 	NO. 24087	DATE 28/09/23
					Series No.	9 of 18






The location of underground services has been compiled from engineering survey and interpolated from Dial Before You Dig as provided by the Service Authorities. No responsibility is taken for the accuracy of the interpolated information supplied. Ensure all services are accurately located prior to commencement of work.

## Scale A

Scales (sheet size A1)

Scale A




0 1.0 2.0 3.0 4.0 5.0

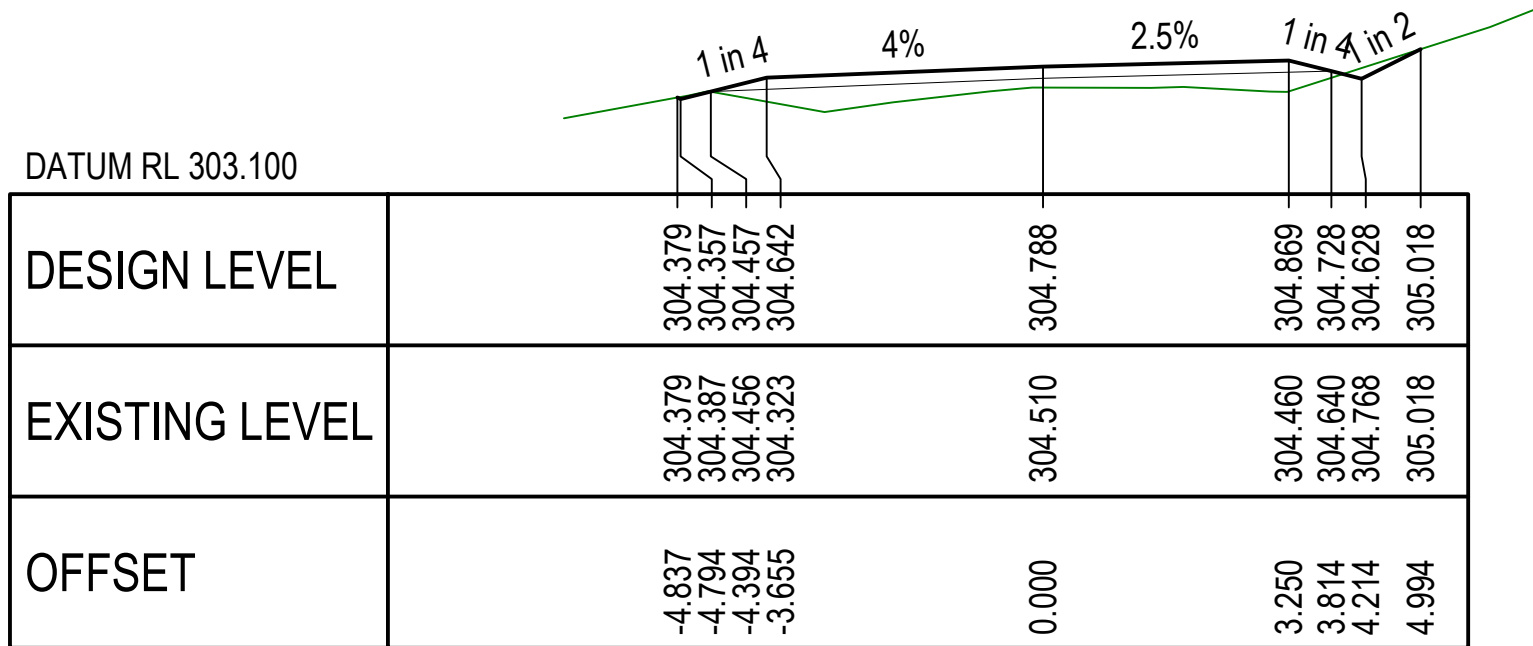
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Dimensions shown in metres  
except where shown otherwise

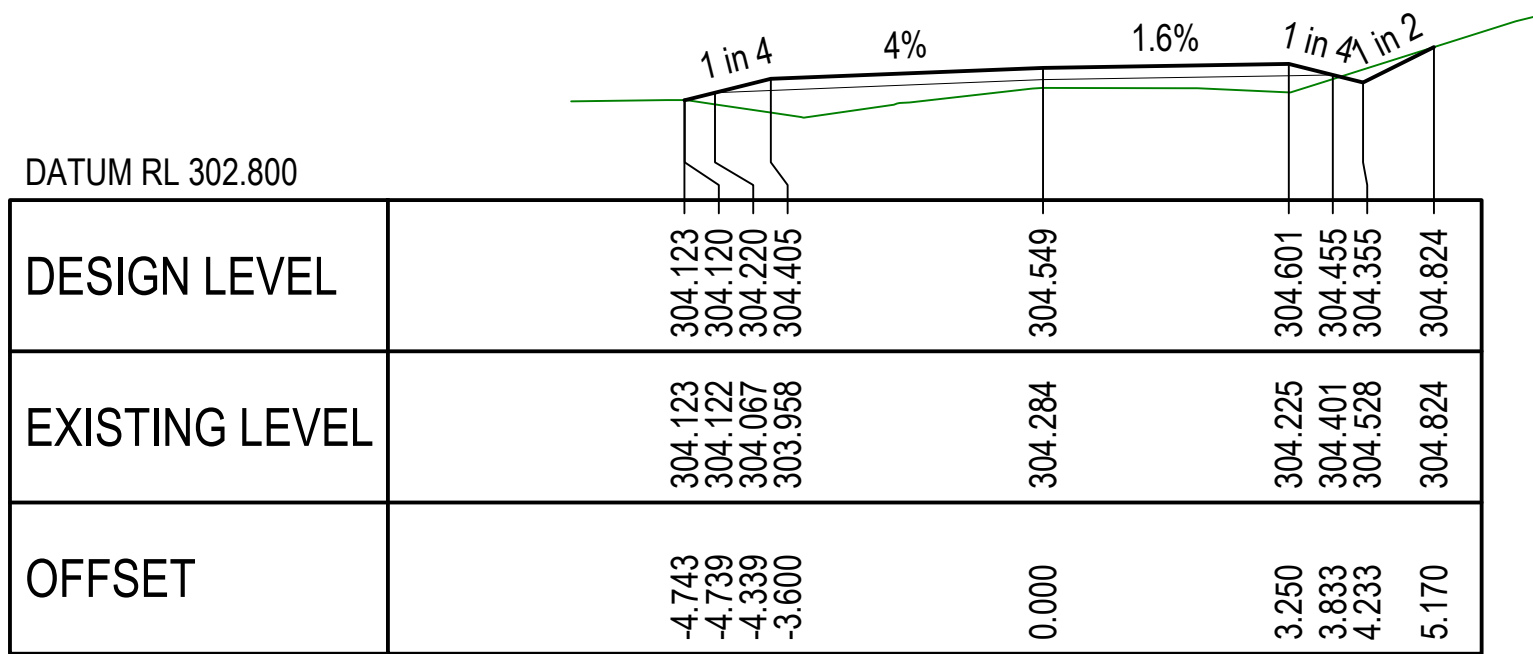


<b>Title</b> CRACOW ROAD UPGRADE (Ch. 73650m - 74002m) SITE 7 - STABILISATION ANNOTATED CROSS SECTIONS SHEET 2						<b>Job No.</b>  	<b>CRC00291</b>
						<b>Drawing No.</b>  	<b>801</b>
<b>Drawn</b>  		<b>ENGINEERING CERTIFICATION (RPEQ)</b>				<b>Revision</b>  	<b>A</b>
<b>B Doherty</b>	<b>ENG. AREA</b>  	<b>NAME</b>  	<b>SIGNATURE</b>  	<b>NO.</b>  	<b>DATE</b>  		
<b>Designed</b>  	Civil	T Penrose		24087	28/09/23	<b>Series No.</b>  	<b>10 of 18</b>
<b>B Doherty</b>							

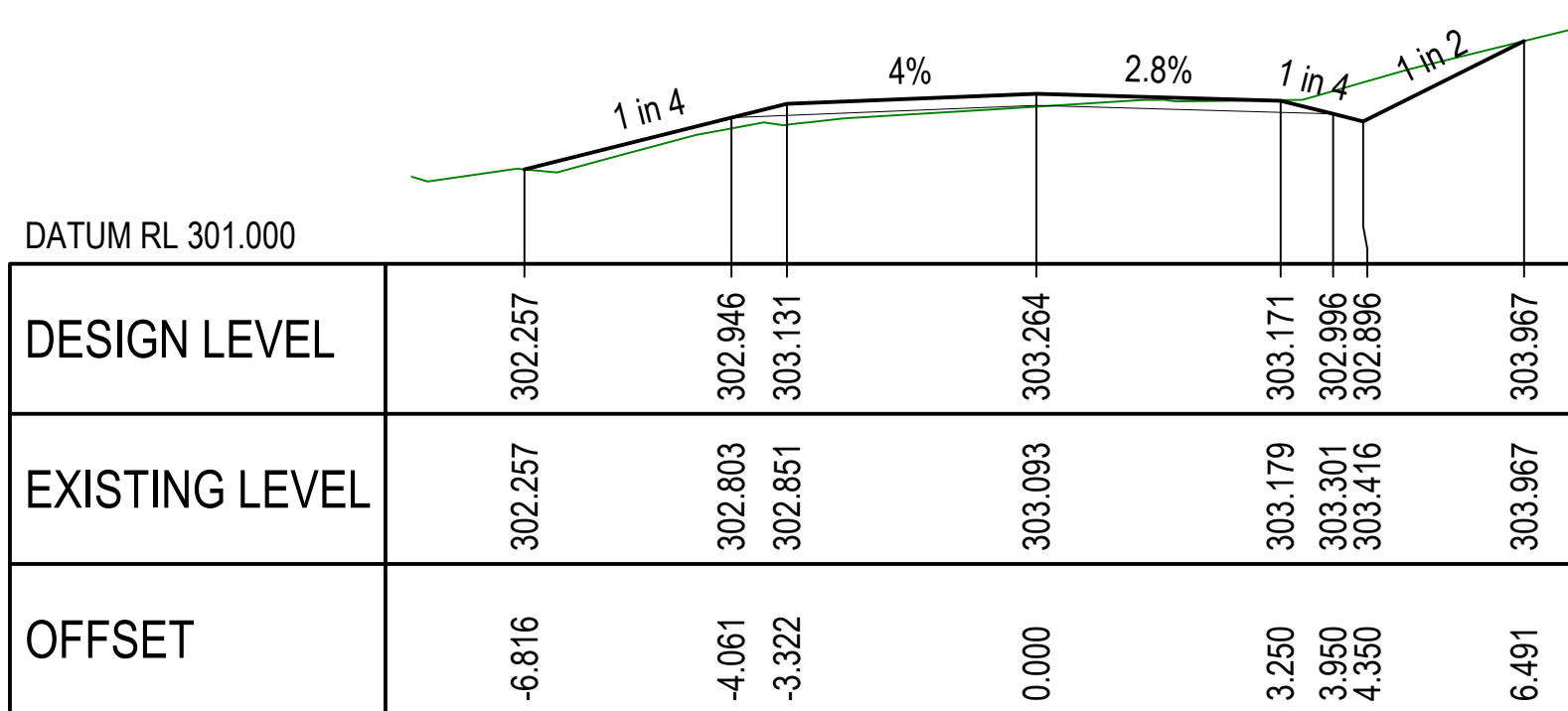




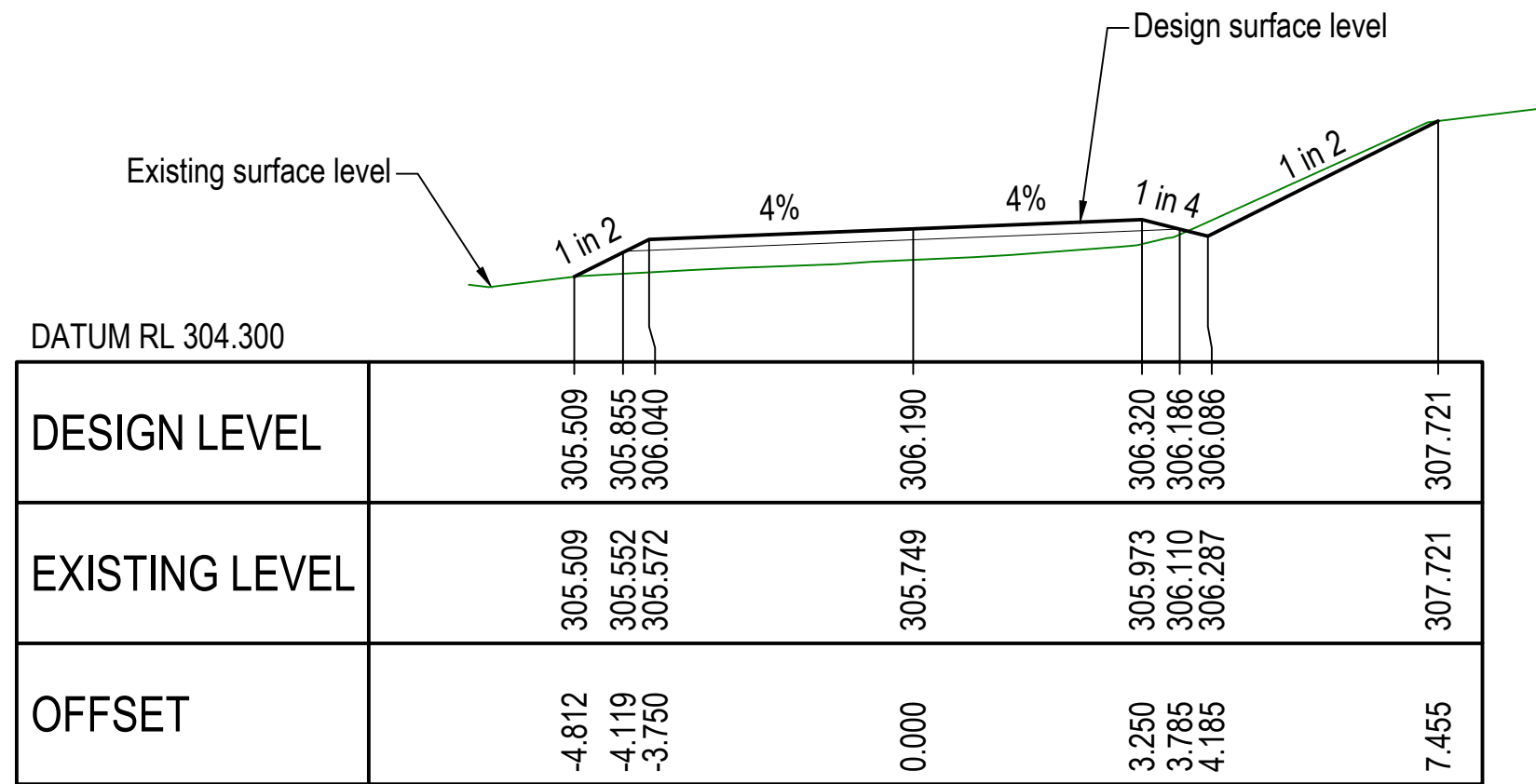
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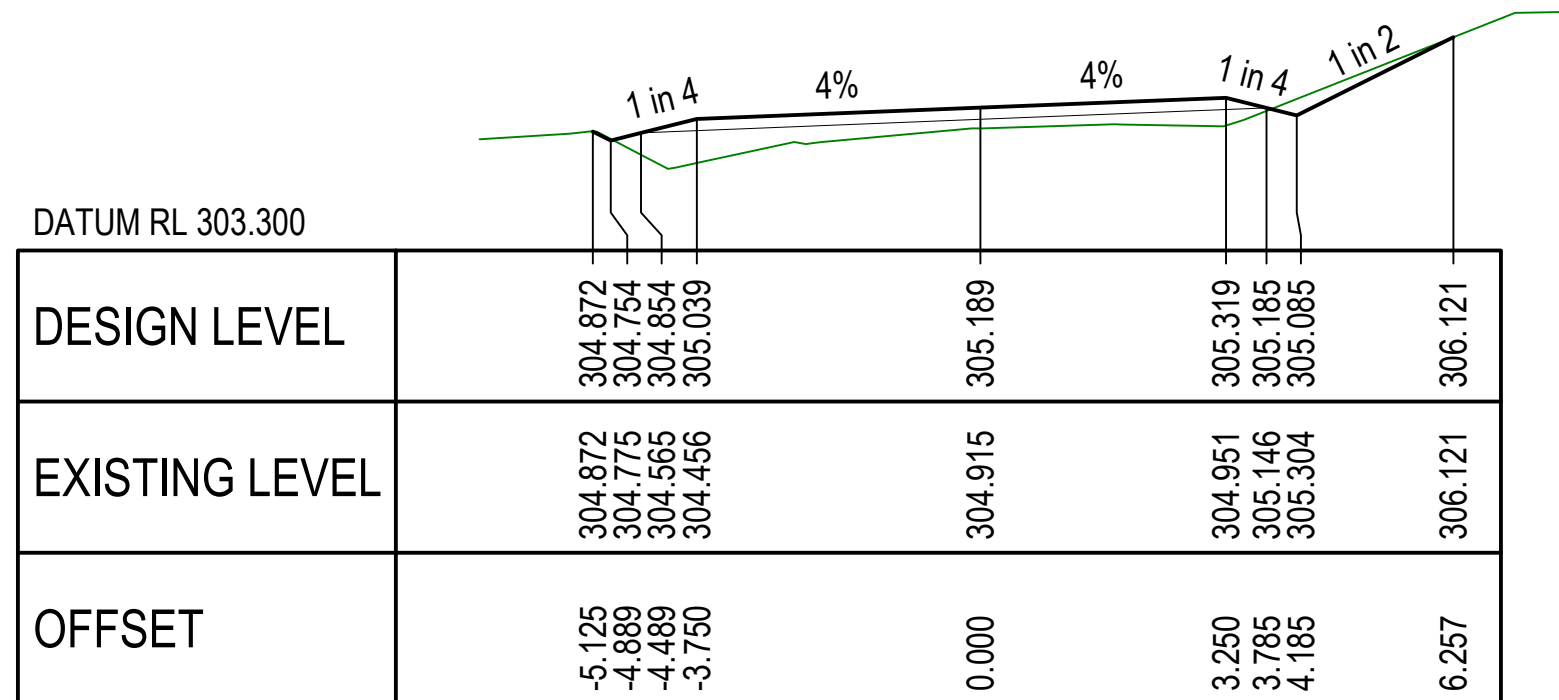
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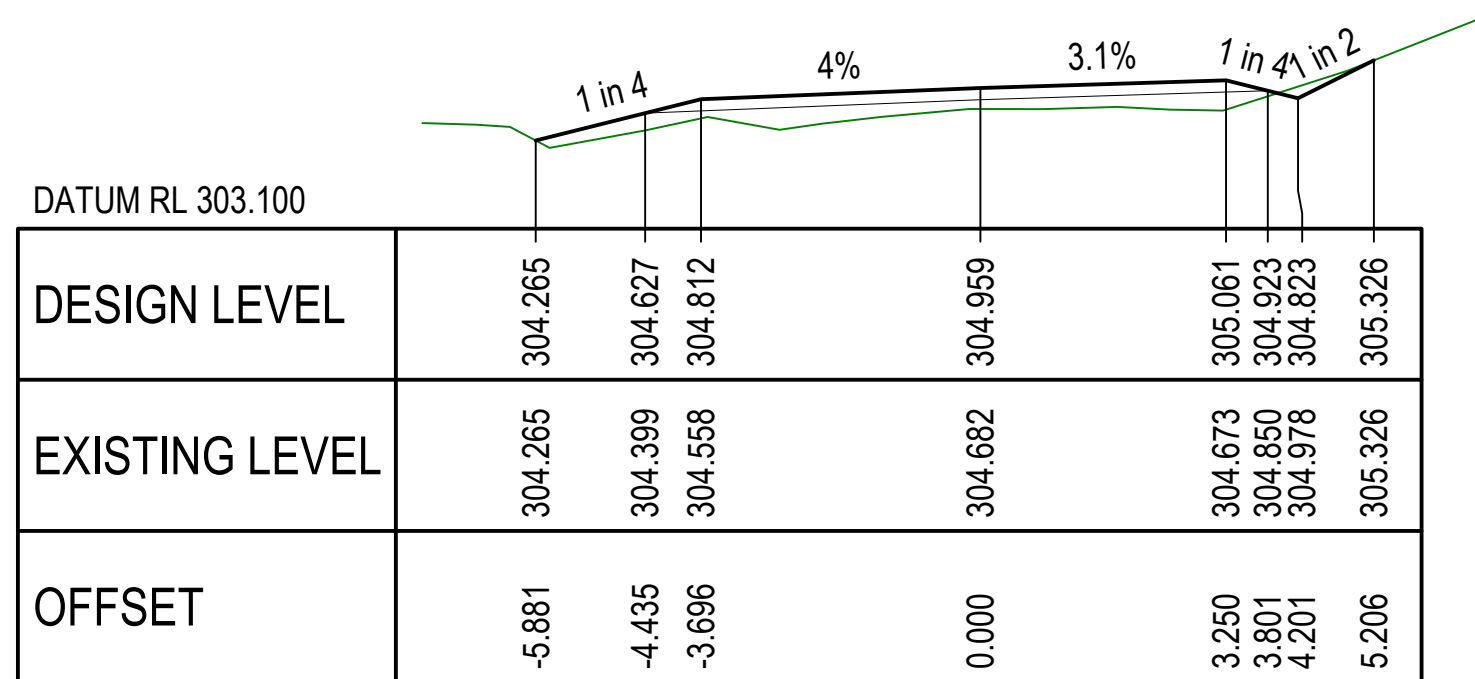
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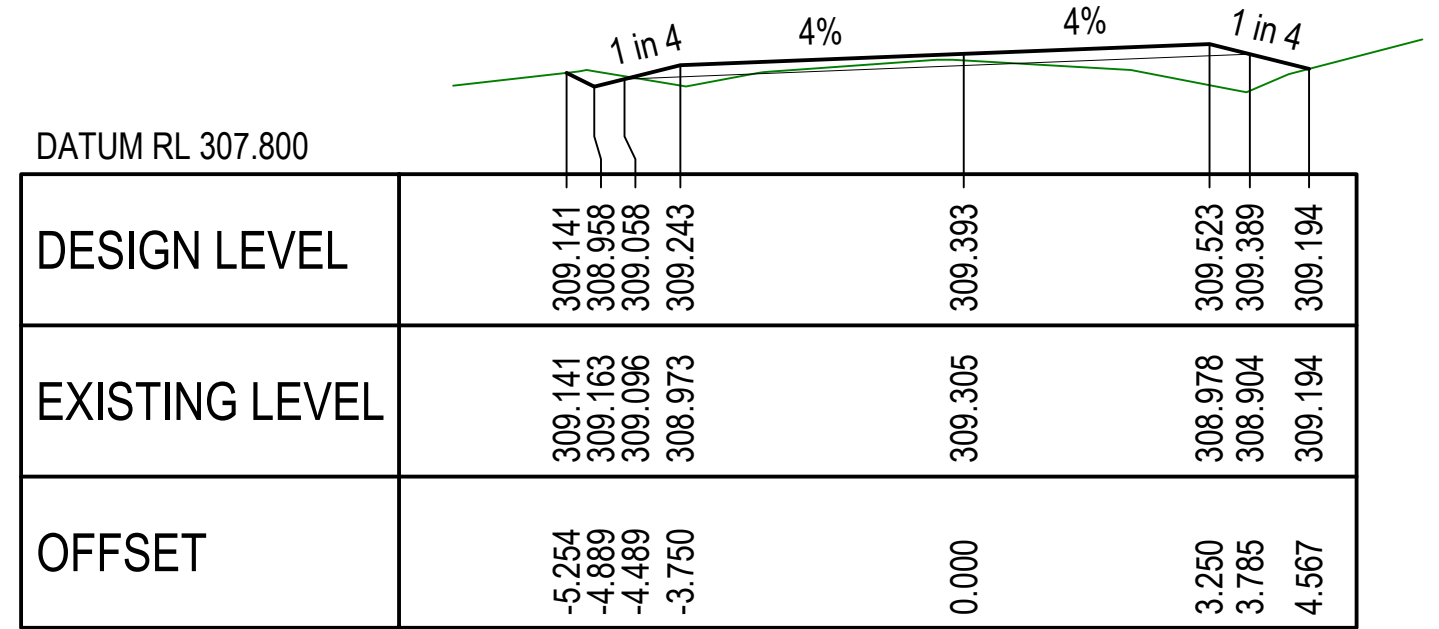
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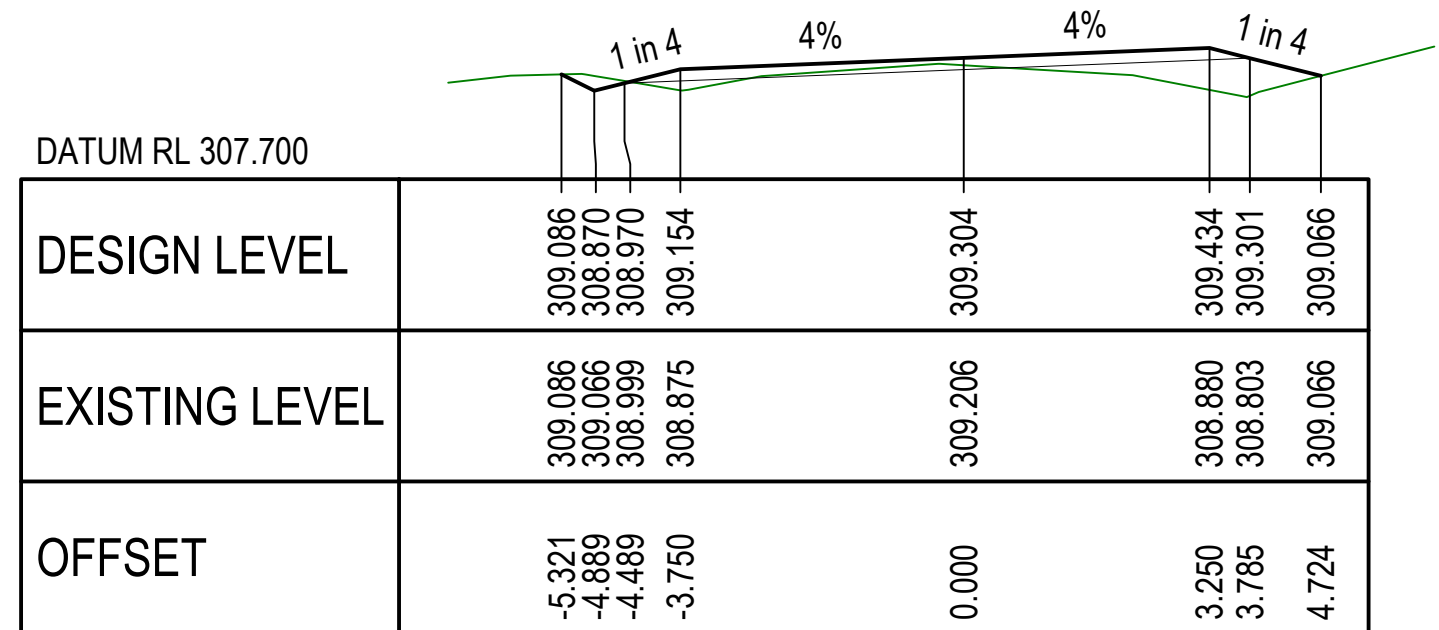
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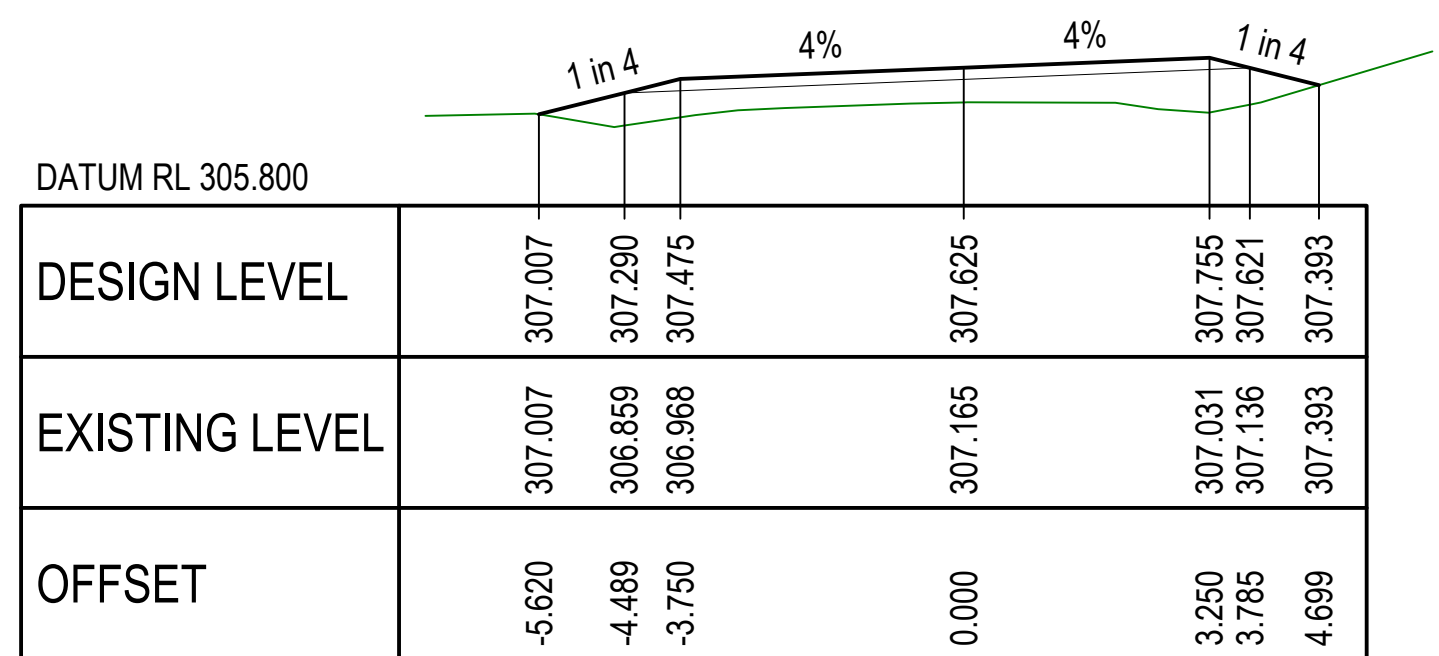
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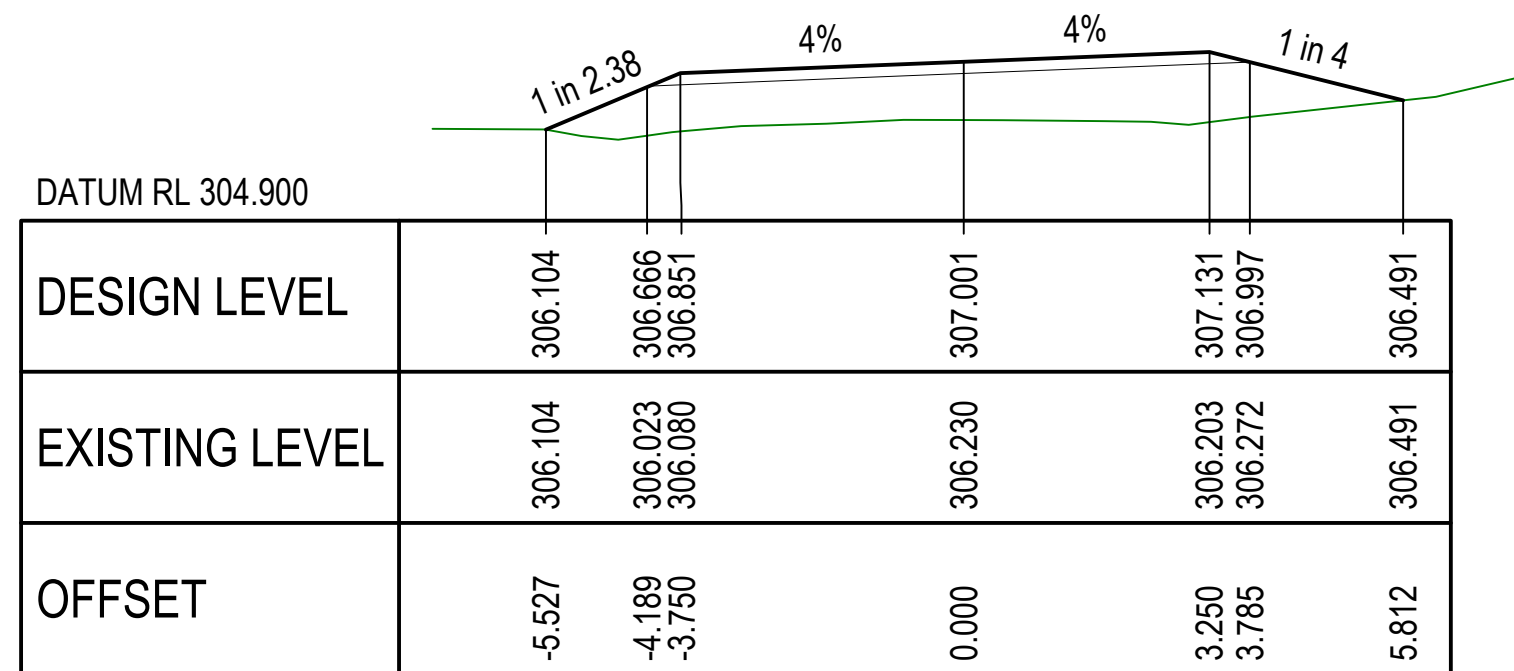
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CH. 73839.092



CH. 73820.000

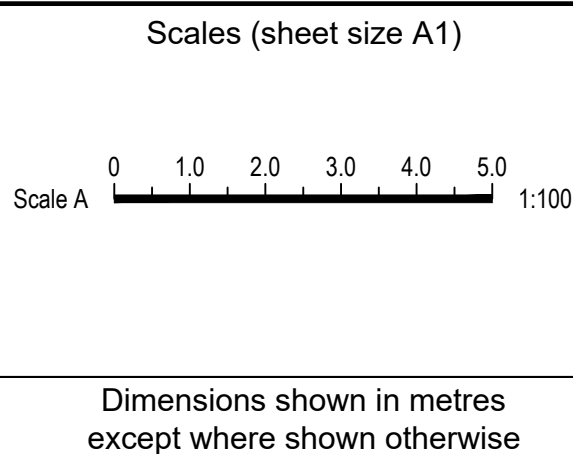


CH. 73811.592

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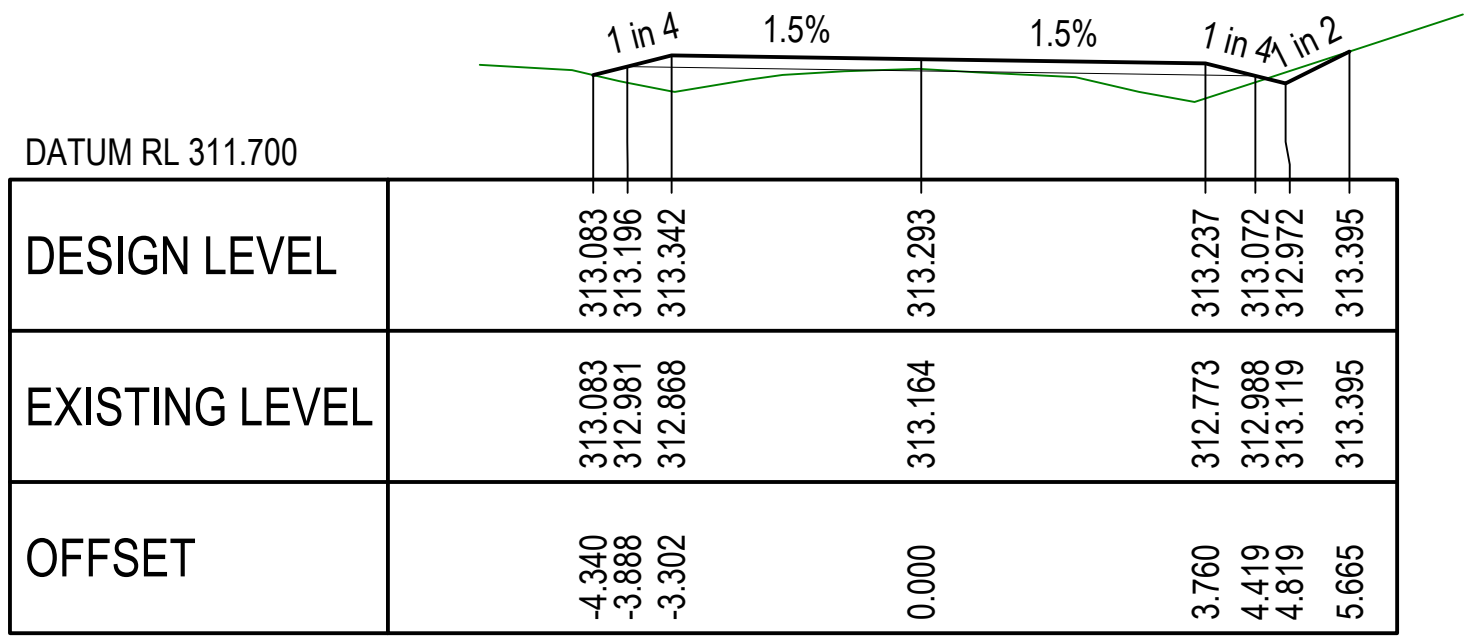
## CROSS SECTIONS

Scale A

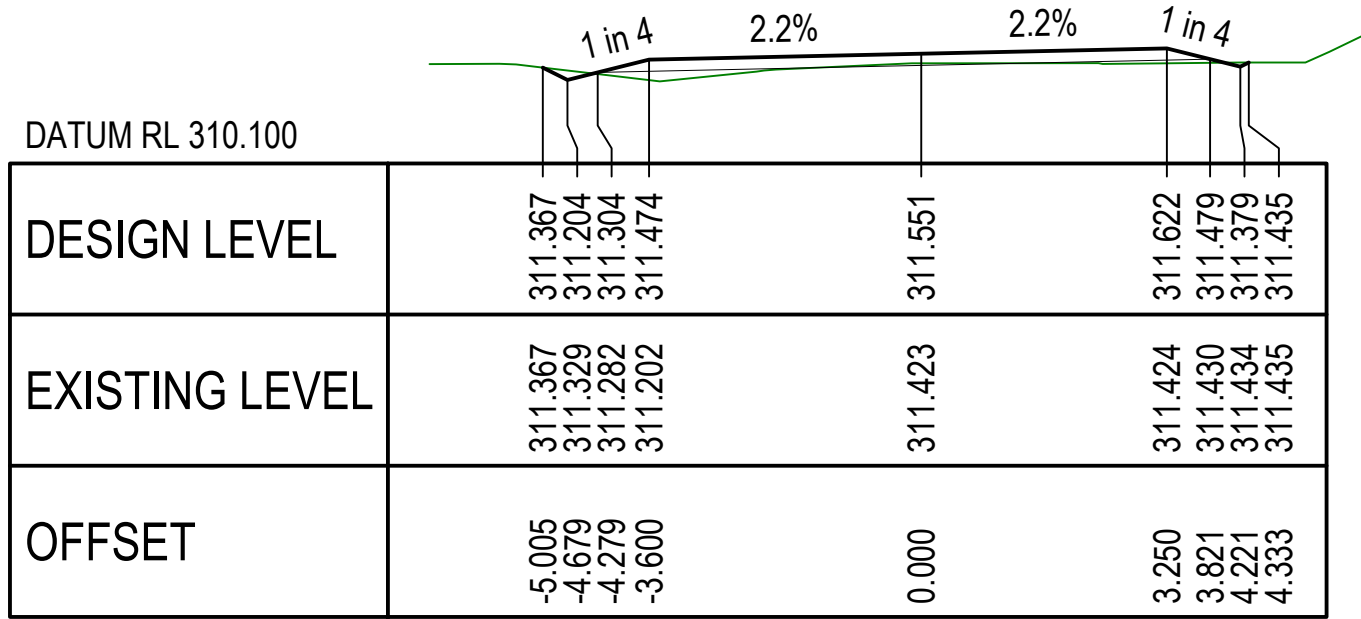


Title CRACOW ROAD UPGRADE (Ch. 73650m - 74002m) SITE 7 - STABILISATION ANNOTATED CROSS SECTIONS SHEET 3					Job No.	CRC00291
					Drawing No.	802
Drawn B Doherty	ENGINEERING CERTIFICATION (RPEQ)					Revision A
	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Series No. 11 of 18
Designed B Doherty	Civil	T Penrose		24087	28/09/23	

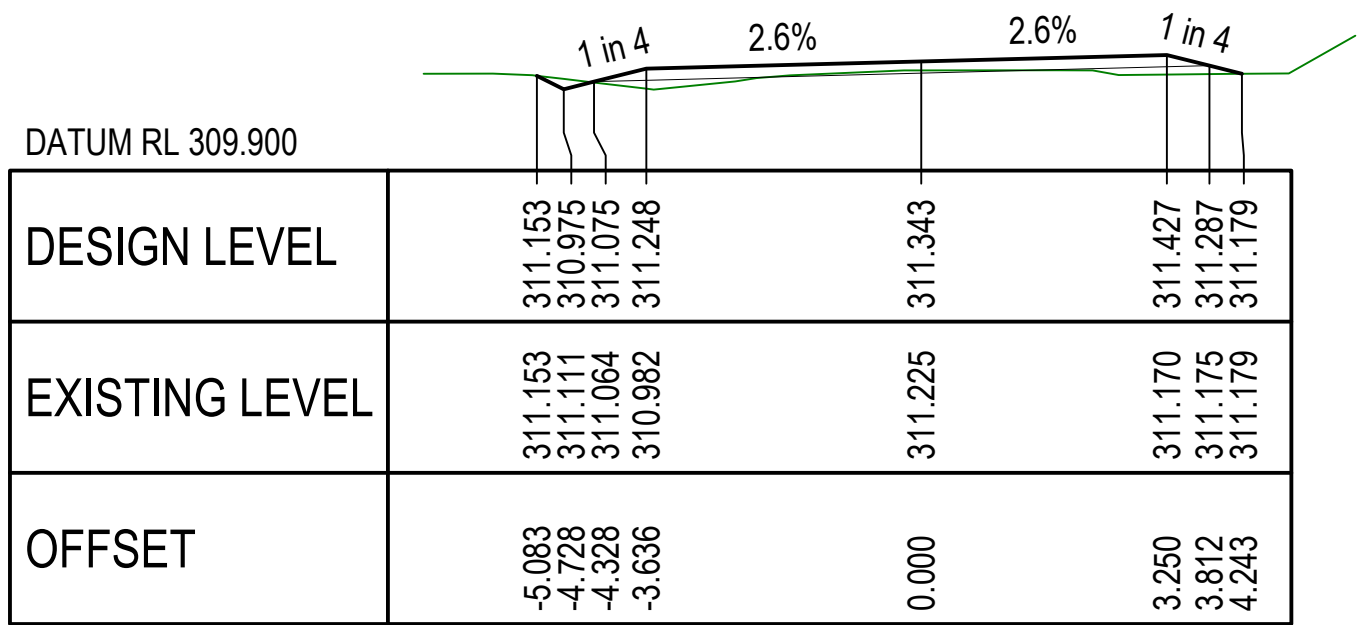




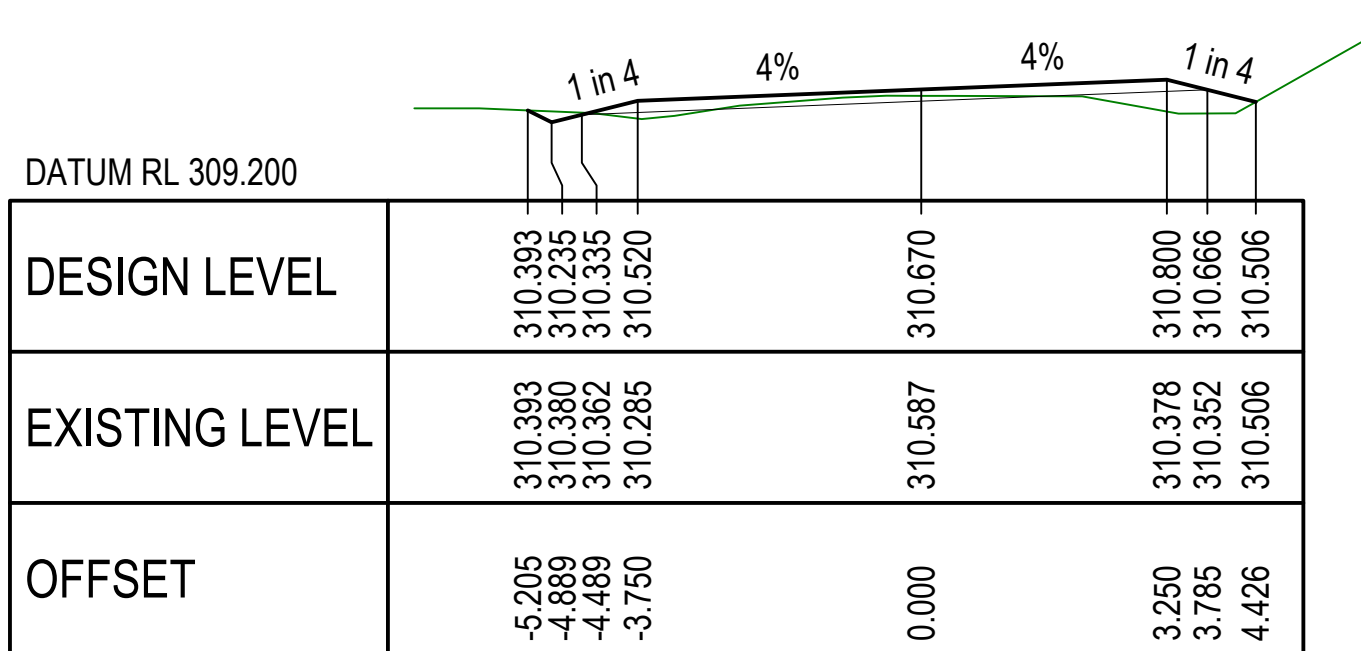
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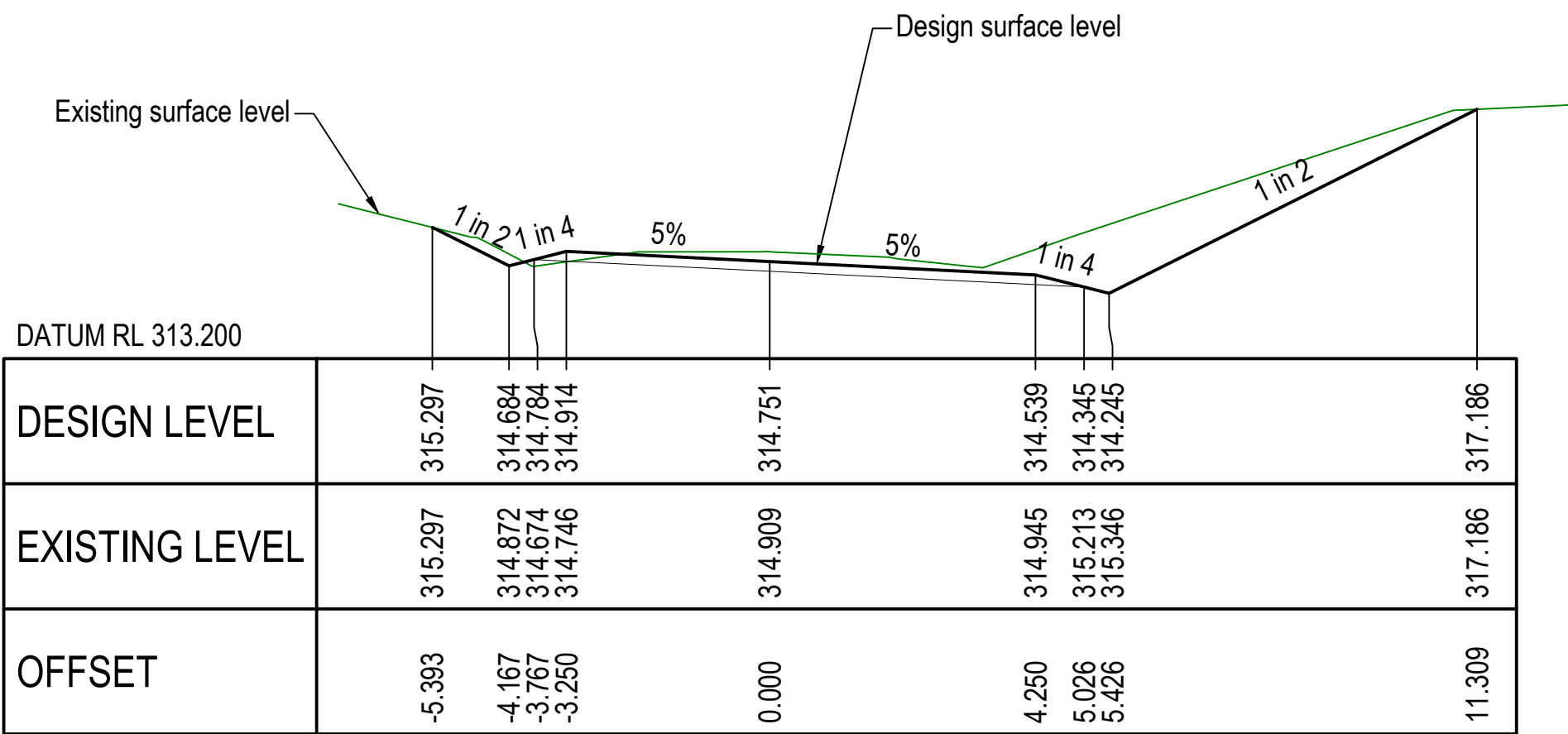
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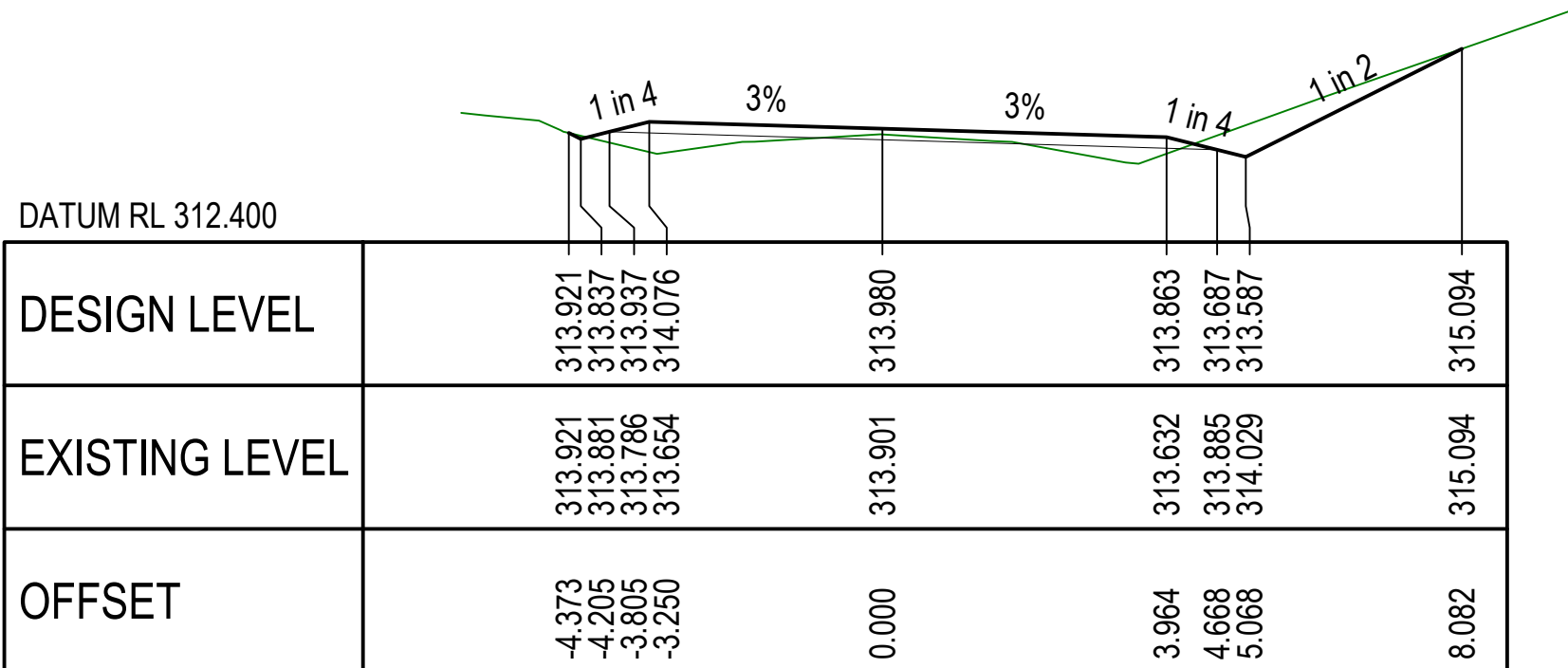
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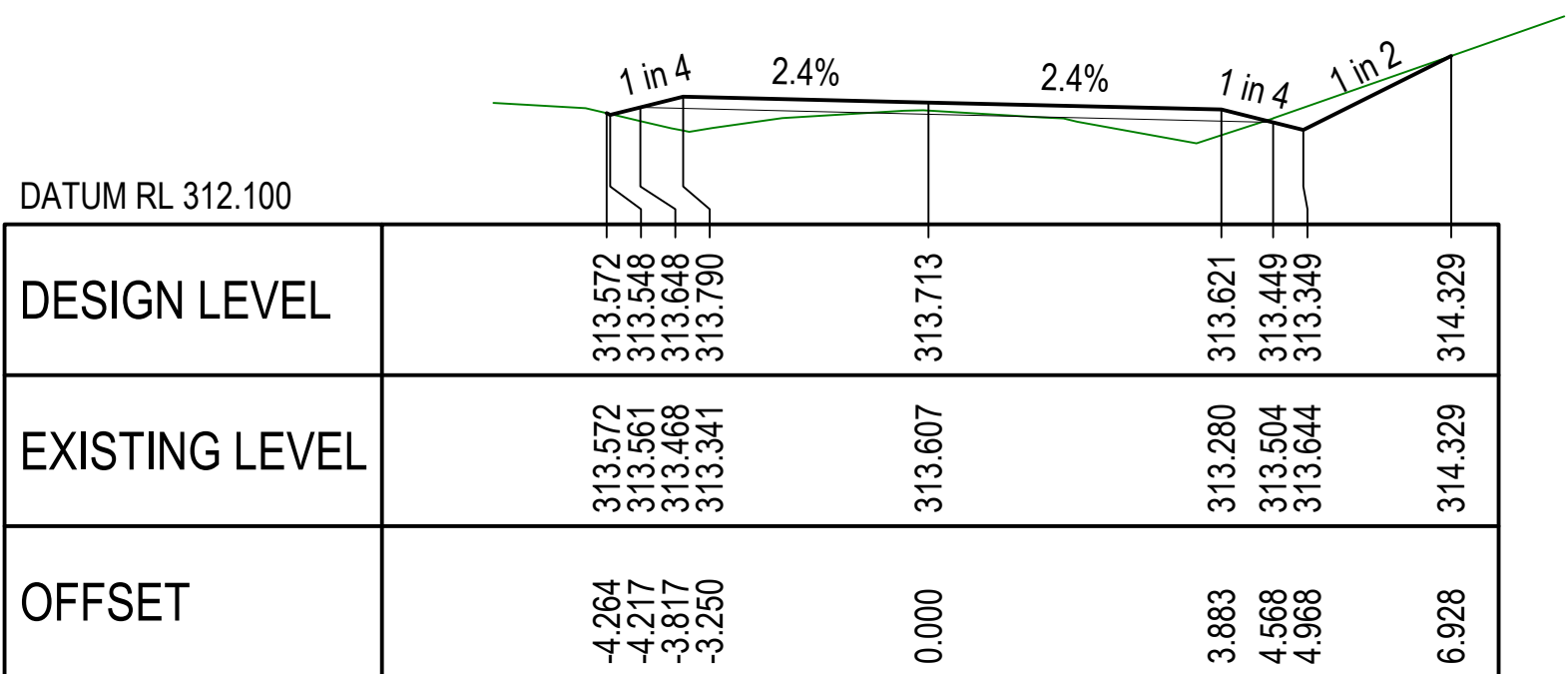
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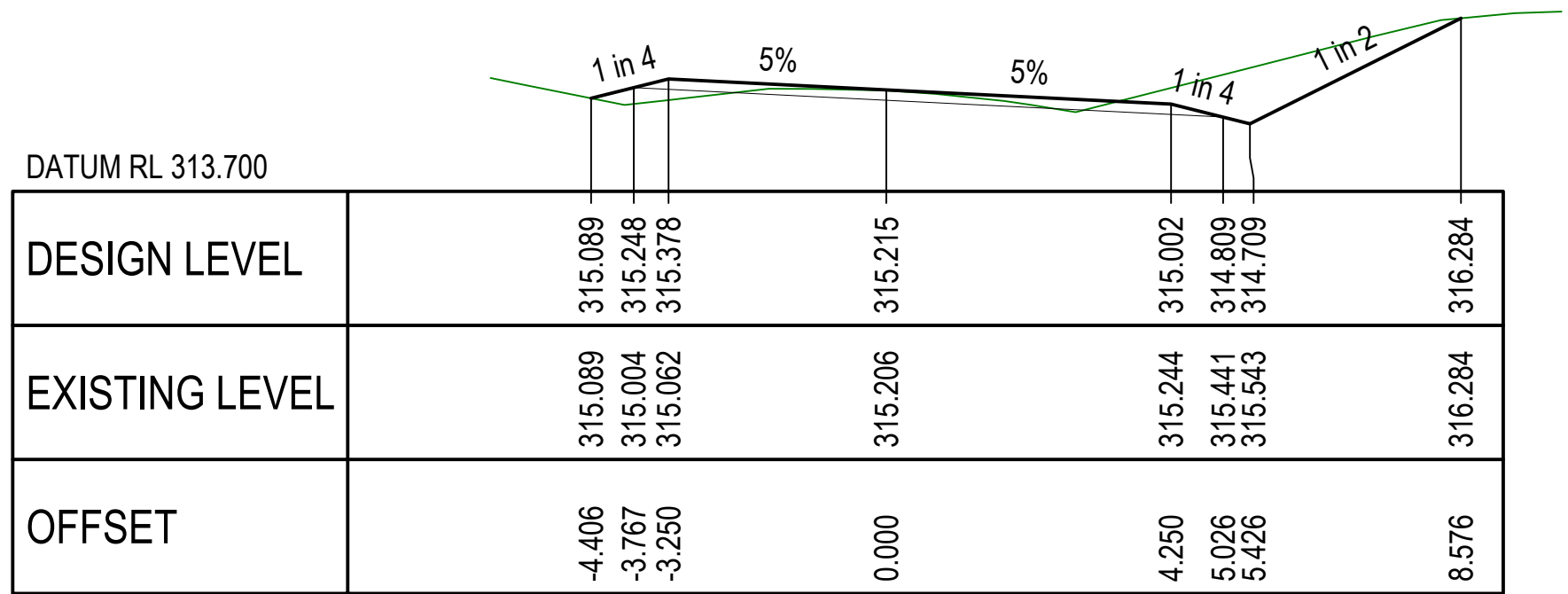
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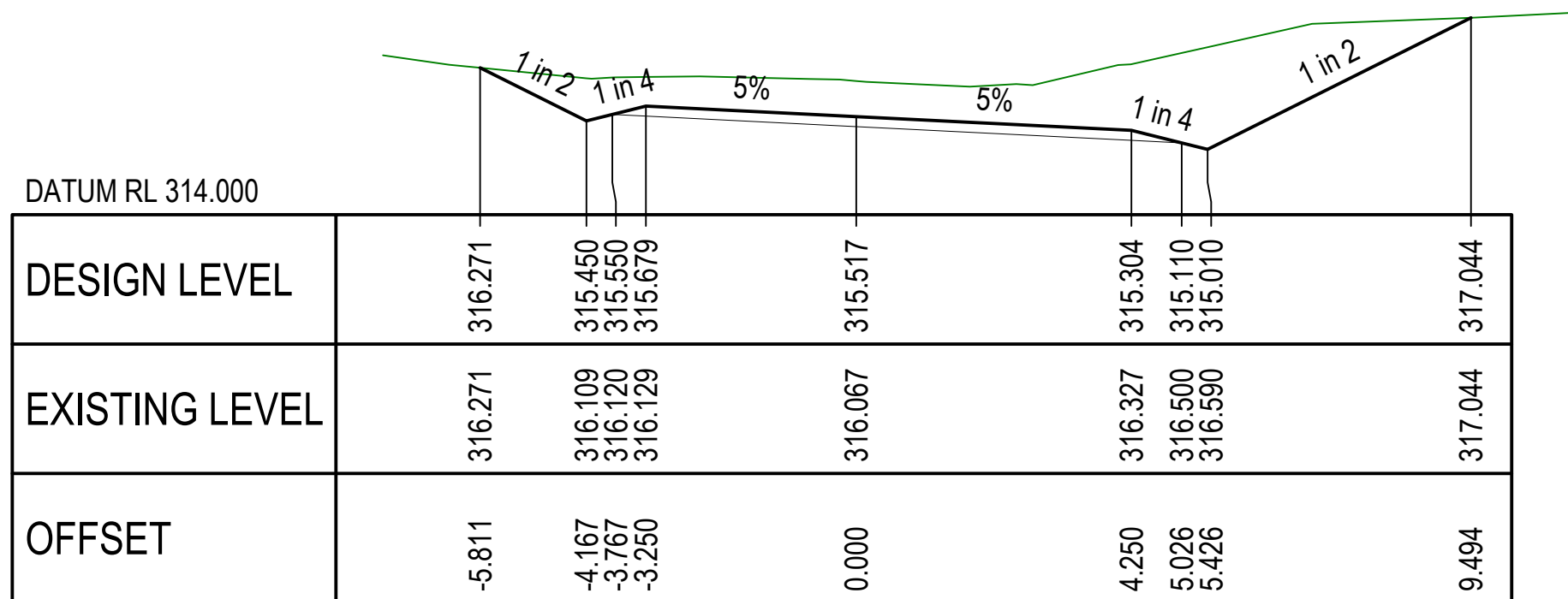
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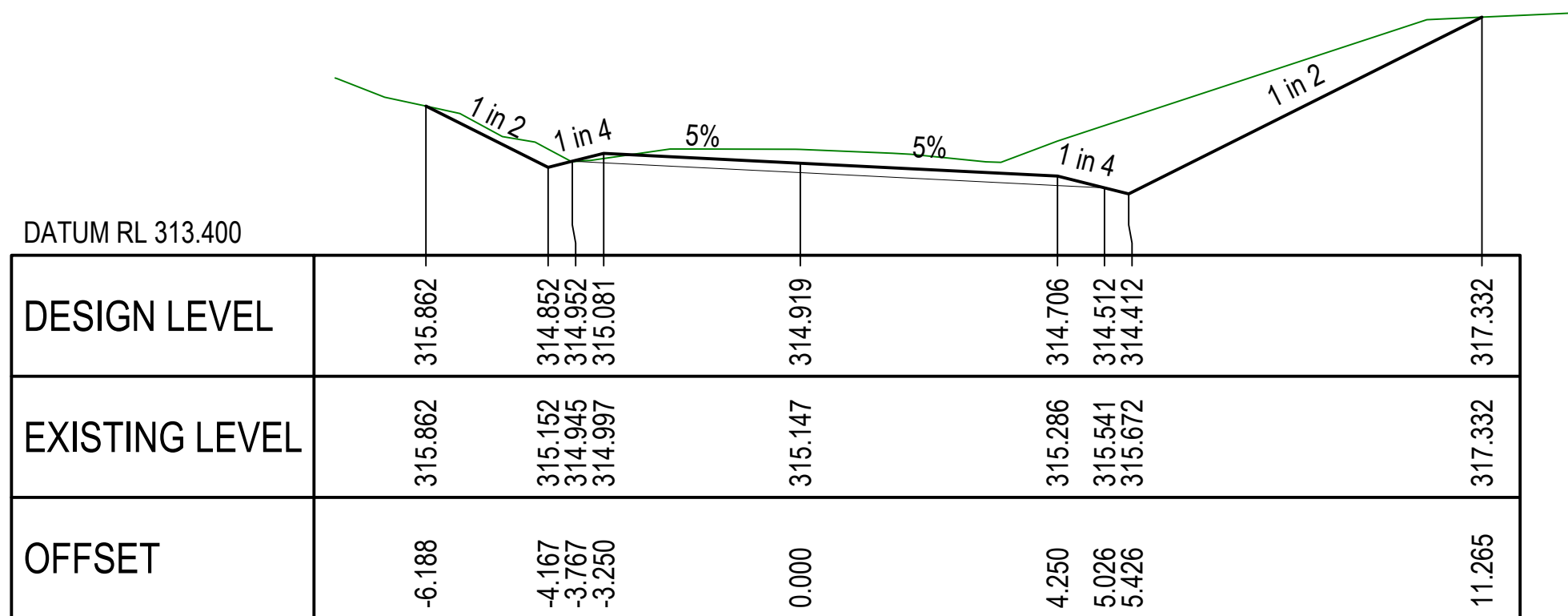
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CH. 73936.558



CH. 73920.000

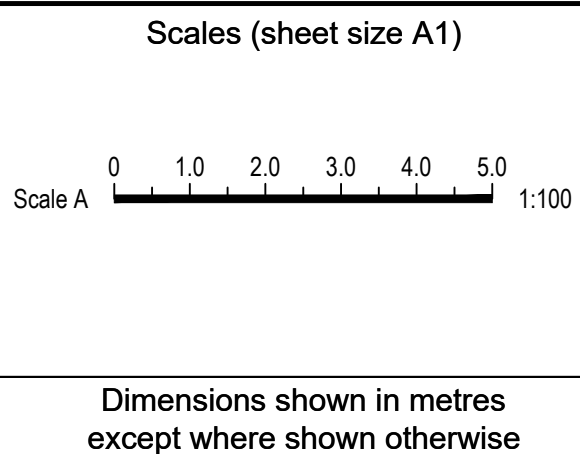


CH. 73900.000

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## CROSS SECTIONS

Scale A



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Title CRACOW ROAD UPGRADE (Ch. 73650m - 74002m) SITE 7 - STABILISATION ANNOTATED CROSS SECTIONS SHEET 4					Job No.	CRC00291
Drawn B Doherty					Drawing No.	803
Designed B Doherty					Revision	A
					Series No.	12 of 18





Existing surface level

Design surface level

1 in 4

4%

4%

1 in 4

1 in 2

DATUM RL 313.500

DESIGN LEVEL	314.755	314.985	315.119	314.989	314.824	314.639	314.539	315.730
EXISTING LEVEL	314.755	314.572	314.627	314.807	314.877	315.063	315.159	315.730
OFFSET	-4.704	-3.785	-3.250	0.000	4.136	4.875	5.275	7.658

The diagram illustrates a cross-section of a road profile. A green line represents the existing ground surface, and a black line represents the proposed design grade. The profile starts with a 1 in 4 downward slope, followed by a 4.5% upward grade, then a 4.6% downward grade, another 1 in 4 downward slope, and finally a 1 in 2 upward slope. A datum of RL 313.500 is indicated on the left. Below the profile, a table provides the vertical alignment data.

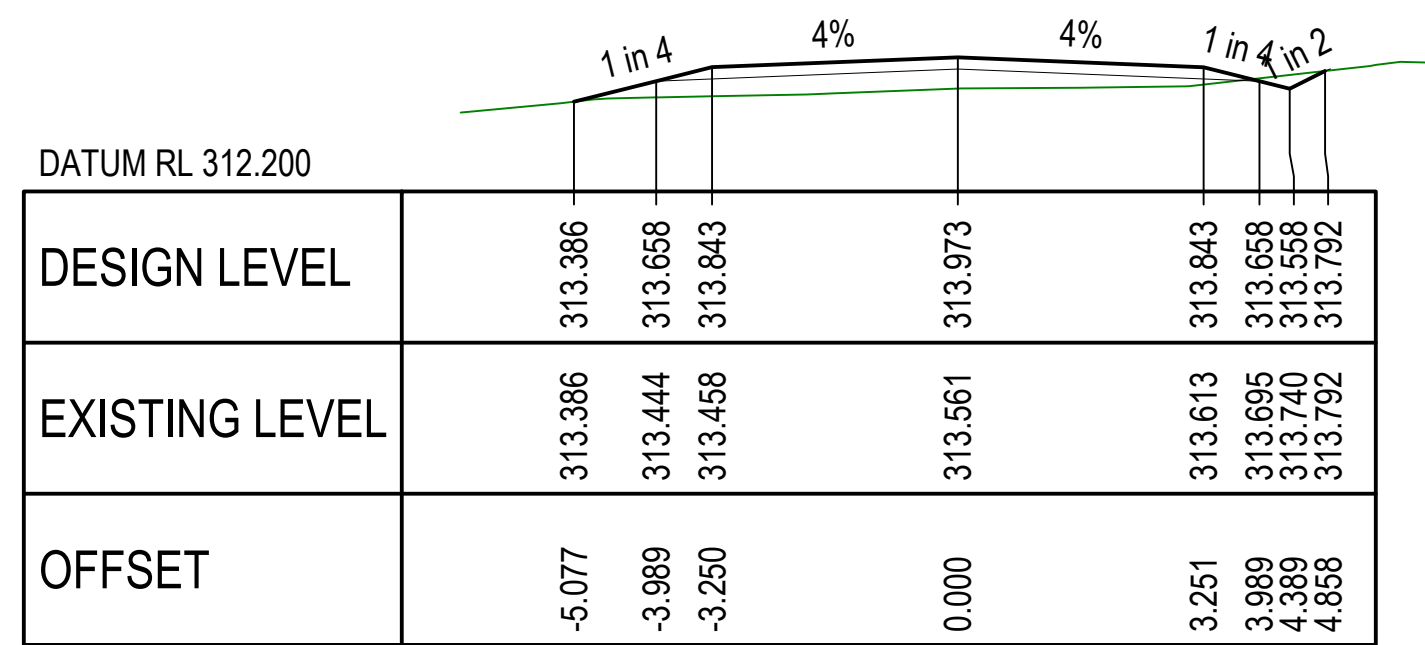
	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7
DESIGN LEVEL	314.890	315.094	315.225	315.077	314.886	314.696	315.994
EXISTING LEVEL	314.890	314.733	314.793	314.963	315.017	315.211 315.314	315.994
OFFSET	-4.588	-3.775 -3.250		0.000		4.199 4.958 5.358	8.154

	Station 1+00	Station 1+25	Station 1+50	Station 1+75	Station 2+00	Station 2+25	Station 2+50	Station 2+75	Station 3+00
DATUM RL 313.600									
DESIGN LEVEL	314.999	315.183	315.312	315.149	314.937	314.743	314.643		316.191
EXISTING LEVEL	314.999	314.874	314.932	315.090	315.139	315.337	315.439		316.191
OFFSET	-4.503	-3.767	-3.250	0.000	4.250	5.026	5.426		8.522

**WARNING!**

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	313.697	314.102	314.261	314.280	314.135	313.951	313.851	314.256
DESIGN LEVEL	313.697	314.102	314.261	314.280	314.135	313.951	313.851	314.256
EXISTING LEVEL	313.697	313.682	313.752	313.886	313.935	314.057	314.122	314.256
OFFSET	-5.505	-3.885	-3.250	0.000	3.628	4.367	4.767	5.578

DATUM RL 312.500

The diagram illustrates a cross-section of a road profile. A green line represents the existing ground surface, and a black line represents the proposed design grade. The design grade starts with a 1 in 4 upward slope, followed by a 0.1% upward slope, then a 4% downward slope, and finally a 1 in 4 downward slope. A 4 in 2 slope is indicated at the far right end of the design grade. The existing ground surface is shown as a green line that generally follows the design grade but with some variations. The vertical axis is labeled 'DATUM RL 312.600'. The horizontal axis shows stationing points: 313.800, 314.187, 314.343, 314.347, 314.200, 314.016, 313.916, and 314.290. The vertical axis also shows offsets: -5.420, -3.874, -3.250, 0.000, 3.678, 4.417, 4.817, and 5.565. The design level is shown as a black line, and the existing level is shown as a green line. The offset is the vertical distance between the design level and the existing level.

Station	Design Level (RL)	Existing Level (RL)	Offset (m)
313.800	313.800	313.800	-5.420
314.187	314.187	313.734	-3.874
314.343	314.343	313.802	-3.250
314.347	314.347	313.930	0.000
314.200	314.200	313.979	3.678
314.016	314.016	314.100	4.417
313.916	313.916	314.166	4.817
314.290	314.290	314.290	5.565

DATUM RL 313.100	
DESIGN LEVEL	<div> <div>1 in 4</div> <div>2.4%</div> <div>4%</div> <div>1 in 4</div> <div>1 in 2</div> </div> <div> <div>314.385</div> <div>314.686</div> <div>314.827</div> <div>314.748</div> <div>314.590</div> <div>314.405</div> <div>314.305</div> <div>315.072</div> </div>
EXISTING LEVEL	<div>314.385</div> <div>314.201</div> <div>314.267</div> <div>314.444</div> <div>314.436</div> <div>314.602</div> <div>314.699</div> <div>315.072</div>
OFFSET	<div>-5.020</div> <div>-3.815</div> <div>-3.250</div> <div>0.000</div> <div>3.964</div> <div>4.703</div> <div>5.103</div> <div>6.636</div>

## CROSS SECTIONS

	313.707	313.741	313.651	313.612	313.742	313.612	313.880	313.938	314.232
DESIGN LEVEL									
EXISTING LEVEL	313.707	313.741	313.651	313.587	313.695	313.807	313.989	314.087	314.232
OFFSET	-5.148	-4.389	-3.989	-3.250	0.000	3.250	3.989	4.389	4.976

The diagram illustrates a cross-section of a road profile. A horizontal line at the top is labeled 'DATUM RL 312.300'. Below this, the profile is divided into sections with different grades: 1 in 4, 4%, and 1 in 4.82 in 2. The profile shows a dip in the center and a rise on the right. The design level is shown as a solid line, and the existing level is shown as a dashed line. The offset is the vertical distance between the design and existing levels.

	313.660	313.347	313.447	313.632	313.762	313.632	313.785	313.803	314.294
DESIGN LEVEL	313.660	313.347	313.447	313.632	313.762	313.632	313.785	313.803	314.294
EXISTING LEVEL	313.660	313.689	313.598	313.556	313.683	313.799	313.981	314.080	314.294
OFFSET	-0.016	-4.389	-3.989	-3.250	0.000	3.250	3.989	4.389	5.371

	313.414	313.600	313.784	313.914	313.784	313.600	313.972
DESIGN LEVEL	313.414	313.600	313.784	313.914	313.784	313.600	313.972
EXISTING LEVEL	313.414	313.430	313.452	313.690	313.667	313.739	313.972
OFFSET	-4.731	-3.989	-3.250	0.000	3.250	3.989	5.333


	313.401	313.651	313.835	313.965	313.835	313.651	313.401
DESIGN LEVEL	313.401	313.651	313.835	313.965	313.835	313.651	313.401
EXISTING LEVEL	313.401	313.436	313.451	313.564	313.618	313.700	313.801
OFFSET	-4.988	-3.989	-3.250	0.000	3.250	3.989	4.889

Client

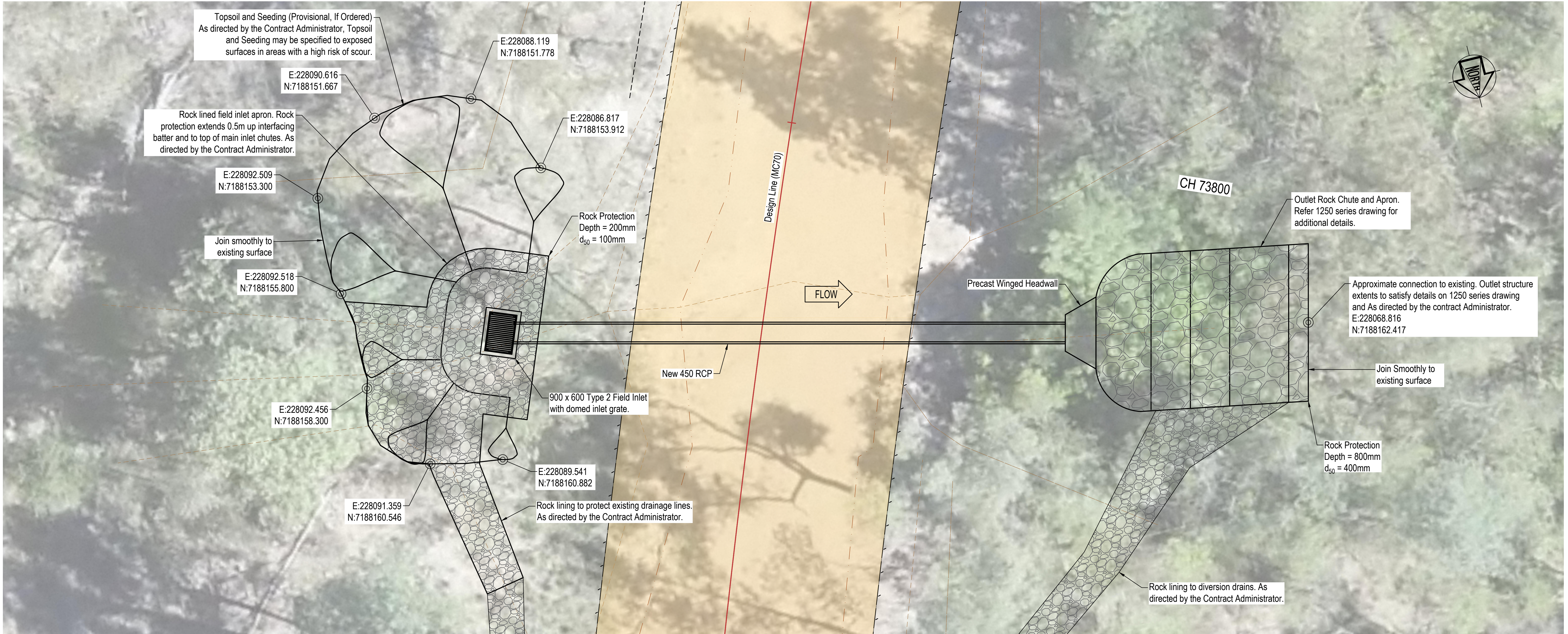


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<div> <div>Title</div> <div>CRACOW ROAD UPGRADE (Ch. 73650m - 74002m)</div> <div>SITE 7 - STABILISATION</div> <div>ANNOTATED CROSS SECTIONS SHEET 5</div> </div>						Job No.	CRC00291
						Drawing No.	804
Drawn	ENGINEERING CERTIFICATION (RPEQ)					Revision	A
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE		
Designed	Civil	T Penrose		24087	28/09/23	Series No.	13 of 18
B Doherty							





**PLAN**  
Scale: 1:50

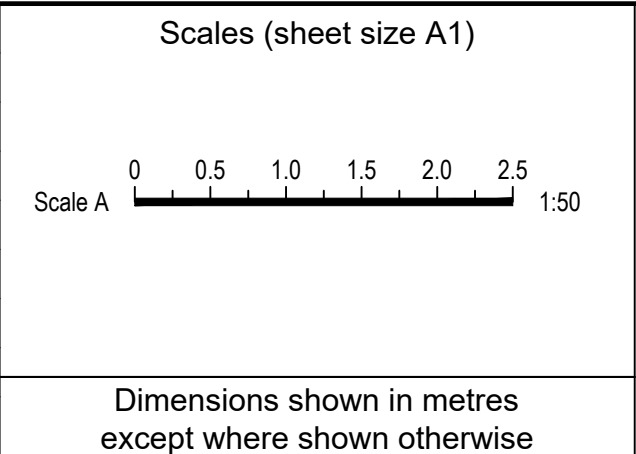
**DRAINAGE SCHEDULE**

**WARNING!**  
**BEWARE OF UNDERGROUND SERVICES**  
The location of underground services has been compiled from engineering survey and interpolated from Dial Before You Dig as provided by the Service Authorities. No responsibility is taken for the accuracy of the interpolated information supplied. Ensure all services are accurately located prior to commencement of work.

Culvert					Base Slab / Footing				Headwall		Apron			Cutoff Wall			Wingwall 1				Wingwall 2				Blinding	Excavation (m³)		Backfill			Filters							
Alignment	Chainage	Skew	ID	Structure	Exp	Concrete	Rebar	Fabric		Concrete	Rebar	Fabric		Concrete	Fabric		Length	Concrete	Rebar	Fabric		Length	Concrete	Rebar	Fabric		Concrete	Culvert	Inlet /	Overlay	Fill	Foundation	Block	Strip				
	(m)	No.			Class	(m²)	(kg)	(m²)	Type	(m²)	(kg)	(m²)	(kg)	(m²)	Type	(m²)	(m²)	Type	(m)	(m²)	(kg)	(m²)	Type	(m)	(m²)	(kg)	(m²)	Type	(m²)		Outlet	(m²)	(m²)	(m²)	Count	Count		
MC70	73805.406	82.3	CULVERT 1	"450 RCP (6/2.44)"	B2					Precast				0.2 (or precast)					Precast											54.2	40.0	5.8	2.2	3.9				
				Total Fabric (Area / Type)																																		

- NOTES:**
- Consideration for overtopping, destructive and nuisance flows - 2% AEP
  - Culvert design immunity - 5% AEP

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20.01	Revisions/Descriptions	Drawn	Approved	Date



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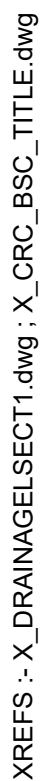
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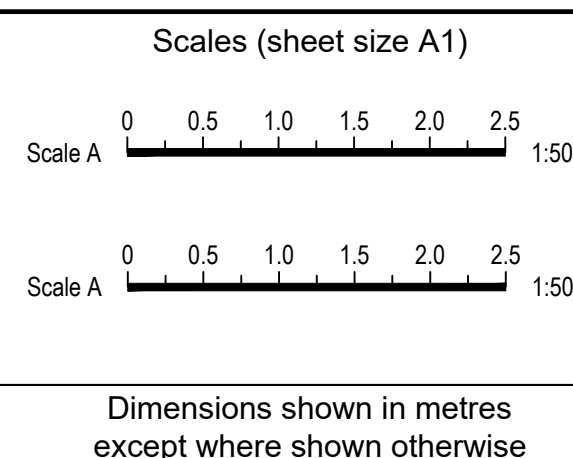
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Title CRACOW ROAD UPGRADE (Ch. 73650m - 74002m) SITE 7 - STABILISATION STORMWATER DETAILS						Job No.	CRC00291
						Drawing No.	1200
Drawn B Doherty	ENGINEERING CERTIFICATION (RPEQ)					Revision	A
	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Series No.	14 of 18
Designed B Doherty	Civil	T Penrose		24087	28/09/23		



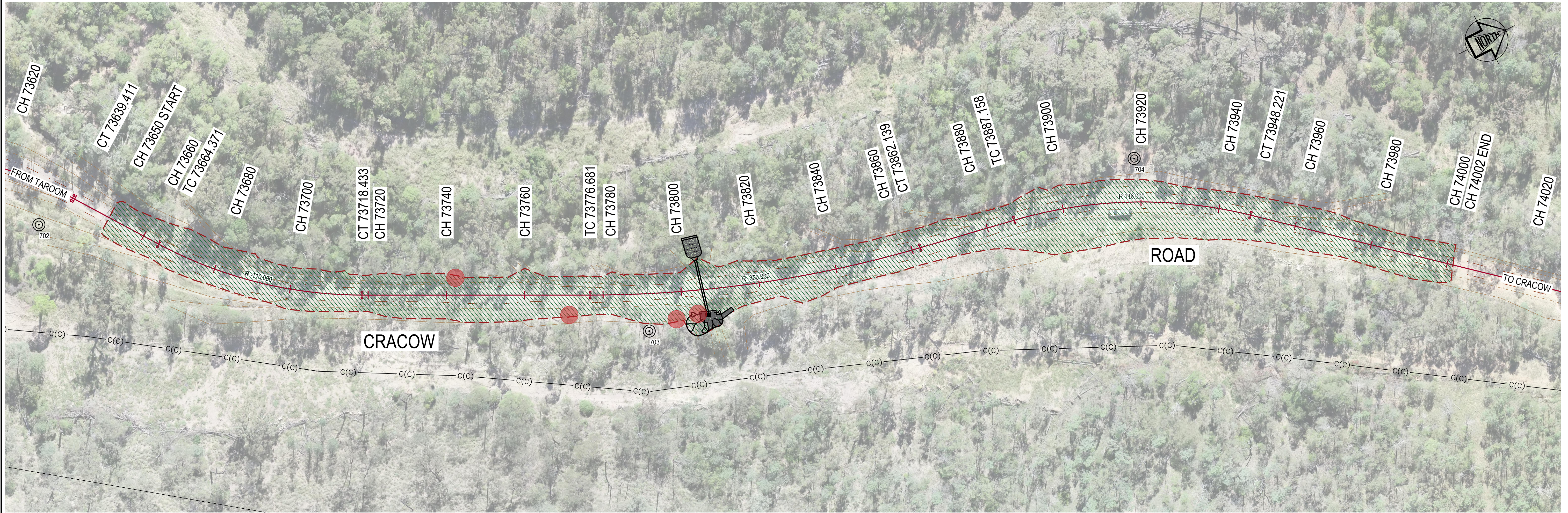


A	Issued for Construction			
20.01	Revisions/Descriptions	Drawn	Approved	Date



Title	CRACOW ROAD UPGRADE (Ch. 73650m - 74002m)					Job No.	CRC00291
	SITE 7 - STABILISATION STORMWATER LONGITUDINAL SECTION					Drawing No.	1250
Drawn	ENGINEERING CERTIFICATION (RPEQ)					Revision	A
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE		
Designed	Civil	T Penrose		24087	28/09/23	Series No.	15 of 18
B Doherty							





**PLAN**  
Scale: 1:500

DESIGN LINE MC70

CHAINAGE	OFFSET LHS	OFFSET RHS
73650	4.365	4.365
73660	5.439	4.744
73670	7.007	4.705
73680	6.057	4.170
73690	6.100	4.265
73700	5.502	5.259
73710	5.618	4.604
73720	5.079	4.221
73730	5.045	6.056
73740	5.450	6.116
73750	4.509	6.986
73760	6.816	6.425

DESIGN LINE MC70

CHAINAGE	OFFSET LHS	OFFSET RHS
73770	4.794	5.700
73780	4.811	4.918
73790	4.976	7.538
73800	4.812	7.420
73810	5.361	5.799
73820	5.620	4.699
73830	5.109	6.907
73840	5.225	4.567
73850	5.075	4.344
73860	5.039	4.243
73870	5.275	4.575
73880	4.340	5.573

DESIGN LINE MC70

CHAINAGE	OFFSET LHS	OFFSET RHS
73890	5.254	9.045
73900	6.144	11.223
73910	5.921	10.907
73920	5.780	9.453
73930	4.463	8.775
73940	4.588	8.106
73950	5.106	6.256
73960	5.505	5.525
73970	5.692	5.050
73980	4.731	5.286
73990	4.480	5.834
74000	5.115	4.943

LEGEND

- Tree to be removed
- Limit of clearing
- Survey Mark and Label
- Comms, Direct buried Optic Fibre

XREFS - X\_CRC\_BSC\_TITLE.dwg : X\_SURVEY.dwg : X\_CONTROL.dwg : X\_DESIGN.dwg : X\_HATCH.dwg : X\_IMAGE.dwg : X\_MDOT1 PLAN.dwg

Last Modified :- Oct 27, 2023 - 4:47pm

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Scales (sheet size A1)

Scale A 1:500

Dimensions shown in metres  
except where shown otherwise

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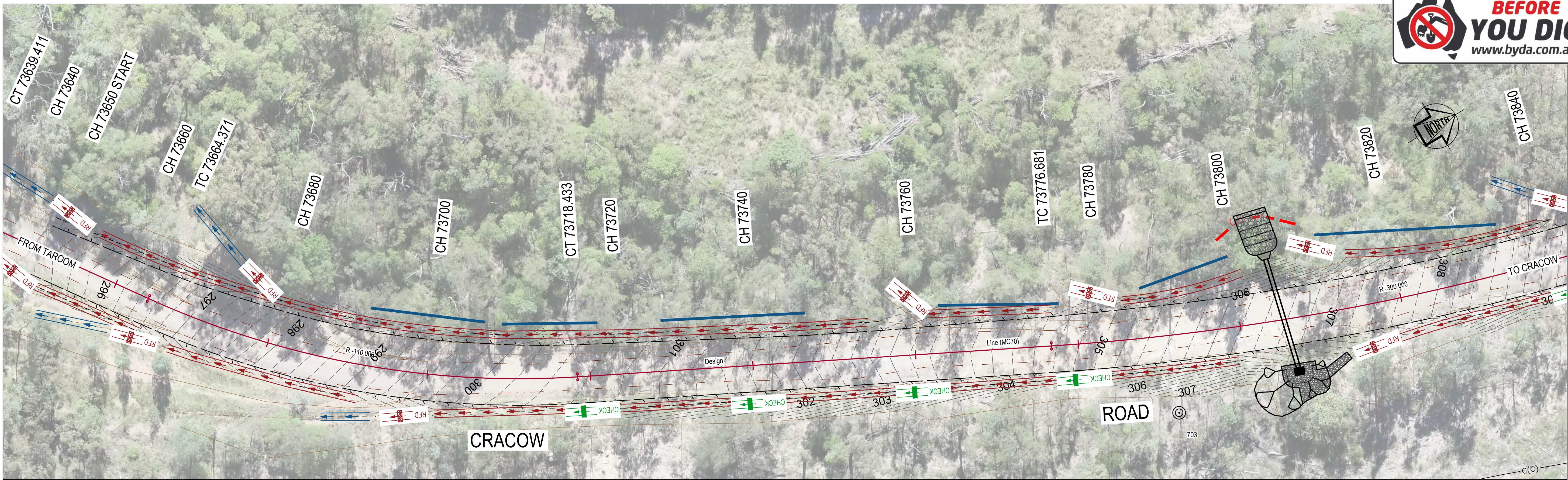
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Title CRACOW ROAD UPGRADE (Ch. 73650m - 74002m) SITE 7 - STABILISATION LIMIT OF CLEARING					Job No.	CRC00291
					Drawing No.	1600
Drawn B Doherty	ENGINEERING CERTIFICATION (RPEQ)				Revision	A
	ENG. AREA Civil	NAME T Penrose	SIGNATURE 	NO. 24087 DATE 28/09/23	Series No.	16 of 18



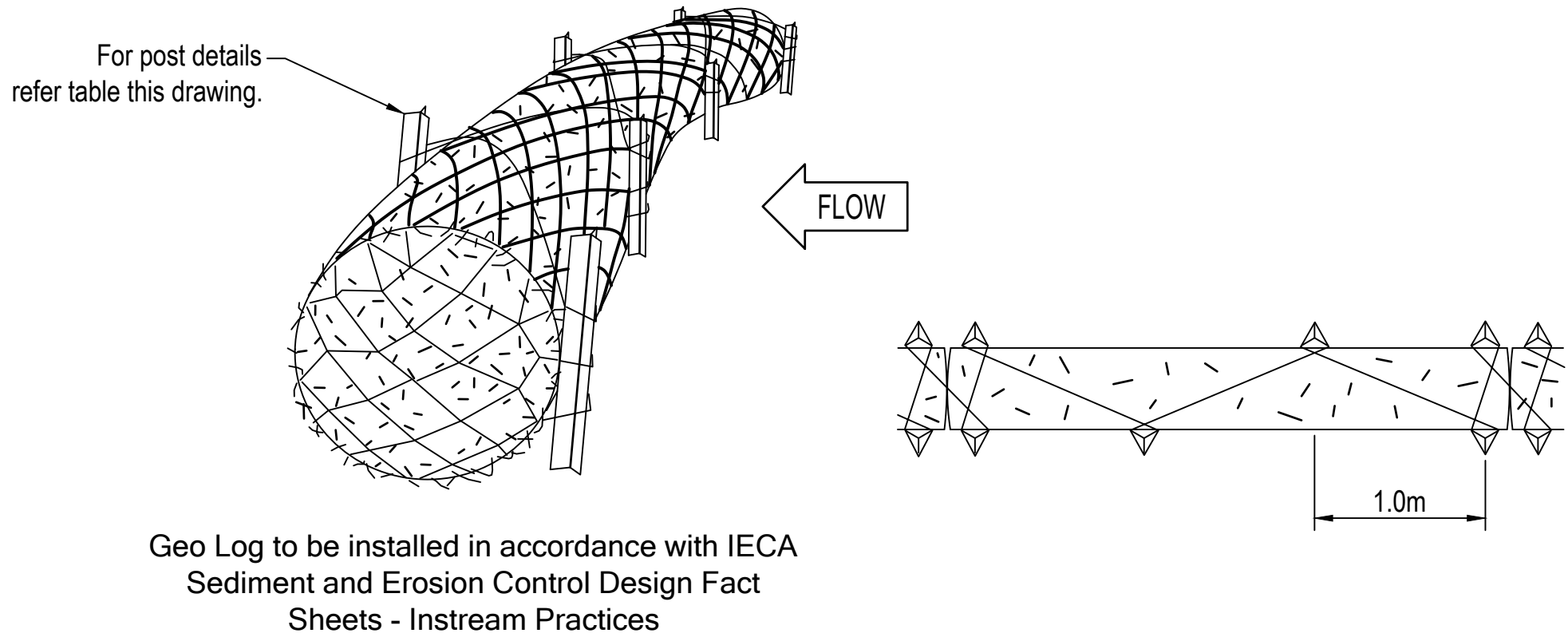


An aerial photograph showing a proposed road alignment through a wooded area. The road is labeled "ROAD" and runs from left to right. A car is visible on the existing road surface. Technical overlays include stationing numbers (e.g., 310, 312, 314, 315, 316, 317), curve data ("R 116.000", "Line (MC70)"), and labels for various points or features like "CH 73860", "CT 73862.139", "CH 73880", "TC 73887.158", "CH 73900", "CH 73920", "CH 73940", "CT 73948.221", "CH 73960", "CH 73980", "CH 74000", and "CH 74002 END". Arrows indicate traffic flow, with some labeled "FROM TAROOM" and others "TO CRACOW". Green boxes labeled "CHECK" are placed along the alignment. A north arrow is located in the top right corner.

**Last Modified :- Oct 27, 2023 - 4:47pm**

					<p>Scales (sheet size A1)</p> <p>Scale A  1:250</p>		 <p>245 Mary Street, GYMPIE, QLD, 4570 ABN 73 617 924 437 Ph: 0477 322 555</p>		<p>Client</p>  <p><small>COPYRIGHT The contents and information contained in this document are the copyright of CRC. This drawing may not be used, copied or reproduced in whole or part for any purpose other than the consent by which it is supplied by CRC.</small></p>		<p>Title</p> <p>CRACOW ROAD UPGRADE (Ch. 73650m - 74002m) SITE 7 - STABILISATION TEMPORARY EROSION AND SEDIMENT CONTROL SHEET 1</p>					<p>Job No.</p> <p>CRC00291</p>								
														<p>Drawing No.</p> <p>1700</p>										
A Issued for Construction									<p>Drawn</p> <p>ENGINEERING CERTIFICATION (RPEQ)</p> <table><tr><th>B Doherty</th><th>ENG. AREA</th><th>NAME</th><th>SIGNATURE</th><th>NO.</th><th>DATE</th></tr><tr><td></td><td>Civil</td><td>P Meredith</td><td></td><td>15268</td><td></td></tr></table>			B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE		Civil	P Meredith		15268		<p>Revision</p> <p>A</p>
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE																			
	Civil	P Meredith		15268																				
20.01 Revisions/Descriptions					20.01 Revisions/Descriptions		20.01 Revisions/Descriptions		20.01 Revisions/Descriptions			<p>Series No.</p> <p>17 of 18</p>												
20.01 Revisions/Descriptions		Drawn	Approved	Date	Dimensions shown in metres except where shown otherwise																			

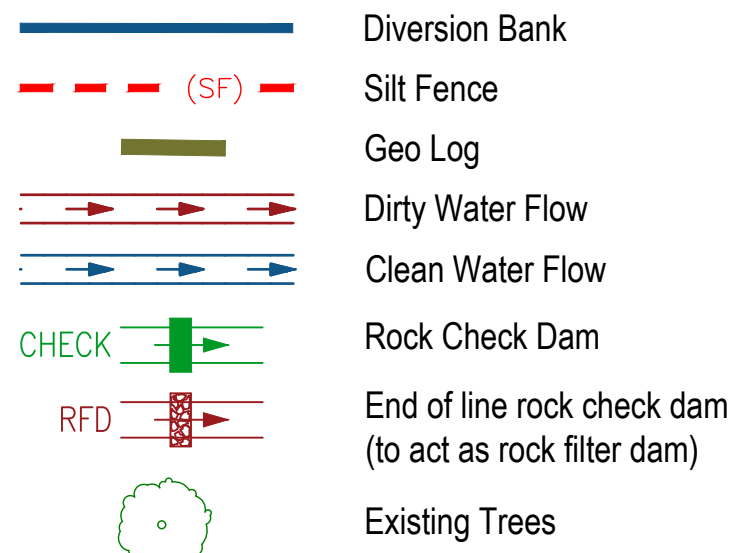




## GEO-LOG STAKING METHOD

N.T.S

### LEGEND

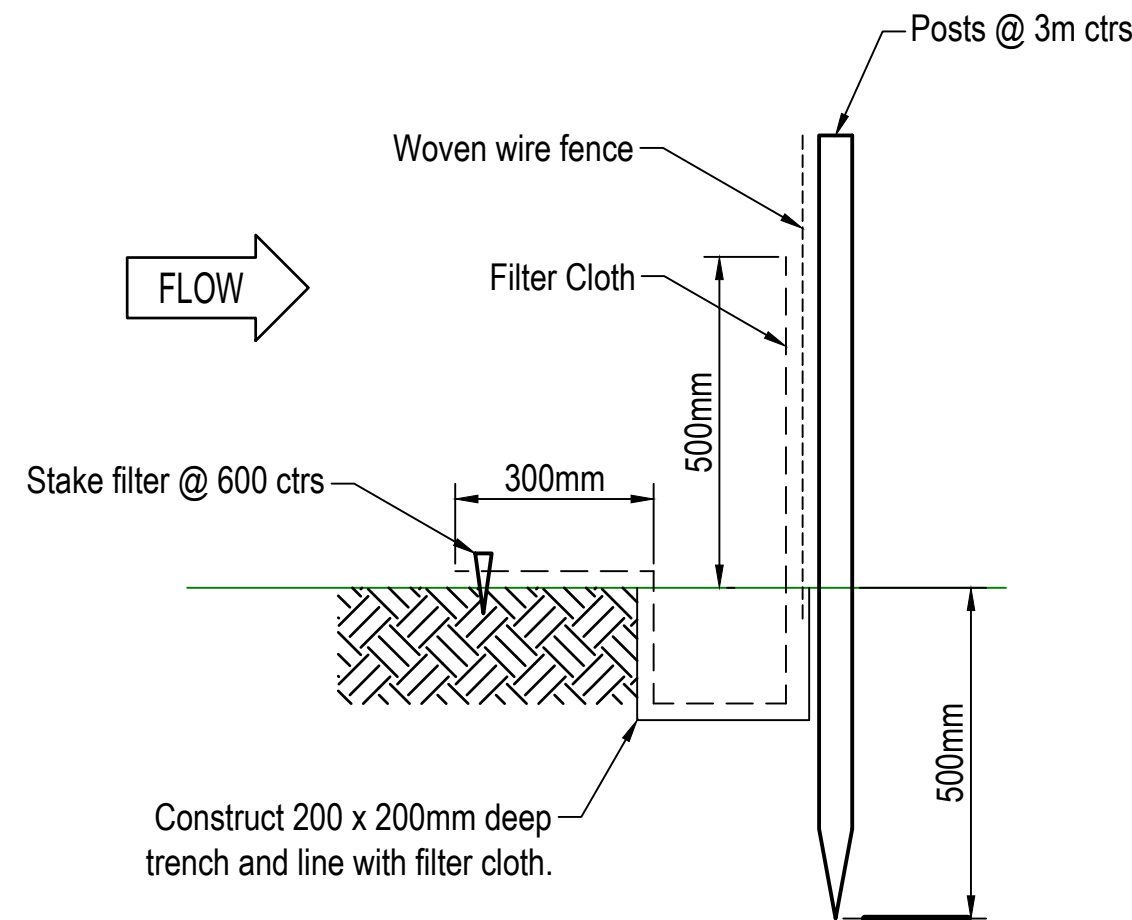


### Notes

- Design and construction of all sediment management devices is the contractors responsibility and shall be completed and effective prior to:
  - Stripping of topsoil and grass.
  - Bulk earthworks to the site.
  - Service installations.
- All sediment management devices are to remain in place until notice from the Contract Administrator
- Both temporary and permanent sediment management devices shall be maintained at a suitable level/condition throughout construction. Sediment fences are to be cleaned out when capacity is reduced by 30%.
- If erosion and sediment control devices have been found to be deficient or failed in service, due to unforeseen circumstances, corrective action is to be undertaken immediately which may include amendments/additions to the original approved erosion control plans. such additions or amendments are to be approved by the Contract Administrator.
- All erosion and sediment control devices are to be inspected at least weekly, before and after rainfall events. Any damage or excess erosion/sediment is to be repaired/managed as required to maintain control devices.
- Devices shown on the drawings shall not necessarily be limited to the locations shown. Additional devices may be required as directed by Contract Administrator.
- Rock check dams to be installed per detail this drawing in drainage channels with slopes greater than 2%. Spacing of check dams to be at every 1.0m vertical drop in drainage channel.
- Contract Administrator to order installation of topsoil and grass seeding to disturbed areas.
- The contractor shall ensure all turfed and/or seeded areas are regularly watered to ensure vegetation is maintained until there is 80% coverage.
- Stockpiles shall be protected from erosion and sediment loss by:
  - The installation of diversion works on the upstream side.
  - The use of silt fences or other approved controls on the downstream side.
  - Compaction.
  - Re-vegetation if left exposed for longer than 30 days

### MATERIALS

MATERIAL	TYPE
Posts (either)	1.5kg/m (min) Steel Star Picket or 1500mm <sup>2</sup> (min) Hardwood or 2500mm <sup>2</sup> (min) Softwood
Fence	Woven wire 14 gauge 150mm max aperture Filter as specified
Filter Cloth	(terram 100, polyfelt ts500, Bidim u24 or equivalent)
Prefabricated Unit	Geofab, envirofence or approved equivalent

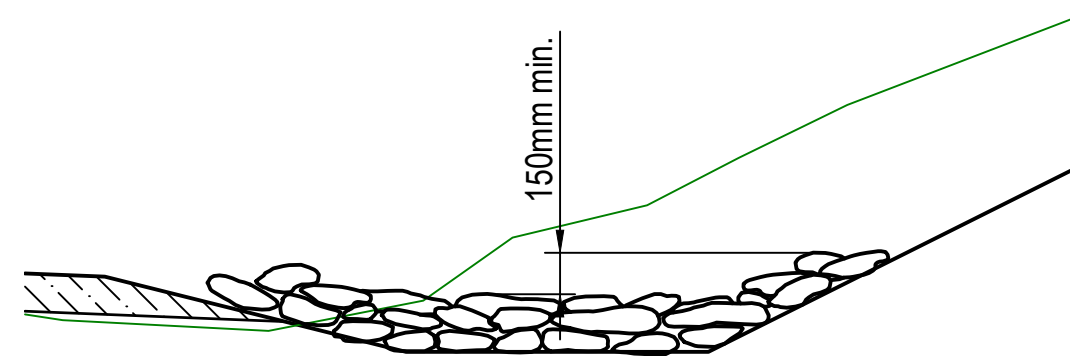


## SILT FENCE

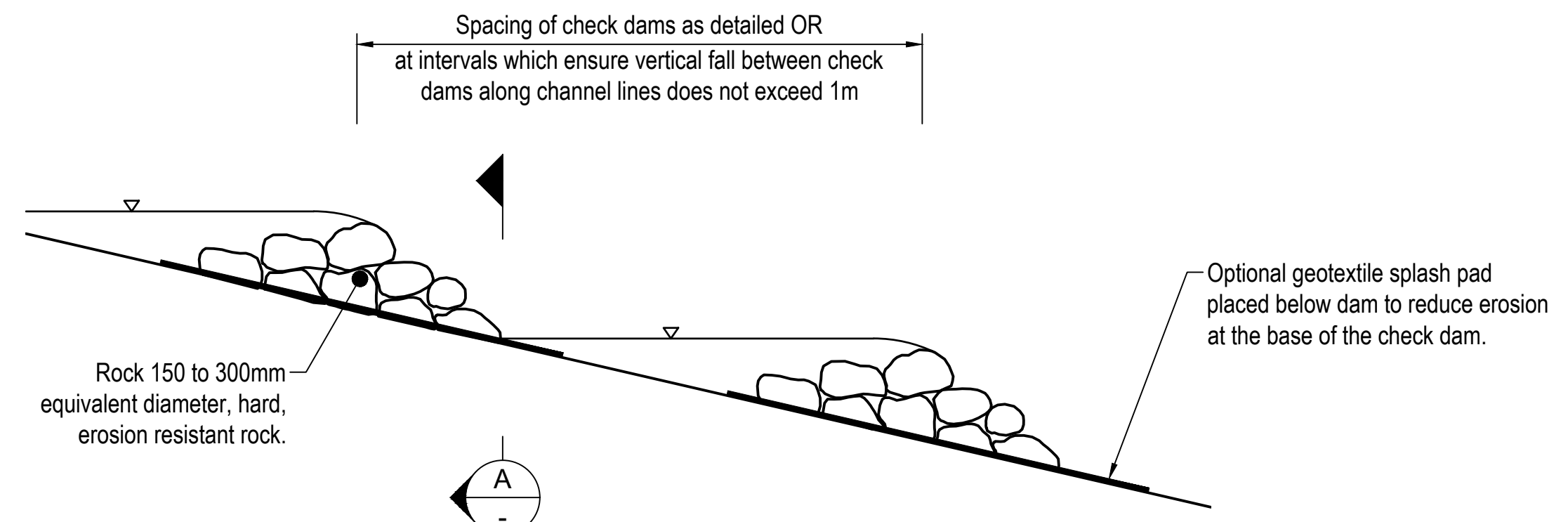
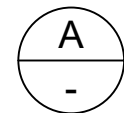
N.T.S

### Erection Notes

Woven fence to be fastened securely to fence posts with wire ties or staples. Filter cloth to be fastened securely to woven wire fence with tees spaced every 600mm at top of mid section. When two sections of filter cloth adjoin each other they shall be overlapped by 150mm and folded and material removed when bulging of fence occurs.

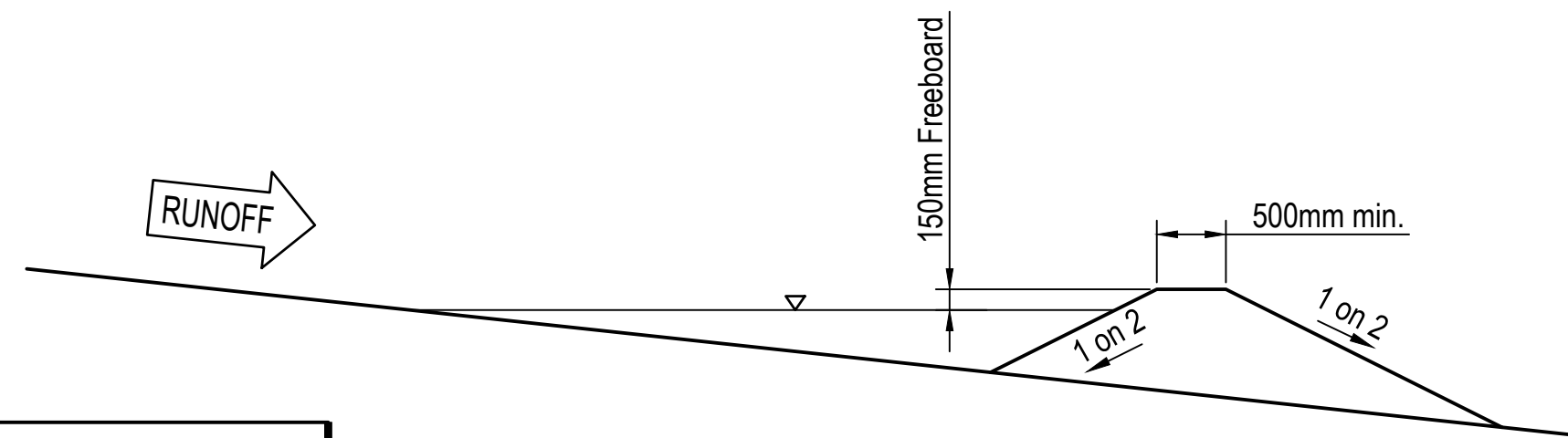


## SECTION



## ROCK CHECK DAM

N.T.S



A minimum freeboard of 300mm is recommended for non-vegetated earth embankments.

## DIVERSION BANK

N.T.S

Scales (sheet size A1)



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Title

CRACOW ROAD UPGRADE (Ch. 73650m - 74002m)  
SITE 7 - STABILISATION  
TEMPORARY EROSION AND SEDIMENT CONTROL SHEET 2

Drawn

B Doherty

Designed

B Doherty

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA

Civil

NAME

P Meredith

SIGNATURE

NO.

15268

DATE

Job No.

CRC00291

Drawing No.

1701

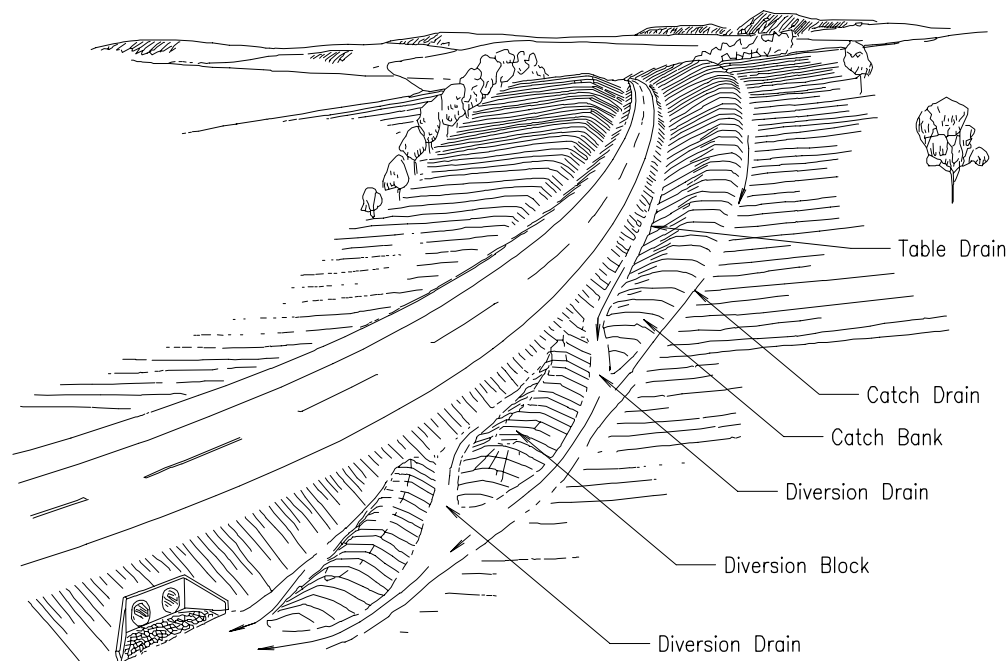
Revision

A

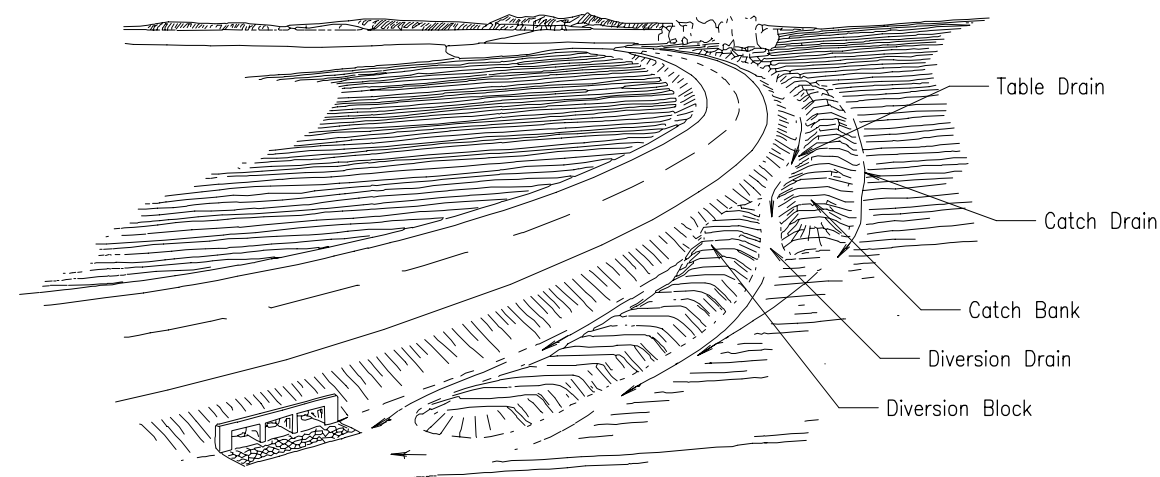
Series No.

18 of 18

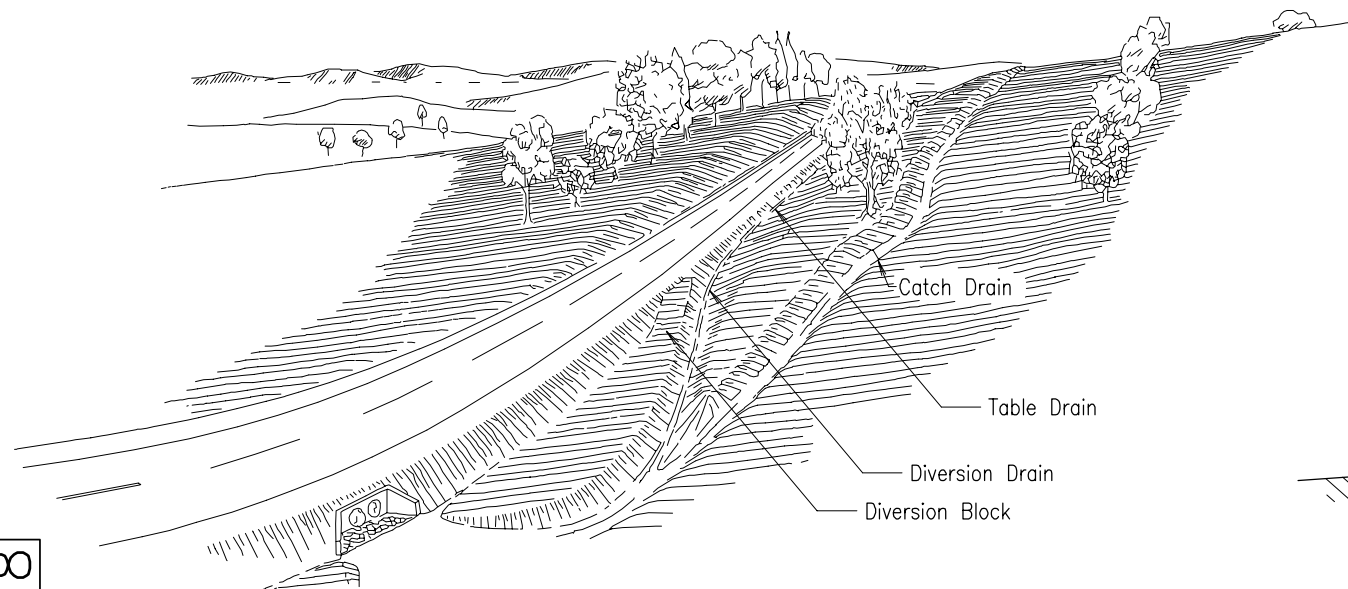




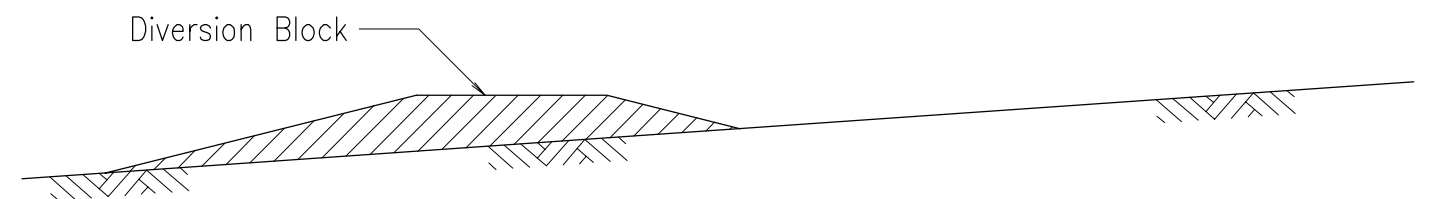
CATCH BANK ON  
EARTHWORKS SECTIONS



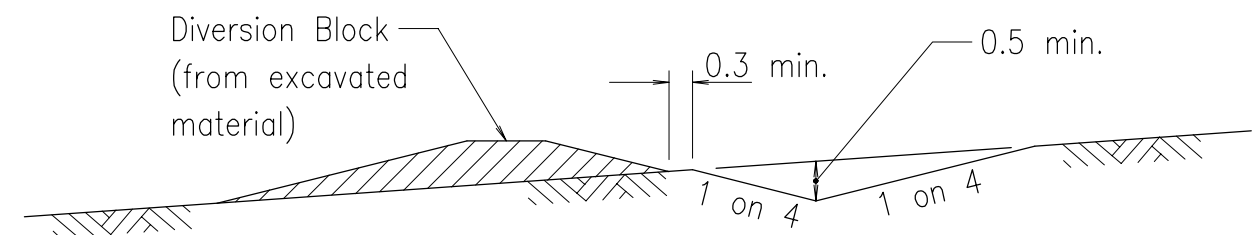
CATCH BANK ON  
LOW FORMATION SECTIONS



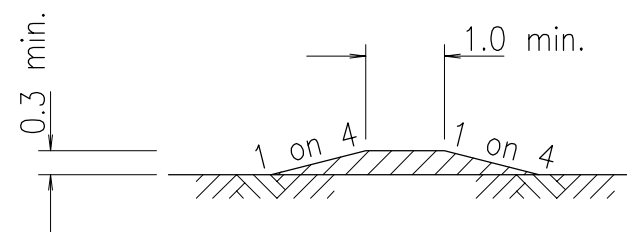
CATCH DRAINS ON  
EARTHWORKS SECTIONS



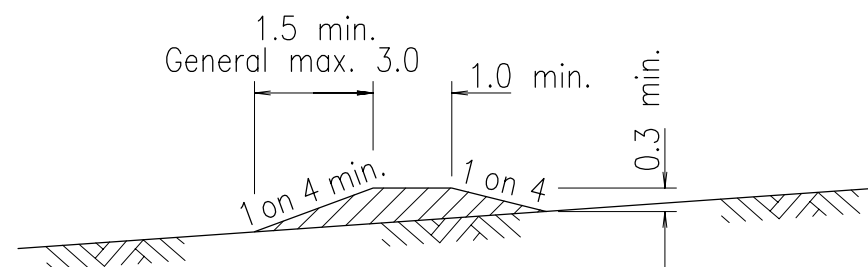
DIVERSION DRAIN IN ERODIBLE SOILS



DIVERSION DRAIN IN NON-ERODIBLE SOILS



DIVERSION BLOCK



CATCH BANK

#### NOTES:


1. DIVERSION DRAINS, unless shown otherwise in the scheme documents, shall be constructed at culverts and at intervals not exceeding 120m on grades up to 2%, 60m on grades 2% to 4%, 30m on grades 4% to 8% and 15m on grades over 8% (except in cuttings). They shall have a cross sectional area at least equal to the cross sectional area of the table drains carrying water to them.
2. ERODIBLE SOILS have sodic and/or dispersive characteristics. Soil testing is required prior to design.
3. DRAINAGE INTO PRIVATE PROPERTIES, with the cooperation of property owners, is to be discharged into contour banks and behind diversion banks to dams where possible.
4. DIMENSIONS are in metres unless shown otherwise.

#### ASSOCIATED DOCUMENTS:

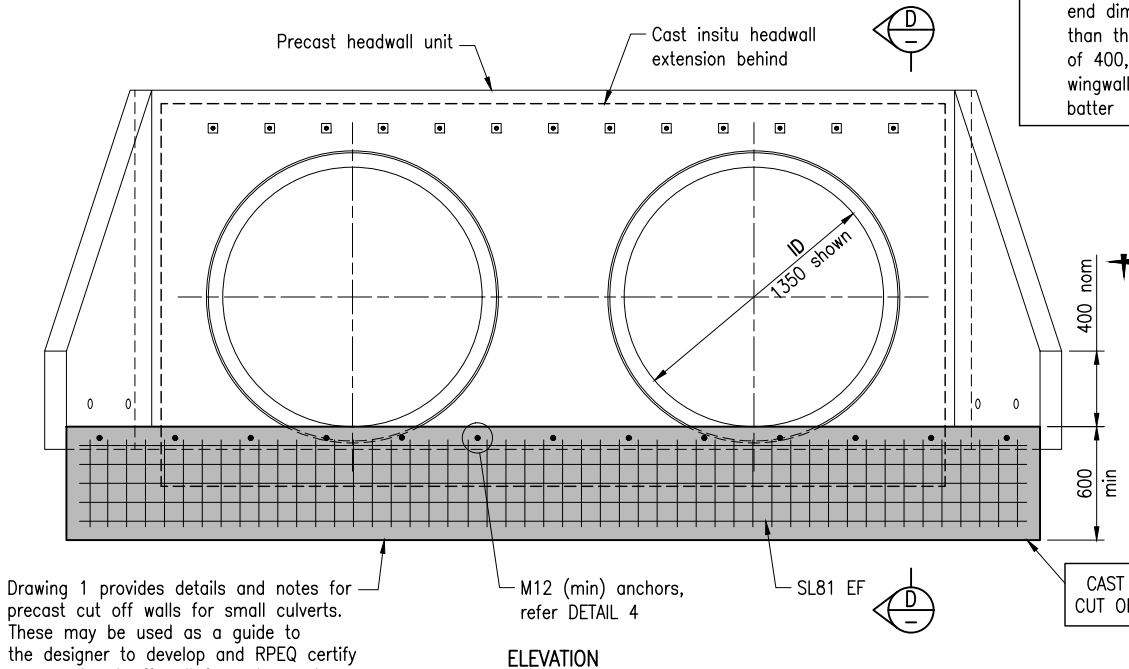
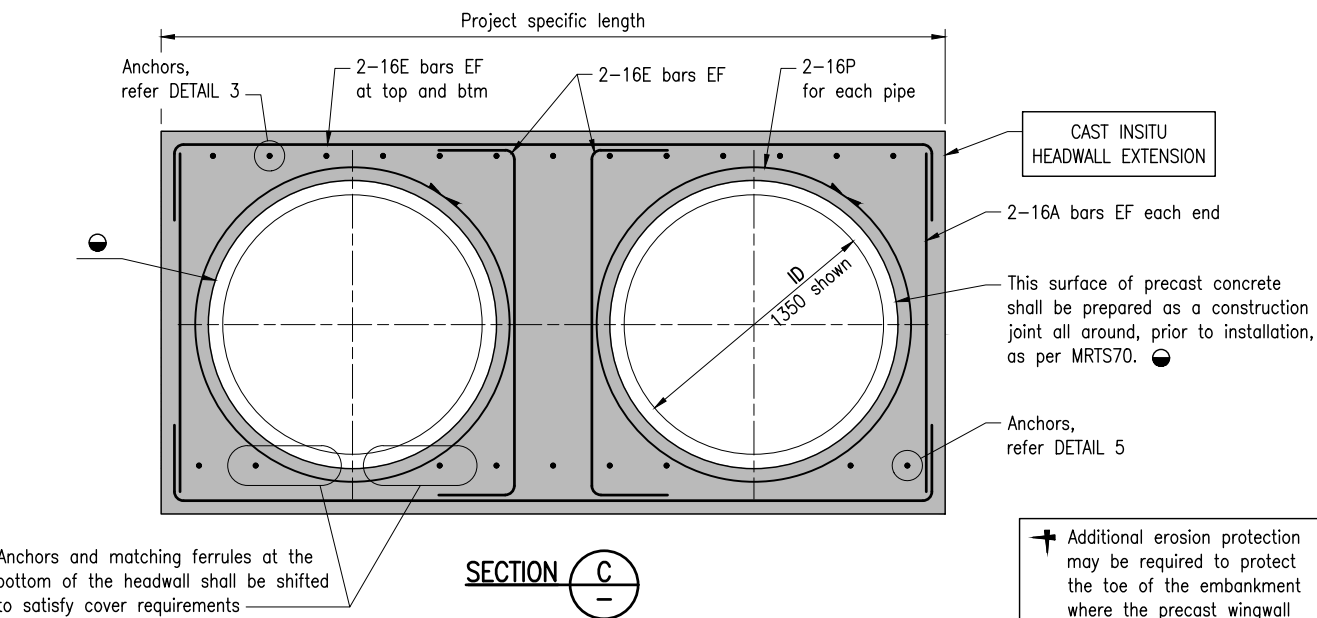
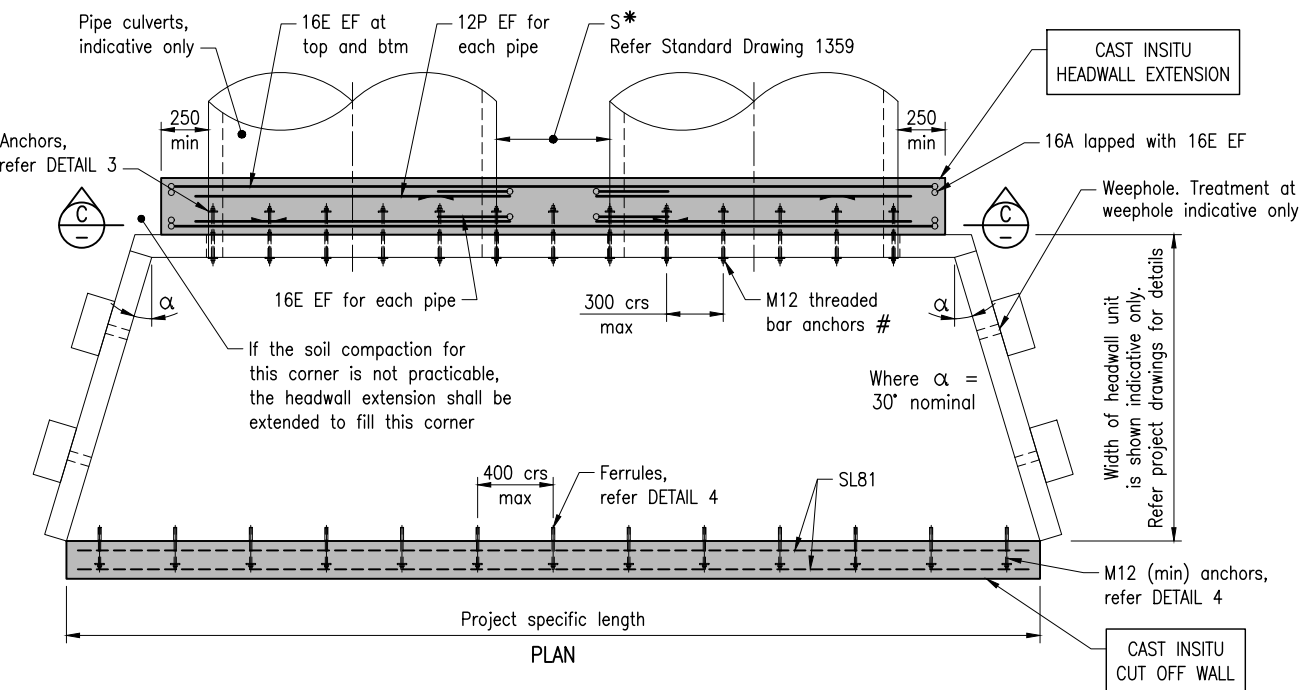
Department of Main Roads Manual of Standard Drawings Roads  
Department of Main Roads Manual of Standard Specifications Roads  
Department of Main Roads Road Drainage Design Manual

#### REFERENCED DOCUMENTS:

Standard Drawings:  
1045 Revegetation Treatment of Cut Batters  
Standard Specifications:  
General Earthworks

DIVERSION OF WATER		 <b>Queensland Government</b> Department of Main Roads	
DIVERSION OF WATER FROM ROADWAY AND TABLE DRAINS		Size A3	Drawing No
		Scales as shown	1178 Date 10/03
		A	B C D E





### GENERAL ARRANGEMENT

Detail is similar in upstream and downstream sides

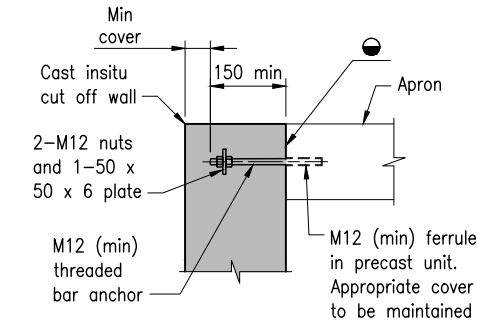
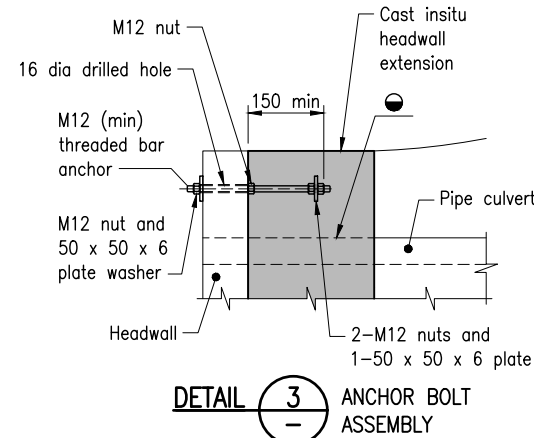
### SCOPE OF PRECAST HEADWALL STANDARD DRAWING 1243

The scope of this standard drawing is to provide standard details for culvert headwall connections for pipe culverts. It is the responsibility of the precast headwall supplier and the project design engineer to provide project specific drawings, based on these standard details, to suit the project situation and to RPEQ certify the project specific drawings. This standard drawing is applicable for single cell and multi-cell headwalls

### HEADWALL ANCHORS

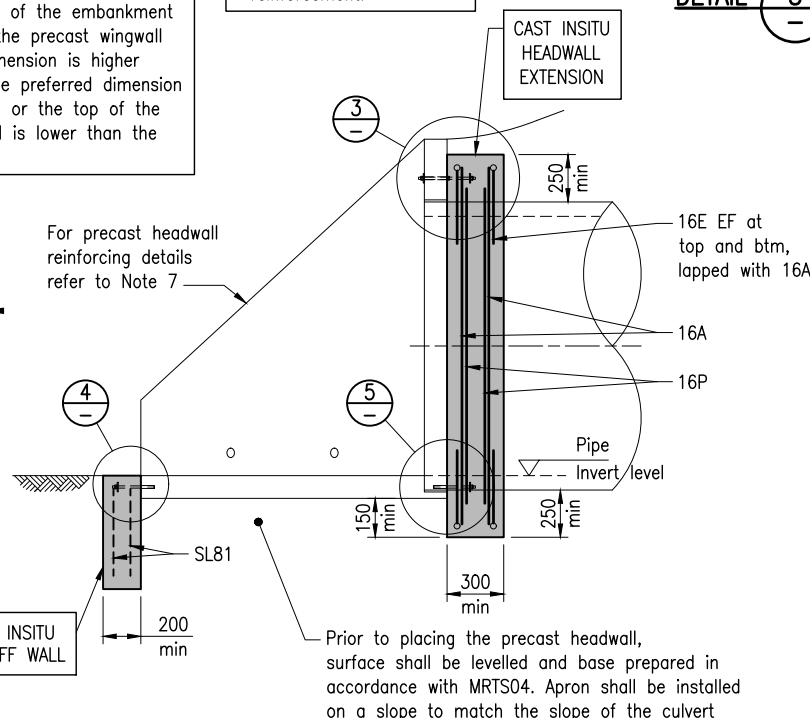
Internal pipe diameter ID	Minimum No OFF # anchors
375	4
450	4
525	4
600	4
675	4
750	8
825	8
900	8
1050	8
1200	8
1350	8
1500	8
1650	12
1800	12
1950	12
2100	12
2250	12
2400	12
2550	12

# This minimum No OFF anchors shall be provided at the top and bottom of the headwall, for each pipe. Before drilling precast units, the position of the reinforcements shall be identified and any drilling shall avoid cutting the reinforcement.



### DETAIL 4 ANCHOR BOLT ASSEMBLY

### DETAIL 5 SIMILAR



### SECTION D

### NOTES for PIPE CULVERTS:

- PIPE CULVERTS shall be in accordance with MRTS03. Precast headwall unit and cast insitu headwall extension shall be designed in accordance with Technical Note 27 (TN27). The standard details shown in this drawing are for exposure class B2 to AS 5100. Refer Note 8 for additional requirements for projects in exposure class C1 and C2.
- FOR SMALLER CULVERTS diameter up to 450, including sloping headwalls, the use of the cast insitu headwall extension details shown in this drawing can be omitted dependent upon site conditions and risk of separation of headwall, as assessed by the Project Engineer. Factors such as low flow in small culverts, ease of maintenance in the event of headwall separation, can be considered in the assessment. Refer Drawing 3 for alternative bolted connection details for culverts diameter ≤ 1200.
- PRECAST HEADWALLS shall be manufactured in accordance with MRTS72. Ferrules shall be TMR approved. Threaded bar, bolts and screws to Class 4.6 to AS 1111.1. Nuts class 5 to AS 1112.1. Washers class 5 to AS 1237.1. Steel plate Grade 250 minimum to AS/NZS 3678. All ferrules, anchors, bolts and nuts shall be hot dip galvanised to AS 1214. All other steelwork hot dip galvanised to AS/NZS 4680 unless shown otherwise.
- CONCRETE shall be in accordance with MRTS70. Requirements for cast insitu concrete for headwall extensions and cut off walls are shown in the table below.

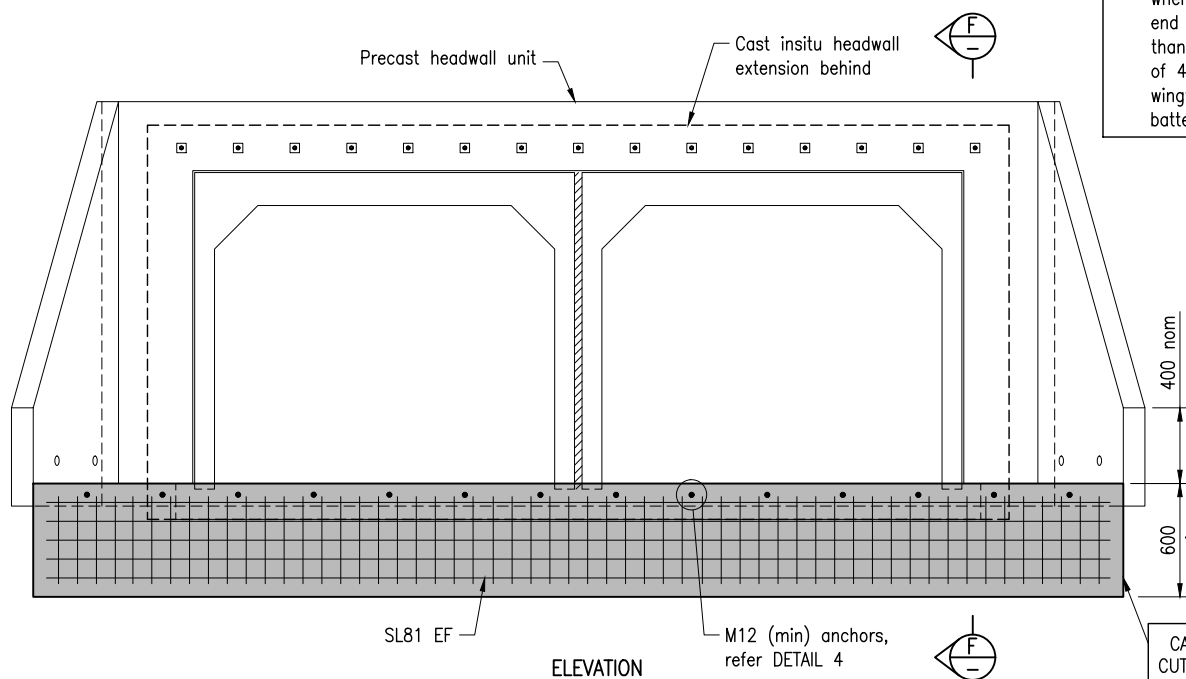
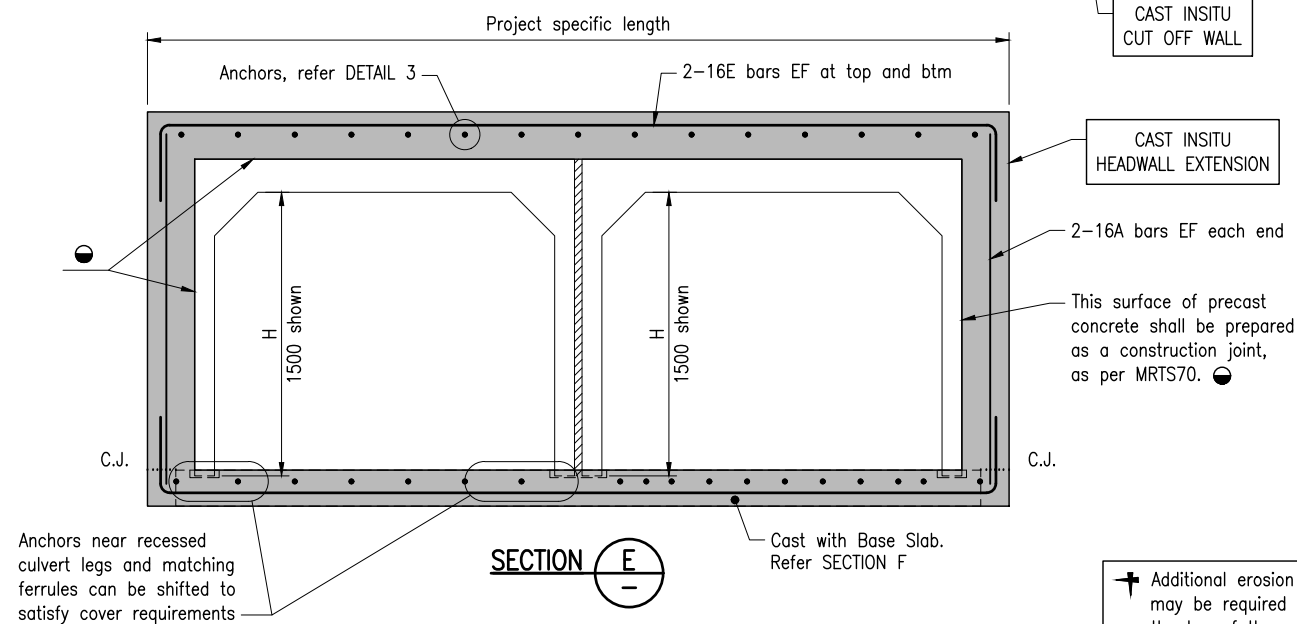
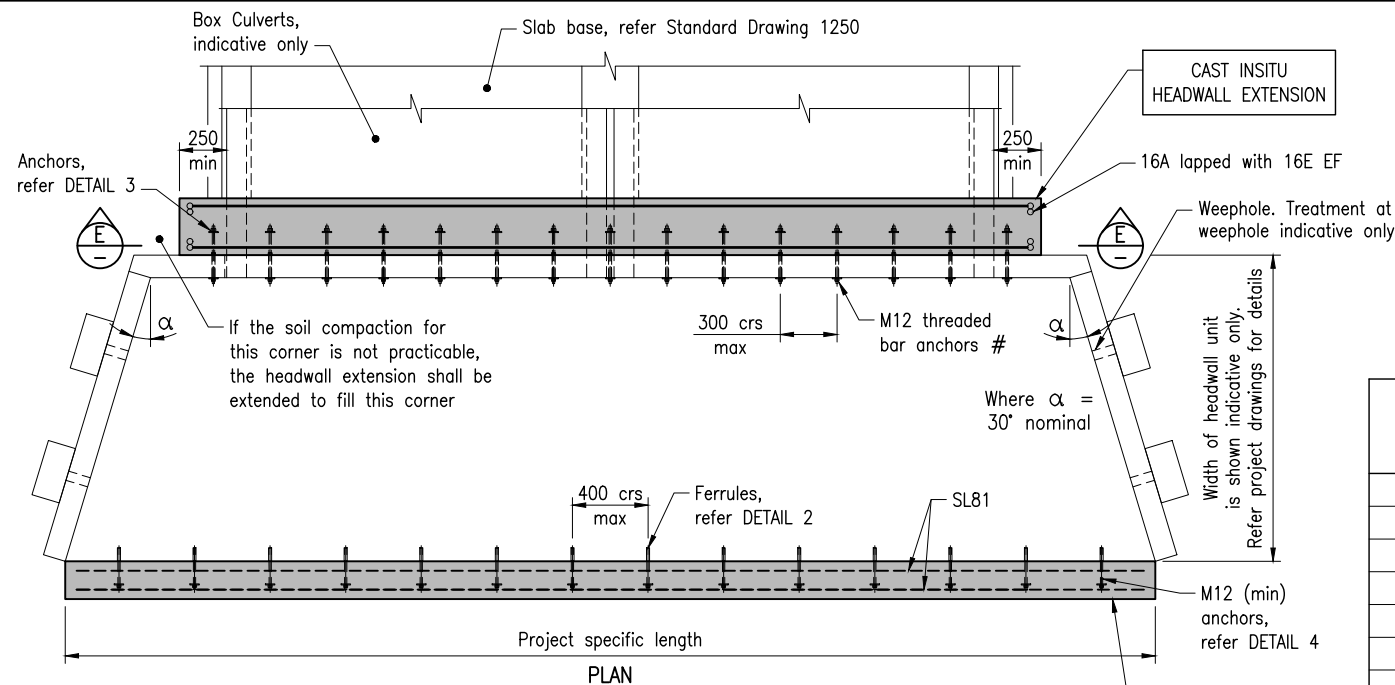
Item	Design requirements
Design life	100 years
Minimum exposure classification	B2 to AS 5100
Minimum concrete class	S40/20
Cover to reinforcement	60 cover to AS 5100
- STEELWORK shall be fabricated to MRTS78, for exposure class B2. Reinforcing Steel welding shall be in accordance with Standard Drawing 1044. Deformed bars Grade D500N. Reinforcing mesh Grade D500L.
- PRECAST HEADWALL UNIT shall be designed and RPEQ certified by the precaster's designer according to the project specific requirements. Minimum details to be shown in the precast supplier provided project specific drawings are:
  - All dimensions of precast headwall unit including wingwall and apron lengths and reinforcement details.
  - Design loads and design standards including Technical Note 27.
  - Details of formed holes/ferrules for the threaded bar anchors for connection between precast headwall unit and cast insitu headwall extension/cut off wall.
  - Design minimum exposure classification.
  - Concrete notes including concrete class, aggregate size, cover to reinforcement.
- Additional requirements for exposure class C1 and C2: Minimum concrete strength and cover to reinforcement shall be to AS 5100. Anchor bolt assemblies shall be of stainless steel bolts, threaded bar, plate, and washers to Grade 316, and nuts to Grade 304, in accordance with MRTS78A, and its referred standards.
- PROJECT-SPECIFIC INFORMATION TO BE SHOWN ON THE PROJECT DRAWINGS:
  - Cast insitu headwall extension dimensions.
  - Cast insitu cut off wall dimensions.
  - Details of threaded bar anchors for cast insitu headwall extension and for cut off wall.
- DIMENSIONS are in millimetres unless shown otherwise.

### ASSOCIATED DEPARTMENTAL DOCUMENTS:

- NDRRA Design Guidelines; Road Drainage Manual
- REFERENCED DEPARTMENTAL DOCUMENTS:
- Standard Drawing 1043 Reinforcing Steel – Standard Bar Shapes  
Standard Drawing 1044 Reinforcing Steel – Lap Lengths  
MRTS03 Drainage, Retaining Structures and Protective Treatments  
MRTS70 Concrete  
MRTS71 Reinforcing Steel  
MRTS72 Manufacture of Concrete Elements  
MRTS78 Fabrication of Structural Steelwork  
MRTS78A Fabrication of Structural Stainless Steelwork  
TN27 Guidelines for Design of Precast Culvert and Pipe Headwalls

Department of Transport and Main Roads		PRECAST CULVERT HEADWALLS	
HEADWALL CONNECTIONS DRAWING 1 OF 3		Standard Drawing No <b>1243</b> Date 7/2022	
FOR PIPE CULVERTS – ALL SIZES		A3 Not to Scale	





**GENERAL ARRANGEMENT**  
Detail is similar in upstream and downstream sides

#### SCOPE OF PRECAST HEADWALL STANDARD DRAWING 1243

The scope of this standard drawing is to provide standard details for culvert headwall extensions for box culverts. It is the responsibility of the precast headwall supplier and the project design engineer to provide project specific drawings, based on these standard details, to suit the project situation and to RPEQ certify the project specific drawings. This standard drawing is applicable for single cell and multi-cell headwalls

#### HEADWALL ANCHORS

Internal height of culvert H	Minimum No OFF anchors
375	4
450	4
600	4
750	4
900	4
1200	6
1500	6
1800	8
2100	8
2400	12

# This minimum No OFF anchors shall be provided at the top and bottom of the headwall, for each box. Before drilling precast units, the position of the reinforcements shall be identified and any drilling shall avoid cutting the reinforcement.

Additional erosion protection may be required to protect the toe of the embankment where the precast wingwall end dimension is higher than the preferred dimension of 400, or the top of the wingwall is lower than the batter

For precast headwall reinforcing details refer to Note 7

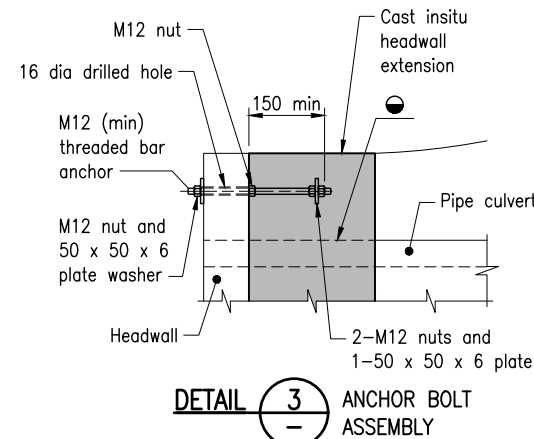
SL81

CAST INSITU CUT OFF WALL

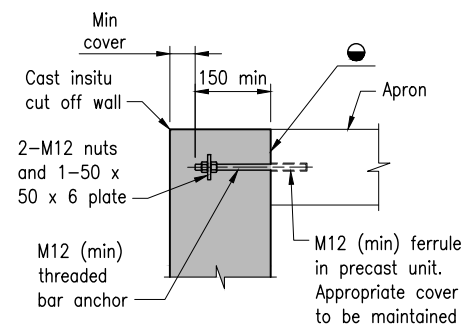
200 min

Prior to placing the precast headwall, surface shall be levelled and base prepared in accordance with MRTS04. Apron shall be installed on a slope to match the slope of the culvert

#### SECTION F



Reinforcement omitted from these details for clarity



#### DETAIL 5 SIMILAR

CAST INSITU HEADWALL EXTENSION

250 min

300 min

C.J.

Invert level

Culvert

Slab base with starter bars for headwall extension indicative only, refer Standard Drawing 1250 for typical details

300 min

#### NOTES for BOX CULVERTS:

- BOX CULVERTS shall be in accordance with MRTS03. Precast headwall unit and cast insitu headwall extension shall be designed in accordance with Technical Note 27 (TN27). The standard details shown in this drawing are for exposure class B2 to AS 5100. Refer Note 8 for additional requirements for projects in exposure class C1 and C2.
- FOR SMALLER CULVERTS diameter up to 450, including sloping headwalls, the use of the cast insitu headwall extension details shown in this drawing can be omitted dependent upon site conditions and risk of separation of headwall, as assessed by the Project Engineer. Factors such as low flow in small culverts, ease of maintenance in the event of headwall separation, can be considered in the assessment. Refer Drawing 3 for alternative bolted connection details for culverts height  $\leq 1200$ .
- PRECAST HEADWALLS shall be manufactured in accordance with MRTS72.
- CONCRETE shall be in accordance with MRTS70. Requirements for cast insitu concrete for headwall extensions and cut off walls are shown in the table below.

Item	Design requirements
Design life	100 years
Minimum exposure classification	B2 to AS 5100
Minimum concrete class	S40/20
Cover to reinforcement	60 cover to AS 5100

- STEELWORK shall be fabricated to MRTS78, for exposure class B2. Ferrules shall be TMR approved. Threaded bar, bolts and screws to Class 4.6 to AS 1111.1. Nuts class 5 to AS 1112.1. Washers class 5 to AS 1237.1. Steel plate Grade 250 minimum to AS/NZS 3678. All ferrules, anchors, bolts and nuts shall be hot dip galvanised to AS 1214. All other steelwork hot dip galvanised to AS/NZS 4680 unless shown otherwise.
- REINFORCING STEEL shall be in accordance with Standard Drawings 1043 and 1044, and compliant with MRTS71 and AS/NZS 4671. All reinforcing steel shall be ACRS certified. Reinforcing Steel welding shall be in accordance with Standard Drawing 1044. Deformed bars Grade D500N. Reinforcing mesh Grade D500L.
- PRECAST HEADWALL UNIT shall be designed and RPEQ certified by the precaster's designer according to the project specific requirements. Minimum details to be shown in the precast supplier provided project specific drawings are:
  - All dimensions of precast headwall unit including wingwall and apron lengths and reinforcement details.
  - Design loads and design standards including Technical Note 27.
  - Details of formed holes/ferrules for the threaded bar anchors for connection between precast headwall unit and cast insitu headwall extension/cut off wall.
  - Design minimum exposure classification.
  - Concrete notes including concrete class, aggregate size, cover to reinforcement.
- Additional requirements for exposure class C1 and C2: Minimum concrete strength and cover to reinforcement shall be to AS 5100. Anchor bolt assemblies shall be of stainless steel bolts, threaded bar, plate, and washers to Grade 316, and nuts to Grade 304, in accordance with MRTS78A, and its referred standards.
- PROJECT-SPECIFIC INFORMATION TO BE SHOWN ON THE PROJECT DRAWINGS:
  - Cast insitu headwall extension dimensions.
  - Cast insitu cut off wall dimensions.
  - Details of threaded bar anchors for cast insitu headwall extension and for cut off wall.

#### ASSOCIATED DEPARTMENTAL DOCUMENTS:

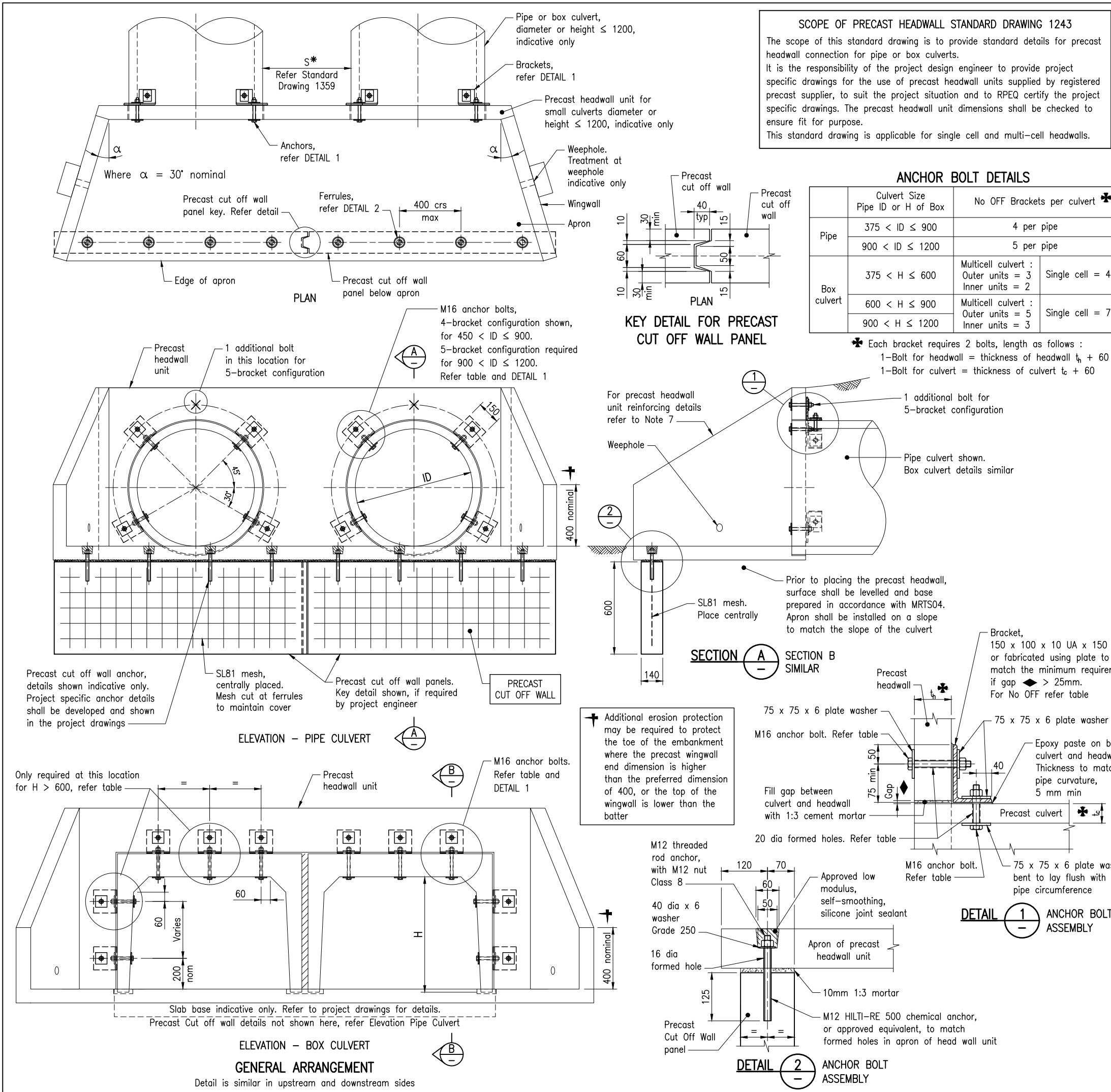
NDRRA Design Guidelines; Road Drainage Manual

#### REFERENCED DEPARTMENTAL DOCUMENTS:

Standard Drawing 1043 Reinforcing Steel – Standard Bar Shapes  
 Standard Drawing 1044 Reinforcing Steel – Lap Lengths  
 MRTS03 Drainage, Retaining Structures and Protective Treatments  
 MRTS70 Concrete  
 MRTS71 Reinforcing Steel  
 MRTS72 Manufacture of Concrete Elements  
 MRTS78 Fabrication of Structural Steelwork  
 MRTS78A Fabrication of Structural Stainless Steelwork  
 TN27 Guidelines for Design of Precast Culvert and Pipe Headwalls

Department of Transport and Main Roads		PRECAST CULVERT HEADWALLS	
HEADWALL CONNECTIONS		DRAWING 2 OF 3	
FOR BOX CULVERTS – ALL SIZES		Standard Drawing No 1243	
A3		Date 7/2022	
Not to Scale		A B C D	







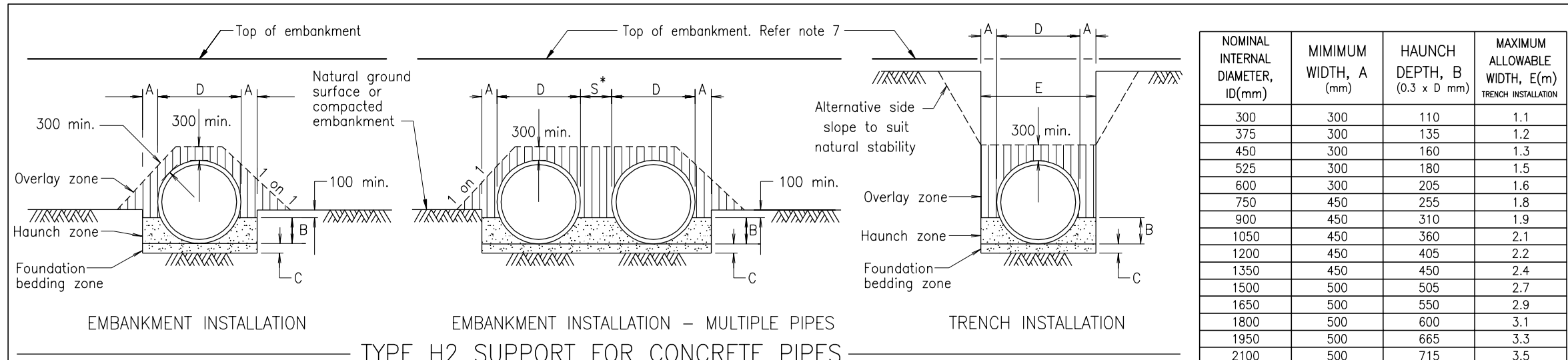
- NOTES for PIPE and BOX CULVERTS diameter  $\leq 1200$ :**
- PIPE and BOX CULVERTS shall be in accordance with MRTS03. Precast headwalls shall be manufactured in accordance with MRTS03 and MRTS72. Precast cut off wall panels shall be manufactured in accordance with MRTS72. Precast headwall unit and headwall connection to this standard drawing shall be designed in accordance with Technical Note 27 (TN27). The standard details shown in this drawing are for exposure class B2 to AS 5100. Refer Note 8 for additional requirements for projects in exposure class C1 and C2.
  - PRECAST HEADWALL CONNECTIONS detailed on this standard drawing are applicable for pipe and box culvert of diameter or height  $\leq 1200$ .
  - FOR SMALLER CULVERTS diameter or height up to 450, including sloping headwalls, the use of the bolted connection details shown in this drawing can be omitted dependent upon site conditions and risk of separation of headwall, as assessed by the Project Engineer. Factors such as low flow in small culverts, ease of maintenance in the event of headwall separation, can be considered in the assessment.
  - CONCRETE shall be in accordance with MRTS70. Design life 100 years. Minimum concrete strength shall be S50/20. Minimum exposure classification B2 to AS 5100. Minimum cover to reinforcement shall be 40 with rigid formwork and subjected to intense compaction. An approved super-workable concrete mix may be used in lieu of intense vibration. All exposed edges shall have 20 x 20 chamfers. Refer Note 8 for additional requirements for higher exposure classifications.
  - STEELWORK shall be fabricated to MRTS78, for exposure class B2. Steel angle Grade 300 to AS/NZS 3679.1. Threaded bar, bolts and screws Class 4.6 to AS 1111.1. Nuts Class 5 to AS 1112.1. Washers Class 5 to AS 1237.1. Steel plate Grade 250 minimum to AS/NZS 3678. All anchors, bolts and nuts shall be hot dip galvanised to AS 1214. All other steelwork shall be hot dip galvanised to AS/NZS 4680.
  - REINFORCING STEEL shall be in accordance with Standard Drawing 1044, and compliant with MRTS71 and AS/NZS 4671. Reinforcing mesh Grade D500L. All reinforcing steel to be ACRS certified. Reinforcing Steel welding shall be in accordance with Standard Drawing 1044.
  - PRECAST HEADWALL UNIT AND CUT OFF WALL PANELS shall be designed and RPEQ certified by the precaster's designer according to the project specific requirements. Minimum details to be shown in the precast supplier provided project specific drawings are:
    - All dimensions of precast headwall unit including wingwall and apron lengths and reinforcement details;
    - Design loads and design standards including Technical Note 27;
    - Details of formed holes/ferrules for the threaded bar anchors for connection between precast headwall unit and precast cut off wall;
    - Design minimum exposure classification;
    - Concrete notes including concrete class, aggregate size, cover to reinforcement.These precast supplier provided project specific drawings shall be included in the project scheme drawings prepared by the project designer.
  - Additional requirements for exposure class C1 and C2: Minimum concrete strength and cover to reinforcement shall be to AS 5100. Anchor bolt assemblies shall be of stainless steel bolts, threaded bar, angle, plate, and washers to Grade 316, and nuts to Grade 304, in accordance with MRTS78A, and its referred standards.
  - PROJECT-SPECIFIC INFORMATION TO BE SHOWN ON THE PROJECT DRAWINGS:
    - Precast headwall connection details;
    - Precast cut off wall details;
    - Details of all anchors at culvert apron and cut off wall.
  - Before drilling precast units, the position of the reinforcements shall be identified and any drilling shall avoid cutting the reinforcement.
  - DIMENSIONS are in millimetres unless shown otherwise.

ASSOCIATED DEPARTMENTAL DOCUMENTS:  
NDRRA Design Guidelines; Road Drainage Manual

REFERENCED DEPARTMENTAL DOCUMENTS:  
Standard Drawing 1044 Reinforcing Steel - Lap Lengths  
MRTS03 Drainage, Retaining Structures and Protective Treatments  
MRTS70 Concrete  
MRTS72 Manufacture of Concrete Elements  
MRTS78 Fabrication of Structural Steelwork;  
MRTS78A Fabrication of Structural Stainless Steelwork  
TN27 Guidelines for Design of Precast Culvert and Pipe Headwalls

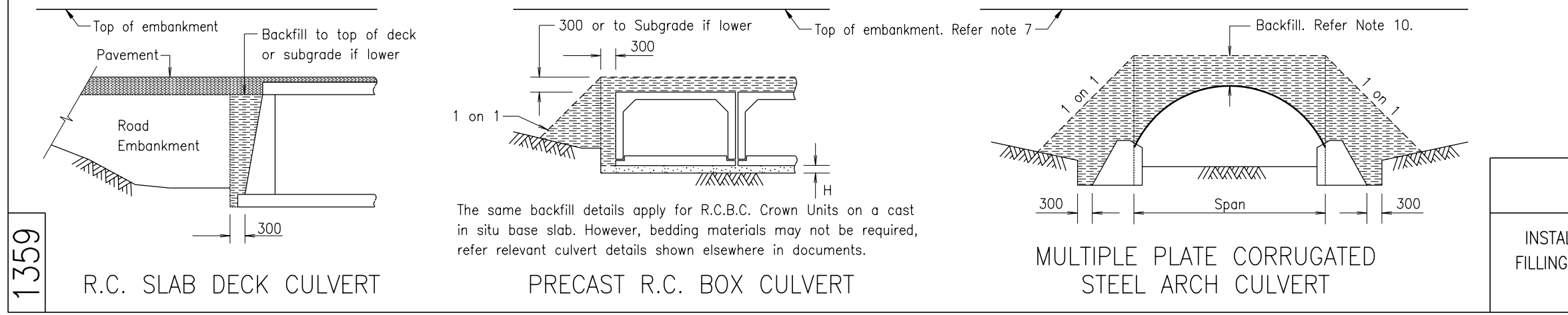
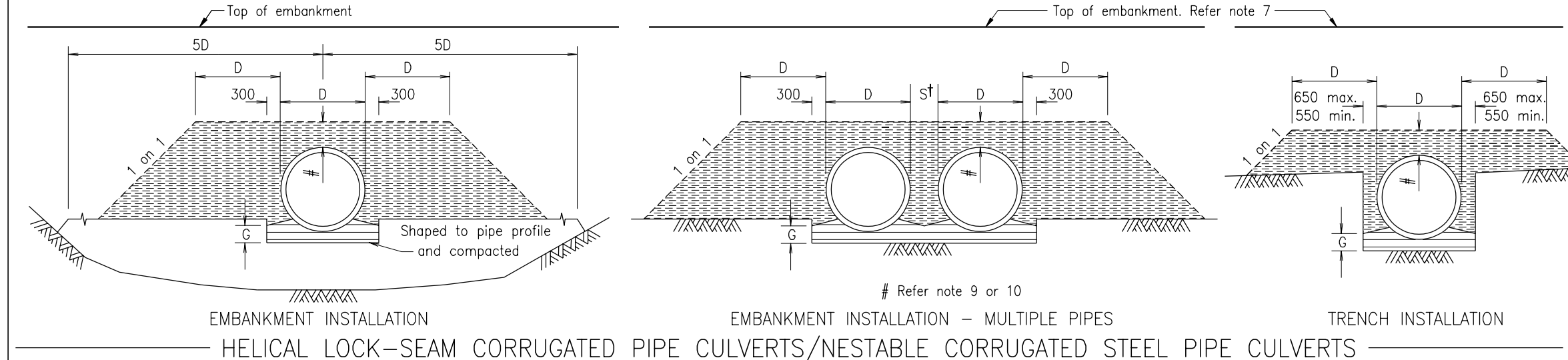
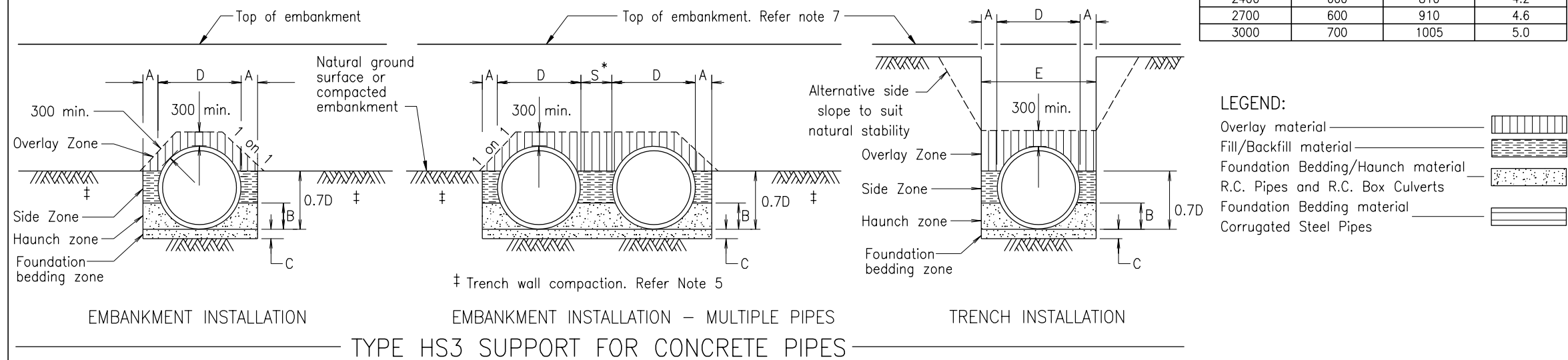
Department of Transport and Main Roads					
PRECAST CULVERT HEADWALLS		Standard Drawing No		1243	
HEADWALL CONNECTIONS		A3		Date 7/2022	
DRAWING 3 OF 3		Not to Scale			
ALTERNATIVE FOR SMALL CULVERTS		A		B	
DIAMETER OR HEIGHT $\leq 1200$		C		D	





NOMINAL INTERNAL DIAMETER, ID(mm)	MINIMUM WIDTH, A (mm)	HAUNCH DEPTH, B (0.3 x D mm)	MAXIMUM ALLOWABLE WIDTH, E(m) TRENCH INSTALLATION
300	300	110	1.1
375	300	135	1.2
450	300	160	1.3
525	300	180	1.5
600	300	205	1.6
750	450	255	1.8
900	450	310	1.9
1050	450	360	2.1
1200	450	405	2.2
1350	450	450	2.4
1500	500	505	2.7
1650	500	550	2.9
1800	500	600	3.1
1950	500	665	3.3
2100	500	715	3.5
2400	600	810	4.2
2700	600	910	4.6
3000	700	1005	5.0

- NOTES :
- "D" denotes external diameter of culvert.
  - FOUNDATION BEDDING
    - C R.C. Pipes
      - 100 if ID < 1350
      - 150 if ID ≥ 1350
    - G Corrugated Steel Culverts
      - 100 in firm material other than rock
      - $\frac{D}{4}$  or 250 which ever the lesser in rock
    - H Precast Box Culverts
      - 75 min. in firm material other than rock
      - 150 min. in rock
  - SPACING BETWEEN MULTIPLE CULVERTS
    - S† R.C. Pipes
      - 300 when nominal ID ≤ 600
      - 600 when nominal ID > 600 and ≤ 1800
      - 900 when nominal ID > 1800
    - st† Corrugated Steel Culverts
      - 1. Nestable Culverts :
        - $\frac{Dia}{2}$  or 300 min.
      - 2. Helical Lock-seam Culvert :
        - 300 (when nominal ID ≤ 600)
        - $\frac{Dia}{2}$  (when nominal ID > 600 and ≤ 1800)
        - 1200 (when nominal ID > 1800)
      - 3. Plate Culverts :
        - $\frac{Dia \text{ (or span)}}{2}$  or 1200 max.
  - WINGWALLS fill/backfill material shall be placed 300mm thick behind wingwalls for the length and height of the wings.
  - TRENCH WALL COMPACTION of natural ground or embankment Minimum 90% Standard RDD for minimum 2.5D each side of trench wall and to a minimum depth of 0.7D.
  - DETAILS TO BE SHOWN ELSEWHERE IN THE DOCUMENTS concrete pipe support type.
  - WORKING LOADS are those due to fill material and standard highway vehicles as per AS 3725. Allowance for construction loads shall comply with standard specification MRS11.03.
  - MINIMUM DEPTH OF OVERLAY ZONE above pipes/culverts as shown may include pavement. Pavement within this area to be compacted by hand or alternatively a lean mix concrete pavement layer may be used.
  - HELICAL LOCK-SEAM CORRUGATED PIPE CULVERTS MINIMUM COVER:

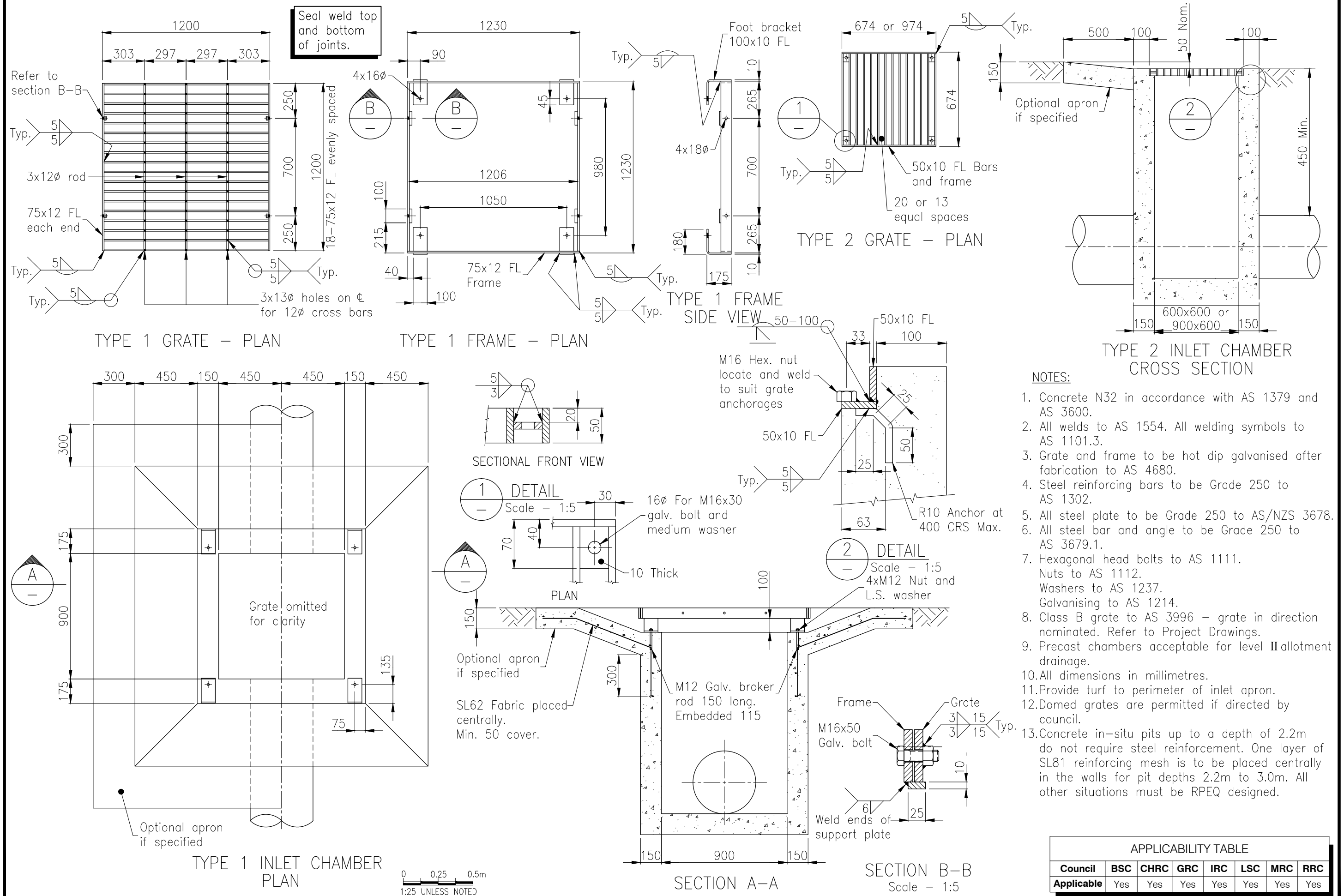


Diameter	Minimum Cover
≤1200mm	600mm
>1200mm	$\frac{Diameter}{2}$

- NESTABLE AND MULTIPLE PLATE CORRUGATED STEEL CULVERTS: Minimum cover shall be 600mm or Diameter or Span whichever is the greater.
- DIMENSIONS are in millimetres unless shown otherwise.
- ASSOCIATED DOCUMENTS :
  - Department of Main Roads Manual of Standard Drawings Roads
  - Department of Main Roads Manual of Standard Specifications Roads
- REFERENCED DOCUMENTS :
  - Australian Standards :
    - AS 3725 Loads on Buried Concrete Pipes
  - Standard Specifications :
    - MRS11.03 Drainage, Retaining Structures and Protective Treatments
    - MRS11.04 General Earthworks

CULVERTS		Queensland Government Department of Main Roads	
INSTALLATION, BEDDING AND FILLING/BACKFILLING AGAINST/ OVER CULVERTS	Size A3	Drawing No	
	Scales	1359	
	as shown	Date 10/03	
		A	B C D E





REVISIONS		DATE
F	NOTE 13 ADDED.	03/2017
E	IRC ADDED	12/2016
D	GRC AND LSC ADDED	09/2014
C	MRC ADDED	04/2011
B	NOTE 12 ADDED RE. DOMED GRATES	07/2010
A	POST AMALGAMATION REVIEW	01/2010

**DISCLAIMER.**

The authors and sponsoring organisations shall have no liability or responsibility to the user or any other person or entity with respect to any liability, loss or damage caused or alleged to be caused, directly or indirectly, by the adoption and use of these Standard Drawings including, but not limited to, any interruption of service, loss of business or anticipatory profits, of consequential damages resulting from the use of these Standard Drawings. Persons must not rely on these Standard Drawings as the equivalent of, or a substitute for, project-specific design and assessment by an appropriately qualified professional.

### Capricorn Municipal Development Guidelines

Incorporating:

Banana Shire Council (BSC)  
Central Highlands Regional Council (CHRC)  
Gladstone Regional Council (GRC)  
Isaac Regional Council (IRC)

Livingstone Shire Council (LSC)  
Maranoa Regional Council (MRC)  
Rockhampton Regional Council (RRC)

## FIELD INLET DETAILS

DRAINAGE

STANDARD DRAWING

CMDG-D-022

REV. A B C D E F





MEDIAN

## LOCATION OF SIGNS – STREETS



## RURAL ROADS

NOTES:

1. All signs to be reflectorised Class 1 to AS1743 unless noted otherwise.
2. Size & sign type has been included in the schedule and/or in the project drawings.  
Special standards are to be provided at large signs when indicated in the project drawings.
3. All signs are to be approved by the Superintendent prior to erection.
4. Where signs are to be erected in streets where footpaths are not constructed to permanent levels the Rural Roads type base shall be adopted.
5. Signs shall be out of aluminium or aluminium alloy not less than 2mm thick to AS 2848.
6. The DN65 sleeve and spike shall only be used on medians.
7. All pipes to be galvanised. Steel pipe to AS 1074. Galvanising to AS/NZS 4680.
8. Concrete N25 in accordance with AS 1379 and AS 3600.
9. Hexagonal head bolts to AS 1111.  
Nuts to AS 1112.  
Washers to AS 1237.  
Galvanizing to AS 1214.
10. All dimensions in millimetres.
11. Sleeve to be provided as directed by Council

LEGEND

# on footpaths

⊗ As directed by the Superintendent

on medians

APPLICABILITY TABLE							
Council	BSC	CHRC	GRC	IRC	LSC	MRC	RRC
Applicable	Yes	Yes	Yes	Yes	Yes	Yes	Yes

REVISIONS		DATE
E	IRC ADDED	12/2016
D	GRC AND LSC ADDED	09/2014
C	MRC ADDED	04/2011
B	NOTE 11 ADDED	07/2010
A	POST AMALGAMATION REVIEW	01/2010

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Livingstone Shire Council (LSC)  
Maranoa Regional Council (MRC)  
Rockhampton Regional Council (RRC)

## SIGN LOCATION AND INSTALLATION DETAILS

ROADS

STANDARD  
DRAWING

CMDG-R-081

REV.	A	B	C	D	F	
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# Cracow Road – Site 7

Stabilised Section 3 Ch. 73650 - 74002m

## Safety in Design

Client: Banana Shire Council

29/09/2023


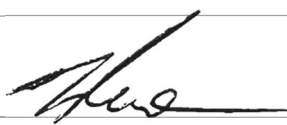


## Document Control

### Document History

Date	Version	Name	Position	Action (Review/endorse/approve)
31/07/2023	0.1	Bryan Doherty	Senior Designer (Civil)	Draft for internal review
31/08/2023	0.2	Bryan Doherty	Senior Designer (Civil)	Final for council review
29/09/2023	1.0	Bryan Doherty	Senior Designer (Civil)	Final

### Certification

Date	Name	Position	Signature
29/09/2023	B. Doherty	Senior Designer	
29/09/2023	T. Penrose	RPEQ	

## Contents

Document Control .....	1
Document History .....	1
Certification .....	1
Contents.....	1
1. Purpose of this Document .....	2
2. Project Scope and Objectives.....	2
3. Safe Design.....	2
4. Duty of Care/Disclaimer .....	3
5. Risk Management .....	4
6. Appendix A – Safe Design Risk Register .....	5



## 1. Purpose of this Document

The purpose of this document is to identify and control project specific risks, where possible, in the civil design phase to ensure the safety of constructors, maintenance providers and end users. All risks identified as part of the design are documented in this report and provided for appropriate risk management in future phases. Risks unable to be closed out in the design phase are documented in the report and communicated to the Client, for action in the construction and or later phases. This document has been produced to provide support to the design undertaken for Cracow Road, Stabilised Section 3 (Site 7, Ch. 73650 - 74002m).

## 2. Project Scope and Objectives

Scope of works for this project include,

- Pavement widening, overlay and stabilization.
- Geometric improvements.
- New Culvert and associated Protective Treatments
- Road edge guideposts.
- Clearing

## 3. Safe Design

Safe design begins from the outset or planning phase of a project and is further refined in the concept and development phases. Safe design covers the:

- Design of a project or a component of a project and its intended purpose or future use
- Materials being used
- Possible methods of construction, maintenance, and operation of the product, and
- Legislation, codes of practice and standards that need to be complied with.

Safe design is a collaborative effort between all parties involved throughout the lifecycle of the project and where possible should eliminate or minimize the risk of project lifecycle occupational health and safety hazards as early as practical. It also encompasses the management and documentation of remaining risks so all parties involved can understand and be aware of all risks identified in the design phase of the project lifecycle.

Safe design consists of a balance between cost, functionality, and aesthetics; without compromise to the health and safety of those who will construct, use, and maintain the product and community expectations. While not all risks can be eliminated or it be cost effective to remove all risks, Safe Design principles in the planning phase should aim to:

- Prevent injury and disease
- Improve useability of products, systems, and facilities
- Improve productivity in all phases
- Reduce operation costs
- Better predict and manage production and operational costs over the lifecycle of a product
- Comply with legislation, and
- Incorporate innovative design which fosters safer design practices and demands new thinking.



## 4. Duty of Care/Disclaimer

This document is not intended to be a standalone document, it should be read in conjunction with the *Work Health and Safety Act 2011* and the *Work Health and Safety Regulation 2011*. The Act and Regulation applies to all phases of a project lifecycle from concept, through design, construction, maintenance, and decommissioning and provides that all risks to health and safety be eliminated, so far as is practical or minimised so far as is reasonably practical where they cannot be eliminated. To properly manage exposure to a risk, a person must:

- Identify hazards
- Assess risks that may result because of the hazards
- Identify appropriate control measures to eliminate or minimise the level of risk
- Implement control measures, and
- Monitor and review the effectiveness of control measures.

To comply with the above, assumptions are made during the assessment as to what construction and maintenance practices may be adopted which may differ from actual methods adopted by those undertaking the works. Use of this document does not remove any obligation of any party involved, either during or after this document is published. A duty of care applies to all parties during subsequent phases and it is incumbent on those involved to further assess risks and hazards include:

- the client
- project managers
- constructor
- maintenance personnel
- users
- visitors
- demolishers, and
- disposers.

Further Safety advice, hazard identification, risk assessment or control measures may indicate other risks associated with the project that have not been identified in the document. Reference is made to the principle of what is considered 'reasonably practical' regarding the extent of Safe Design achievable by the designers.

Use of this document does not remove the obligation of the client, constructor end user or other parties during the lifecycle of the project.

Any party who has read this document and disagrees with the assessment or requires clarification of an item should contact the Project Designer at their earliest opportunity.



## 5. Risk Management

**Table 1 – Methods of controlling risk in order of preference**

Method	
Elimination	Remove the risk by modifying the design
Substitution	Remove or reduce the risk by modifying the design
Isolation	Physically separate the hazard
Engineered Control	Using <i>Design Safety</i> measure to reduce risks
Administration	Using formal process to reduce the risk
PPE	Ensure appropriate Personal Protective Equipment is used or worn.

The Risk Assessment Matrix is intended to assist our designers in:

- Fulfilling their obligations under the Work Health and Safety Act 2011.
- Achieving safe, economical and efficient constructions for our clients.
- Consulting and communicating with all parties involved in a project (designers, client, end-users, constructors etc.) to establish the hazards and risks identified during the design phase associated with the construction, operation, maintenance and decommissioning of a project.
- Consulting and communicating with all parties involved in a project on the controls that have or are required to mitigate these risks. This is not an exhaustive list and all parties should therefore undertake a thorough review of this document to satisfy themselves that it accurately reflects the intended purpose.
- Consulting and communicating to all parties the controls adopted to mitigate these risks and any residual risks that are considered present during construction, operation, maintenance and decommission that may need continual monitoring to achieve a safe working environment.



## 6. Appendix A – Safe Design Risk Register



Safety in Design Register													
Cracow Road, Site 7, Stabilised Section 3, Road Upgrade													
Hazards							Controls				Action		
No.	Project Phase	Risk Description	Consequence Description	Raw Risk (no controls)			Mitigation Strategy / Control Measures	Residual Risk		Risk Rating	Responsibility	By When	Comments / Notes
				Likelihood	Consequence	Risk Rating		Likelihood	Consequence				
				1. Very Unlikely 2. Unlikely 3. Possible 4. Likely 5. Almost Certain	A. Minor B. Major C. Severe D. Critical E. Catastrophic			1. Very Unlikely 2. Unlikely 3. Possible 4. Likely 5. Almost Certain	A. Minor B. Major C. Severe D. Critical E. Catastrophic				
1	Pre-Design	Insufficient/inaccurate data collection. (e.g. GIS, Traffic Data, LIDAR, Aerial photography)	Risk results in inadequate or substandard design that could lead to potential safety risk to travelling public, Constructors and maintenance workers.	4	D	Significant	Project is adequately scoped, discussed and documented during pre-detailed design phases to ensure data collection is appropriate. Detailed survey has been supplied for this project	1	C	Low	Designer/ Principal	Detailed Design	Residual risk with Principal
2	Pre-Design	Poor Scoping/Client brief on project requirements.	Risk results in inadequate design that could lead to potential safety risk. EDD, design exceptions, funding constraints.	4	D	Significant	Risks identified and accepted by Client. Mitigating treatments incorporated into design to the available funding.	2	B	Negligible	Designer/ Principal	Detailed Design	Residual risk with Principal Client decisions recorded within Design Decision Register.
1	Design	Errors and omissions in design.	Errors/omissions in design resulting in inadequate or substandard design that could lead to potential safety risk to travelling public. Constructor, maintenance – workers	3	E	Extreme	Design has been carried out in accordance with quality management procedures to avoid potential for errors in design. Design has been carried out in accordance with Australian Standards and quality management procedures in line with scope and deliverables to avoid potential for errors in design.	1	D	Moderate	Designer/ Principal	Detailed Design	Residual risk with Principal
2	Design	Design methodology poorly considers construction practices leading to potential safety risks for both construction workplace and the travelling public.	E.g. Traffic management, working near overhead power lines, lifting, trenching, site access, materials storage and handling (Asbestos identified within site), working close to travelling public due to corridor restrictions.	4	E	Extreme	Design incorporates learnings from previous projects and include recommendations from industry experts on appropriate site treatments in the design.	2	C	Low	Designer/ Principal	Detailed Design	Residual Risk transferred to Contractor.
3	Design	Project exceeds budget	Identified safety issues will not be addressed leading to an unsafe environment for the travelling public.	3	D	Significant	BSC to prepare contingency plans to reduce project cost to within budget constraints.	2	D	Moderate	BSC	Detailed Design	Residual risk with Principal
4	Design	Hazards in designated clear zones and road corridor.	Poor Scoping of project requirements resulting in inadequate design that could lead to potential safety risk to travelling public, constructor, maintenance. Impact of errant vehicle resulting in injury or death.	3	E	Extreme	Risks identified and accepted by BSC. Mitigating treatments have been incorporated into the design. Hazard Treatment Evaluation undertaken in accordance with Austroads and the information available at the time of detailed design.	2	D	Moderate	Designer/ Principal	Detailed Design	Residual risk with Principal
5	Design	Inadequate treatment of private entrance or turnout design.	This could lead to potential safety risk to travelling public. SISD, ASD, angles, vertical clearance, appropriate layout, design vehicle.	3	D	Significant	Private entrances and turnouts to be designed in accordance with BSC standard drawing and incorporating validated road function, traffic volumes and usage. Key stakeholder consultation, EDD/Design Exceptions.	1	D	Moderate	Designer/ Principal	Detailed Design	Residual Risk with Principal
6	Design	Services not identified during design.	This could lead to the potential safety risk of constructors and/or closure of key services to the general public.	4	D	Significant	<ul style="list-style-type: none"><li>• Contact DBYD and other relevant authorities to identify existing services (DBYD received 17/02/23).</li><li>• Designers have noted known services on drawings.</li><li>• Carry out field inspection to confirm and identify any potential service related issues e.g. potholing and locating activities.</li><li>• Locating activities have been carried out during the design phase with PUP infrastructure located on site running parallel to the proposed works. No conflict found</li><li>• Contractor to complete service locations to confirm the preconstruction investigations</li></ul>	2	D	Moderate	Designer/ Principal	Detailed Design	Residual Risk with Principal and Contractor
1	Construction	Drainage during construction	Poor drainage during construction affecting pavements/traffic/etc	3	B	Low	Maintain flow paths during construction where practical. Make pumping equipment available if required.	2	A	Negligible	Contractor	Construction	Residual risk with Principal and contractor
2	Construction	Exposure to asbestos	Existing abandoned conduits/pits/culverts may be present which could be exposed during construction.	2	D	Moderate	Details of existing services/culverts where known have been provided. Contractor to undertake appropriate investigations as required.	1	D	Moderate	Contractor	Construction	Residual risk with Principal and Contractor It is unknown if any asbestos infrastructure is located within the project limit.
3	Construction	Deep excavation of trenches	Trench collapse injuries	2	E	Significant	Depth of culverts to be minimised where possible. Contractor to employ appropriate temporary work measures.	1	E	Moderate	Contractor	Construction	Residual risk with Principal and contractor
4	Construction	Design changes made by Contractor or Administrator following design completion	Design changes do not meet safety requirements.	3	C	Moderate	Contractor / Administrator to advise the Designer or any proposed design changes. Follow RFI process.	1	C	Low	BSC	Construction	Residual risk with Principal and contractor
5	Construction	Working in vicinity of High Voltage Ergon power lines, both overhead and underground.	Death or serious injury	2	E	Significant	Contractor to identify all services and have construction procedures for working near HV services.	1	E	Moderate	Contractor	Construction	Constructors shall conduct their own DBYD and verify all utilities on site prior to commencing any roadworks.
6	Construction	The risk of traffic not being managed adequately.	Traffic chaos, delays and accidents caused by lack of controls.	2	E	Significant	Designer has nominated traffic volumes in design documentation. It is noted that the traffic volumes are low. Contractor to engage a suitably qualified traffic manager to implement traffic management controls considering road function; traffic volumes; constructability and road users.	1	E	Moderate	Contractor	Construction	Residual Risk with Principal and Contractor
7	Construction	Working on top of high and steep embankments	Injury due to personnel fall or overturning construction plant	3	E	Extreme	Consider construction methodology prior to implementation.	2	D	Moderate	Contractor	Construction	Residual risk with Principal and contractor
8	Construction	Lighting levels during construction.	Inadequate lighting of conflict points during construction resulting in confusion/collisions	2	B	Negligible	Temporary standalone LED lighting, if required.	1	B	Negligible	BSC	Construction	Residual risk with Principal and contractor
9	Construction	Disruption / damage to existing services	Constructors may damage existing services during construction. Service may/may not have been shown on design plans.	3	D	Significant	Constructors to conduct dial before you dig and no work shall be carried out over utility or within 3m of services without prior notification to the appropriate service authorities. Contractor to complete service locations to verify existing infrastructure. Appropriate demarcations and planning by contractor to highlight any locations where work activities are undertaking in the vicinity of existing services.	2	D	Moderate	Contractor	Construction	Constructors shall conduct their own DBYD and verify all utilities on site prior to commencing any roadworks or excavations.
10	Construction	Unexpected weather events resulting in potential injury to construction personnel and/or travelling public	Sudden weather events resulting in the need to evacuate the site.	4	D	Significant	Constructor to consider location, likely duration and characteristics of project to determine likelihood of event and consider project specific mitigation strategies via risk management.	3	D	Significant	Contractor	Construction	Residual Risk with Principal and Contractor
11	Construction	Unearthing unexpected soil types e.g. acid sulphate soil, sodic soils or contaminated soil from rail reserves. resulting in potential safety risk to construction personnel and general public.	This results in potential safety risk to construction personnel and general public.	3	D	Significant	<ul style="list-style-type: none"><li>• Design to consider location and likelihood of encountering specific soil type.</li><li>• Site inspection and/or geotechnical investigation to confirm presence of soils requiring specific treatment.</li><li>• Include comments in "notes to contract administrators" advising of potential for presence of hazardous materials.</li><li>• Experienced construction staff that can recognise potential hazards</li></ul>	3	C	Moderate	Contractor	Construction	Residual Risk with Principal and Contractor
12	Construction	Incorrect or unsuitable surface treatment either temporary or permanent resulting in potential safety risk to the travelling public. e.g. line marking removal, appropriate seal design	This results in potential safety risk to construction personnel and general public.	3	D	Significant	Constructor to consider road function, traffic volumes, location and seasonal conditions to propose suitable surface treatment.	2	E	Significant	Contractor	Construction	Residual Risk with Principal and Contractor
1	Maintenance	Final product leads to potential safety issues with maintenance activities.	Personel cannot undertake maintainance activities safely due to the proposed design.	3	C	Moderate	Design to consider maintenance requirements including provision of safe environment to facilitate maintenance activities including safe ingress and egress and clear work area. E.g. batter slopes, under bridge inspections, gardens in medium strips, allowance for access tracks etc.	1	E	Moderate	BSC	Ongoing	Residual risk with Principal
2	Maintenance	Inadequate as constructed information.	Existing conditions not accurately reflected.	4	E	Extreme	Adequate handover to maintenance provider.	1	D	Moderate	BSC	Ongoing	Residual risk with Principal
1	Finalisation	Not applying all the appropriate standards.	This could result in an unsafe design.	3	D	Significant	Carry out appropriate design reviews and RPEQ approvals	1	D	Moderate	Designer	Ongoing	Residual risk with Principal



