

Ref: 16026.04_160705_IPD_REP_Dampier Drainage Design & Cost Estimate Report

08 July 2016

Mr. Arqum Hayat
City of Karratha
Welcome Road
Karratha WA 6714

Dear Arqum,

DAMPIER DRAINAGE PRELIMINARY DESIGN AND COST ESTIMATE REPORT

The Dampier Stormwater Management Study (DSMS) was completed by GHD in 2015. In it a suite of recommendations was made to better manage the local flooding issues. Based on this report the City of Karratha has commissioned WISE/IPD to undertake preliminary designs for the open drain remediation, culvert upgrades and crossover reinstatements for the preparation of a detail cost estimate. The following presents the design philosophy and costings for the above scope of work.

1. Design Philosophy

The Dampier Stormwater Management Study (DSMS) has made a number of assumptions to establish the hydraulic model. Among these are the typical geometries of the open drains, culvert sizes and locations as well as the identification of the unapproved rear accesses. The DSMS however did not report the assumed invert levels within the hydraulic model for both the open drains and the culverts. To overcome this lack of information we have adopted the control points at the various outfalls (that is the invert levels of the natural streams where the last culvert discharges into). From these points the open drains are graded upstream to establish the other invert levels.

As well as achieving the hydraulic capacities, the design approach also took into consideration the constructability and cost implications. Specifically, the design examined the efficiencies of the infrastructure assets. For example, the design has adopted reinforced concrete pipes (RCP) as the preferred culverts over the reinforced box culverts (RBC). This is due to the ease of constructing the DN600 pipes over its larger counterpart. In addition, the large number of units required would give this preference the economy of scale needed to achieve a lower unit cost. The commonly used DN600 is also more readily available and thus making it more price competitive.

1.1 Open Drain Remediation

The DSMS has recommended a geometry of 1.5m deep drain with 15m top width. Whilst the 1.5m depth can generally be achieved, the top width were constrained by the drainage reserves itself. Where there is sufficient drainage reserve, a 15m top width has been provided for. Where the drainage reserve is constrained, the road reserve has been utilized to maximize the cross sectional area and thereby the drainage capacity. This approach of utilizing road reserves to convey major storm events is a commonly accepted approach under best practice.

The terrain within the catchment is generally steep thereby creating a potential for scouring and sediment transport. To minimize this effect, all drains have been designed with a longitudinal grade of 2% or less. Where the open drain bends significantly, rock pitching have been placed at the bends to again minimize the effects of scouring.

1.2 Culvert Upgrades

In comparing the RPC and RBC it was noted that almost 90% of the RPC is of a singular size (DN600). By adopting the RCP would therefore benefit from economy of scale as well as being able to achieve a higher degree of efficiencies (repeatable work). Additionally, the design attempts to minimize the depth of installation in order to avoid the extent of rock excavation. This will not only reduce the amount of work required (excavation) but also the cost (excavation and removal of rocks). On this basis the minimum cover for Class 4 RCP culverts has been established to be 400mm.

The culverts have been graded to match the upstream and downstream invert levels of the open drain where possible. Instances where this is not possible the open drain will need to be regraded locally to match.

Headwalls at both the up and downstream ends are to be installed and rock pitching is to be extended 2m from the concrete apron to prevent scouring.

1.3 Crossover Reinstatement

Two crossover improvement options were assessed. Whilst cost is an important criteria ongoing maintenance and minimizing flow impediments to the open drain also formed part of the consideration.

From a cost perspective the culvert option will require 2 x DN600 or more for approximately 65% of the crossovers. The cost for the culvert installation alone has been assessed to be approximately 40% higher than the floodway option. This is considered cost prohibitive due to the number of crossovers involved.

It is understood that the open drain has been modelled both in terms of its flow as well as its storage capacity. The culvert option would not only impede flows but also reduces the available storage volume.

Adopting the culvert option would therefore change the intent of the open drain's function.

From a maintenance perspective, less efforts are required to maintain floodway crossovers than those of culvert crossovers. Debris washed down from upstream could cause blockages to the crossover culverts, thus resulting in localized flooding. In addition, the batters from the rear accesses is likely to be eroded over time which would require periodic reinstatement.

For the above reasons it is proposed that all crossovers be reinstated using the floodway option.

2. Cost Estimate

2.1 Construction Sequence

The cost estimate prepared under this report is based on a logical sequence of work. That is, we have assumed that the open drain remediation has been completed prior to culvert upgrades. Once these two activities have been completed the crossover reinstatements can be carried out. This approach aims to reduce the amount work required and thereby achieving a high level of cost efficiencies.

2.2 Assumptions

The construction rates prepared under this cost estimate is based on a number of assumptions. These are as follows:

Preliminaries:

- The preliminaries associated with typical contract of \$2M or more is between 8% to 10% of the total cost. However, as we anticipate the Dampier drainage remediation to be undertaken as a multi-stage contract, we have increased the preliminaries to 12.5% to reflect the smaller value.
- Preliminaries as a minimum includes:
 - Mobilisations and demobilisations of plants and resources
 - Establishing and maintaining site compounds and facilities
 - Prepare various management plans including OSH, traffic, environmental, noise, dust etc.
 - OHS compliance
 - Insurances
 - Survey and setout
 - Supervision
 - Security
 - BCITF levy

Open Drain Remediation:

- No geotechnical investigations were undertaken. GHD however noted that the soils up to 1.5m in depth are likely to be imported fill (sand). As such the cost estimate has assumed 10% of excavated material to be rock.
- Rocks from excavation and those at surface are to be stockpile and then replaced upon completion of re-grading the drain.
- Excavated material other than rocks can be distributed locally.
- Demolished pavements within the encroachment area are to be disposed off-site. Assumed disposal location is within 5km from site.
- Fencing and other structures (patios etc) removed within the encroachment area are to be stockpiled on the respective lot. No costs have been allocated to reinstall the fencing or structures.

Culvert Upgrade:

- Open trenching is used.
- Existing roads have been assumed to consisted of a 400mm pavement.
- Allowances for 500mm of rocks to be excavated within the length of trenches.
- Rocks from excavation are to be replaced within the re-graded open drain.
- Multiple twin-barrel headwalls will be cut and mortar joined on site to form four or more barrel headwalls.

Crossover Reinstatement:

- Concrete apron for the crossover only extends over the open drain. The remaining sections within the drainage and road reserves are to be constructed from compacted road gravel.
- For economy of scale it has been assumed that each crossover reinstatement contract will have a minimum of 25 crossovers.

2.3 Bill of Quantities

The bill of quantities has been prepared based on the preliminary design drawings and the assumptions stated above.

2.4 Cost Estimate

The table below is a summary of the cost estimate prepared based on the preliminary design. It should be noted that the rates have been obtained from similar work within the region. These rates may change from the time of this report as a result of changing market conditions and the vagaries of tendering.

| Item | Descriptions | Costs |
|------|-----------------------------------|-----------|
| 1.0 | Construction | |
| 1.1 | Preliminaries | 603,000 |
| 1.2 | Open Drain Remediations | 2,713,000 |
| 1.3 | Culvert Upgrades | 1,485,000 |
| 1.4 | Crossover Reinstatements | 696,000 |
| 1.5 | Provisionals | 464,000 |
| 2.0 | Fees and Charges | |
| 2.1 | Design & Contract Superintendence | 269,000 |
| 2.2 | Geotechnical Investigation | 80,000 |
| 2.3 | Surveying | 65,000 |
| 3.0 | Contingency | 597,000 |
| | Total | 6,972,000 |

3. Remediation Program

The extent and severity of flooding reported in the DSDM of the varies from sub-catchment to sub-catchment. In term of the properties affected, sub-catchment 1a and 2 are most notable (refer to Plan 100). It is therefore recommended that these sub-catchments be prioritized ahead of others in the remediation programme.

Within the 2 priority sub-catchments, work should proceed in an orderly manner from downstream to upstream with open drains to be completed first, followed by culvert upgrades and crossover reinstatements.

On this basis it is envisaged that there are works 4 packages (sub-catchments) for the Dampier Drainage Remediation Programme.

4. Recommendations

To complete the final detail design for construction purposes, it is recommended that the assumptions **in GHD's hydraulic model be cross-checked**. Specifically, the invert levels of the open drains as well as the culverts needs to be verified.

Additionally, in order to de-risk the extent of rock assumed in the costs estimate, a geotechnical investigation is recommended to quantify the volume undertaken as part of the final detail design.

We trust the above is satisfactory however please do not hesitate to contact the undersigned should you require any further information or clarification.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Dan Luong', with a stylized flourish at the end.

Dan Luong
Principal
Infrastructure Planning & Development
IP&D Pty Ltd

Appendix 1 – Bill of Quantities

DAMPIER DRAINAGE BILL OF QUANTITIES

| ITEM | DESCRIPTION | QTY | UNIT | RATE | COSTS |
|------|---|-----------|-------|-----------|-----------|
| 1 | PRELIMINARIES | 4,894,528 | Item | 12.5% | 611,816 |
| 2 | OPEN DRAIN REMEDIATION | | | | 2,713,198 |
| 2.1 | Strip and clear drainage corridor | | | | |
| | a) Remove, stockpile and replace rocks | 14,789.6 | m3 | 53.56 | 792,116 |
| | b) Remove and disposed of existing hardstands and crossovers. | 11,092.2 | m3 | 43.93 | 487,325 |
| | c) Remove and stockpile structure (fencing, carport, etc) | 5,083.0 | m2 | 26.50 | 134,699 |
| 2.2 | Excavate and respread of insitu material | 122,014.2 | m3 | 8.25 | 1,006,617 |
| 2.3 | Grade and shape open drain | 101,659.5 | m2 | 1.93 | 195,695 |
| 2.4 | Proof roll site | 101,659.5 | m2 | 0.45 | 45,747 |
| 2.5 | Quality Assurance as specified, including | | | | |
| | a) Dilapidation survey | 5.0 | day | 3,500.00 | 17,500 |
| | a) Compaction testing | 1.0 | item | 8,000.00 | 8,000 |
| | c) Final inspection | 1.0 | item | 3,000.00 | 3,000 |
| | d) As constructed survey and documentation. | 1.0 | item | 22,500.00 | 22,500 |
| 3 | CULVERT UPGRADE | | | | 1,485,229 |
| 3.1 | Removal of existing pavement | 280.3 | m3 | 43.93 | 12,315 |
| 3.2 | Excavation and backfill to depths shown; | | | | |
| | a) 0-2m | 1,414.4 | m | 128.47 | 181,707 |
| | a) Extra over for excavating in rock | 851.3 | m3 | 53.56 | 45,595 |
| | a) Replace rock in open channels | 851.3 | m3 | 63.90 | 54,402 |
| | b) Import sand for bedding | 851.3 | m3 | 89.90 | 76,535 |
| | Extra over for excavating in existing road reserve | 279.6 | m | 290.71 | 81,282 |
| 3.3 | Remove existing drainage | 865.8 | m | 171.72 | 148,676 |
| 3.4 | Supply and lay Class 4 RCP pipework | | | | |
| | a) DN450 | 115.7 | m | 305.84 | 35,386 |
| | b) DN600 | 1,248.3 | m | 306.97 | 383,186 |
| | b) DN1050 | 50.4 | m | 674.72 | 34,006 |
| 3.5 | Supply and install culvert hadwalls | | | | |
| | a) 1 x barrel | 24.0 | ea | 2,025.00 | 48,600 |
| | b) 2 x barrel | 34.0 | ea | 3,075.00 | 104,550 |
| | c) 4 x barrel | 8.0 | ea | 6,765.00 | 54,120 |
| | d) 7 x barrel | 2.0 | ea | 13,530.00 | 27,060 |
| 3.6 | Reinstate asphaltic pavement | 622.9 | m2 | 118.84 | 74,022 |
| 3.7 | Reinstate concrete kerbing | 51.3 | m | 61.61 | 3,161 |
| 3.8 | Reinstate 2m wide footpaths | 51.3 | m | 265.65 | 13,628 |
| 3.9 | Remove and reinstate existing driveway/carport | | | | |
| | a) Culvert 61 | 1.0 | item | 25,000.00 | 25,000 |
| | b) Culvert 336 | 1.0 | item | 70,000.00 | 70,000 |
| 3.1 | Quality Assurance as specified, including | | | | |
| | a) Final inspection | 1.0 | item | 2,500.00 | 2,500 |
| | b) As constructed survey and documentation. | 1.0 | item | 9,500.00 | 9,500 |
| 4 | CROSSOVER REINSTATEMENT | | | | 696,101 |
| 4.1 | Trim batters to tie-in with drainage corridor | 2,219.5 | m2 | 8.18 | 18,156 |
| 4.2 | Construct floodway crossover | | | | |
| | a) Construct 100mm compacted gravel within road reserve | 2,219.5 | m2 | 16.94 | 37,595 |
| | b) Construct 100mm unreinforced concrete (32MPa) | 5,178.9 | m2 | 120.75 | 625,350 |
| 4.3 | Quality Assurance as specified, including | | | | |
| | a) Final inspection | 1.0 | item | 2,500.00 | 2,500 |
| | b) As constructed survey and documentation. | 1.0 | item | 12,500.00 | 12,500 |
| 5 | PROVISIONALS | | | | 464,077 |
| 5.1 | Traffic Management | 18.0 | weeks | 11,639.34 | 209,508 |
| 5.2 | Extra over for excavating in rock | 500.0 | m3 | 53.56 | 26,780 |
| 5.3 | Replace rock in open channels | 500.0 | m3 | 63.90 | 31,952 |
| 5.4 | Remove and disposed of existing hardstands and crossovers. | 250.0 | m2 | 43.93 | 10,984 |
| 5.5 | Demolish and stockpile structure (fencing, carport, etc) | 250.0 | m2 | 26.50 | 6,625 |
| 5.6 | Dust management | 28.0 | weeks | 4,579.61 | 128,229 |
| 5.7 | Works directed by superintendent | 1.0 | item | 50,000.00 | 50,000 |

Appendix 2 – Preliminary Design

Plans 000 – 100 Catchment Plans

Plans 200 – 299 Open Drain Remediation

Plans 300 – 310 Culvert Upgrade

Plans 400 – 405 Crossover Reinstatement

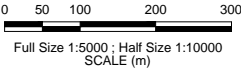
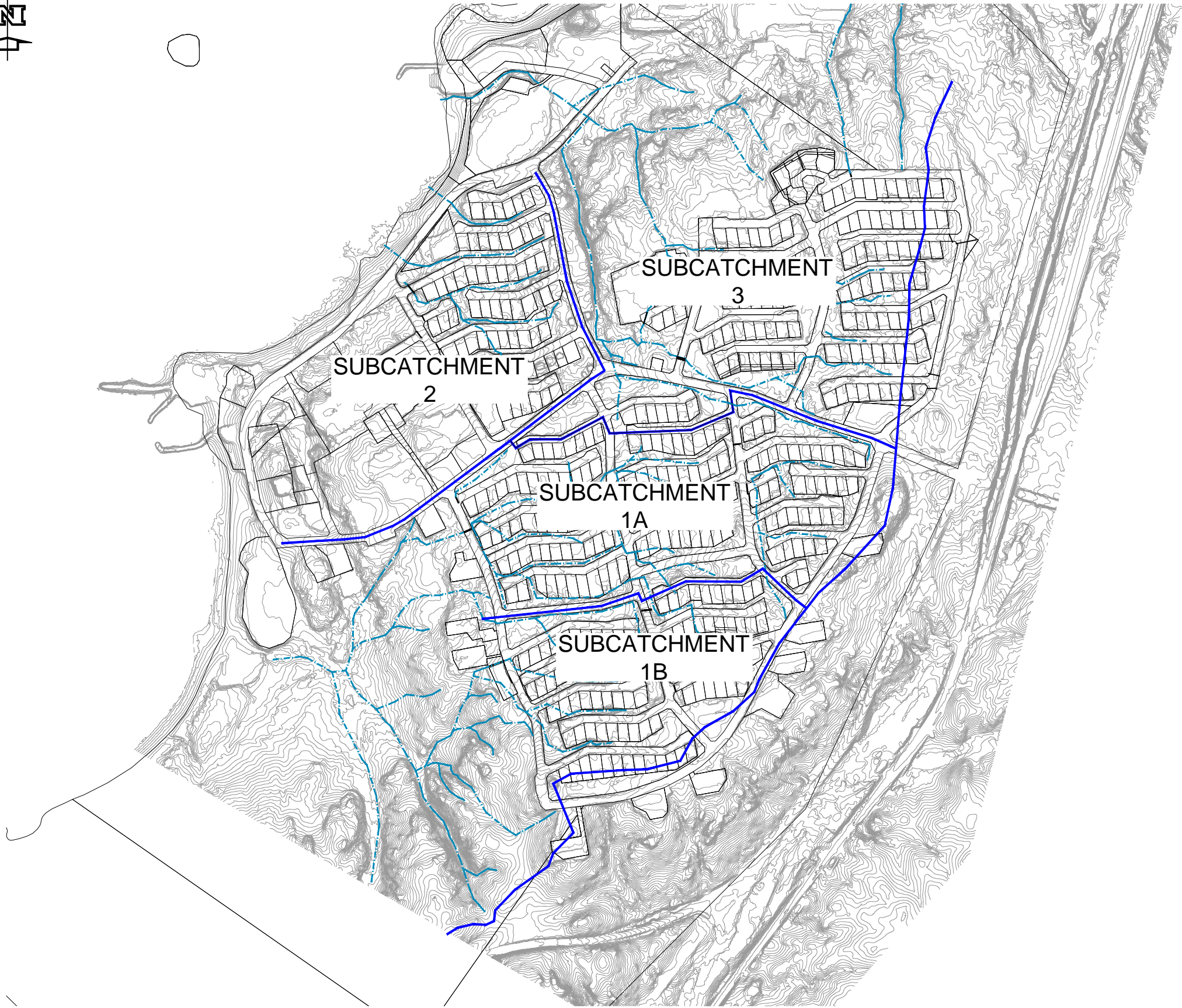
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LEGEND:

EXISTING NATURAL STREAM

CATCHMENT BOUNDARY



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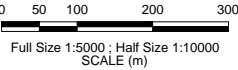
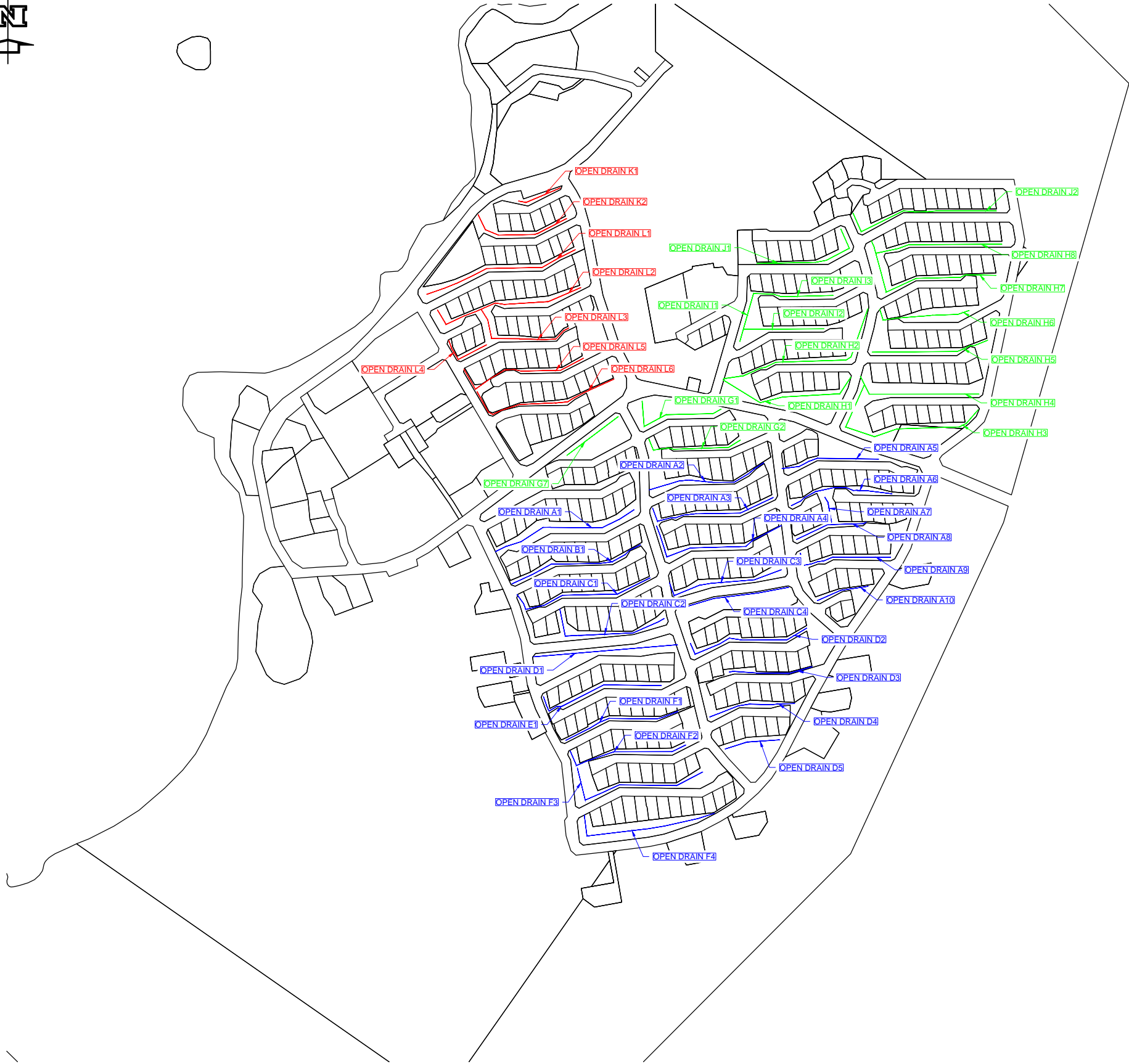
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| PROJECT | | DAMPIER DRAINAGE | | | |
| PROPOSED STROMWATER UPGRADE DRAINAGE CATCHMENT PLAN AND FLOW PATHS | | | | | |
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100mm AT FULL SIZE AT A1 SHEET SIZE



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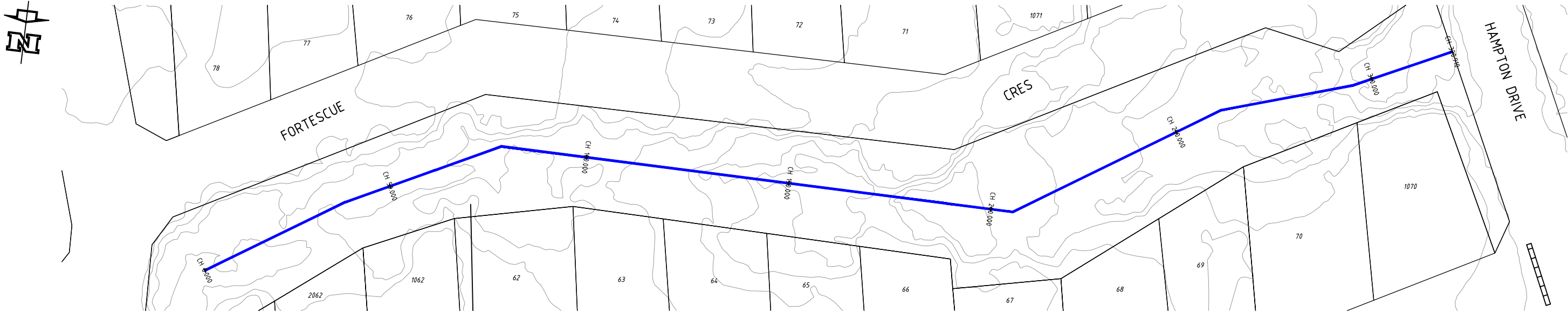
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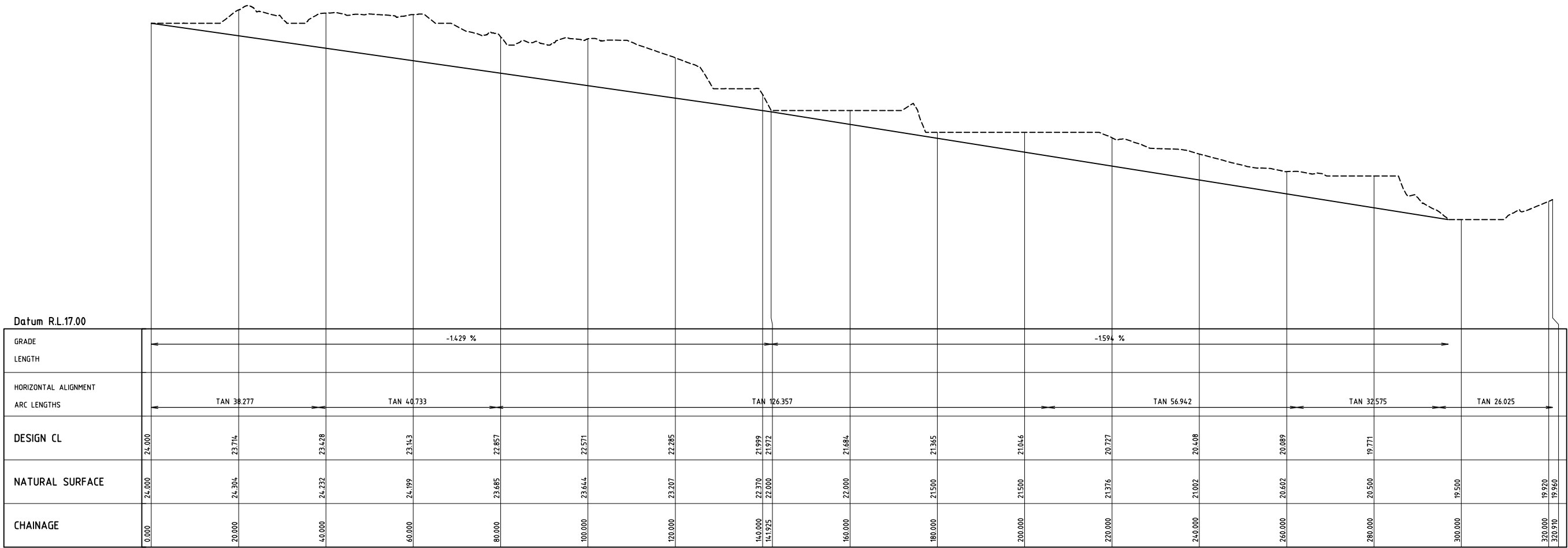
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| PROJECT | DAMPIER DRAINAGE | | |
| | PROPOSED STORMWATER UPGRADE | | |
| | OPEN DRAINAGE REMEDIATION | | |
| | OVERALL OPEN DRAIN LAYOUT | | |
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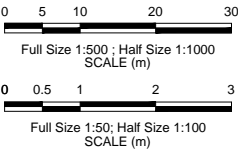
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DRAIN PROFILE A1
SCALE 1500



DRAIN PROFILE A1
SCALE 1500 HORIZONTAL
SCALE 150 VERTICAL



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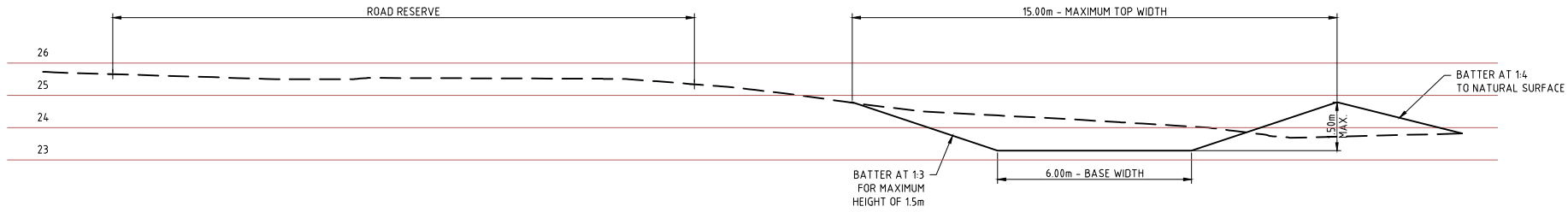
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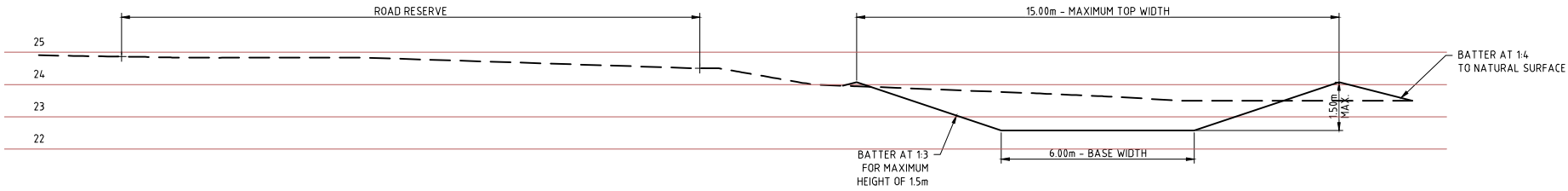
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| PROPOSED STORMWATER UPGRADE | | OPEN DRAINAGE REMEDIATION | |
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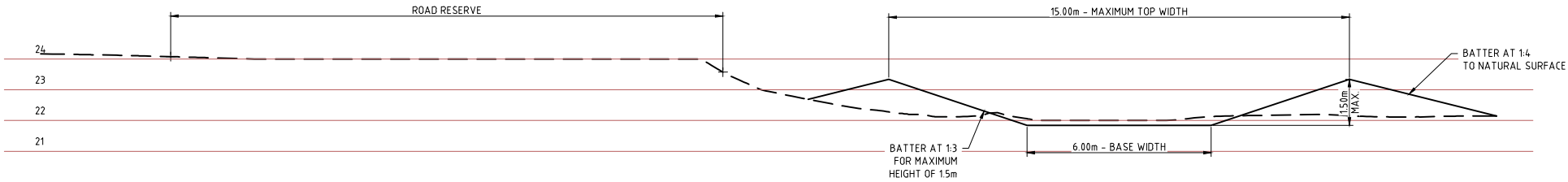
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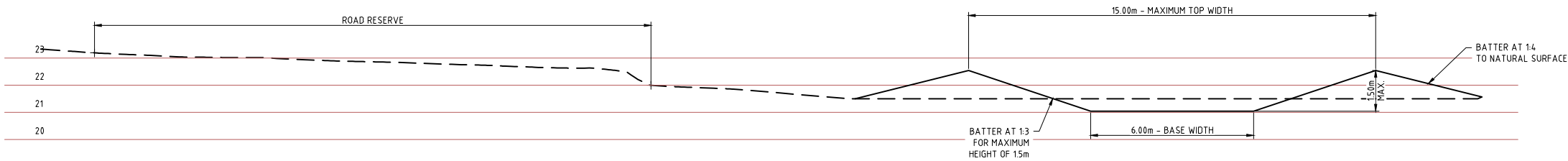
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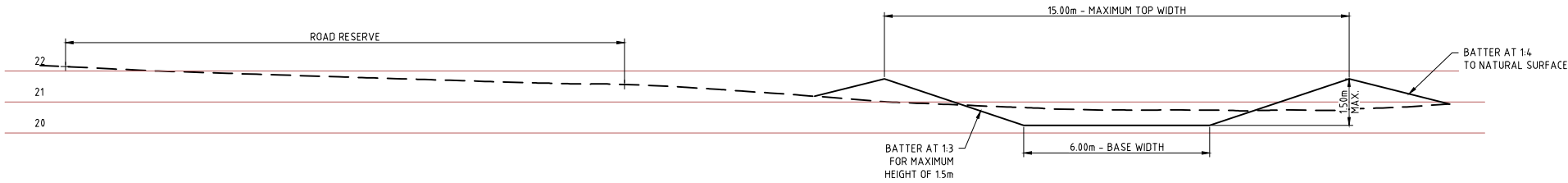
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SCALE 1:100



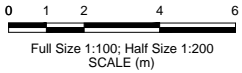
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OPEN DRAIN A1 - CHAINAGE 200.0
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OPEN DRAIN A1 - CHAINAGE 250.0
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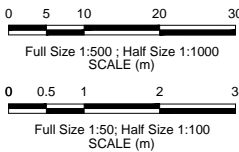
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| SIZE A1 | SCALE 1:1000 |
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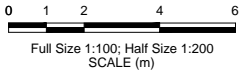
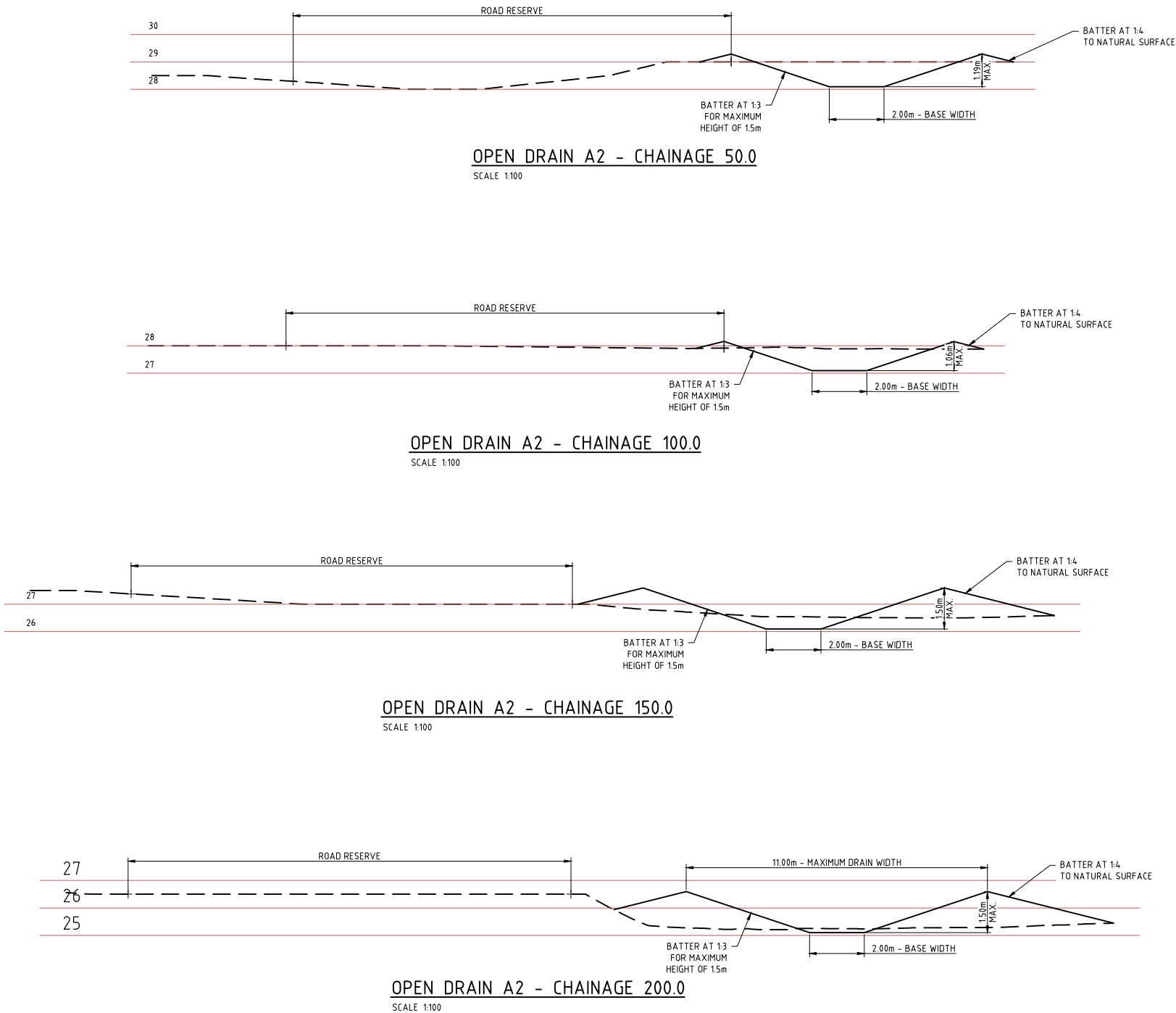
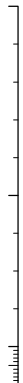
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | <p>DAMPIER DRAINAGE</p> <p>PROPOSED STROMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A2 PLAN AND PROFILE</p> | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0203 | REV. A |

16026-0204

100mm AT FULL SIZE AT A1 SHEET SIZE



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| A | 08/06/16 | ISSUED FOR INFORMATION | CB | | |
| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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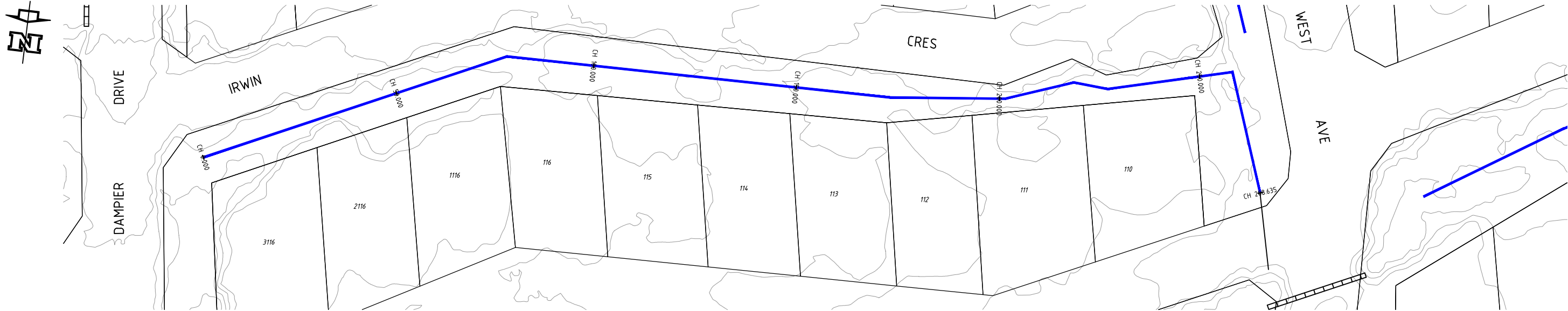
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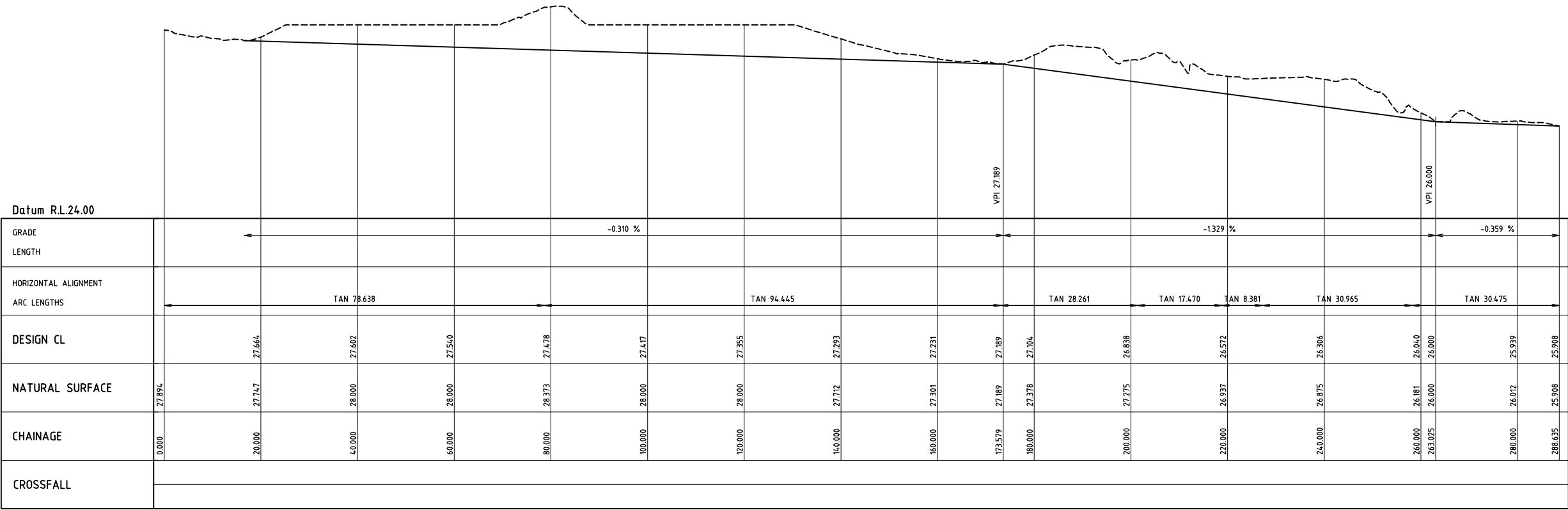
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A2 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0204 |
| | | REV. A |

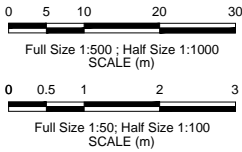
16026-0205



DRAIN PROFILE A3
SCALE 1:500



DRAIN PROFILE A3
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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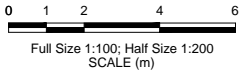
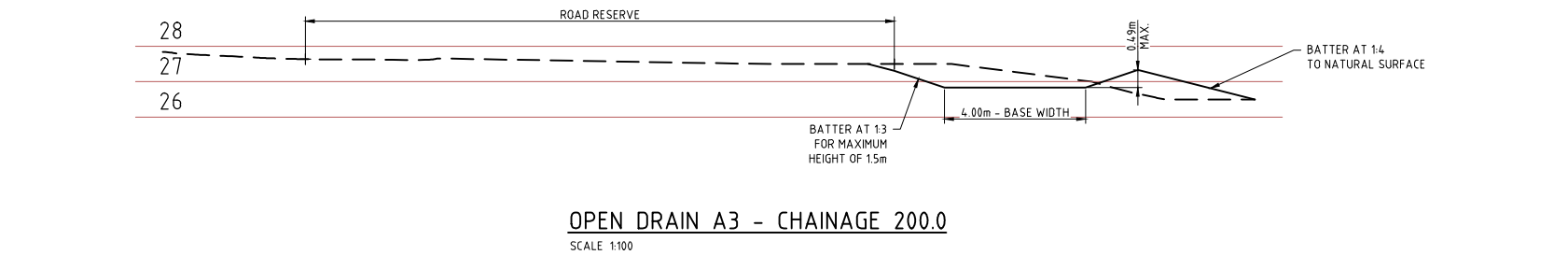
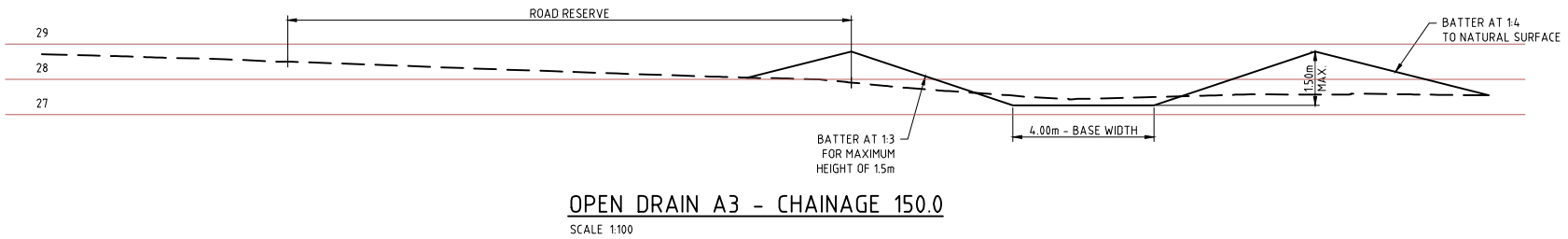
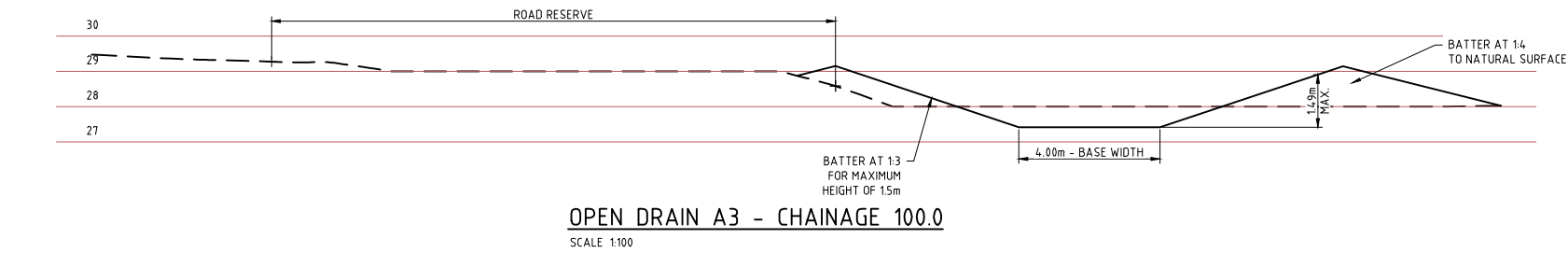
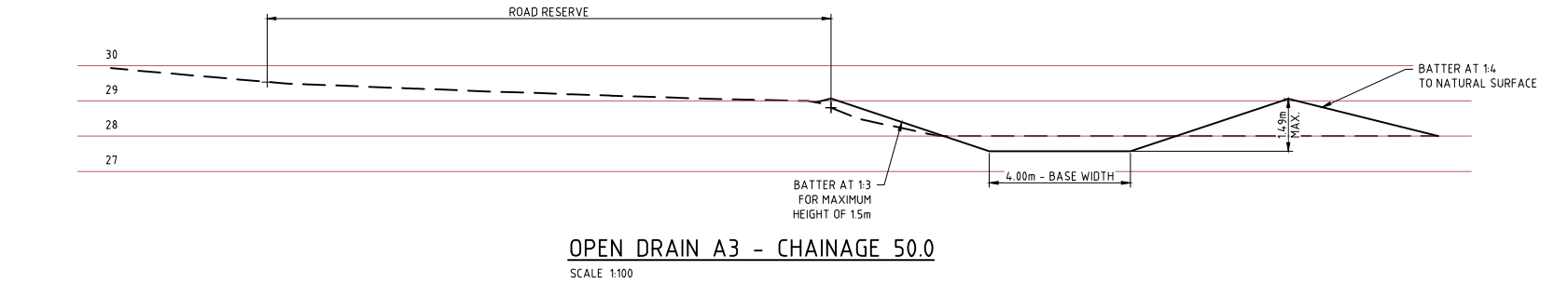
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| CLIENT CITY OF KARRATHA | PROJECT DAMPIER DRAINAGE |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A3 PLAN AND PROFILE | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0205 | REV. A |

16026-0206

100mm AT FULL SIZE AT A1 SHEET SIZE



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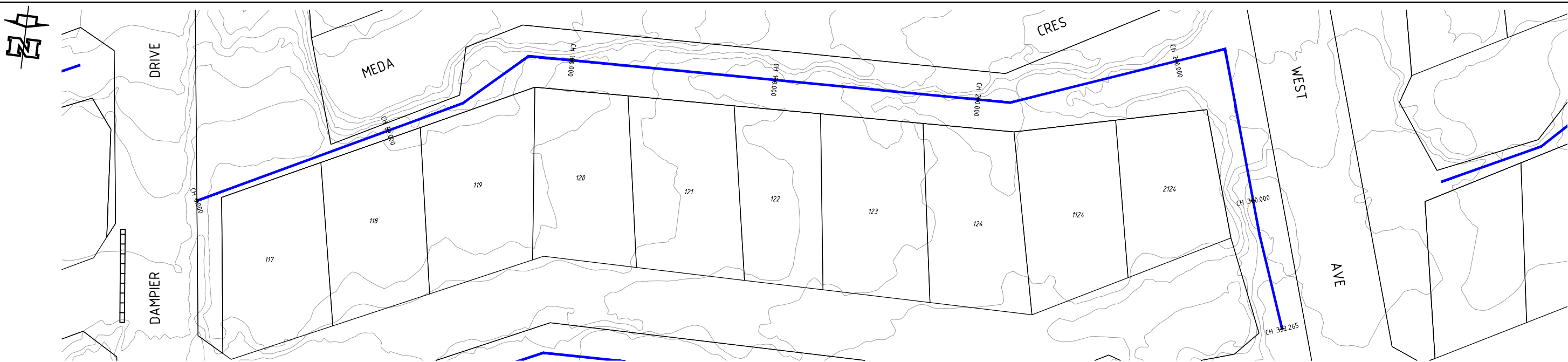
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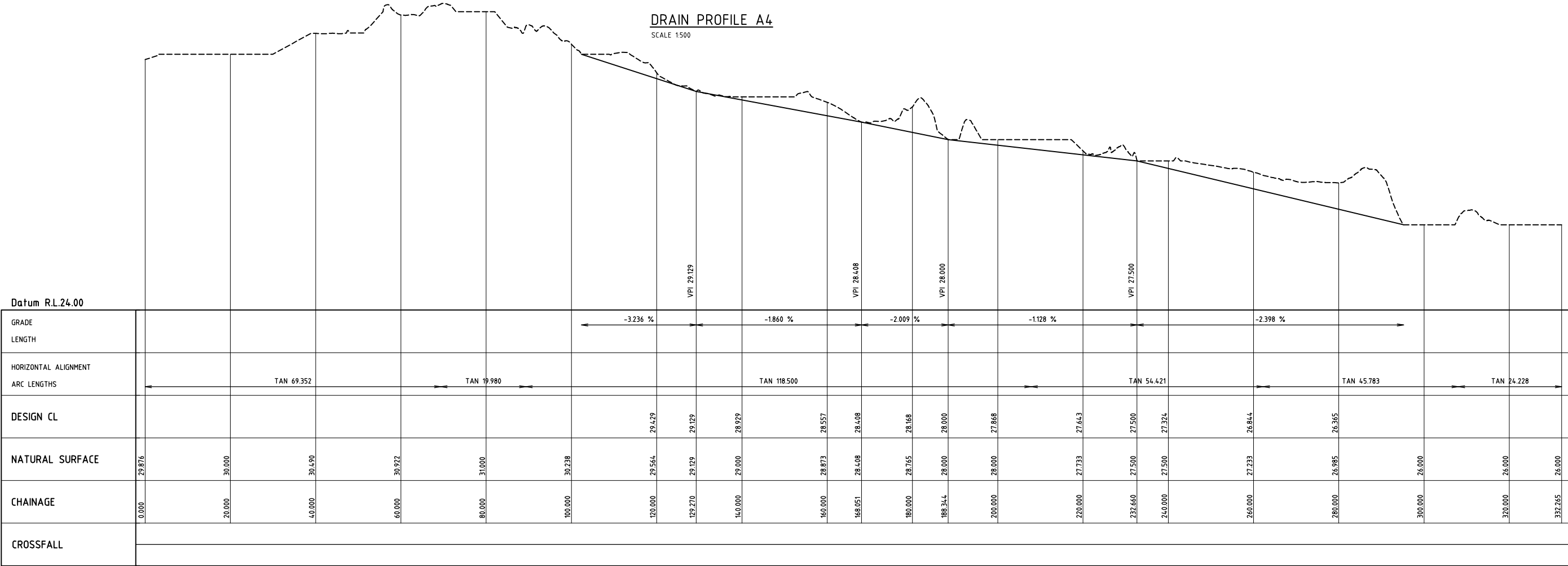
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A3 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0206 |
| | | REV. A |

16026-0207

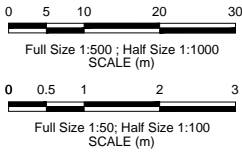
100mm AT FULL SIZE AT A1 SHEET SIZE



DRAIN PROFILE A4
SCALE 1:500



DRAIN PROFILE A4
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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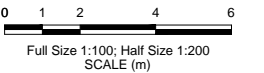
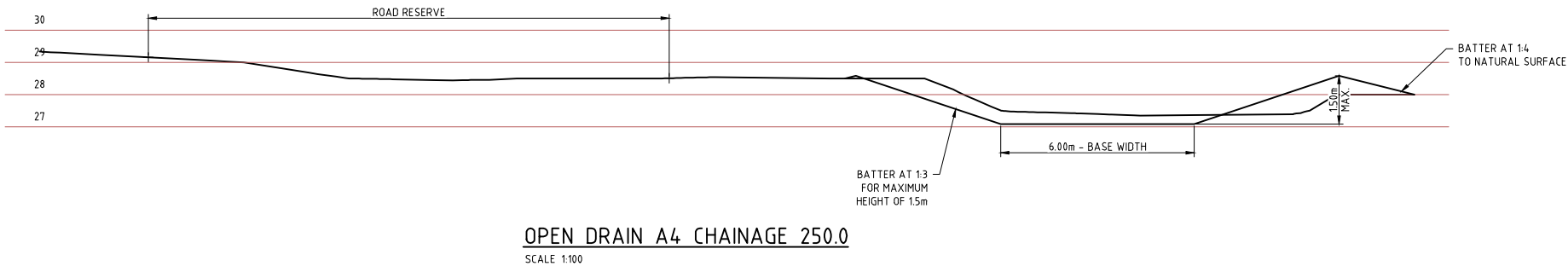
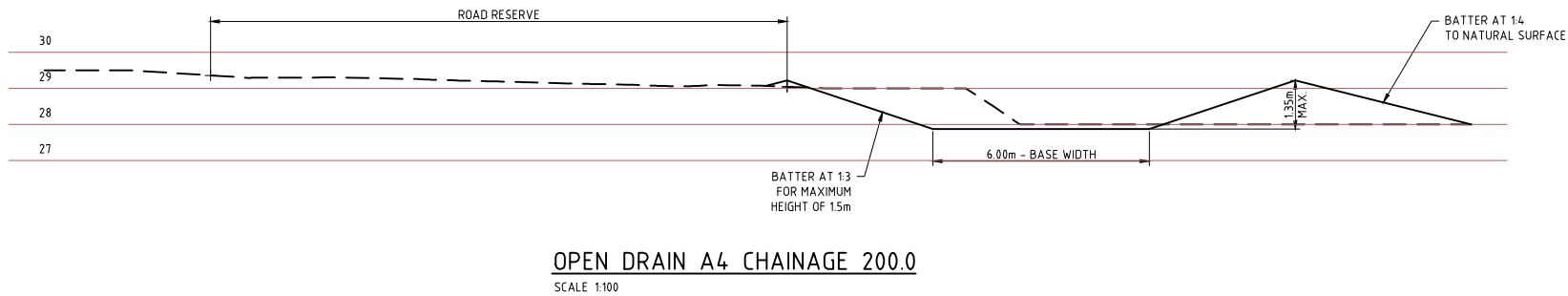
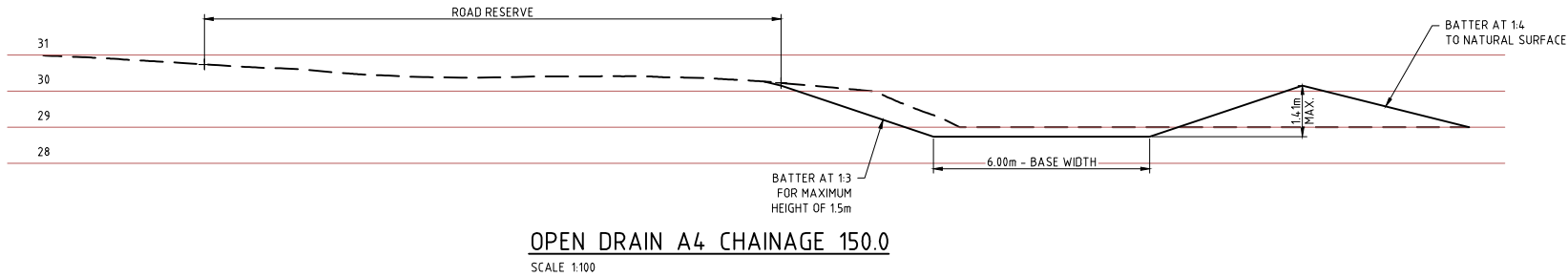


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| CLIENT CITY OF KARRATHA | PROJECT DAMPIER DRAINAGE |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A4 PLAN AND PROFILE | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0207 | REV. A |



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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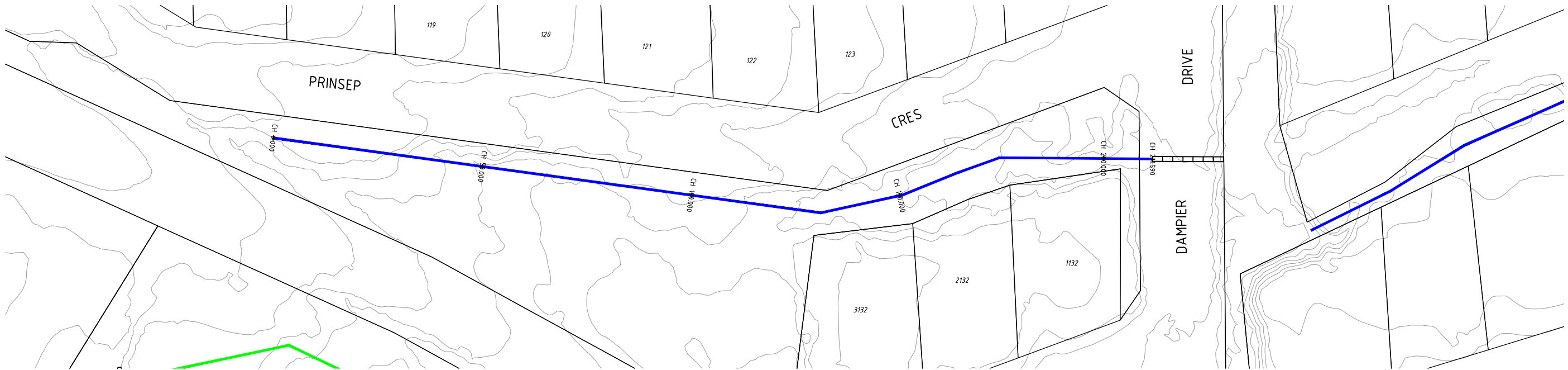
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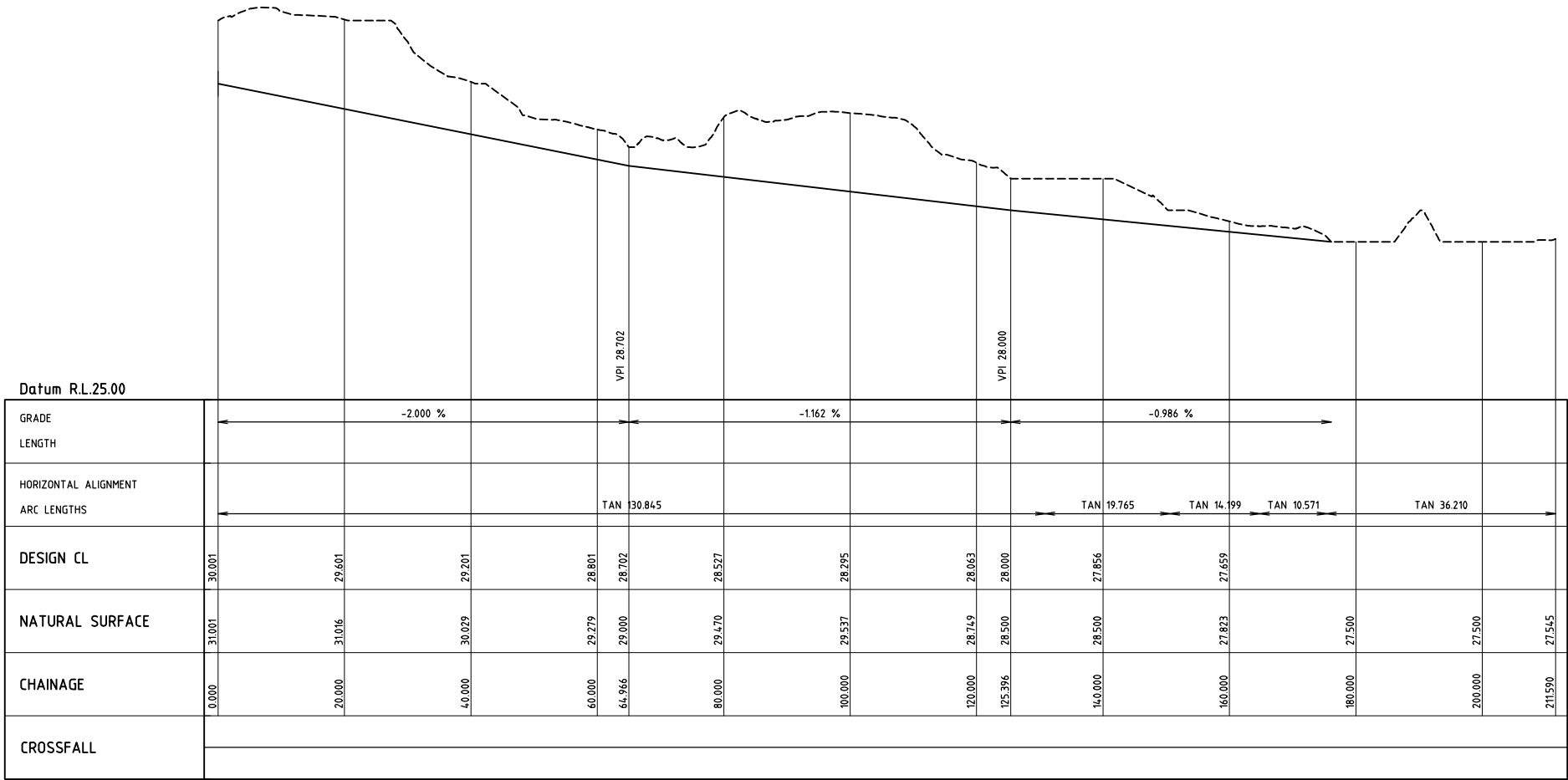
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A4 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0208 |
| | | REV. A |

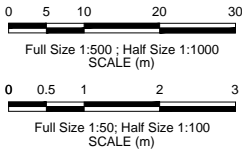
16026-0209



DRAIN PROFILE A5
SCALE 1:500



DRAIN PROFILE A5
SCALE 1500 HORIZONTAL
SCALE 150 VERTICAL



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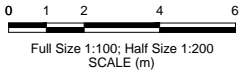
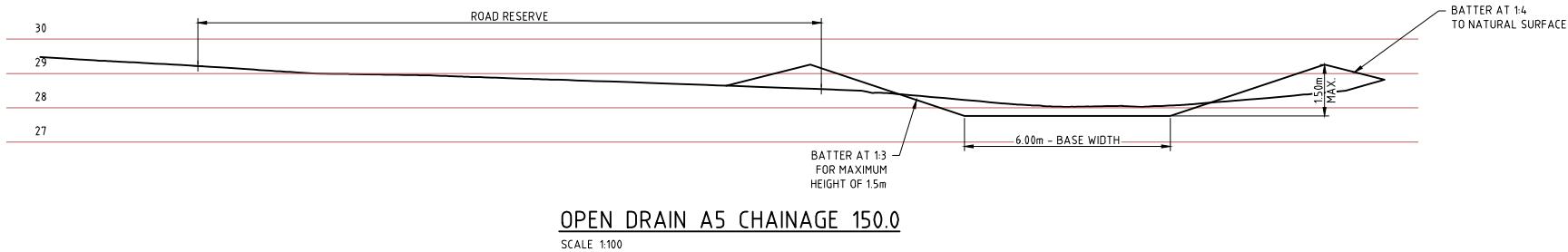
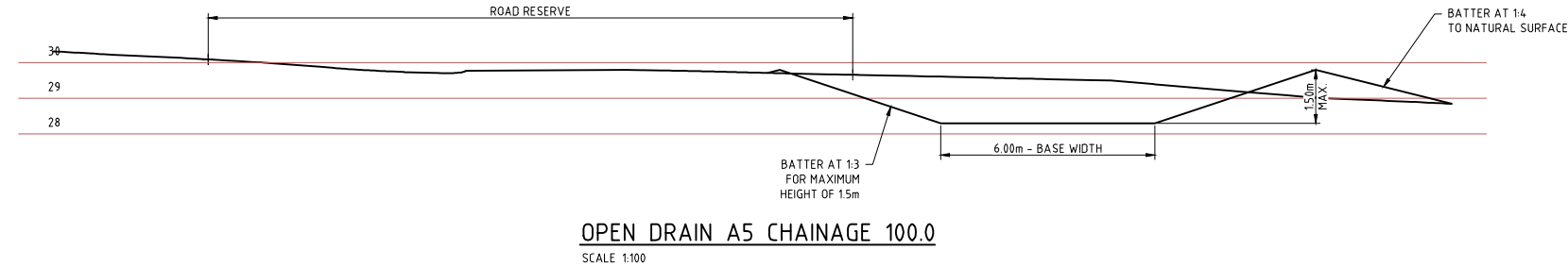
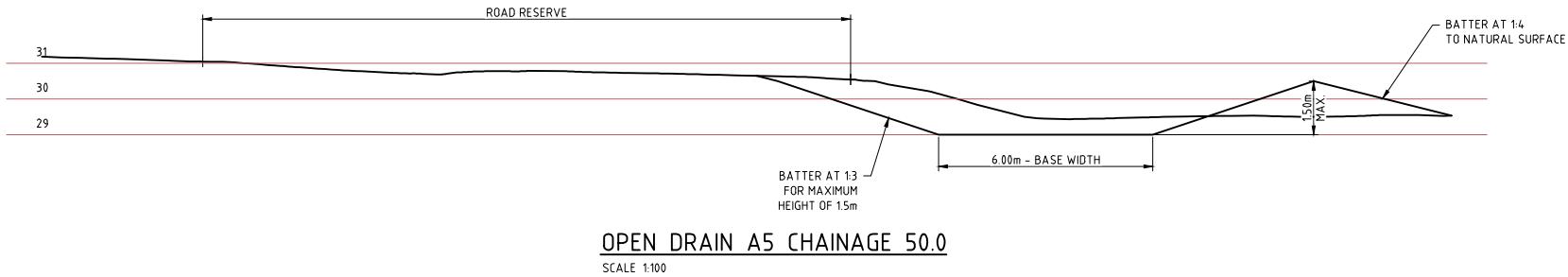
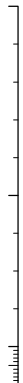
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| CLIENT | CITY OF KARRATHA | | | | |
| PROJECT | DAMPIER DRAINAGE | | | | |
| | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A5 PLAN AND PROFILE | | | | |
| SIZE | A1 | SCALE | AS SHOWN | DRAWING NUMBER | 16026-0209 |
| REV. | A | | | | |

16026-0210

100mm AT FULL SIZE AT A1 SHEET SIZE



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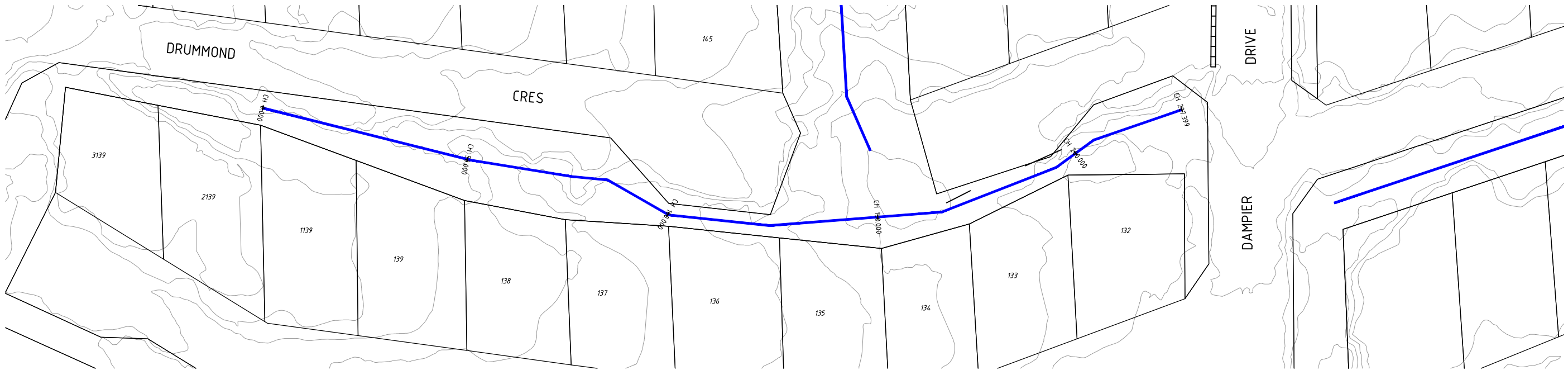
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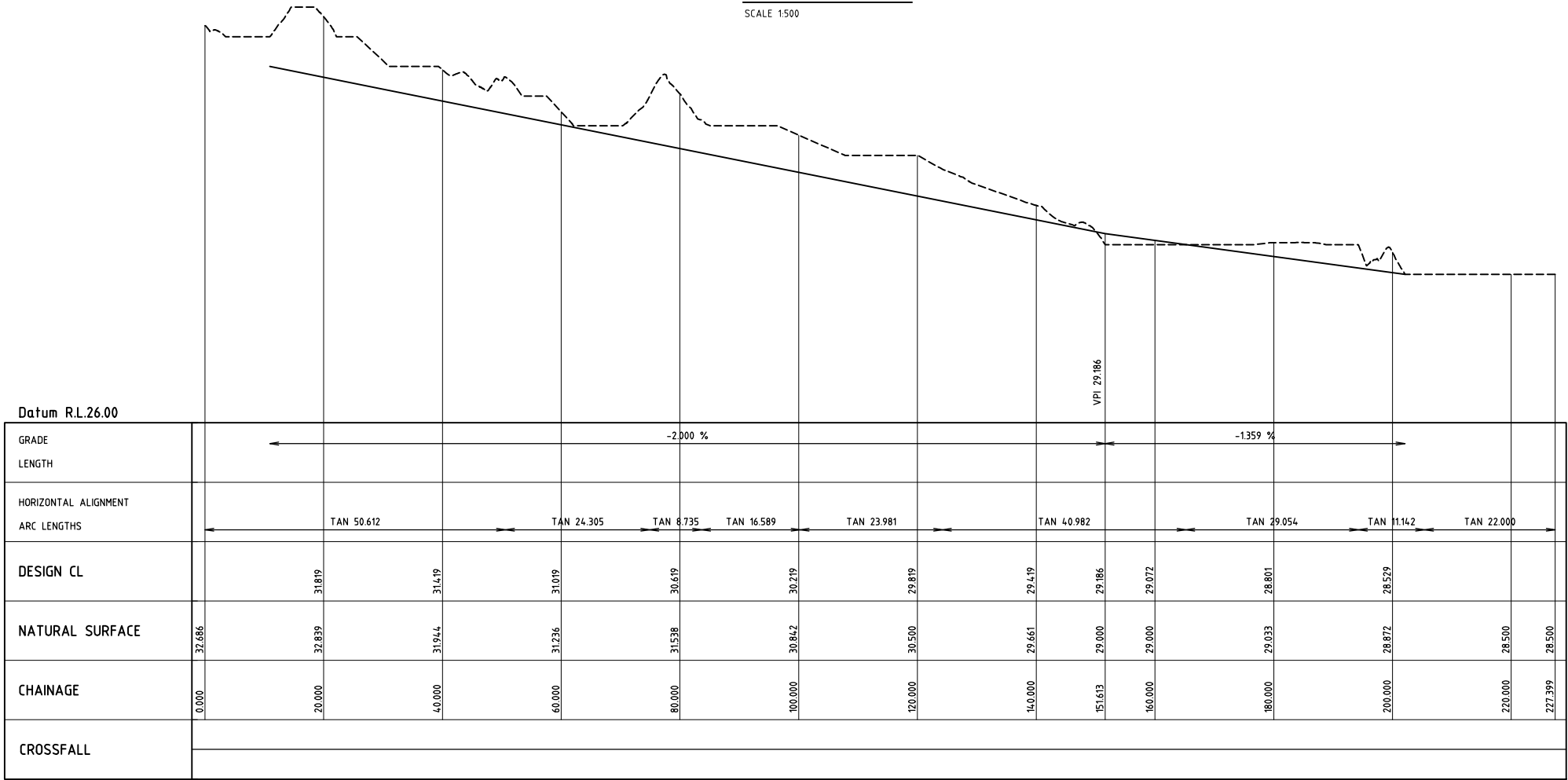
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A5 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0210 |
| | | REV. A |

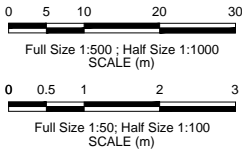
16026-0211



DRAIN PROFILE A6
SCALE 1:500



DRAIN PROFILE A6
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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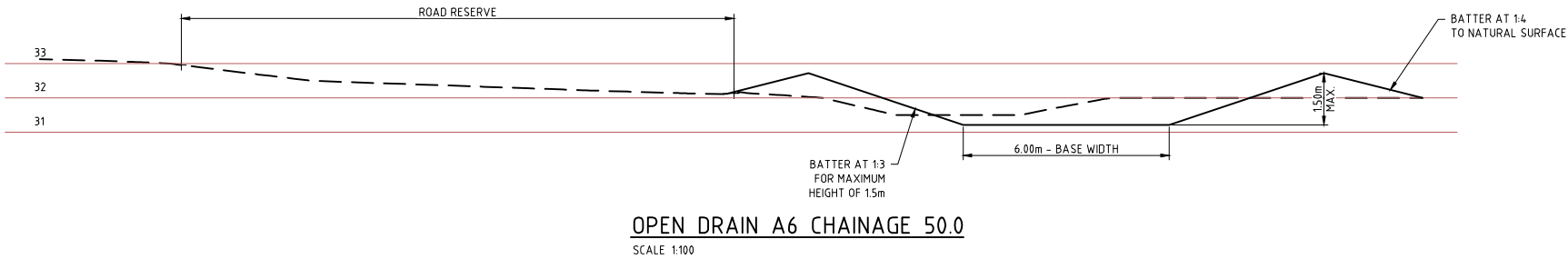
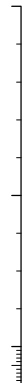
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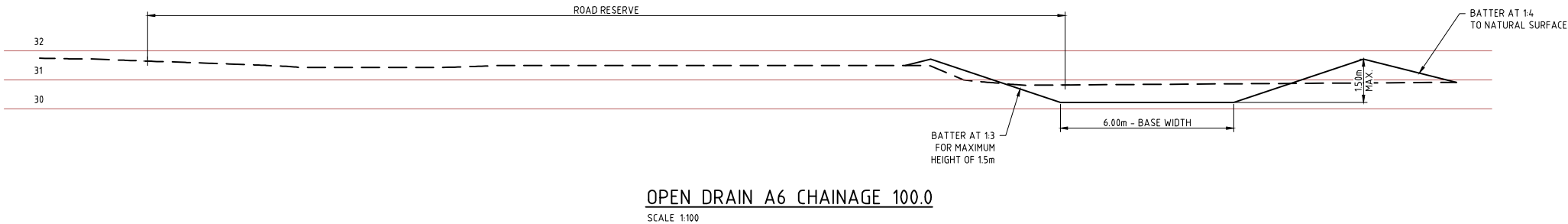
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A6 PLAN AND PROFILE | | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0211 | REV. A |

16026-0212

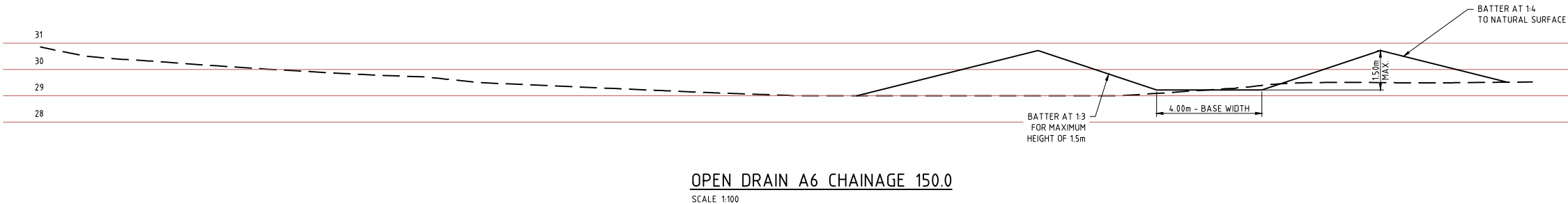
100mm AT FULL SIZE AT A1 SHEET SIZE



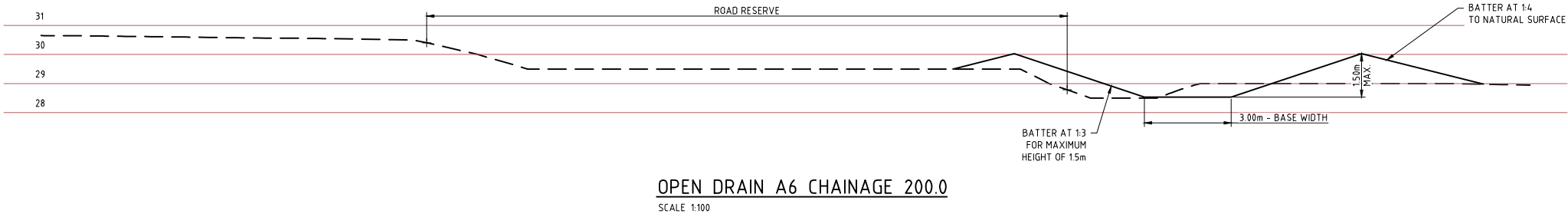
OPEN DRAIN A6 CHAINAGE 50.0
SCALE 1:100



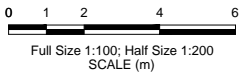
OPEN DRAIN A6 CHAINAGE 100.0
SCALE 1:100



OPEN DRAIN A6 CHAINAGE 150.0
SCALE 1:100



OPEN DRAIN A6 CHAINAGE 200.0
SCALE 1:100



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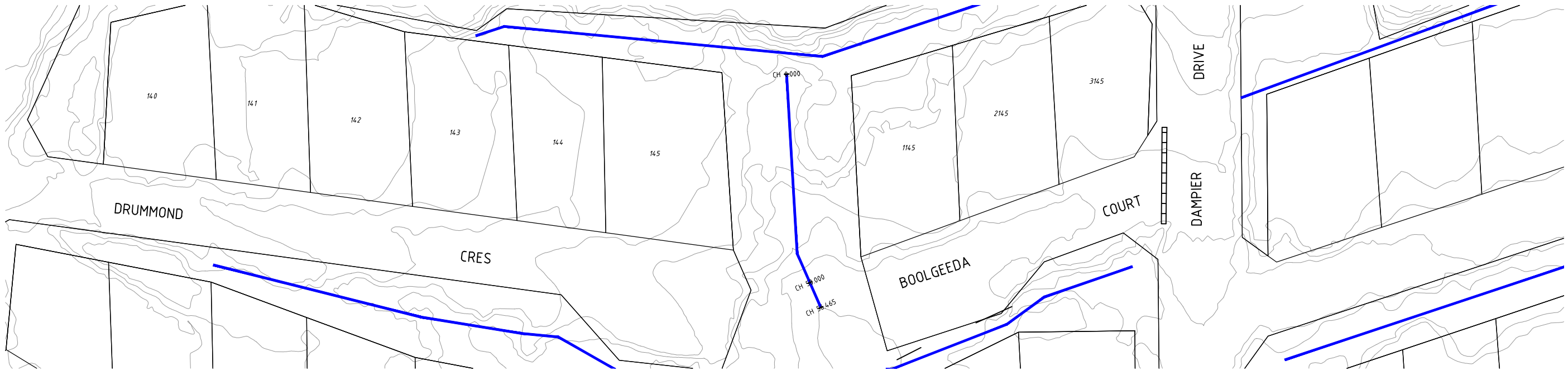
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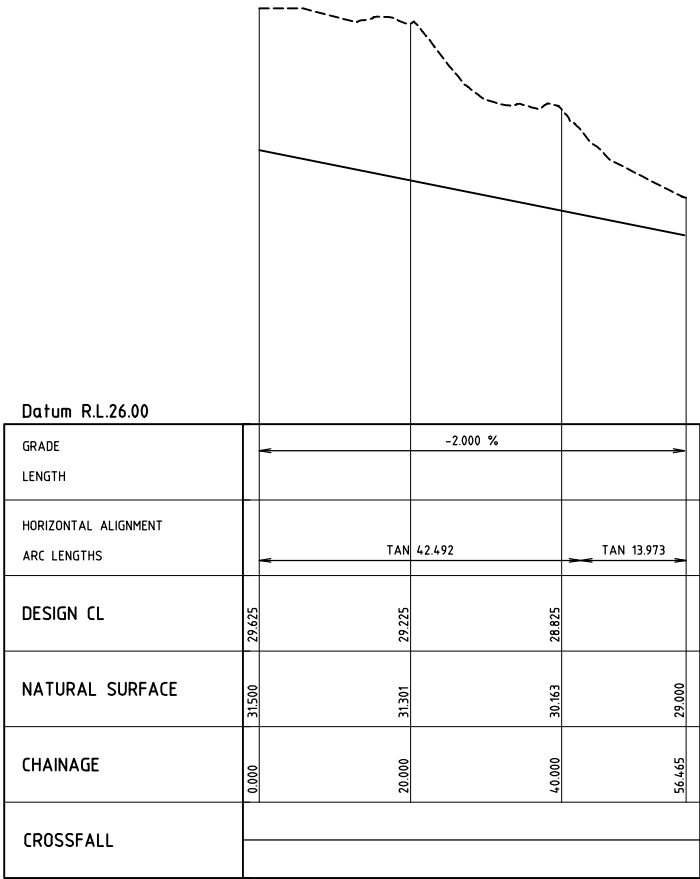
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A6 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0212 |
| | | REV. A |

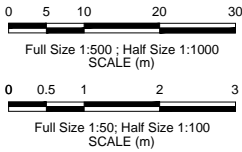
16026-0213



DRAIN PROFILE A7
SCALE 1:500



DRAIN PROFILE A7
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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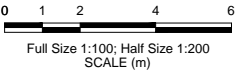
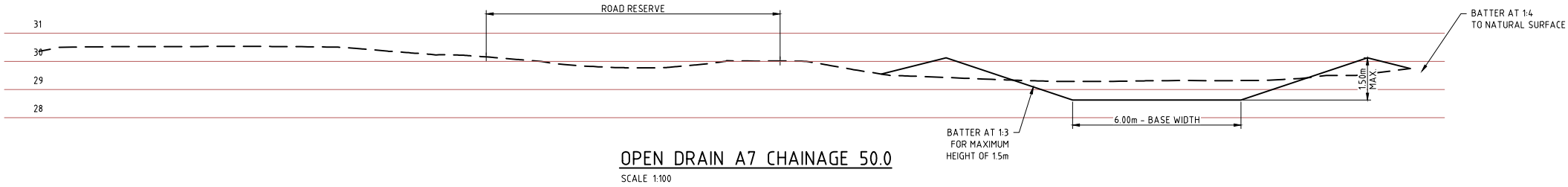
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| CLIENT CITY OF KARRATHA | PROJECT DAMPIER DRAINAGE |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A7 PLAN AND PROFILE | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0213 | REV. A |



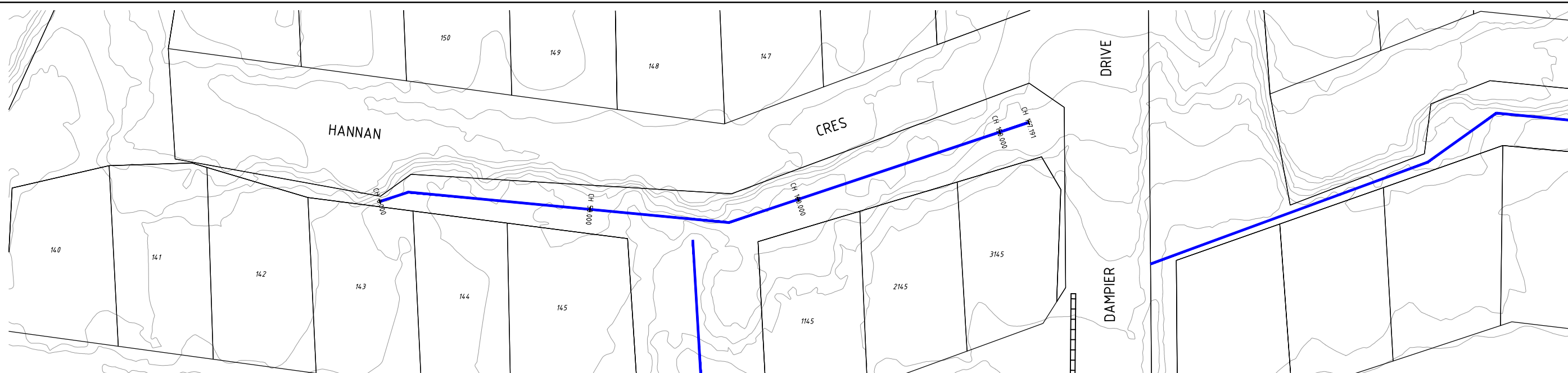
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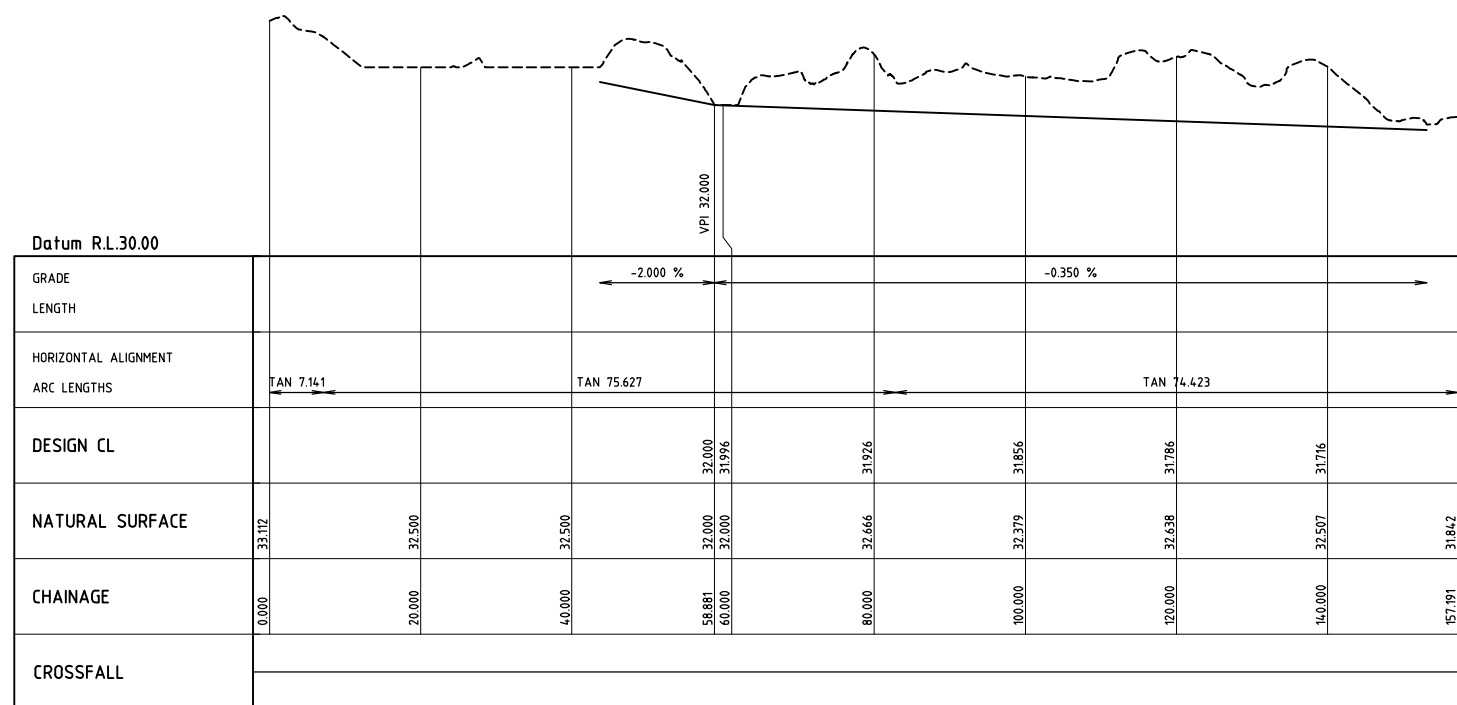
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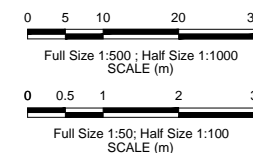
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A7 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0214 |
| | | REV. A |



DRAIN PROFILE A8
SCALE 1:500



DRAIN PROFILE A8
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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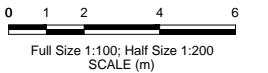
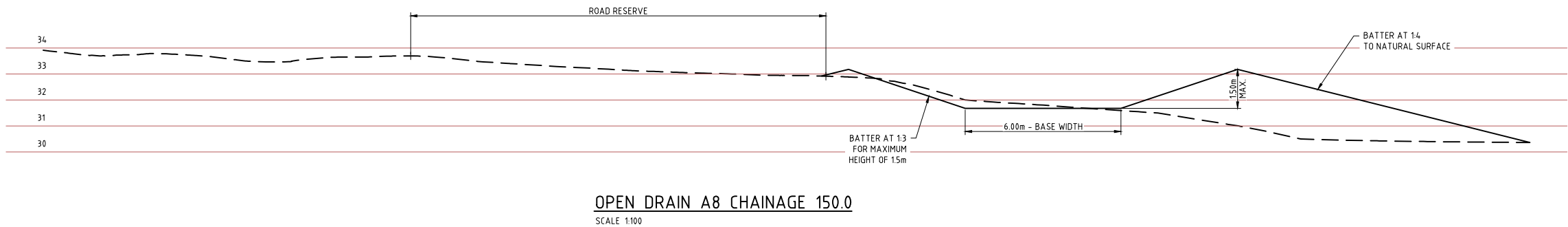
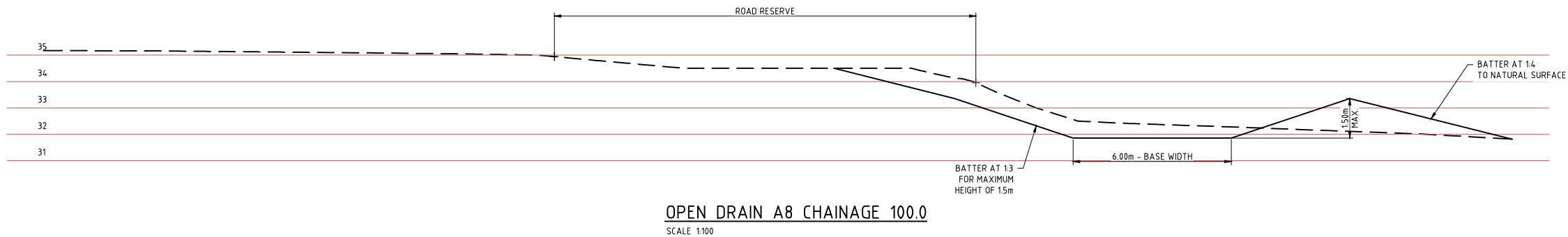
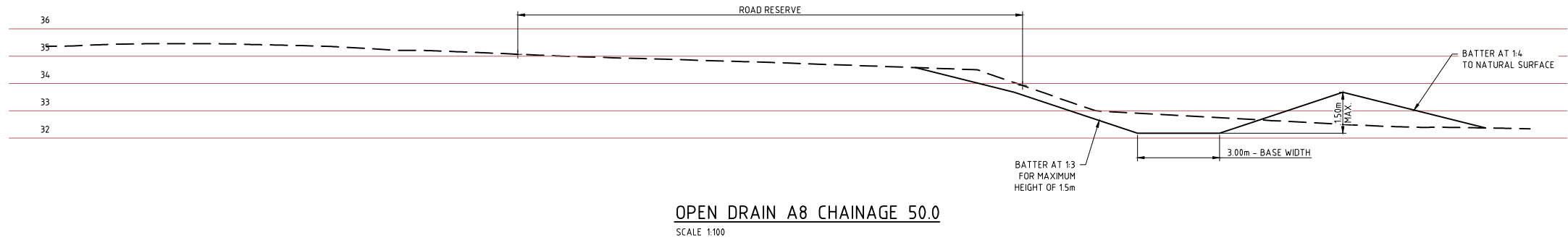


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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A8 PLAN AND PROFILE | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0215 | A |



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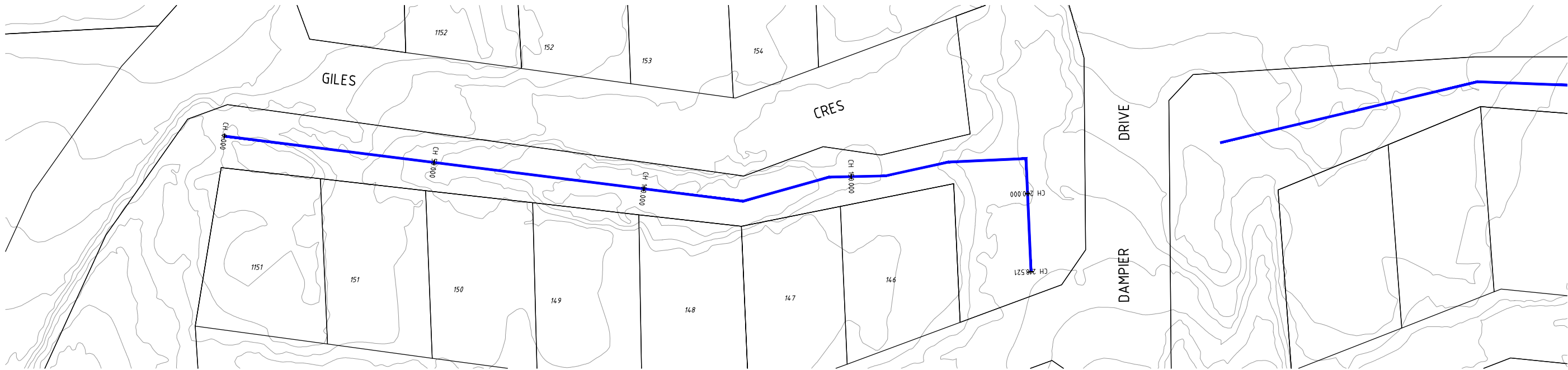
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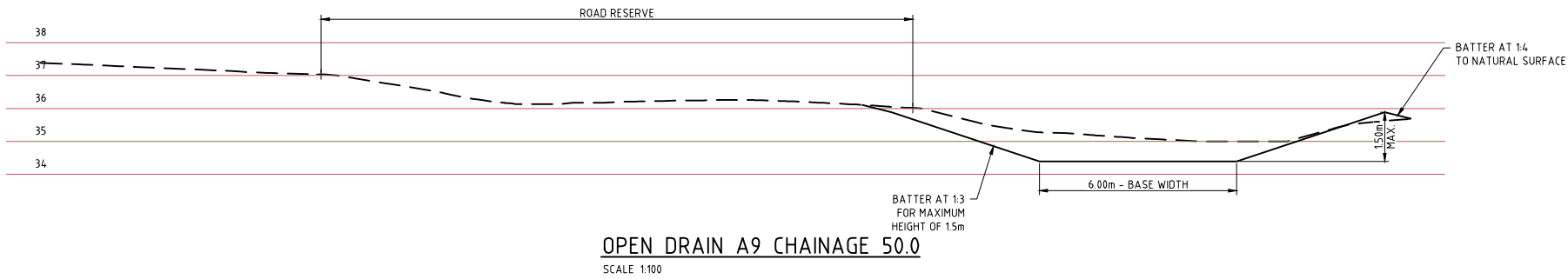
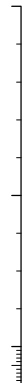
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A8 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0216 |
| | | REV. A |

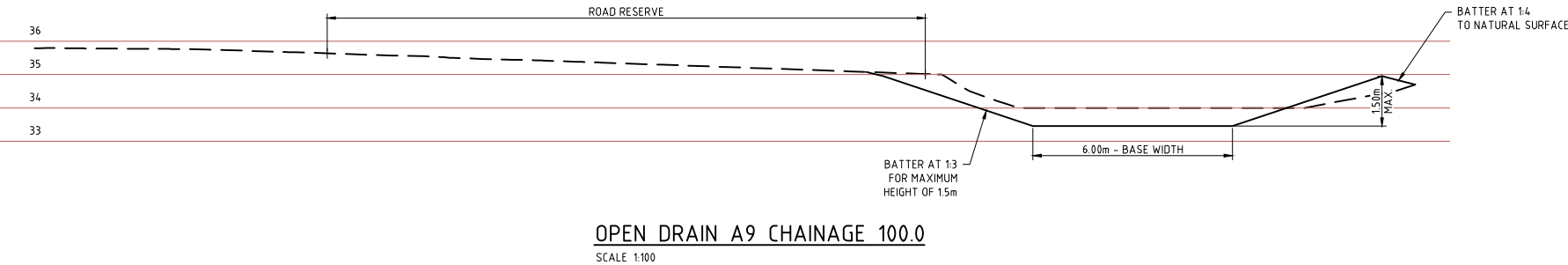
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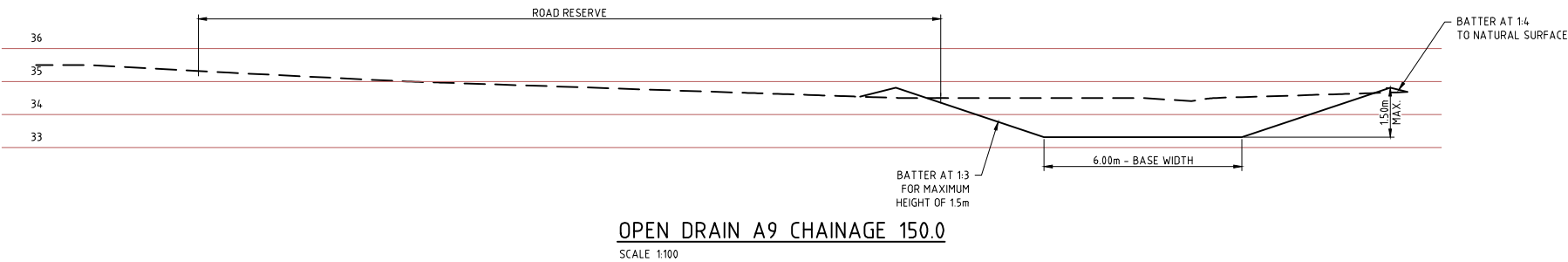
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SCALE 1:100



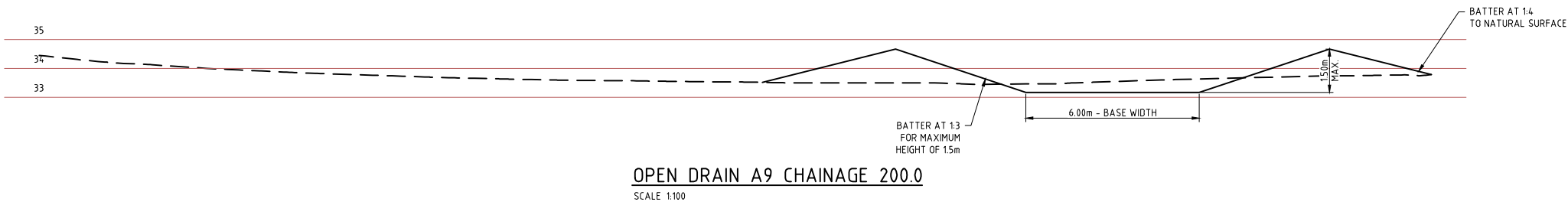
OPEN DRAIN A9 CHAINAGE 100.0

SCALE 1:100



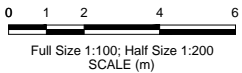
OPEN DRAIN A9 CHAINAGE 150.0

SCALE 1:100



OPEN DRAIN A9 CHAINAGE 200.0

SCALE 1:100



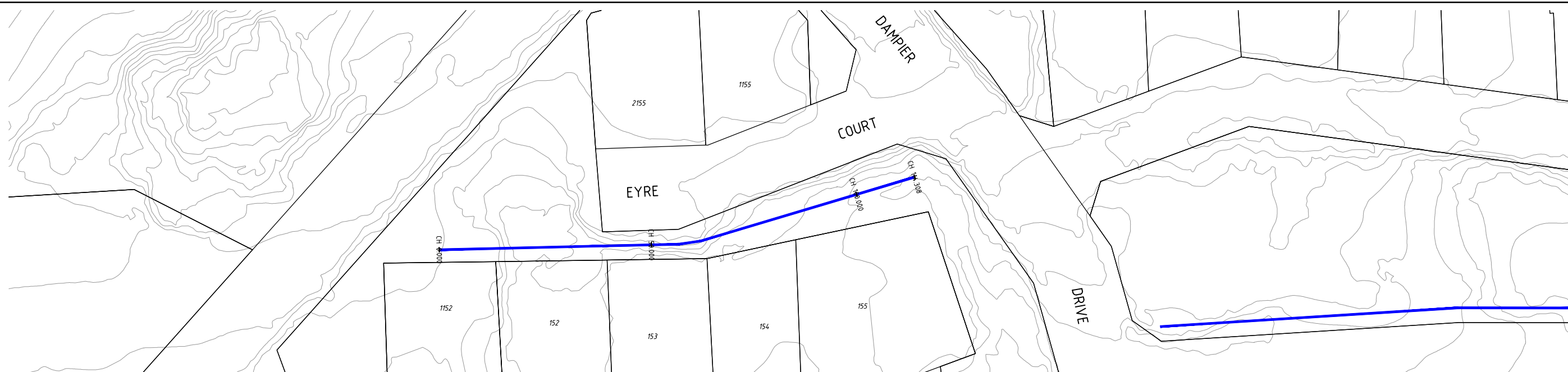
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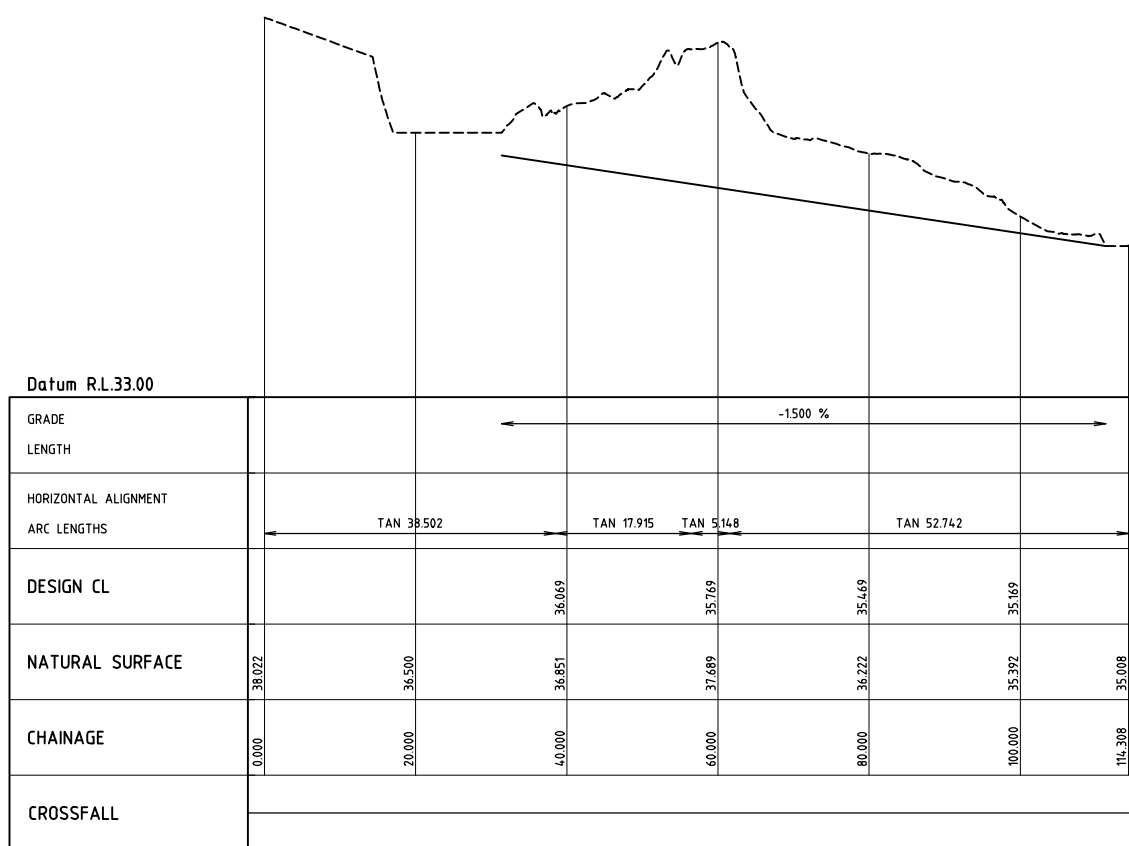
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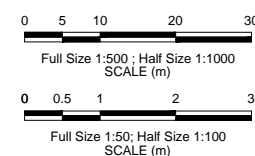
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A9 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0218 |
| | | REV. A |



DRAIN PROFILE A10
SCALE 1:500



DRAIN PROFILE A10
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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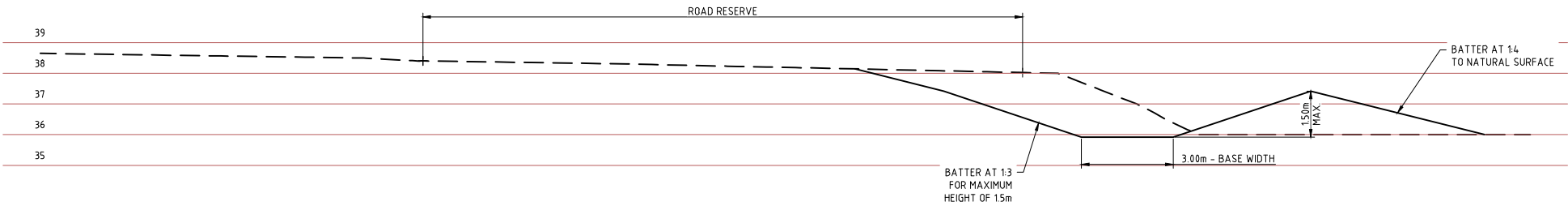
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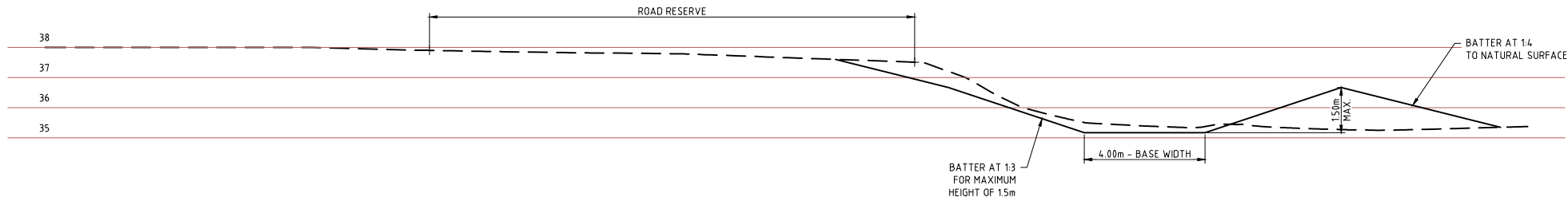
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STROMWATER UPGRADE | |
| | | OPEN DRAINAGE REMEDIATION | |
| | | OPEN DRAIN A10 PLAN AND PROFILE | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0219 | A |

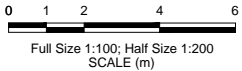
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OPEN DRAIN A10 CHAINAGE 50.0
SCALE 1:100



OPEN DRAIN A10 CHAINAGE 100.0
SCALE 1:100



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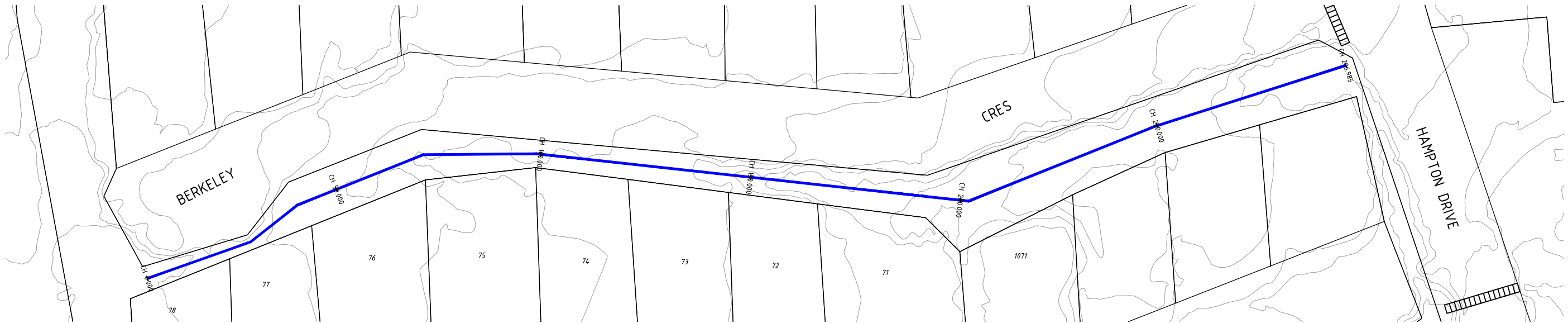
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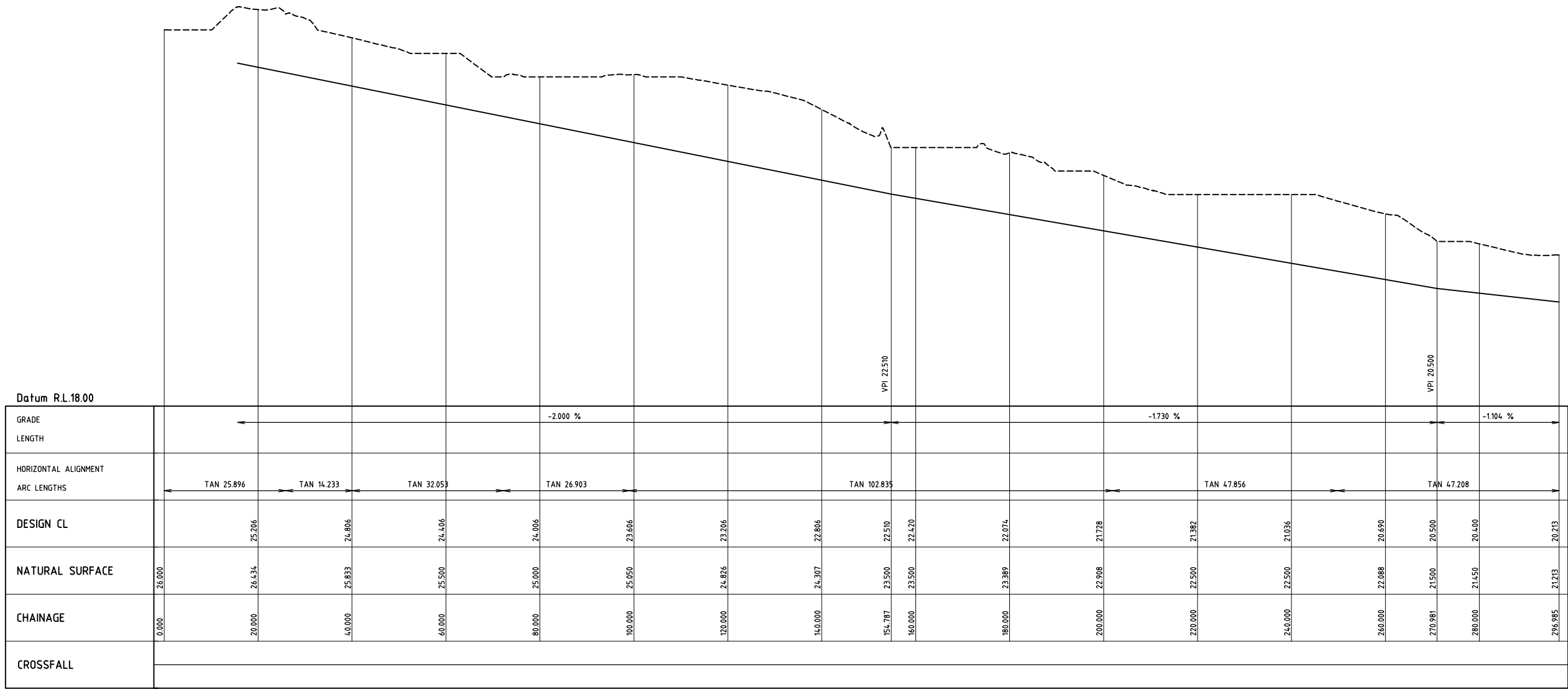
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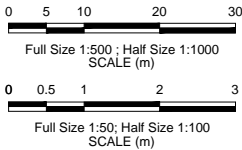
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN A10 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0220 |
| REV. A | | |



DRAIN PROFILE B1
SCALE 1:500



DRAIN PROFILE B1
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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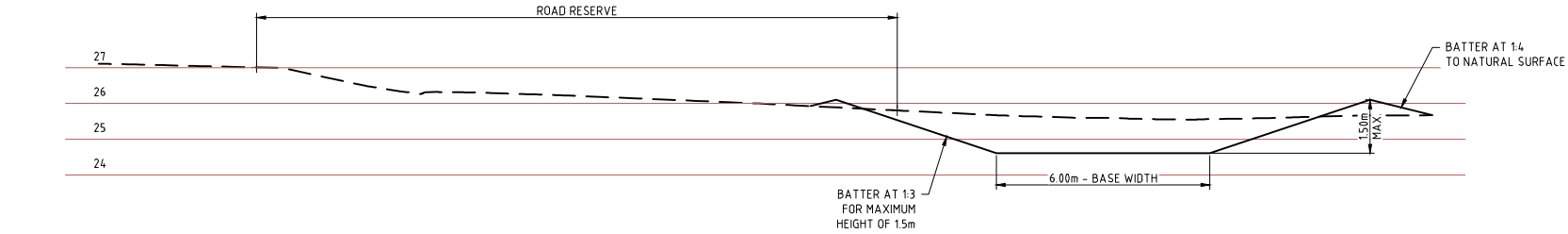
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| CLIENT CITY OF KARRATHA | PROJECT DAMPIER DRAINAGE |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN B1 PLAN AND PROFILE | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0221 | REV. A |

16026-0222

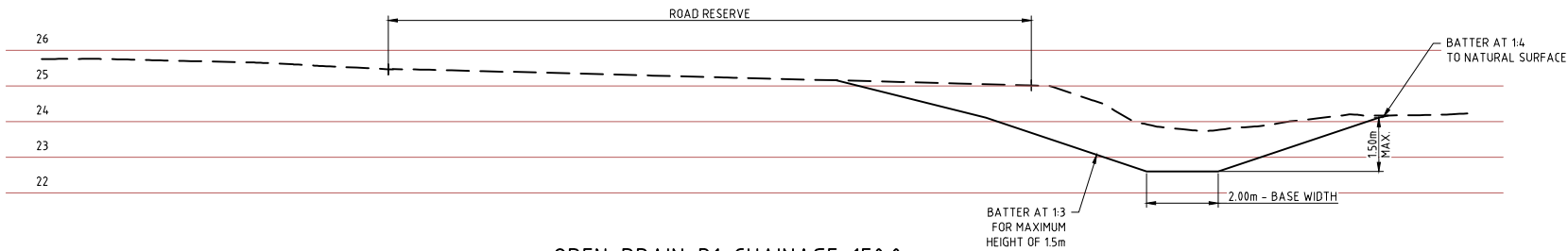
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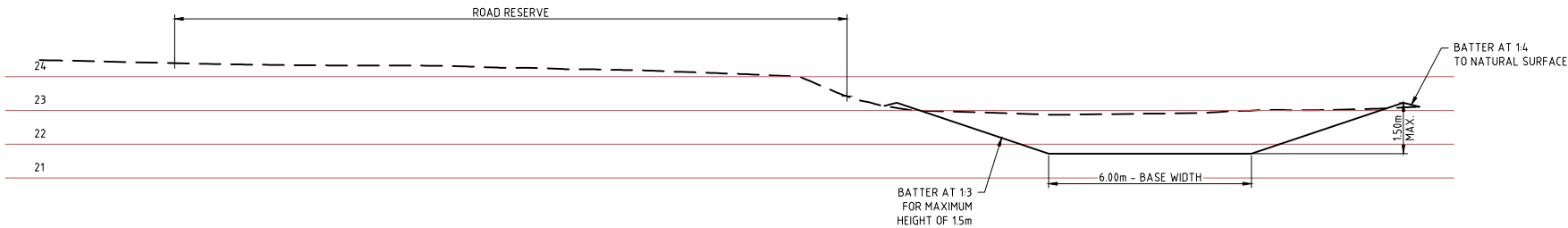
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SCALE 1:100



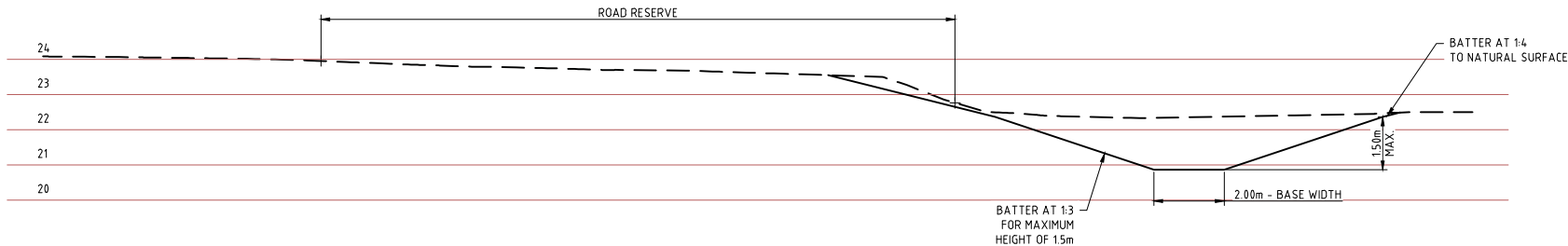
OPEN DRAIN B1 CHAINAGE 100.0
SCALE 1:100



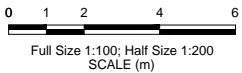
OPEN DRAIN B1 CHAINAGE 150.0
SCALE 1:100



OPEN DRAIN B1 CHAINAGE 200.0
SCALE 1:100



OPEN DRAIN B1 CHAINAGE 250.0
SCALE 1:100



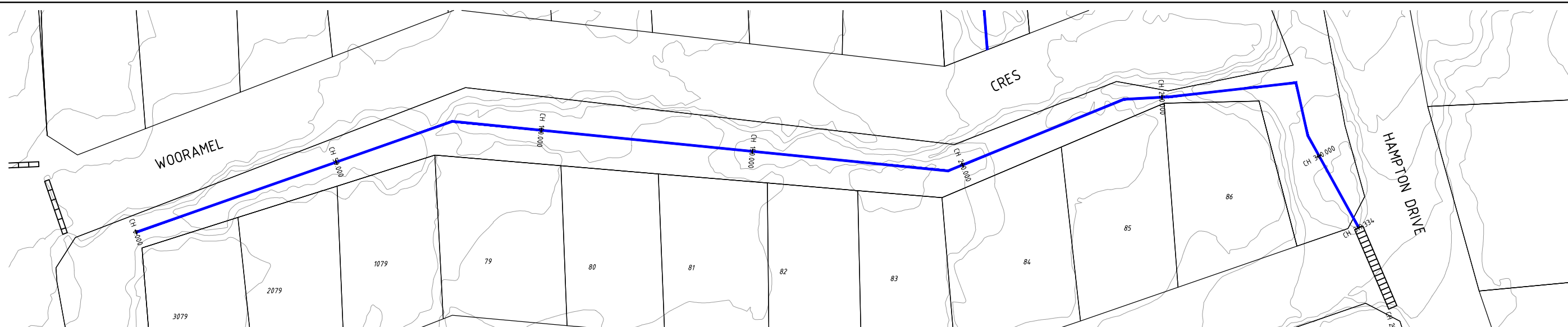
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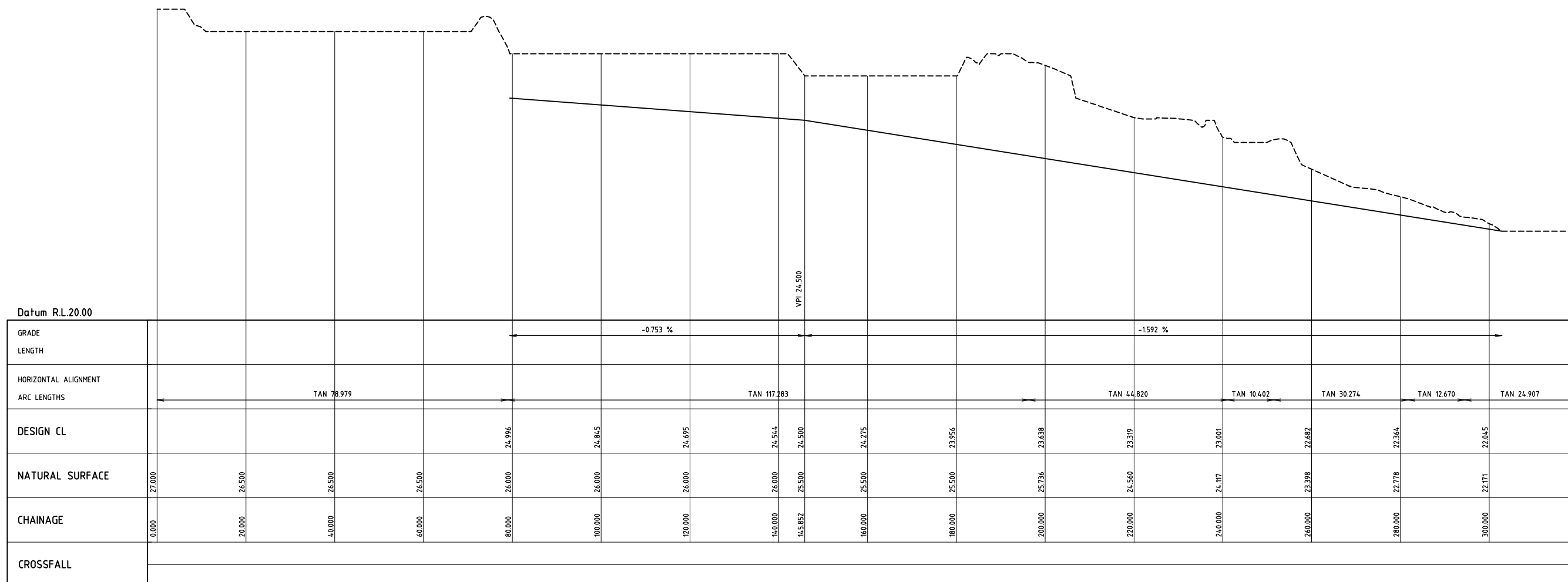
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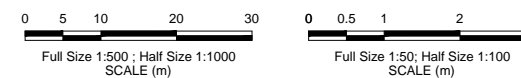
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN B1 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0222 |
| | | REV. A |



SCALE 1:500



SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |

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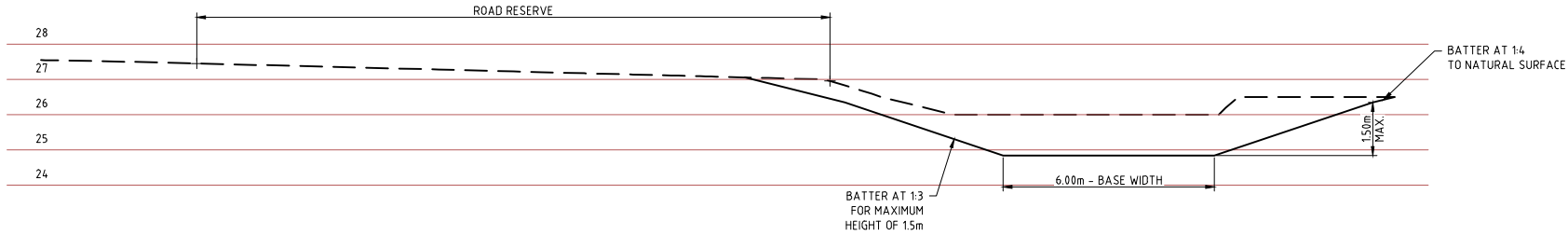
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| DRAWN | DESIGNED | APPROVED |
| C.BENFIELD | D.LUONG | |
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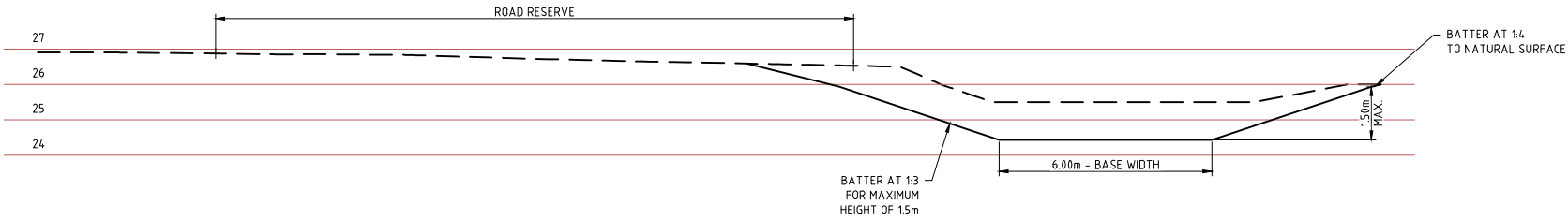
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STORMWATER UPGRADE | |
| | | OPEN DRAINAGE REMEDIATION | |
| | | OPEN DRAIN C1 PLAN AND PROFILE | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0223 | A |

16026-0224

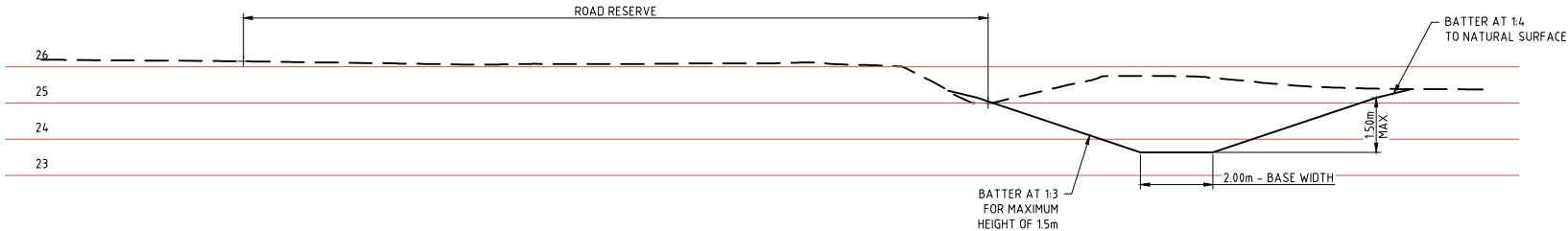
100mm AT FULL SIZE AT A1 SHEET SIZE



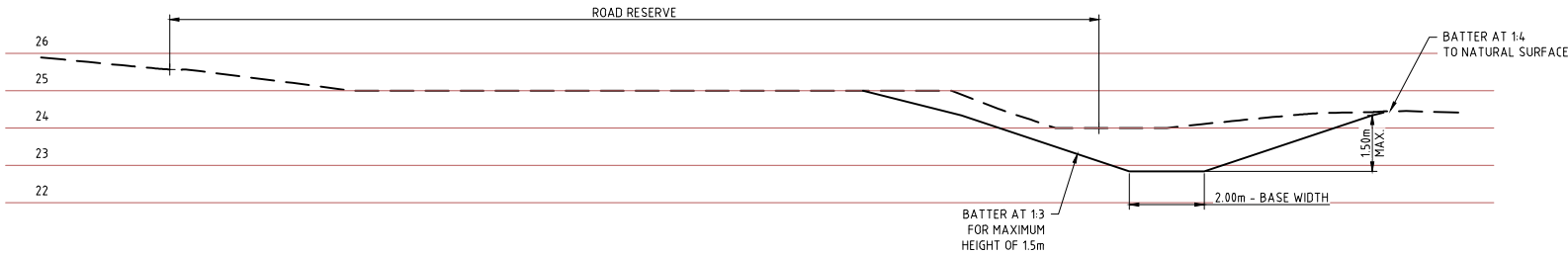
OPEN DRAIN C1 CHAINAGE 100.0
SCALE 1:100



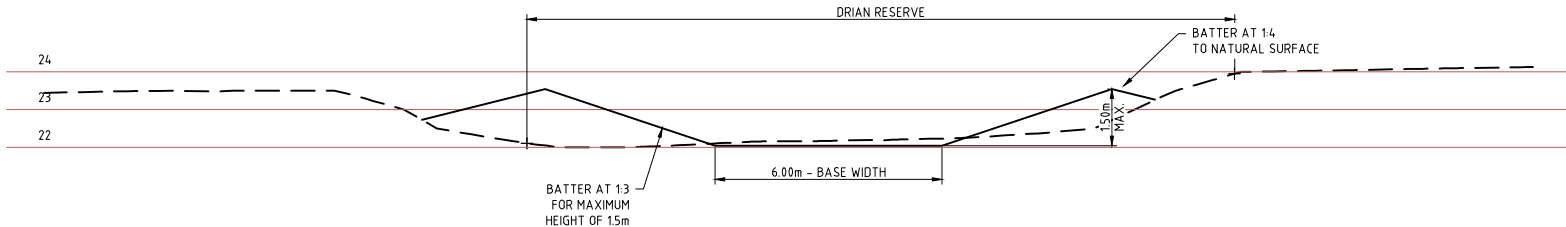
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SCALE 1:100



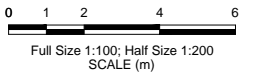
OPEN DRAIN C1 CHAINAGE 200.0
SCALE 1:100



OPEN DRAIN C1 CHAINAGE 250.0
SCALE 1:100



OPEN DRAIN C1 CHAINAGE 300.0
SCALE 1:100



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| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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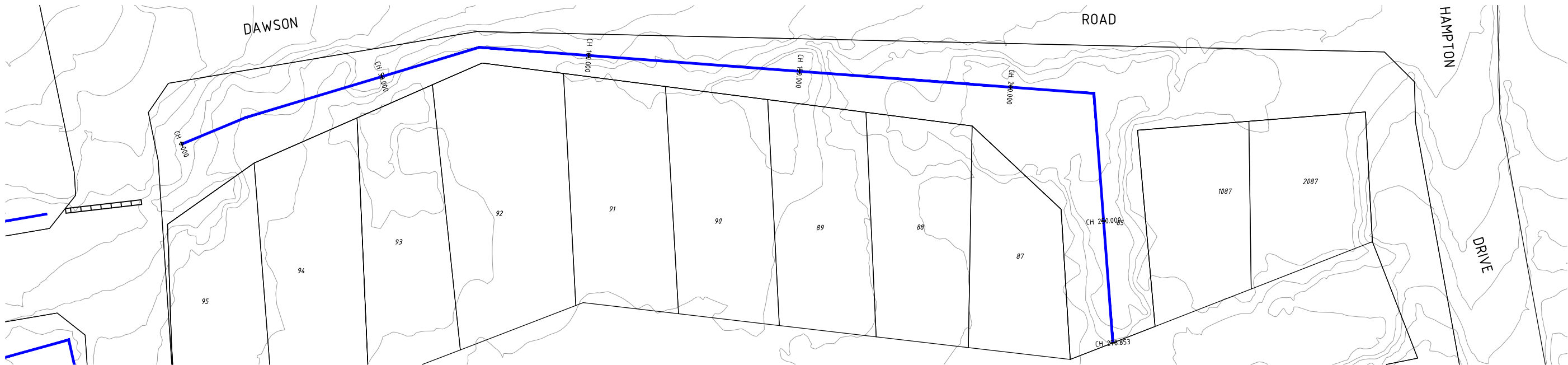
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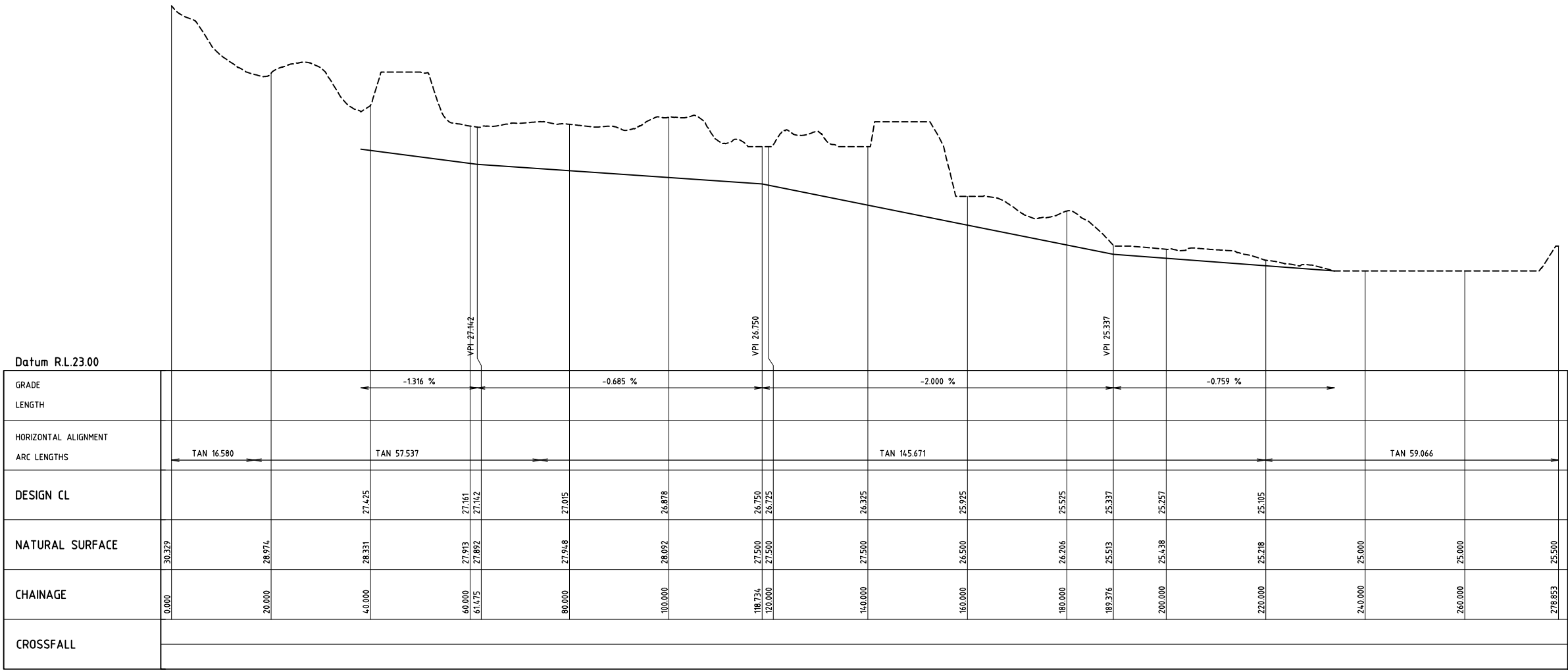
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN C1 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0224 |
| | | REV. A |

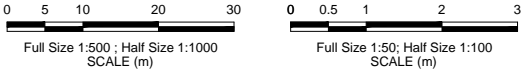
16026-0225



DRAIN PROFILE C2
SCALE 1:500



DRAIN PROFILE C2
SCALE 1500 HORIZONTAL
SCALE 1:50 VERTICAL



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| A | 08/06/16 | ISSUED FOR INFORMATION | CB | | |
| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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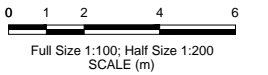
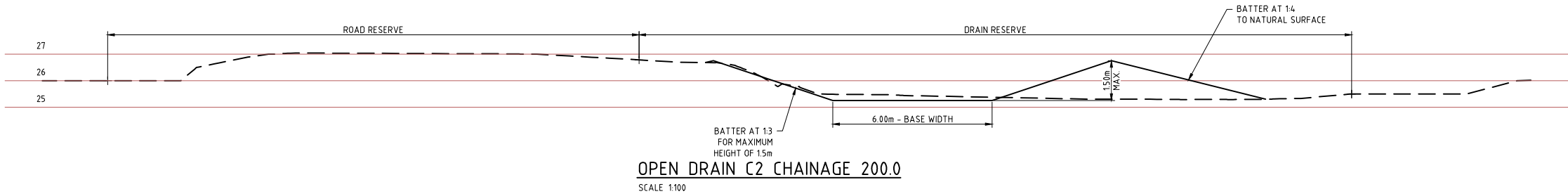
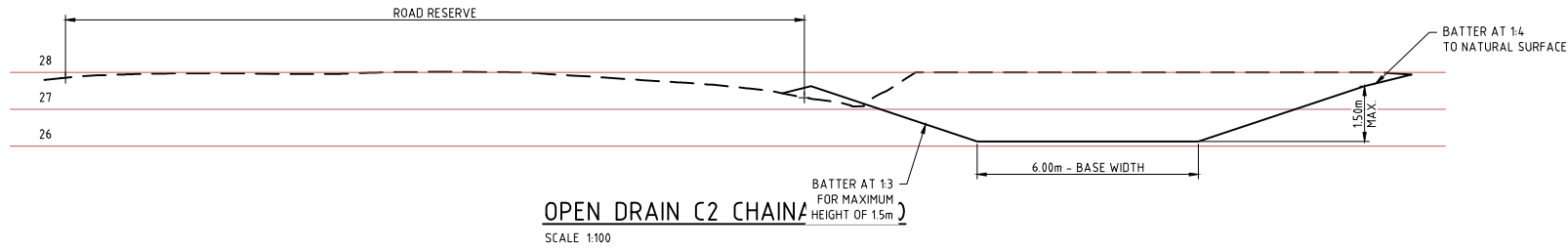
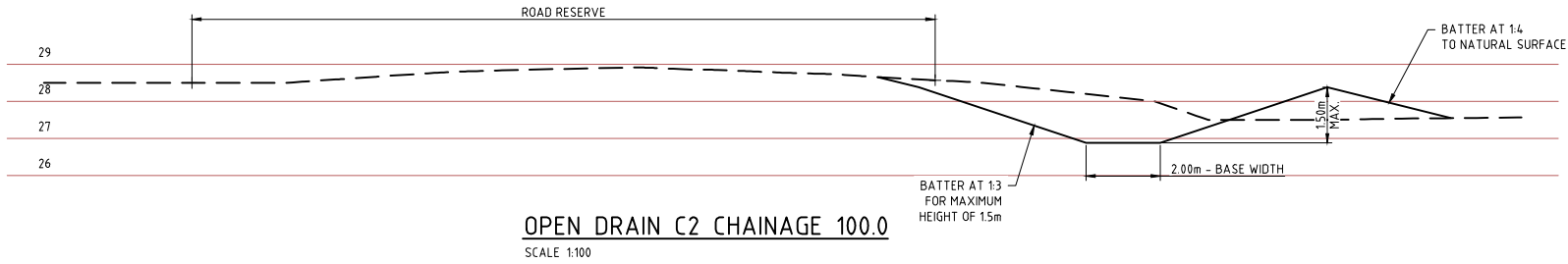
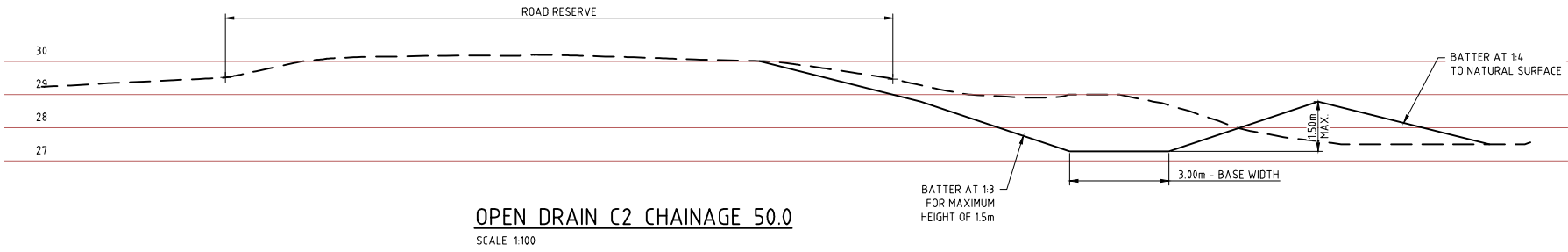
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| DRAWN C.BENFIELD | DESIGNED D.LUONG | APPROVED |
| DRAW. CHECK | DES. CHECK | |
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| CLIENT CITY OF KARRATHA | PROJECT DAMPIER DRAINAGE |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN C2 PLAN AND PROFILE | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0225 | REV. A |

16026-0226

100mm AT FULL SIZE AT A1 SHEET SIZE

Vertical



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
|--|----------|------------------------|-------|---------|----------|
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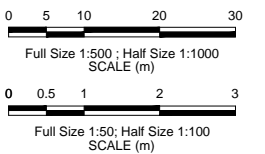
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN C2 - CROSS SECTIONS | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0226 | REV. A |



Datum R.L.26.00

DRAIN PROFILE C3
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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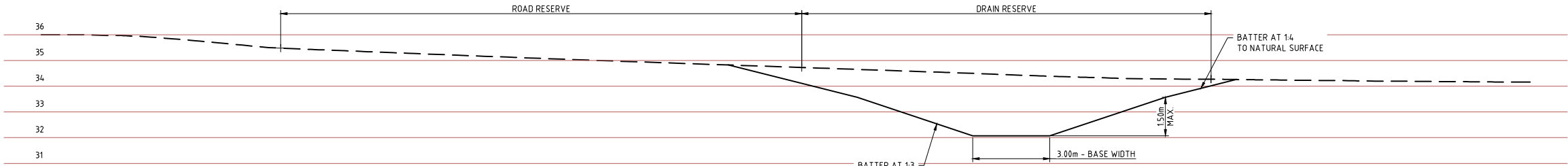
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| C.BENFIELD | D.LUONG | |
| DRAW. CHECK | DES. CHECK | |
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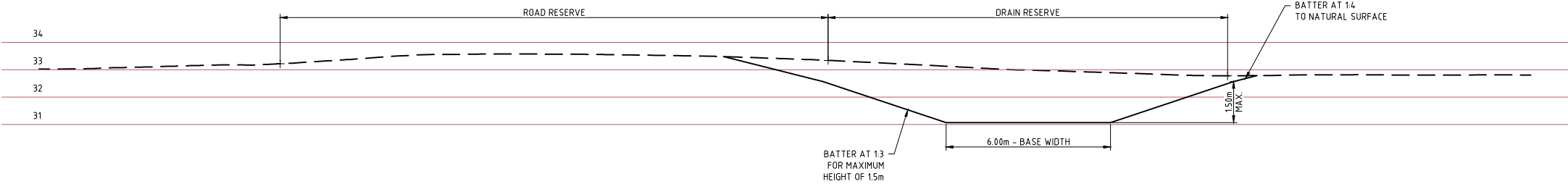
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STROMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN C3 PLAN AND PROFILE | |
| SIZE: A1 | SCALE: AS SHOWN | DRAWING NUMBER: 16026-0227 | REV: A |

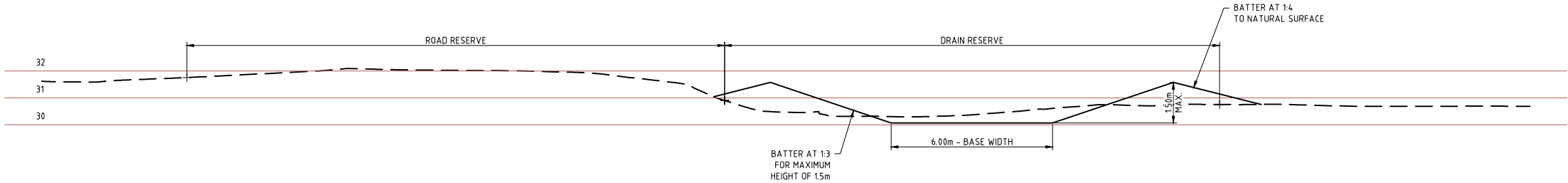
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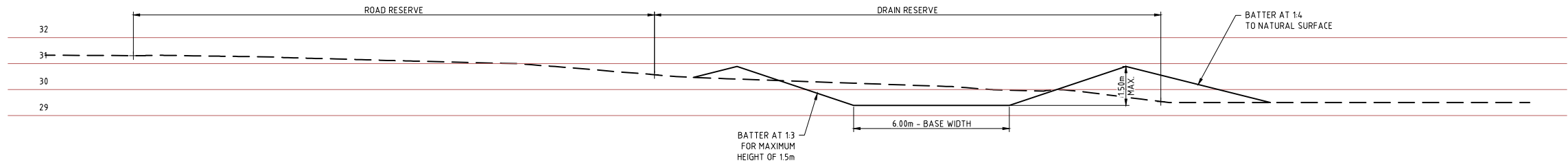
OPEN DRAIN C3 CHAINAGE 50.0
SCALE 1:100



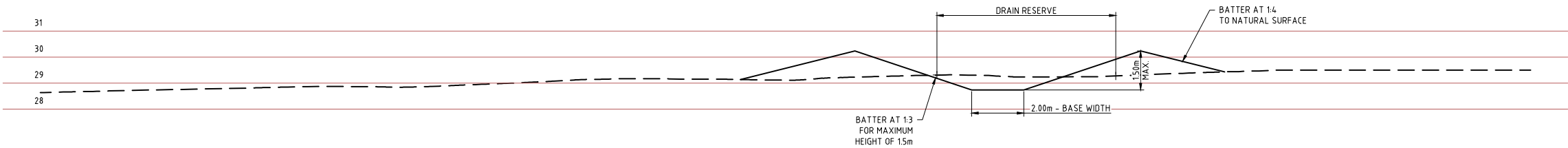
OPEN DRAIN C3 CHAINAGE 100.0
SCALE 1:100



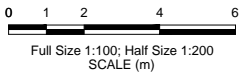
OPEN DRAIN C3 CHAINAGE 150.0
SCALE 1:100



OPEN DRAIN C3 CHAINAGE 200.0
SCALE 1:100



OPEN DRAIN C3 CHAINAGE 250.0
SCALE 1:100



100mm AT FULL SIZE AT A1 SHEET SIZE

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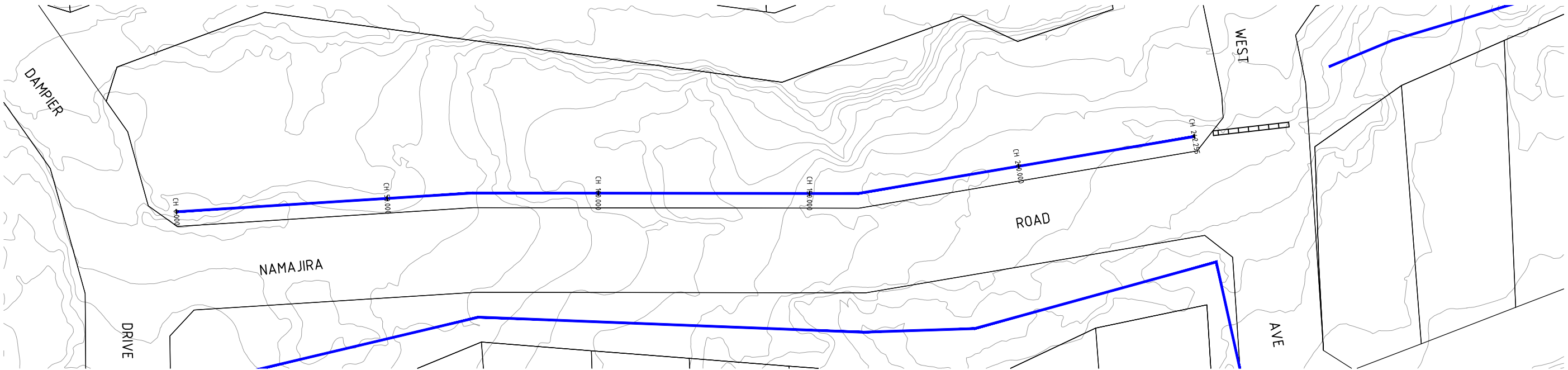
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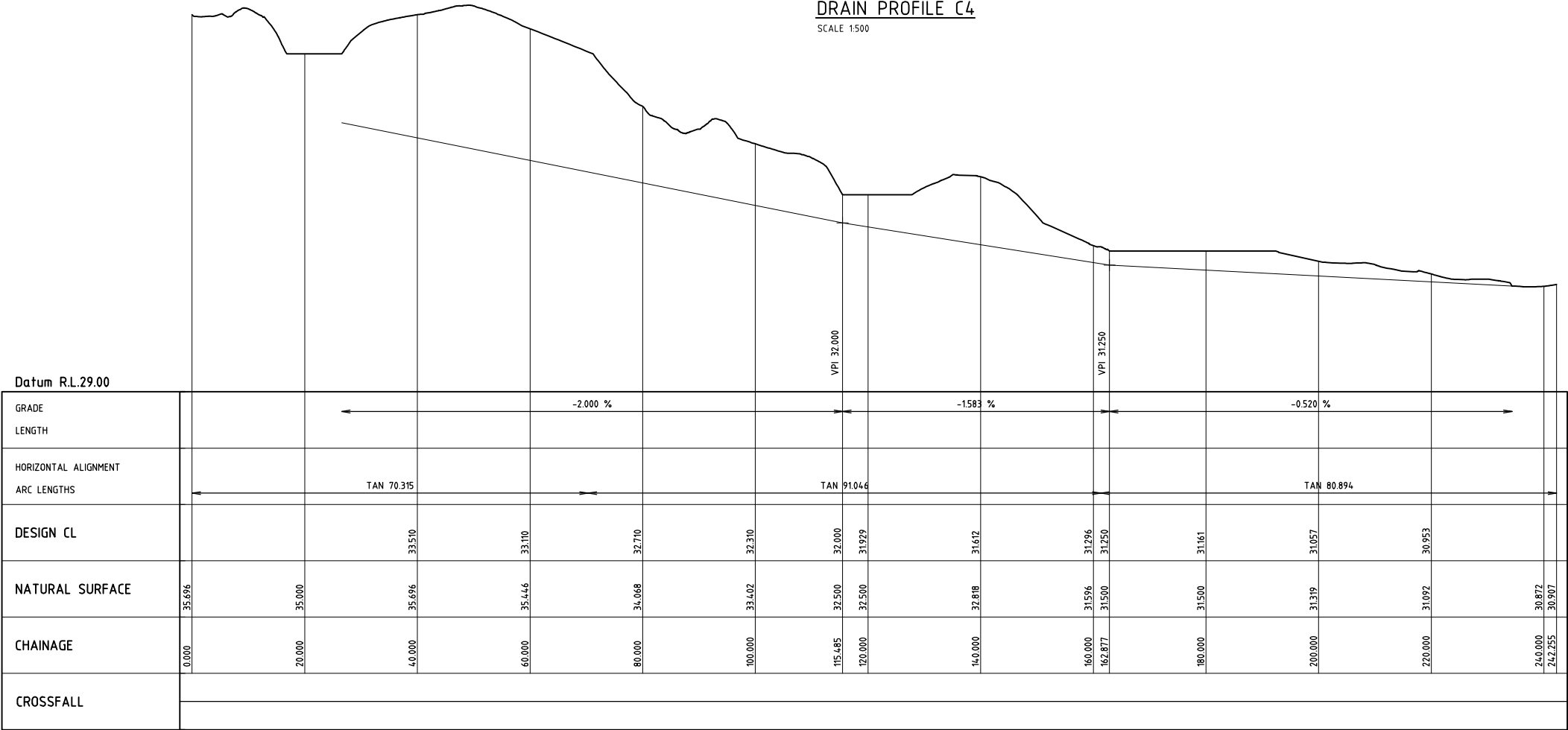
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| CLIENT | CITY OF KARRATHA | | |
| PROJECT | DAMPIER DRAINAGE | | |
| | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN C3 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0228 | REV. A |

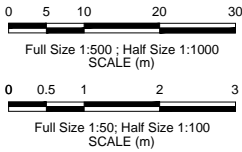
16026-0229



DRAIN PROFILE C4
SCALE 1:500



DRAIN PROFILE C4
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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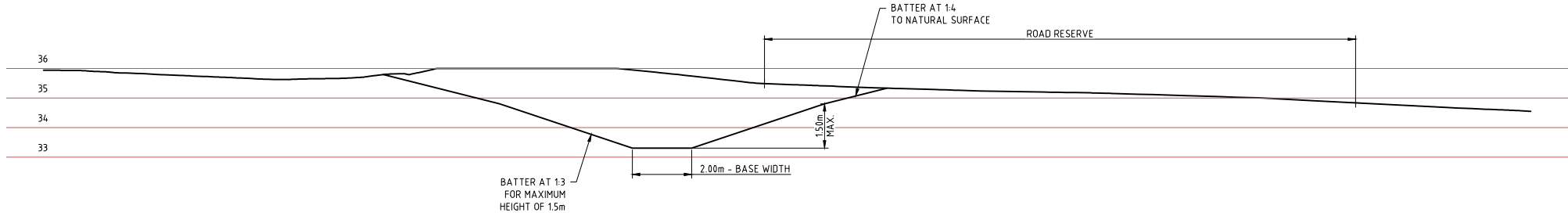


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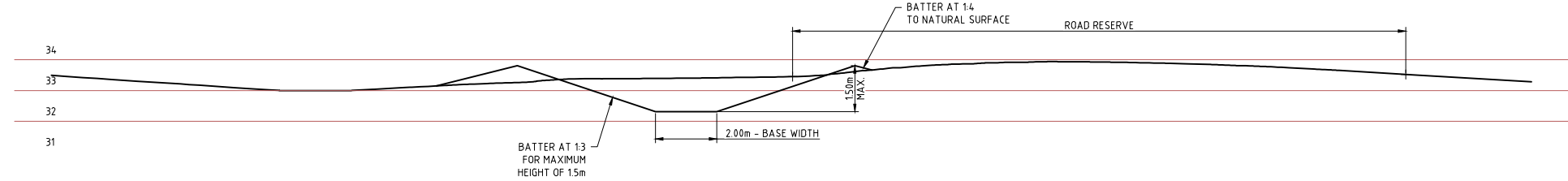
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| CLIENT | CITY OF KARRATHA | | |
| PROJECT | DAMPIER DRAINAGE | | |
| | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN C4 PLAN AND PROFILE | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0229 | REV. A |

16026-0230



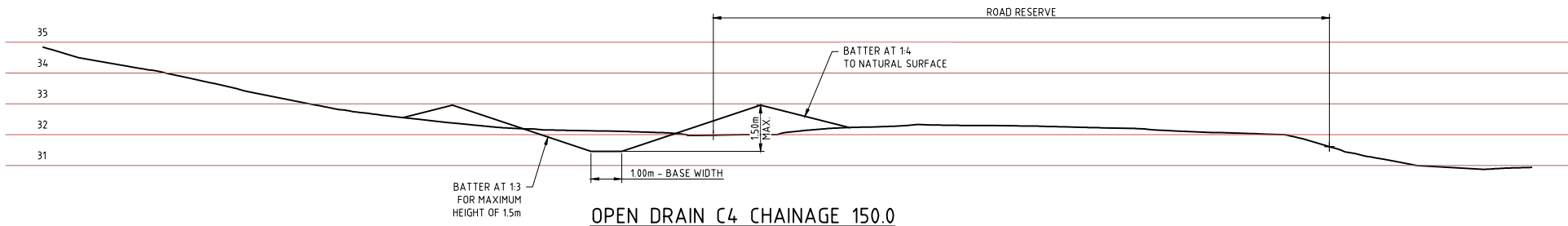
OPEN DRAIN C4 CHAINAGE 50.0

SCALE 1:100



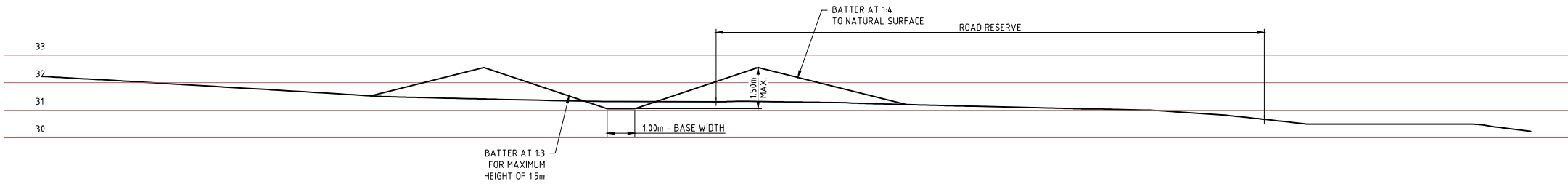
OPEN DRAIN C4 CHAINAGE 100.0

SCALE 1:100



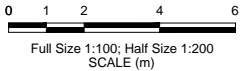
OPEN DRAIN C4 CHAINAGE 150.0

SCALE 1:100



OPEN DRAIN C4 CHAINAGE 200.0

SCALE 1:100



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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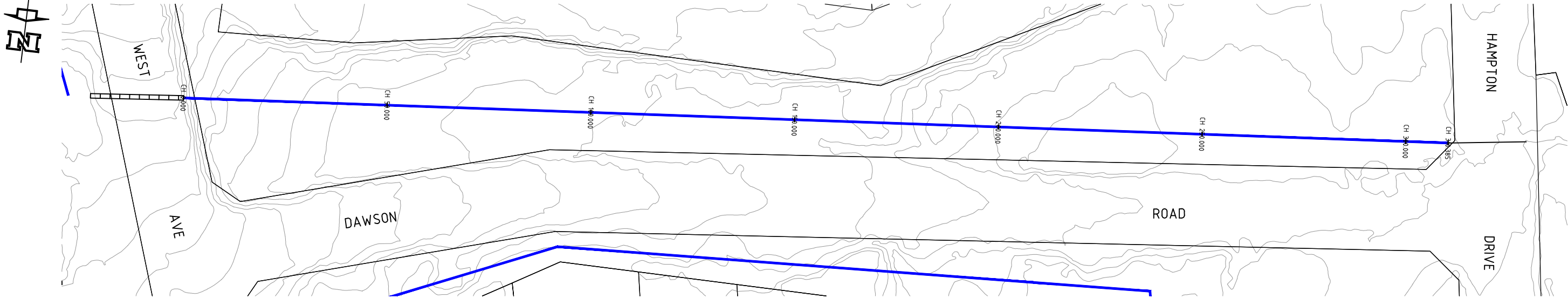
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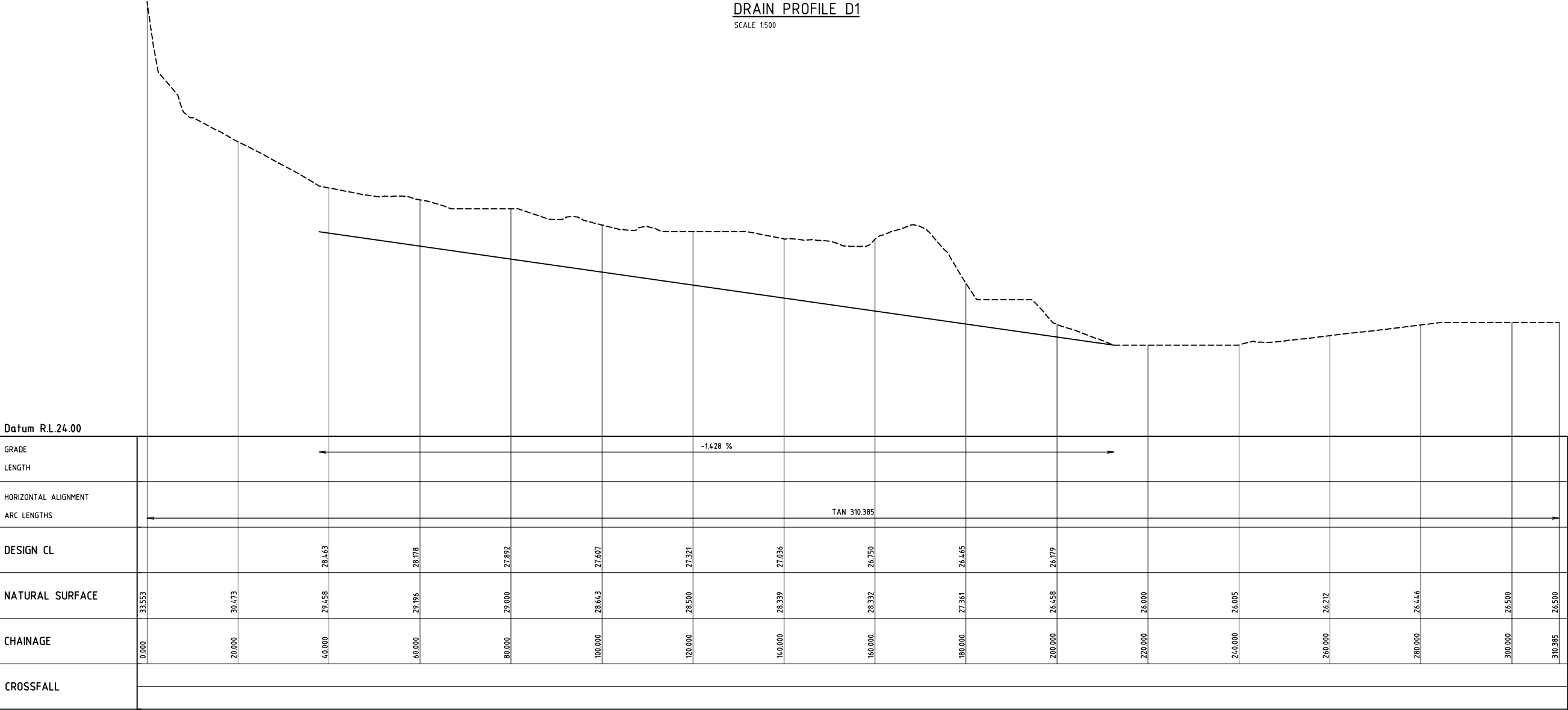
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STROMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN C4 - CROSS SECTIONS | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0230 | REV. A |

16026-0231



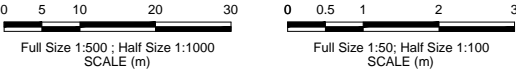
DRAIN PROFILE D1
SCALE 1:500



Datum R.L.24.00

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|----------------------|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| GRADE | -14.28 % | | | | | | | | | |
| LENGTH | | | | | | | | | | |
| HORIZONTAL ALIGNMENT | | | | | | | | | | |
| ARC LENGTHS | TAN 310.385 | | | | | | | | | |
| DESIGN CL | | | 28.443 | 28.178 | 27.892 | 27.607 | 27.321 | 27.036 | 26.750 | 26.465 |
| NATURAL SURFACE | 33.553 | 30.473 | 29.458 | 29.196 | 29.000 | 28.643 | 28.500 | 28.339 | 28.332 | 27.361 |
| CHAINAGE | 0.000 | 20.000 | 40.000 | 60.000 | 80.000 | 100.000 | 120.000 | 140.000 | 160.000 | 180.000 |
| CROSSFALL | | | | | | | | | | |
| | | | | | | | | | | |
| | 0.000 | 20.000 | 40.000 | 60.000 | 80.000 | 100.000 | 120.000 | 140.000 | 160.000 | 180.000 |
| | 20.000 | 40.000 | 60.000 | 80.000 | 100.000 | 120.000 | 140.000 | 160.000 | 180.000 | 200.000 |
| | 40.000 | 60.000 | 80.000 | 100.000 | 120.000 | 140.000 | 160.000 | 180.000 | 200.000 | 220.000 |
| | 60.000 | 80.000 | 100.000 | 120.000 | 140.000 | 160.000 | 180.000 | 200.000 | 220.000 | 240.000 |
| | 80.000 | 100.000 | 120.000 | 140.000 | 160.000 | 180.000 | 200.000 | 220.000 | 240.000 | 260.000 |
| | 100.000 | 120.000 | 140.000 | 160.000 | 180.000 | 200.000 | 220.000 | 240.000 | 260.000 | 280.000 |
| | 120.000 | 140.000 | 160.000 | 180.000 | 200.000 | 220.000 | 240.000 | 260.000 | 280.000 | 300.000 |
| | 140.000 | 160.000 | 180.000 | 200.000 | 220.000 | 240.000 | 260.000 | 280.000 | 300.000 | 310.385 |

DRAIN PROFILE D1
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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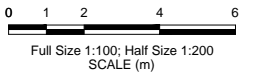
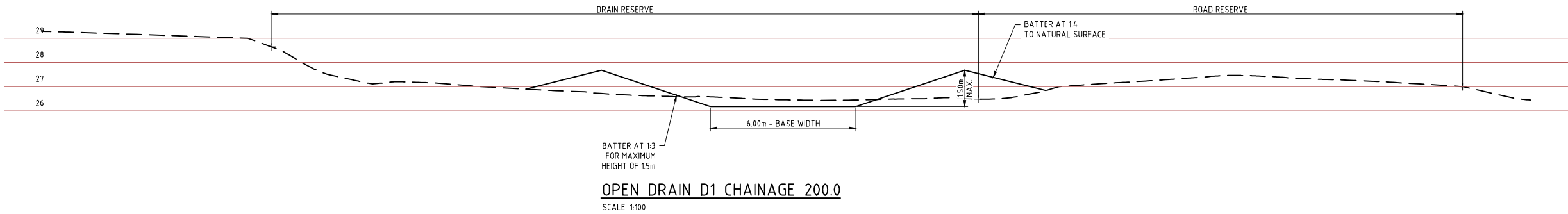
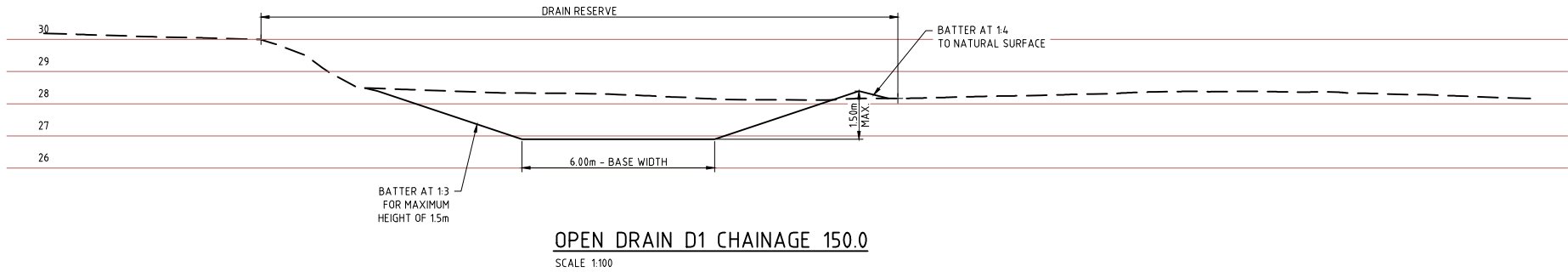
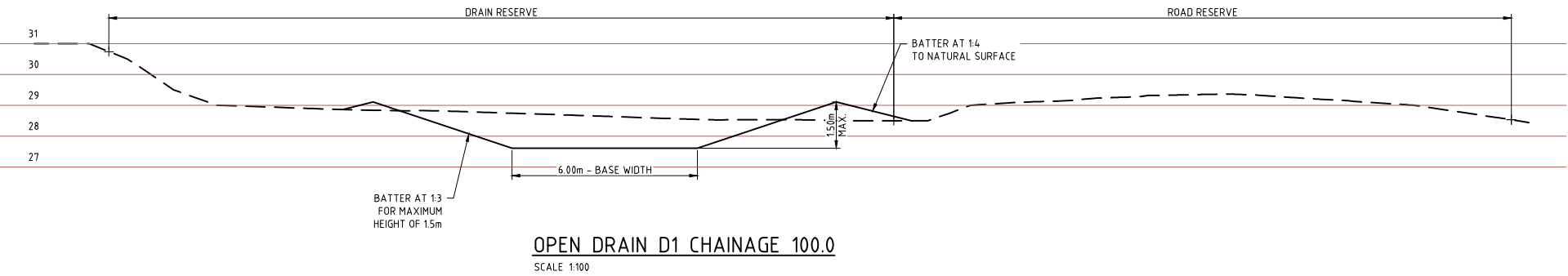
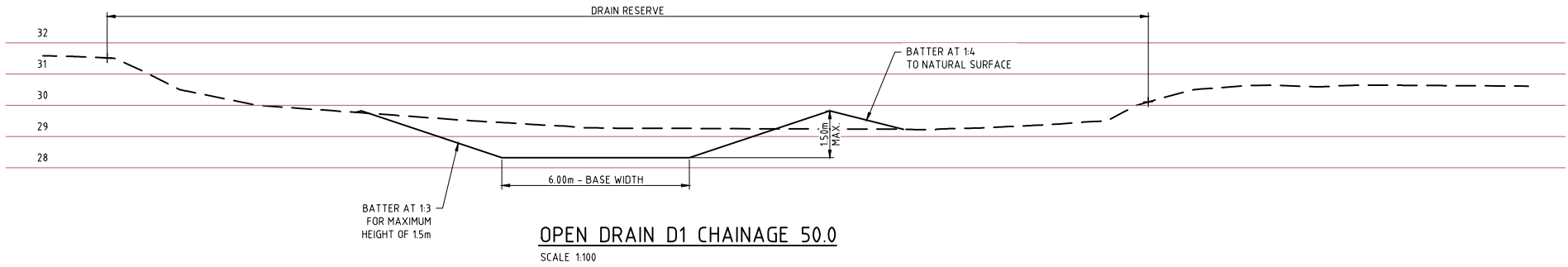
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN D1 PLAN AND PROFILE | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0231 | REV. A |

16026-0232

100mm AT FULL SIZE AT A1 SHEET SIZE



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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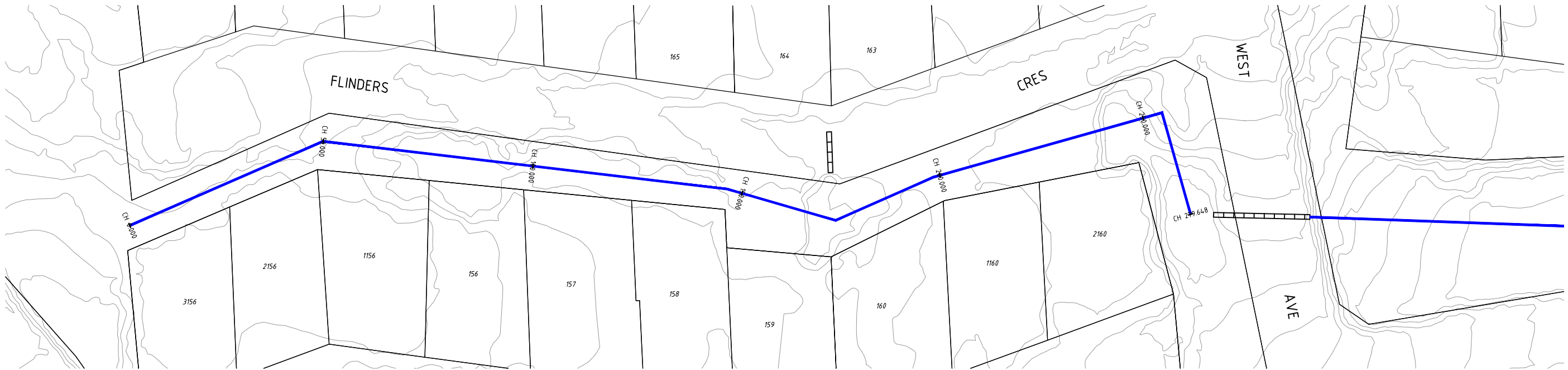


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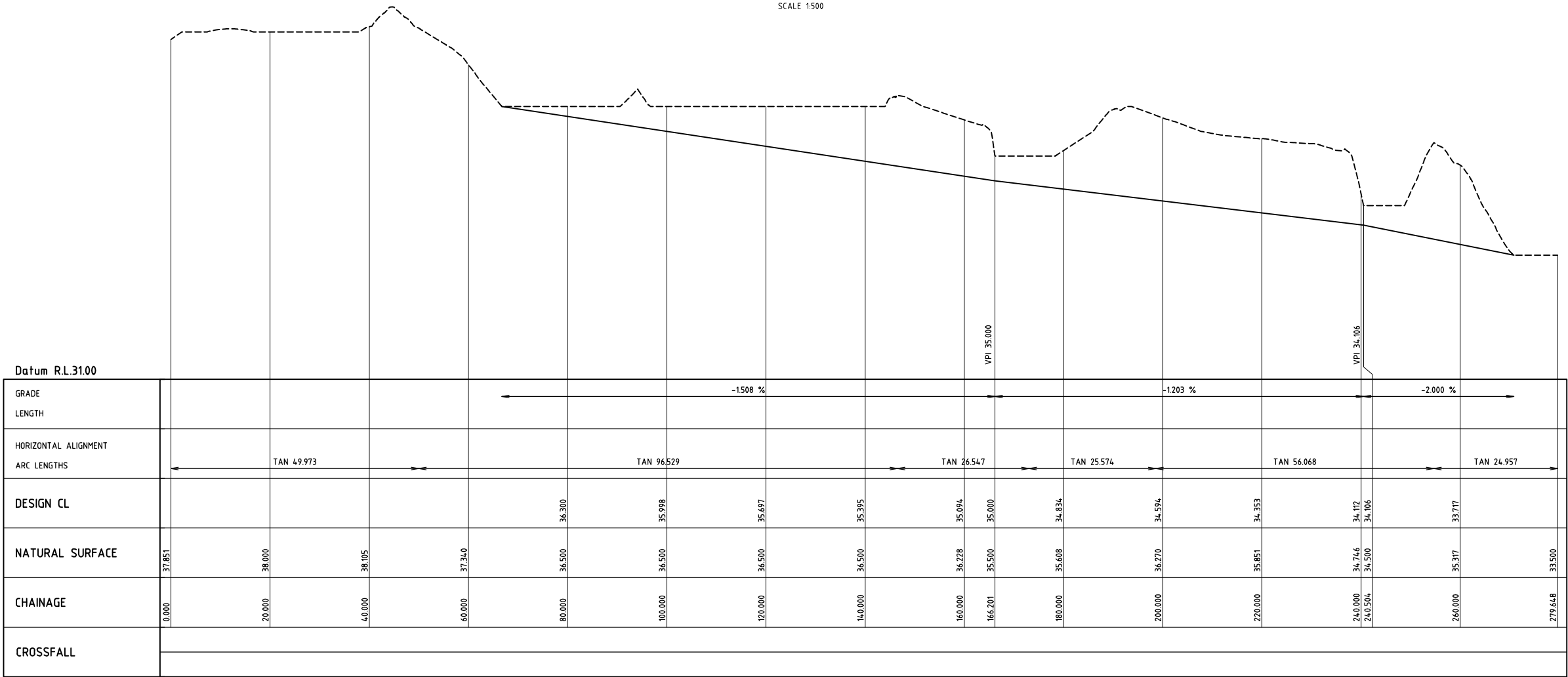
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| CLIENT CITY OF KARRATHA | | | |
| PROJECT DAMPIER DRAINAGE | | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN D1 - CROSS SECTIONS | | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0232 | REV. A |

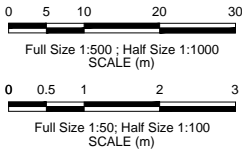
16026-0233



DRAIN PROFILE D2
SCALE 1:500



DRAIN PROFILE D2
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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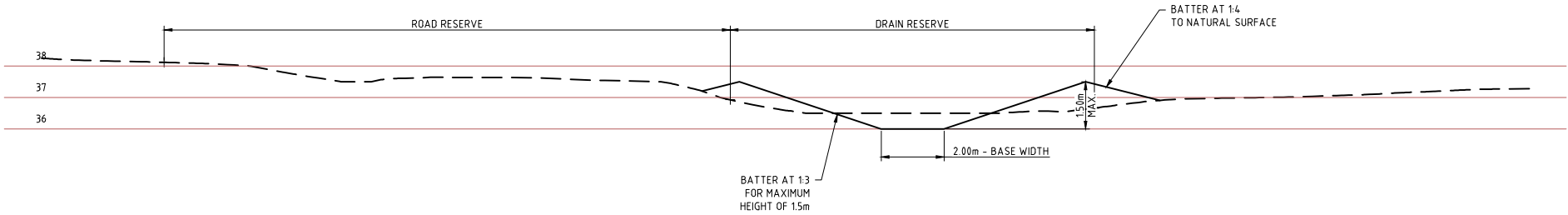
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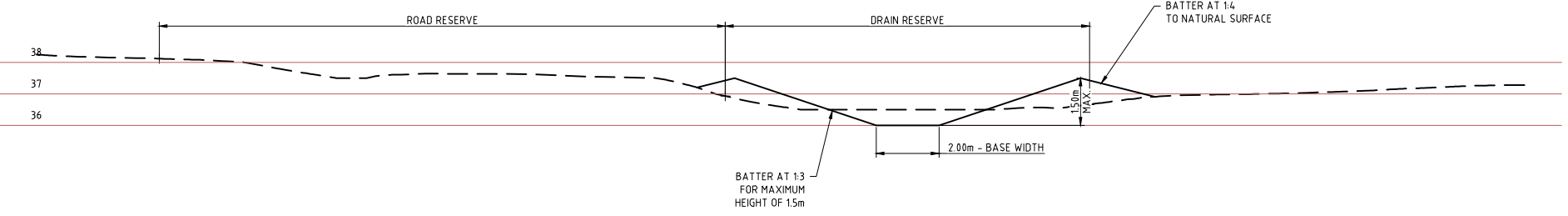
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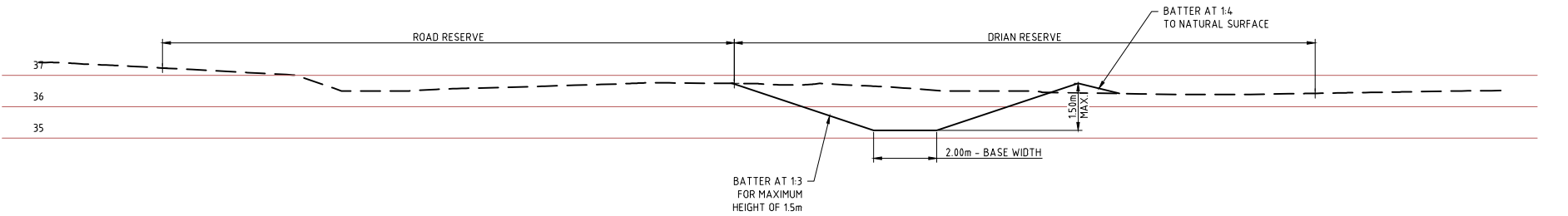
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN D2 PLAN AND PROFILE | | | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0233 | A |



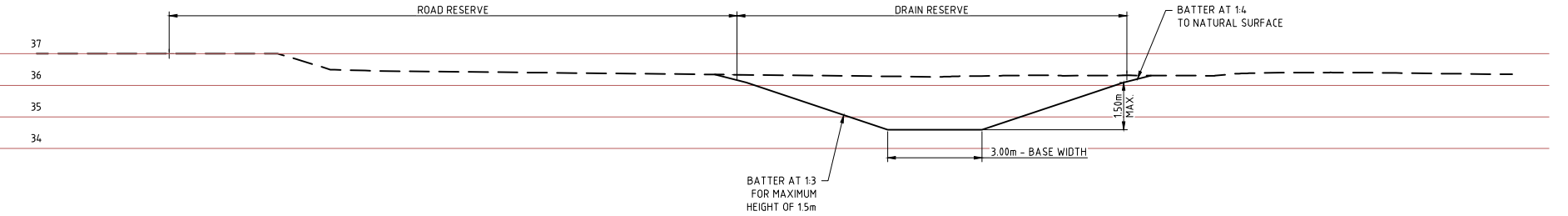
OPEN DRAIN D2 CHAINAGE 50.0
SCALE 1:100



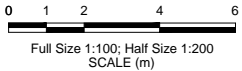
OPEN DRAIN D2 CHAINAGE 100.0
SCALE 1:100



OPEN DRAIN D2 CHAINAGE 150.0
SCALE 1:100



OPEN DRAIN D2 CHAINAGE 200.0
SCALE 1:100



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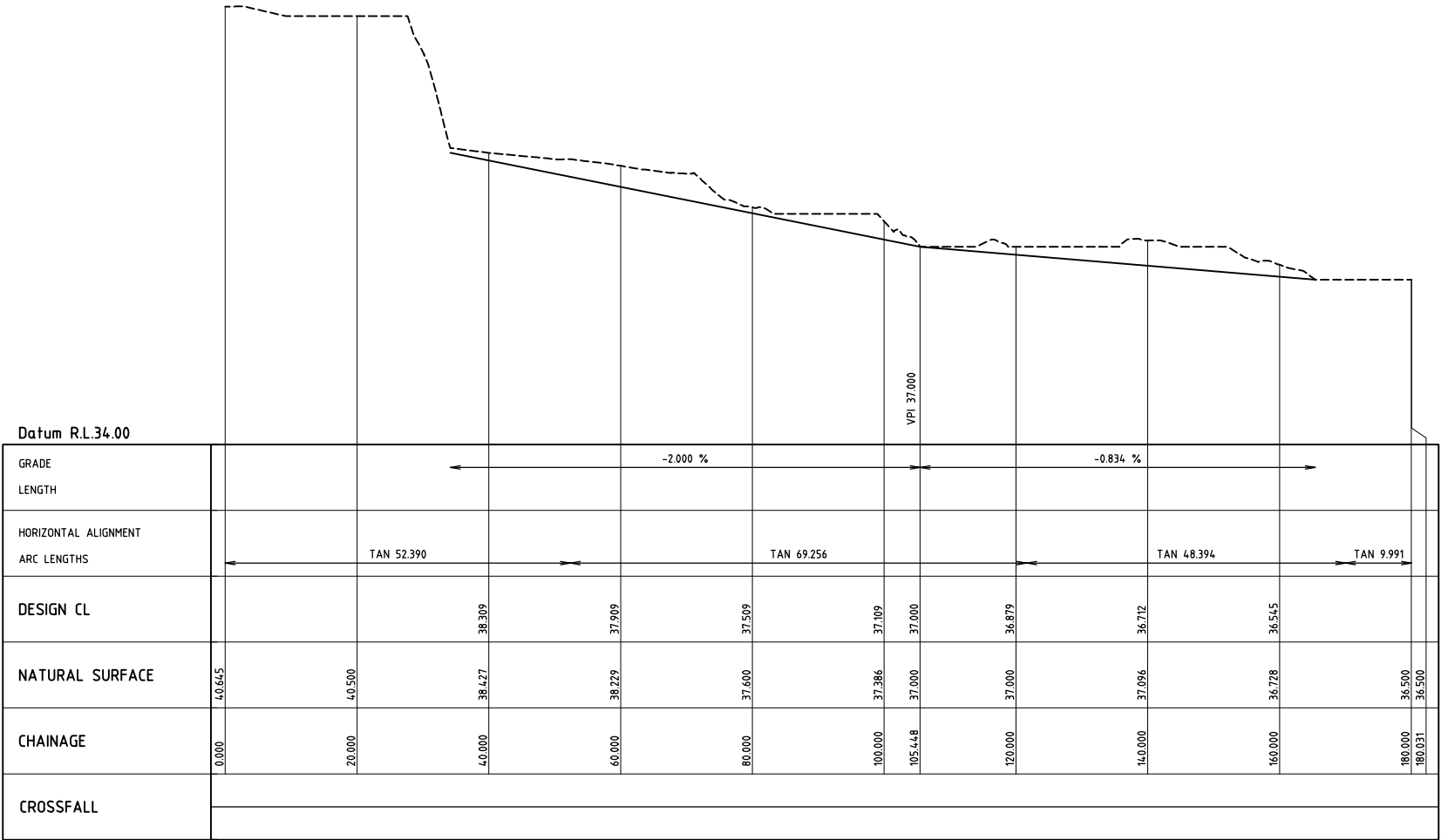
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN D2 - CROSS SECTIONS | | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0234 | REV. A |

16026-0235

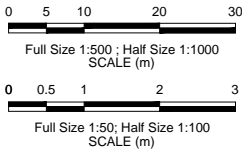
100mm AT FULL SIZE AT A1 SHEET SIZE



DRAIN PROFILE D3
SCALE 1:500



DRAIN PROFILE D3
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



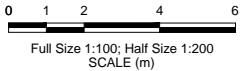
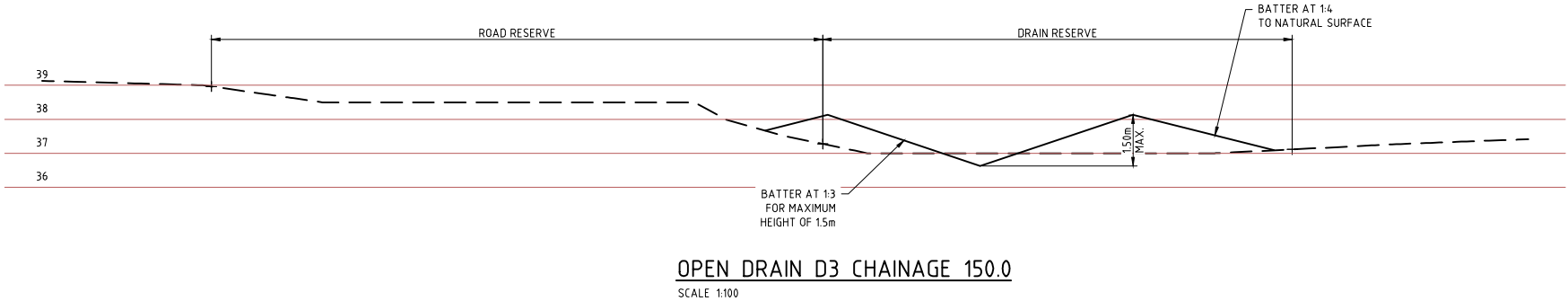
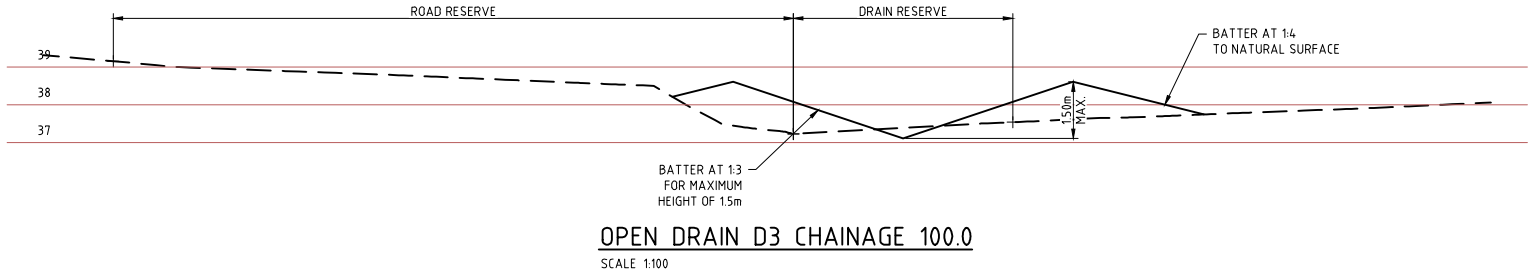
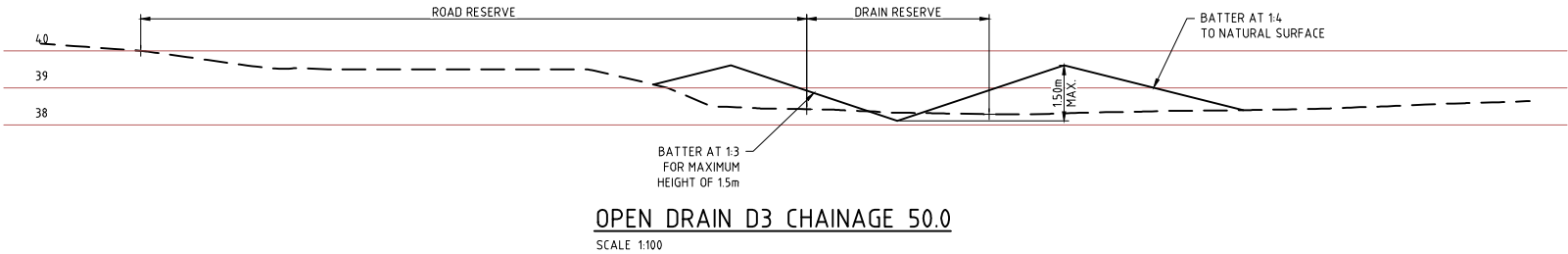
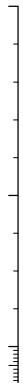
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN D3 PLAN AND PROFILE | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0235 | A |



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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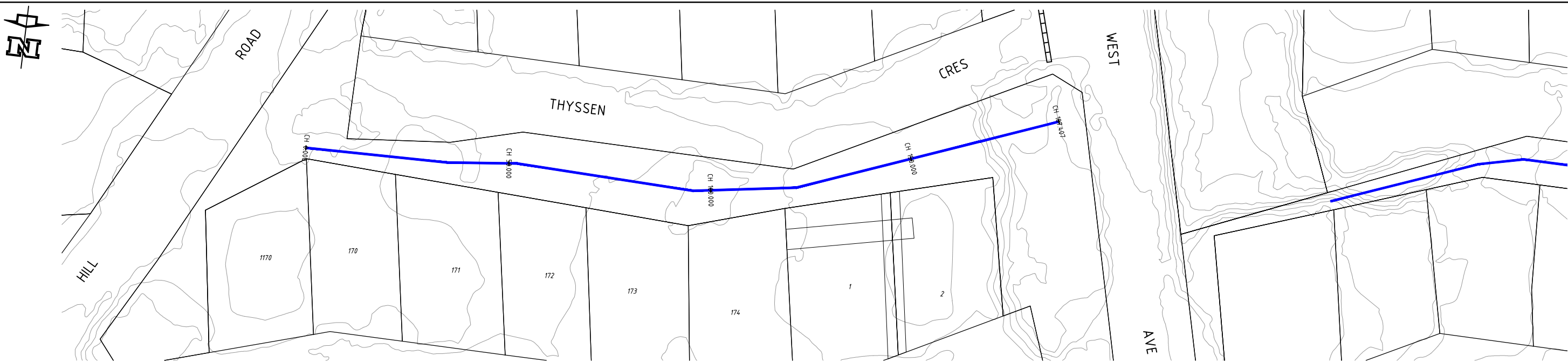
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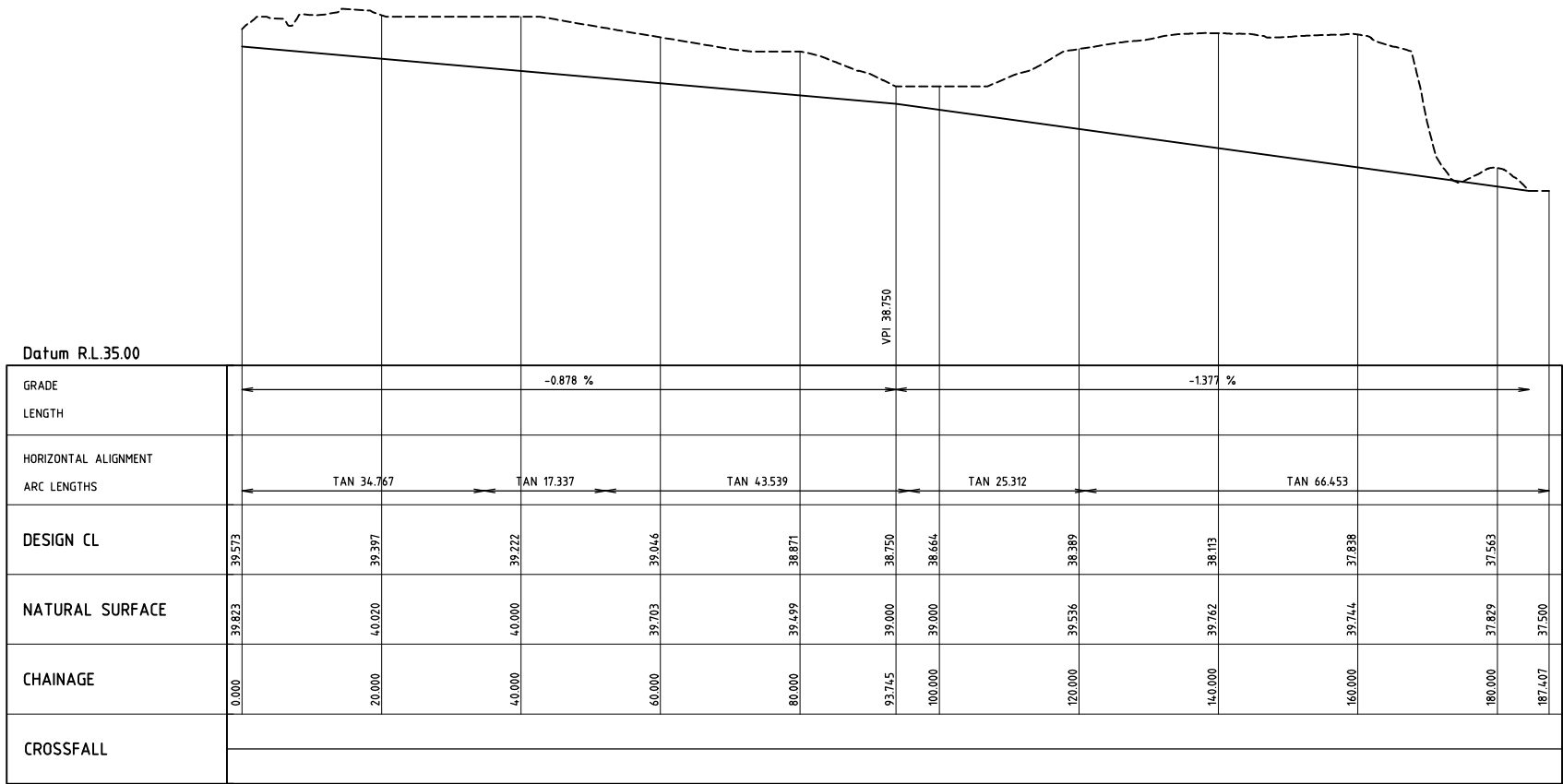
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| CLIENT | | | CITY OF KARRATHA | |
| PROJECT | | | DAMPIER DRAINAGE | |
| | | | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN D3 - CROSS SECTIONS | |
| SIZE | SCALE | DRAWING NUMBER | REV. | |
| A1 | AS SHOWN | 16026-0236 | A | |

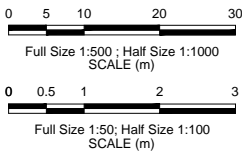
16026-0237



DRAIN PROFILE D4
SCALE 1:500



DRAIN PROFILE D4
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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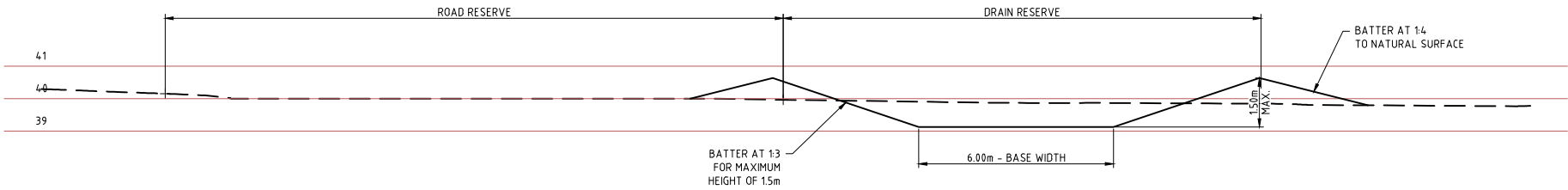
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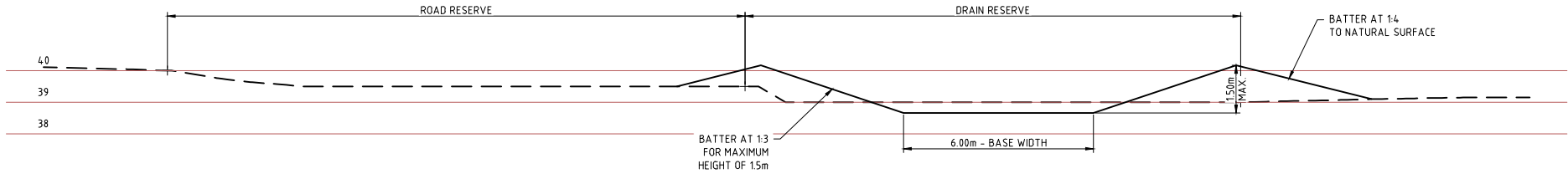
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN D4 PLAN AND PROFILE | | | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0237 | A |

16026-0238

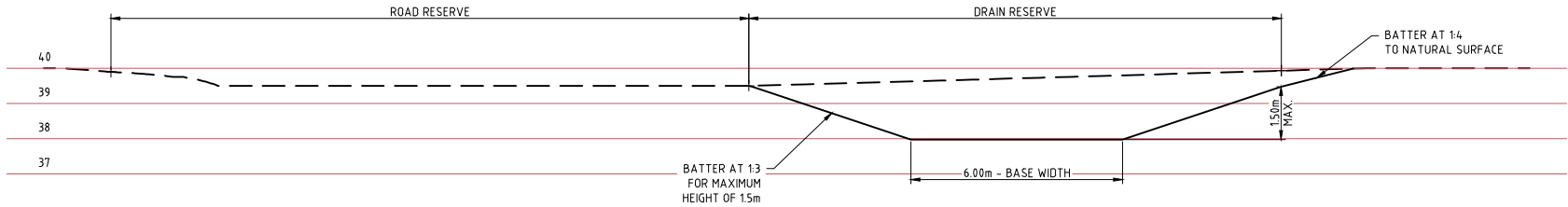
100mm AT FULL SIZE AT A1 SHEET SIZE



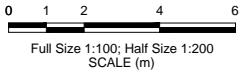
OPEN DRAIN D4 CHAINAGE 50.0
SCALE 1:100



OPEN DRAIN D4 CHAINAGE 100.0
SCALE 1:100



OPEN DRAIN D4 CHAINAGE 150.0
SCALE 1:100



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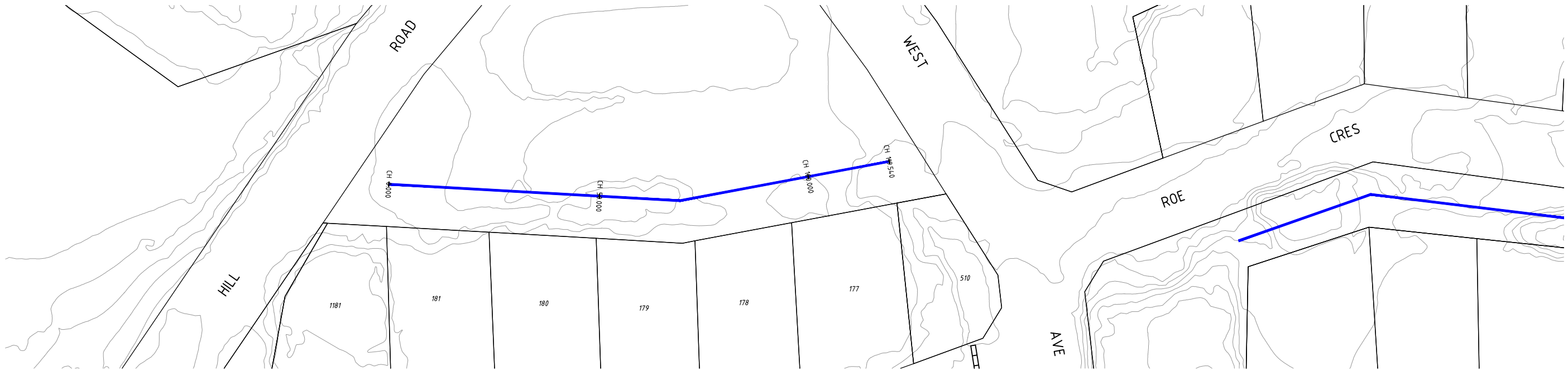
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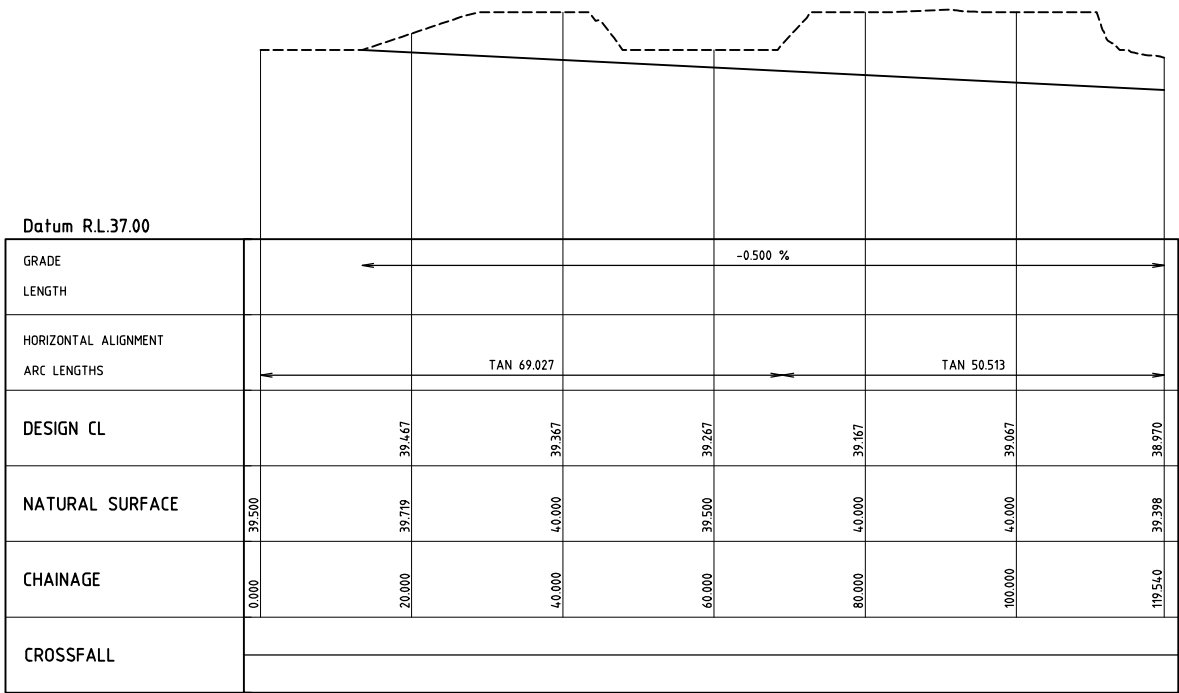
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN D4 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0238 |
| | | REV. A |

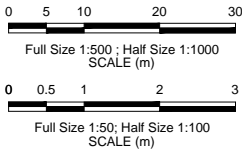
16026-0239



DRAIN PROFILE D5
SCALE 1:500



DRAIN PROFILE D5
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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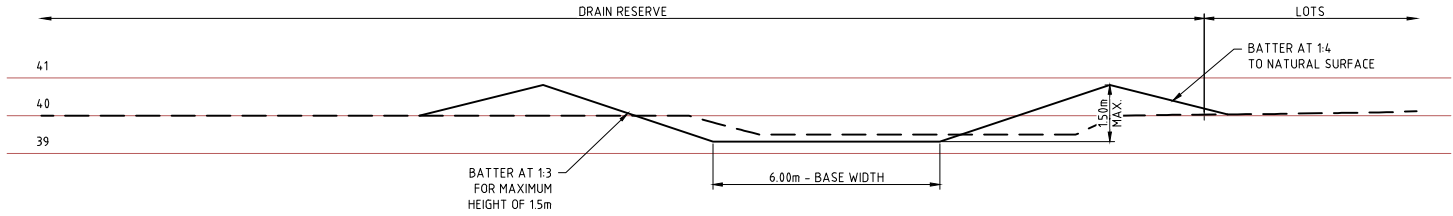


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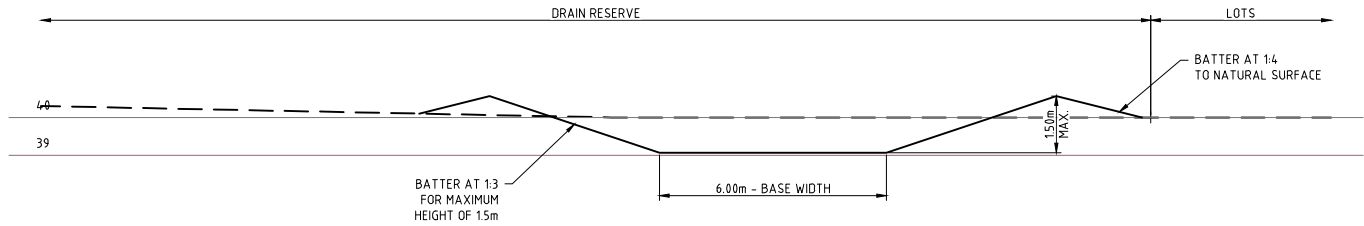
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN D5 PLAN AND PROFILE | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0239 | REV. A |

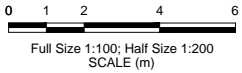
16026-0240



OPEN DRAIN D5 CHAINAGE 50.0
SCALE 1:100



OPEN DRAIN D5 CHAINAGE 100.0
SCALE 1:100



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| | | | | APPROVED | |

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| CLIENT | | | CITY OF KARRATHA | |
| PROJECT | | | DAMPIER DRAINAGE | |
| | | | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN D5 - CROSS SECTIONS | |
| SIZE | SCALE | DRAWING NUMBER | | |
| A1 | AS SHOWN | 16026-0240 | REV. | A |



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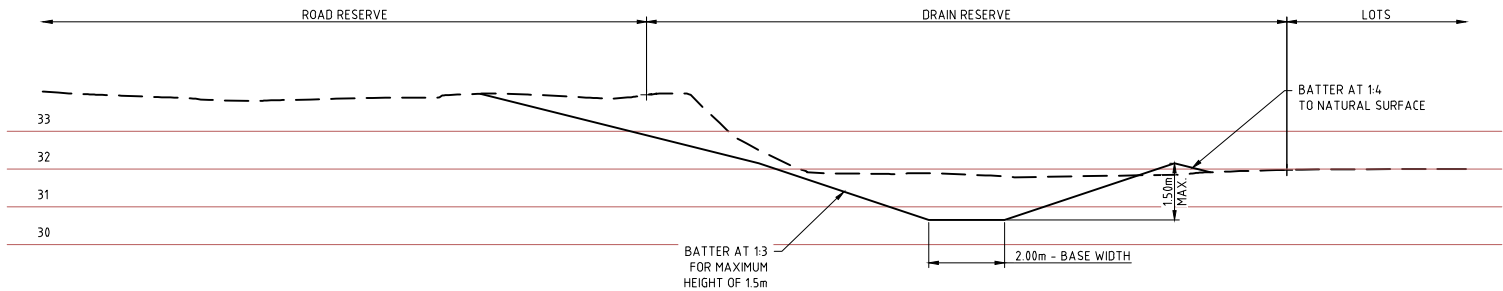


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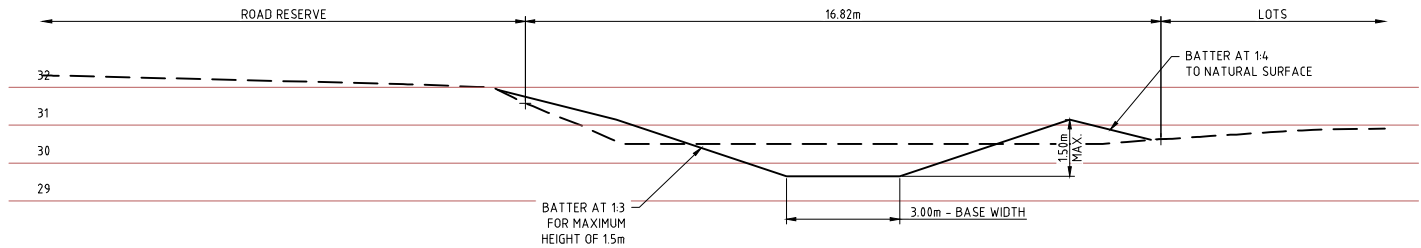
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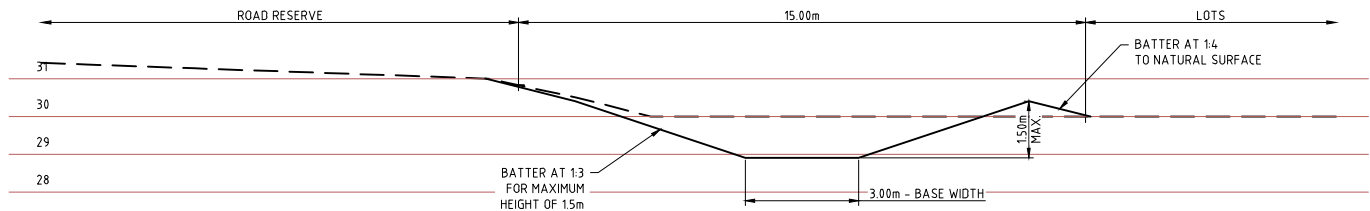
REV. A



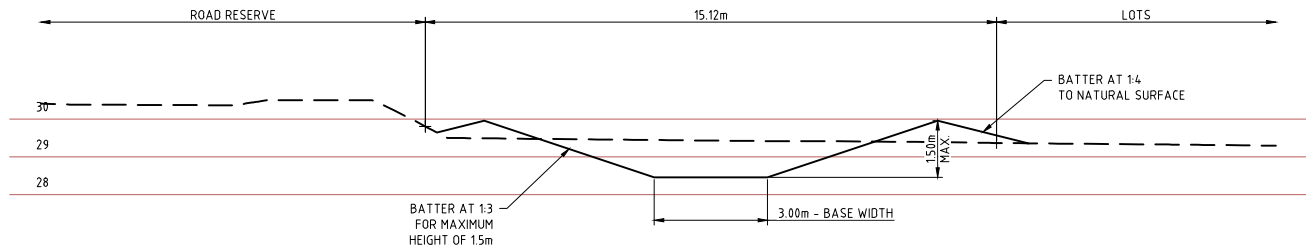
OPEN DRAIN E1 CHAINAGE 50.0
SCALE 1:100



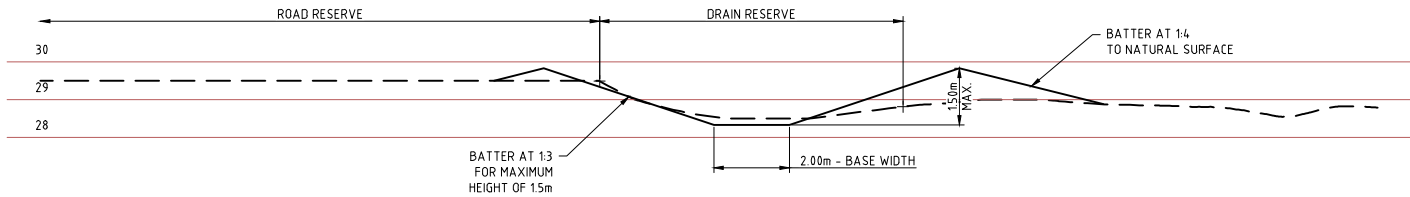
OPEN DRAIN E1 CHAINAGE 100.0
SCALE 1:100



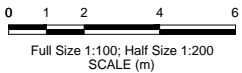
OPEN DRAIN E1 CHAINAGE 150.0
SCALE 1:100



OPEN DRAIN E1 CHAINAGE 200.0
SCALE 1:100



OPEN DRAIN E1 CHAINAGE 250.0
SCALE 1:100



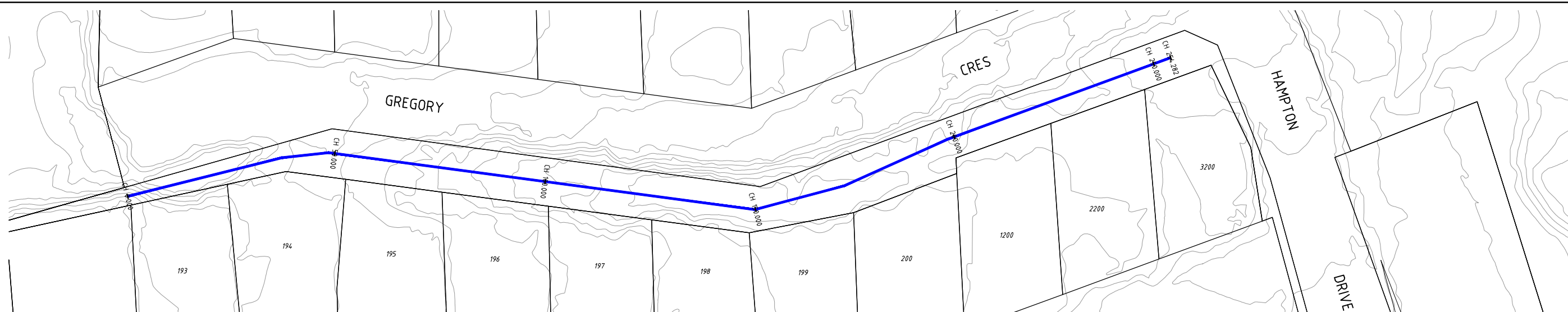
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| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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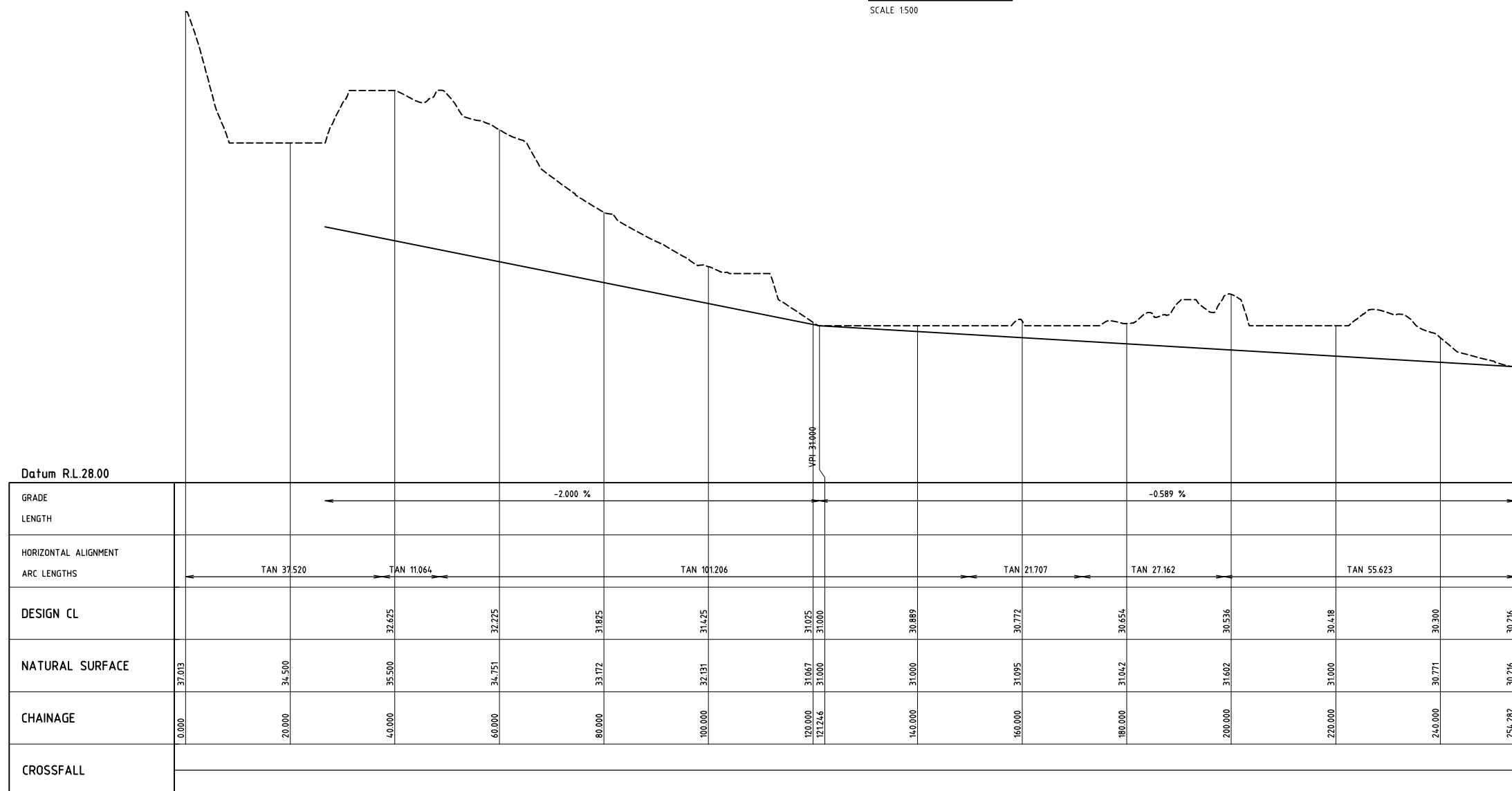
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| DRAW. CHECK | DES. CHECK | |
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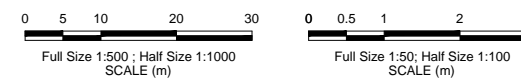
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN E1 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0242 |
| | | REV. A |



SCALE 1:500



SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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| A | 08/06/16 | ISSUED FOR INFORMATION | CB | | |
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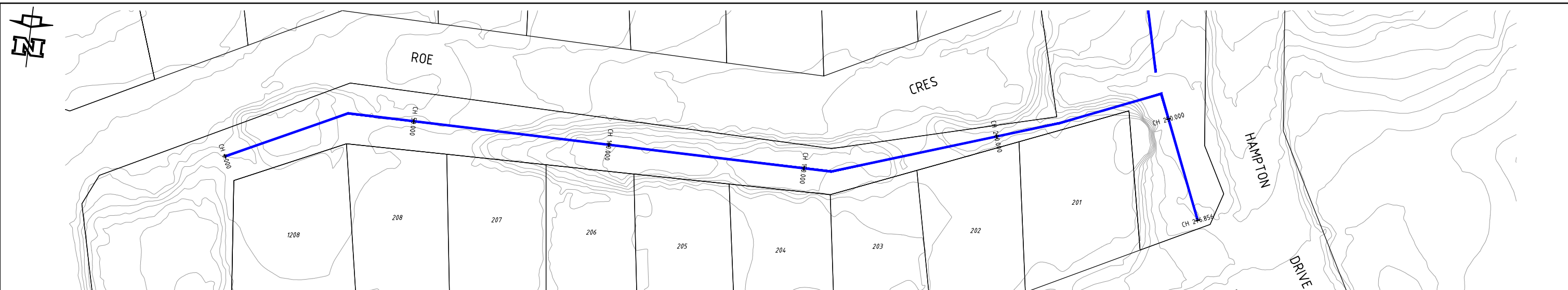
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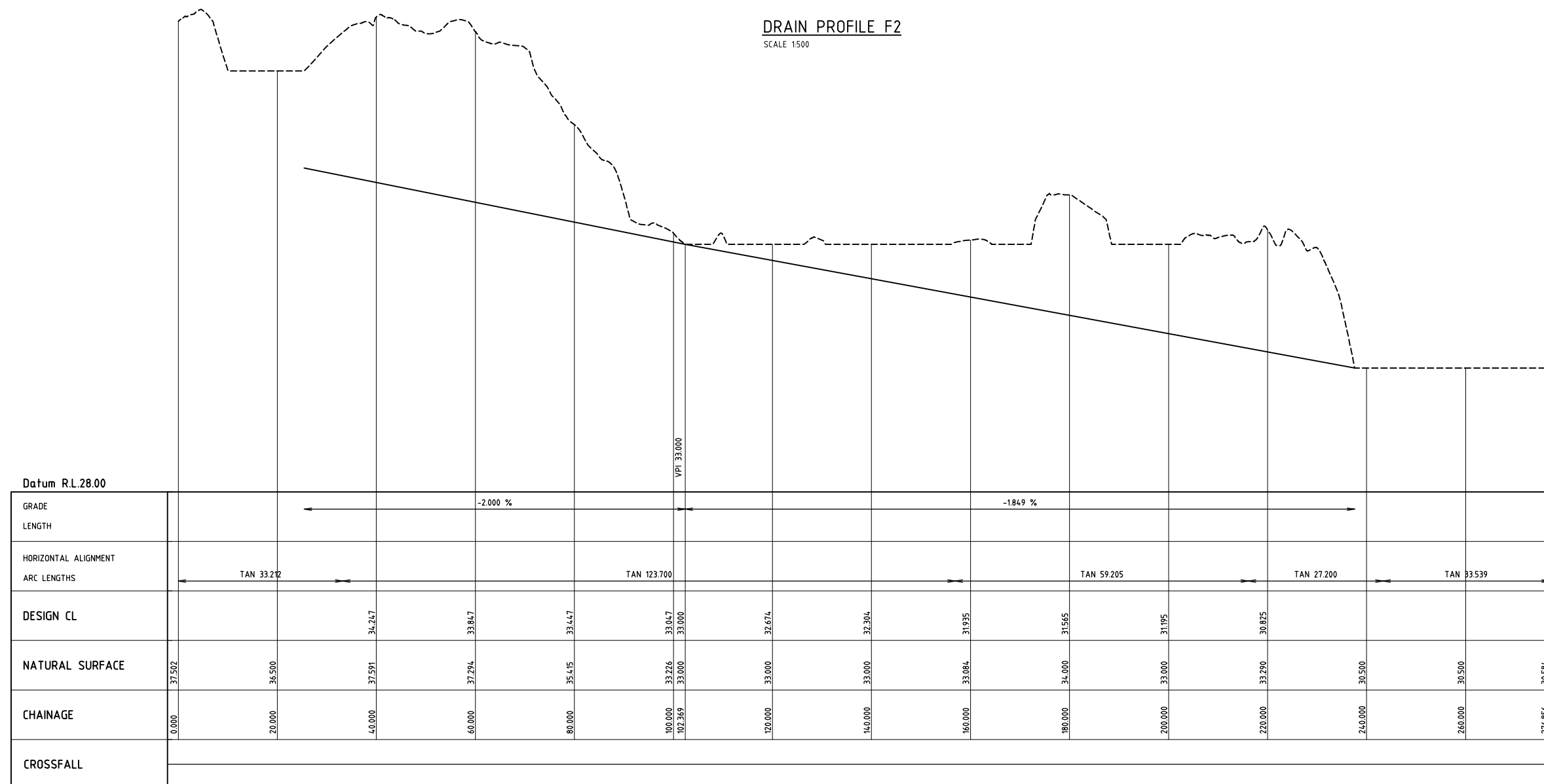
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| C.BENFIELD | D.LUONG | |
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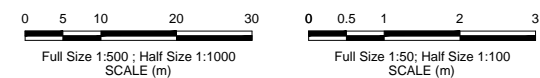
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STORMWATER UPGRADE | |
| | | OPEN DRAINAGE REMEDIATION | |
| | | OPEN DRAIN F1 PLAN AND PROFILE | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0243 | A |



SCALE 1:500



SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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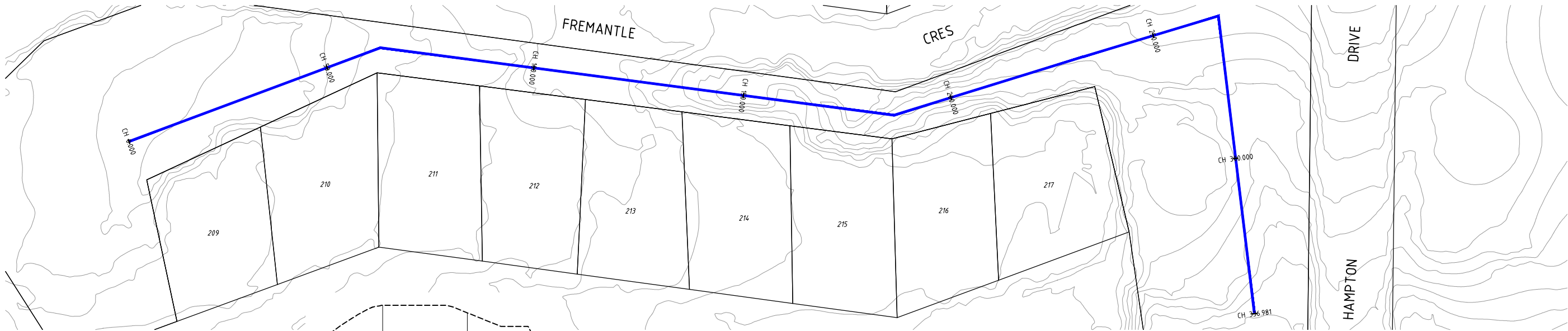


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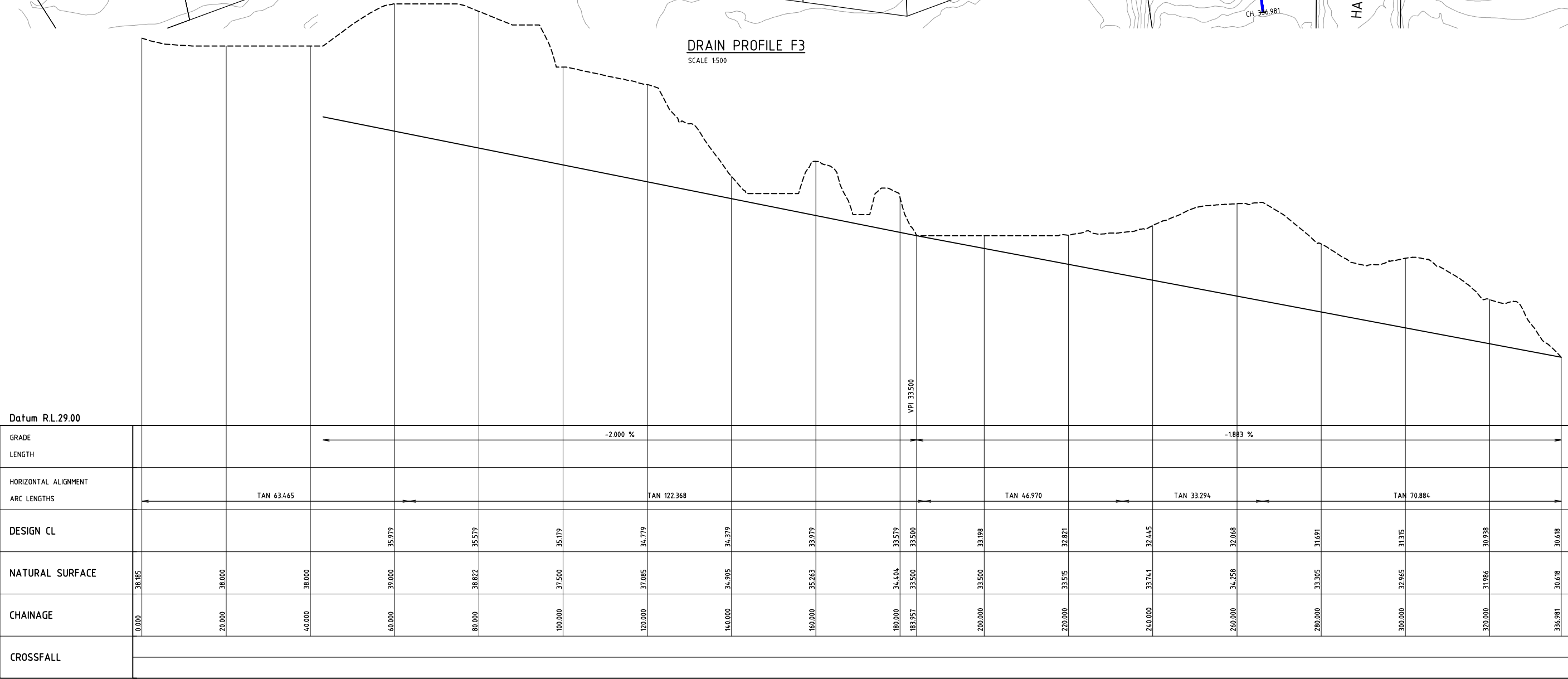
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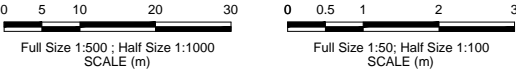
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STROMWATER UPGRADE | |
| | | OPEN DRAINAGE REMEDIATION | |
| | | OPEN DRAIN F2 PLAN AND PROFILE | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0245 | A |



DRAIN PROFILE F3
SCALE 1:500



DRAIN PROFILE F3
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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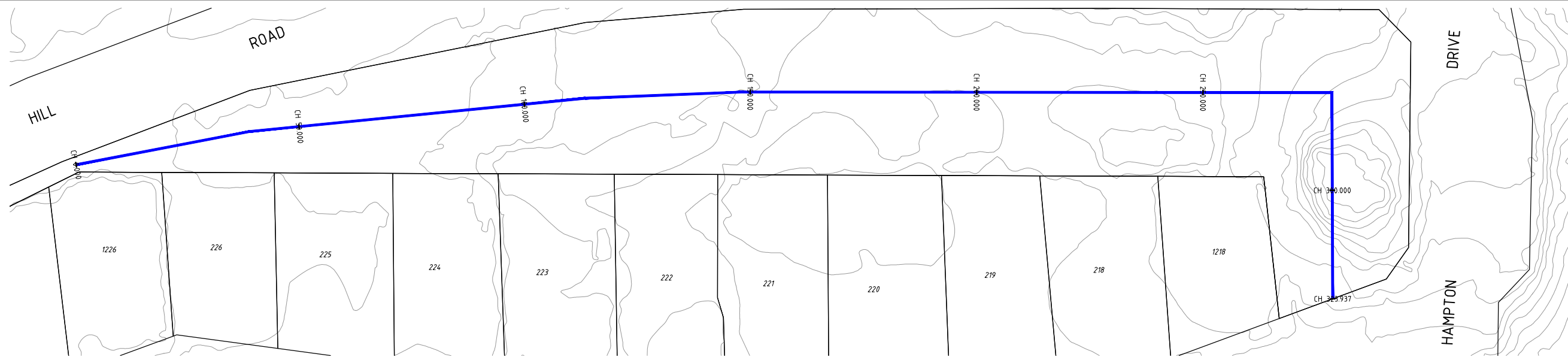
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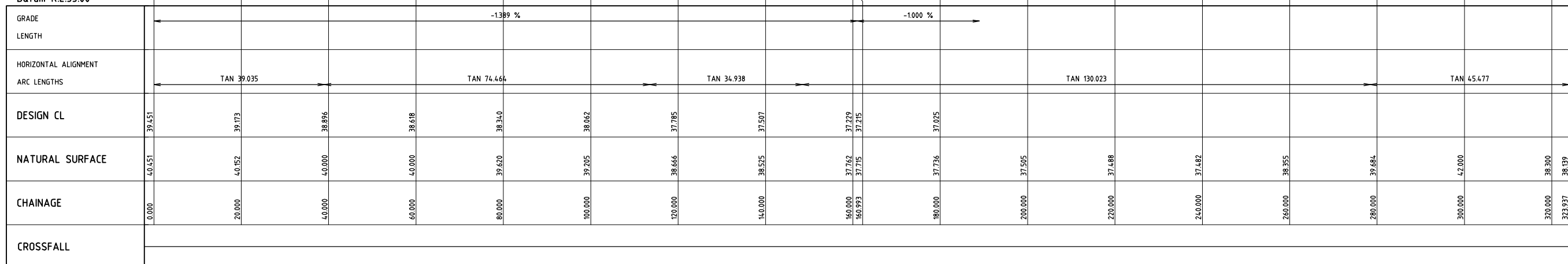
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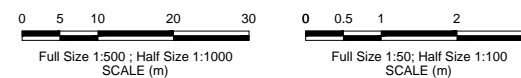
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| PROPOSED STROMWATER UPGRADE | | | |
| OPEN DRAINAGE REMEDIATION | | | |
| OPEN DRAIN F3 PLAN AND PROFILE | | | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0247 | A |



Datum R.L.35.00



SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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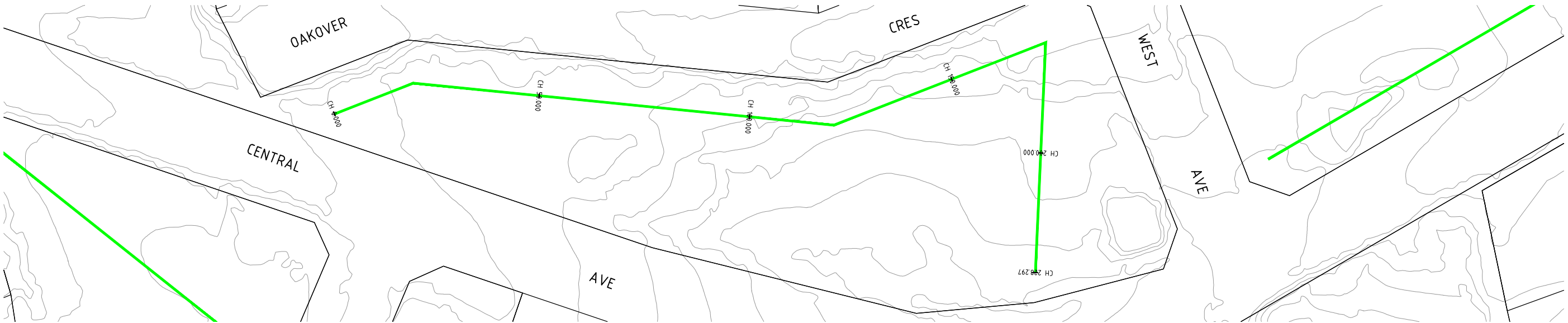
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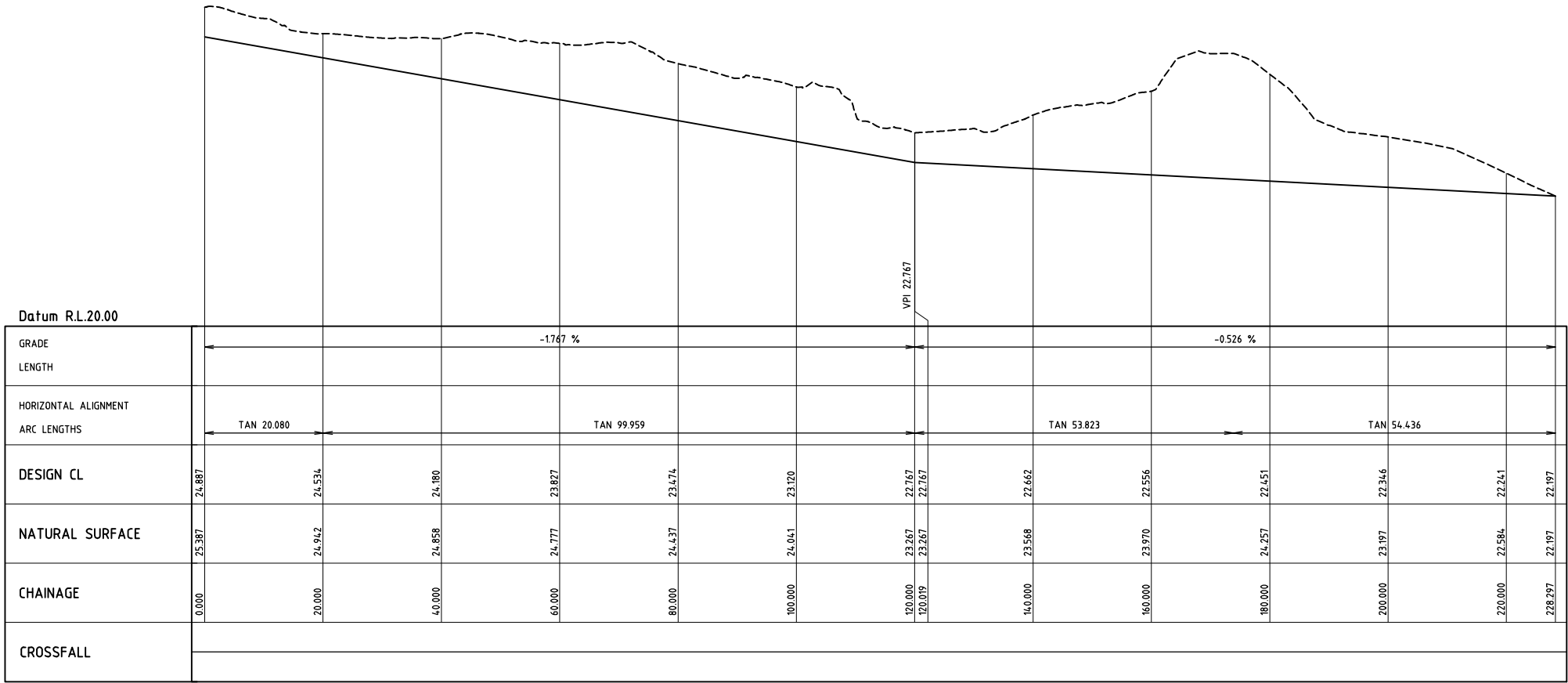
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STROMWATER UPGRADE | |
| | | OPEN DRAINAGE REMEDIATION | |
| | | OPEN DRAIN F4 PLAN AND PROFILE | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0249 | A |

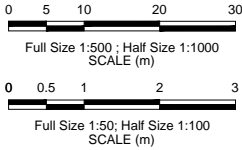
16026-0251



DRAIN PROFILE G1
SCALE 1:500



DRAIN PROFILE G1
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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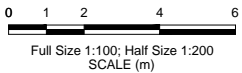
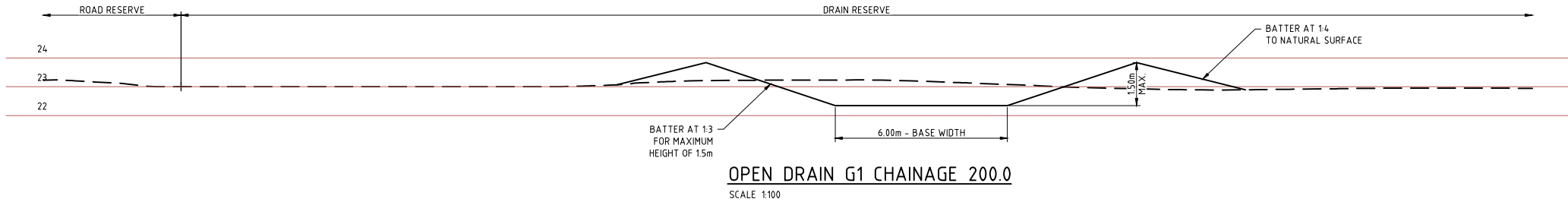
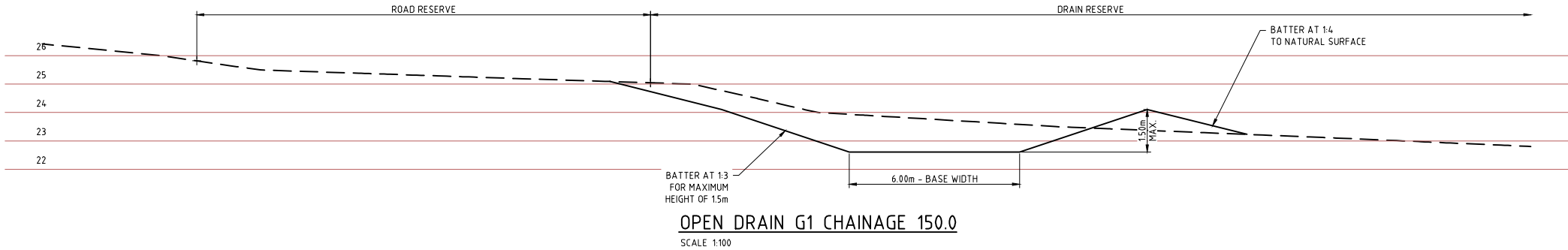
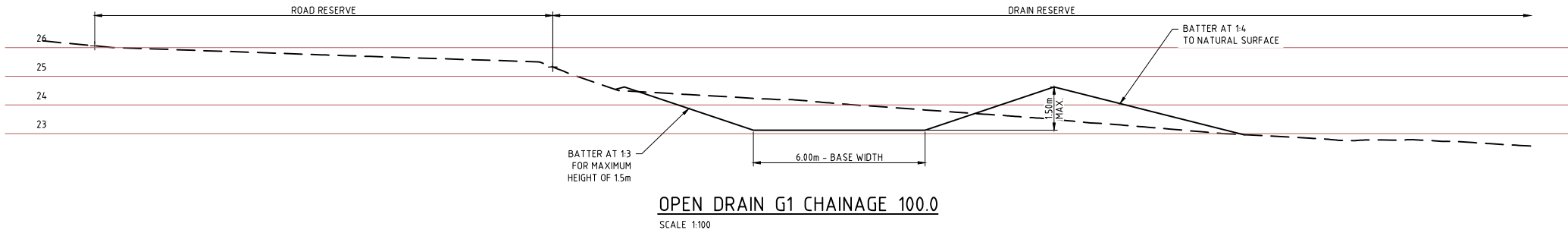
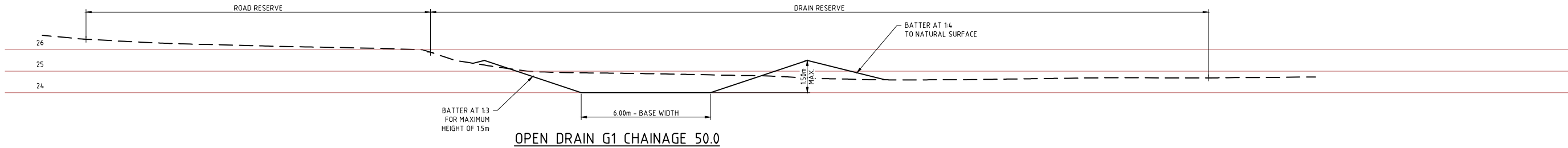
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN G1 PLAN AND PROFILE | | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0251 | REV. A |

16026-0252

100mm AT FULL SIZE AT A1 SHEET SIZE



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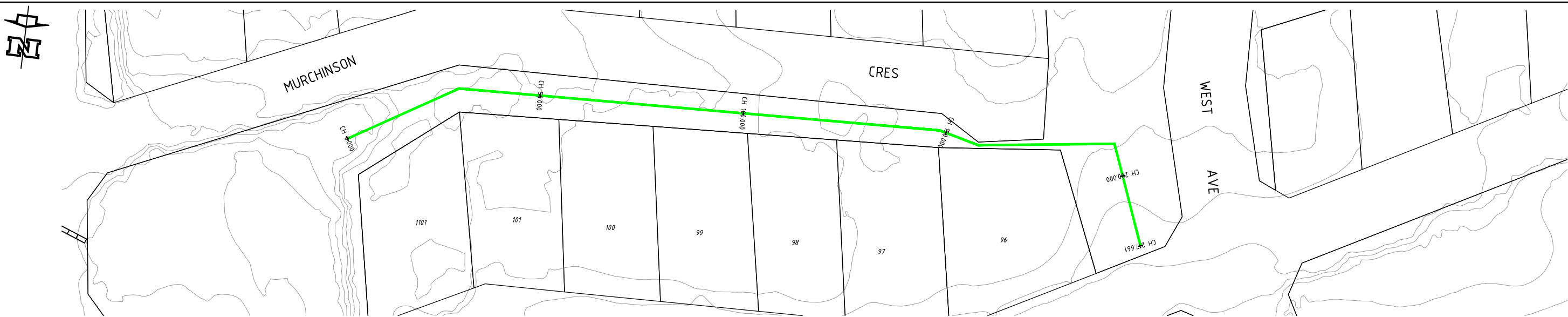
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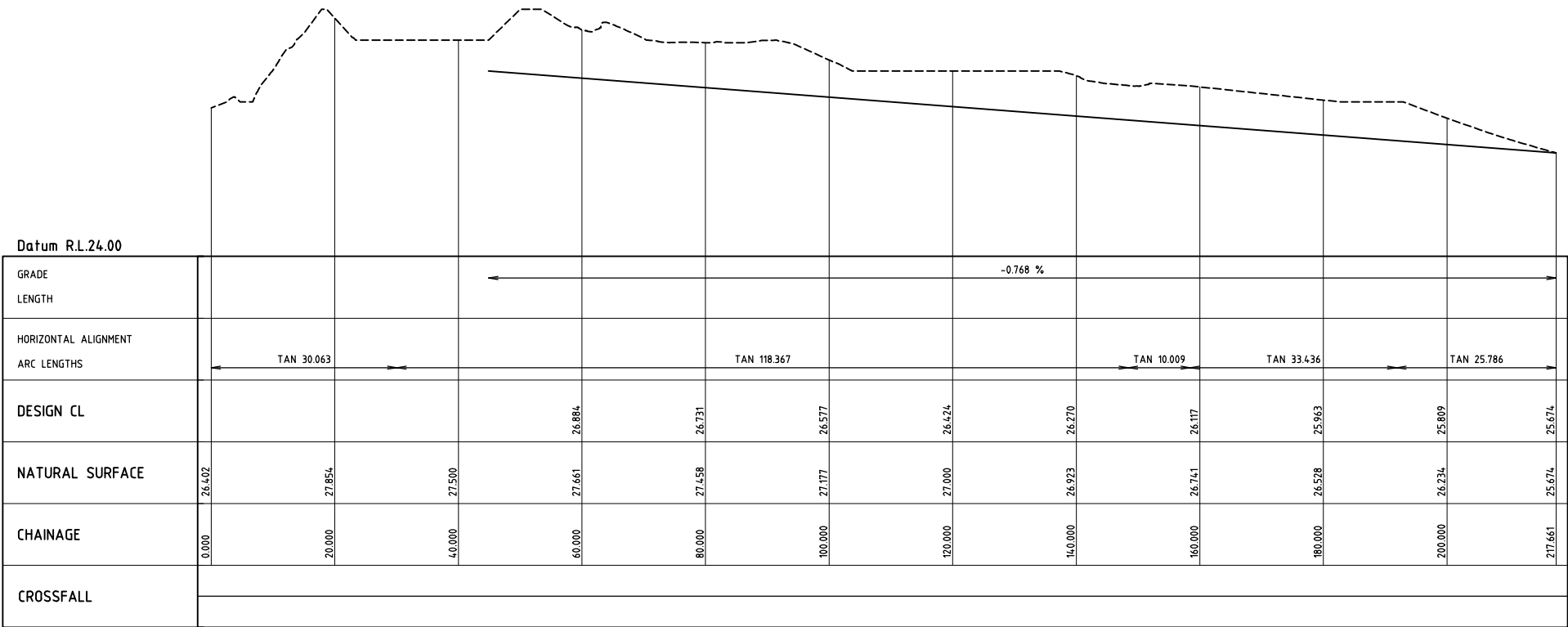
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| CLIENT | | CITY OF KARRATHA | | | |
| PROJECT | | DAMPIER DRAINAGE | | | |
| | | PROPOSED STORMWATER UPGRADE | | | |
| | | OPEN DRAINAGE REMEDIATION | | | |
| | | OPEN DRAIN G1 - CROSS SECTIONS | | | |
| SIZE | A1 | SCALE | AS SHOWN | DRAWING NUMBER | 16026-0252 |
| REV. | | | | | A |

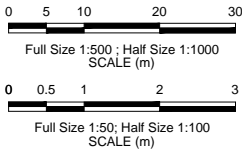
16026-0253



DRAIN PROFILE G2
SCALE 1:500



DRAIN PROFILE G2
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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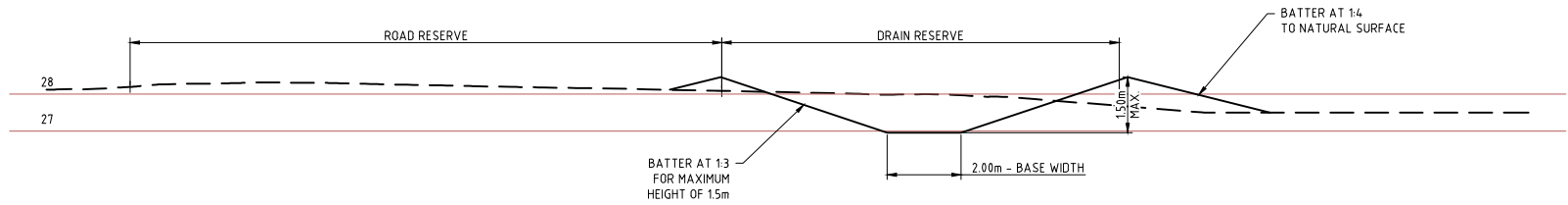
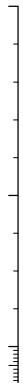
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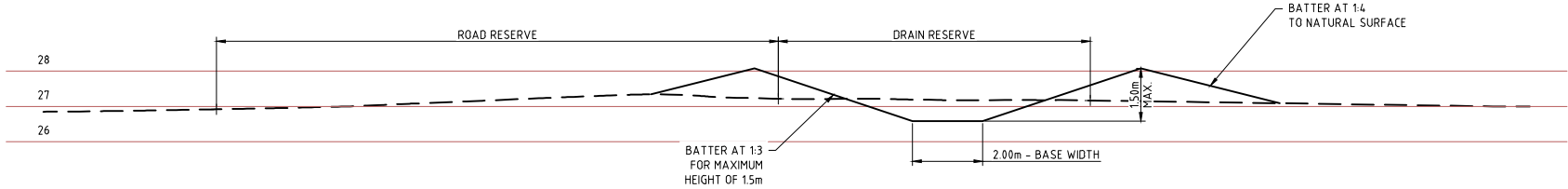
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| CLIENT | CITY OF KARRATHA | | |
| PROJECT | DAMPIER DRAINAGE | | |
| | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN G2 PLAN AND PROFILE | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0253 | REV. A |

16026-0254

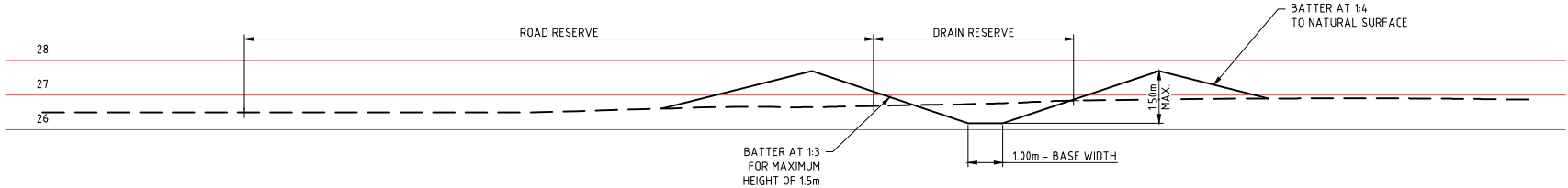
100mm AT FULL SIZE AT A1 SHEET SIZE



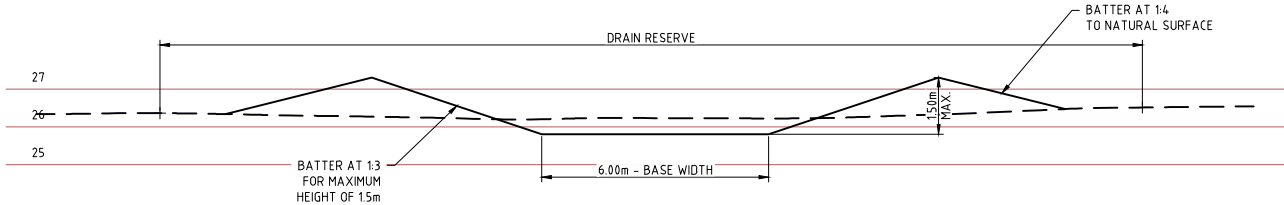
OPEN DRAIN G2 CHAINAGE 50.0
SCALE 1:100



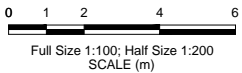
OPEN DRAIN G2 CHAINAGE 100.0
SCALE 1:100



OPEN DRAIN G2 CHAINAGE 150.0
SCALE 1:100



OPEN DRAIN G2 CHAINAGE 200.0
SCALE 1:100



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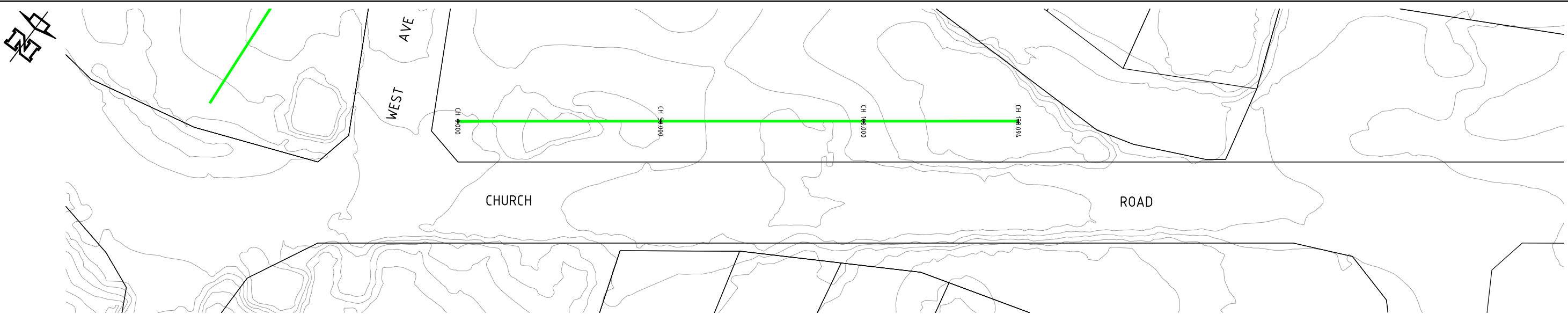
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN G2 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0254 |
| | | REV. A |

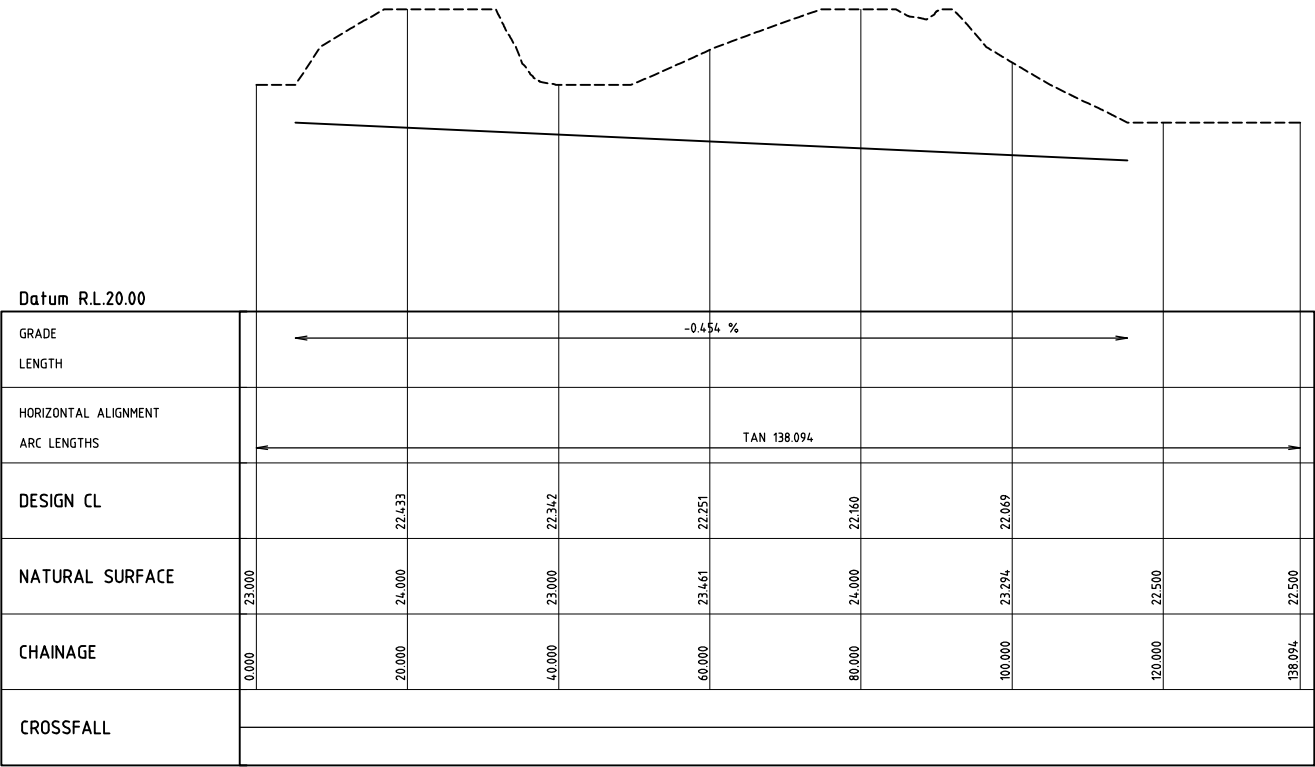
16026-0255

100mm AT FULL SIZE AT A1 SHEET SIZE

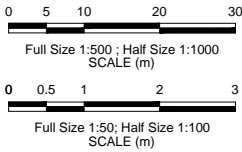
Vertical



DRAIN PROFILE G7
SCALE 1500



DRAIN PROFILE G7
SCALE 1500 HORIZONTAL
SCALE 150 VERTICAL



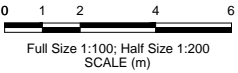
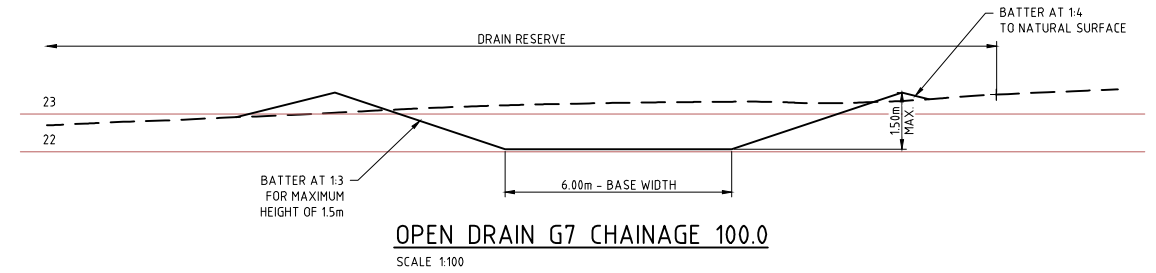
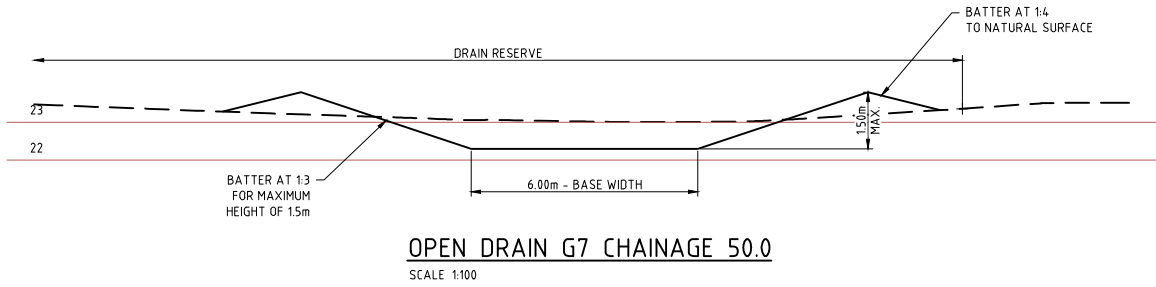
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN G7 PLAN AND PROFILE | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0255 |
| | | REV. A |



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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN G7 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0256 |
| | | REV. A |



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| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
| NOTE: * INDICATES SIGNATURES ON ORIGINAL ISSUE OF DRAWING, OR LAST REVISION OF DRAWING | | | | | |



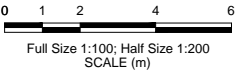
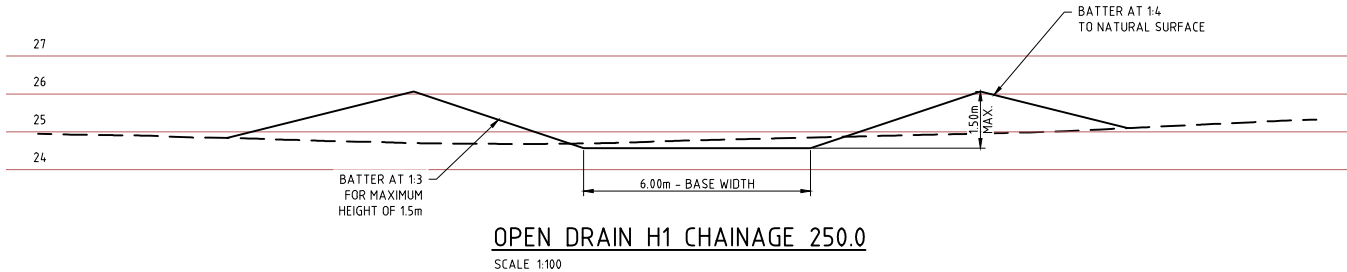
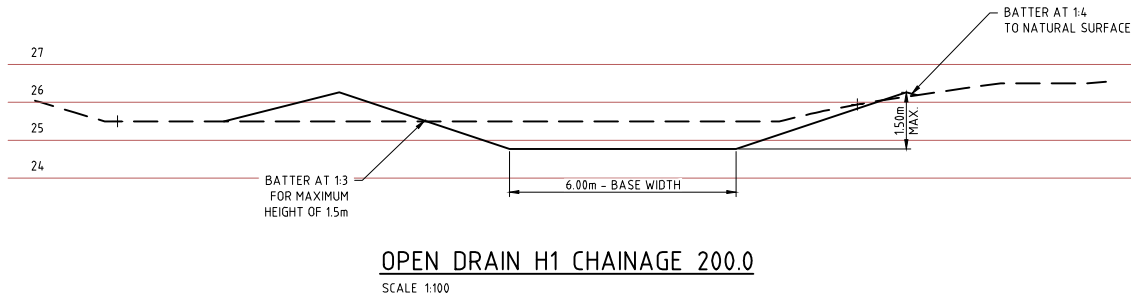
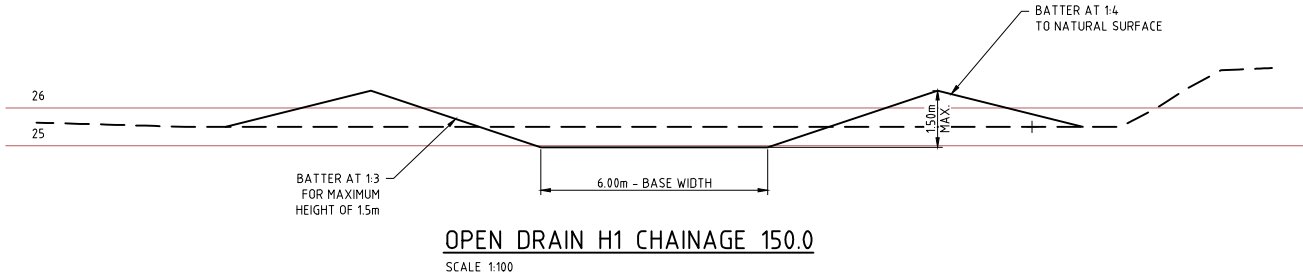
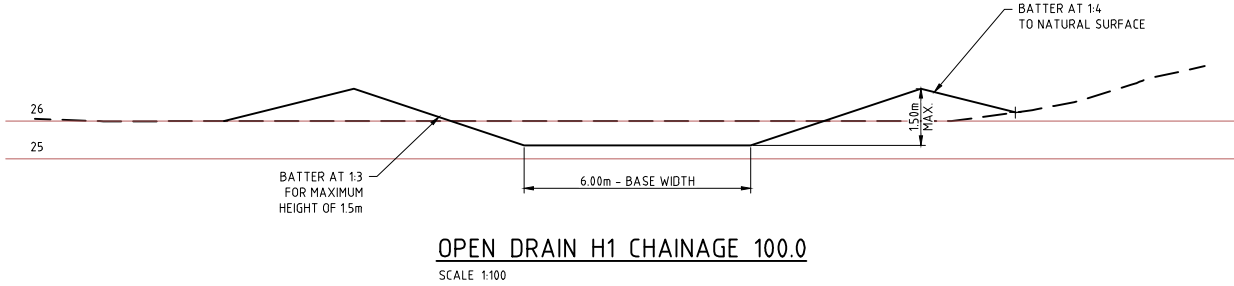
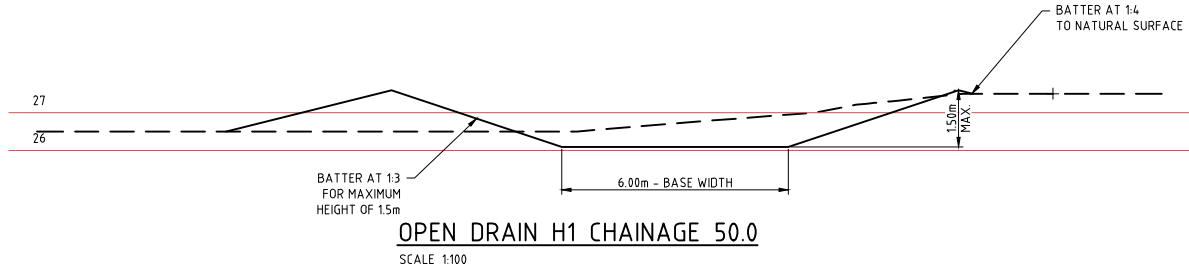
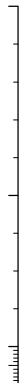
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| C.BENFIELD | D.LUONG | |
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STROMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H1 PLAN AND PROFILE | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0257 | REV. A |



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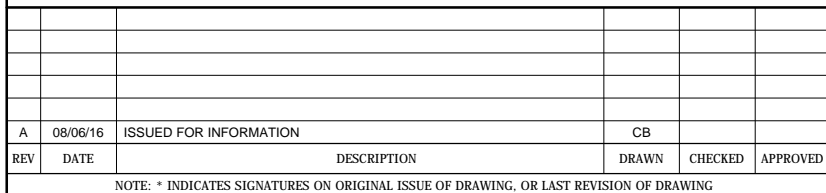


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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H1 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0258 |
| | | REV. A |

100mm AT FULL SIZE AT A1 SHEET SIZE



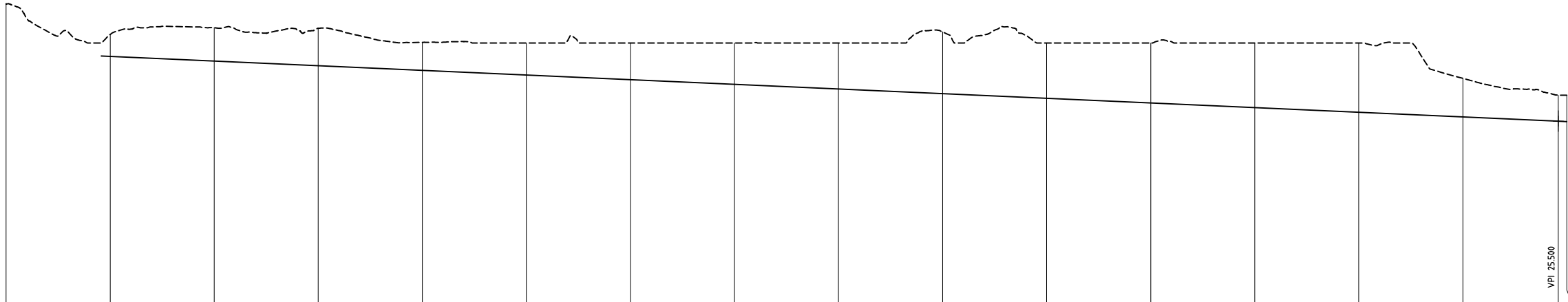
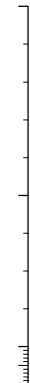
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H2 PLAN | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0259 | A |

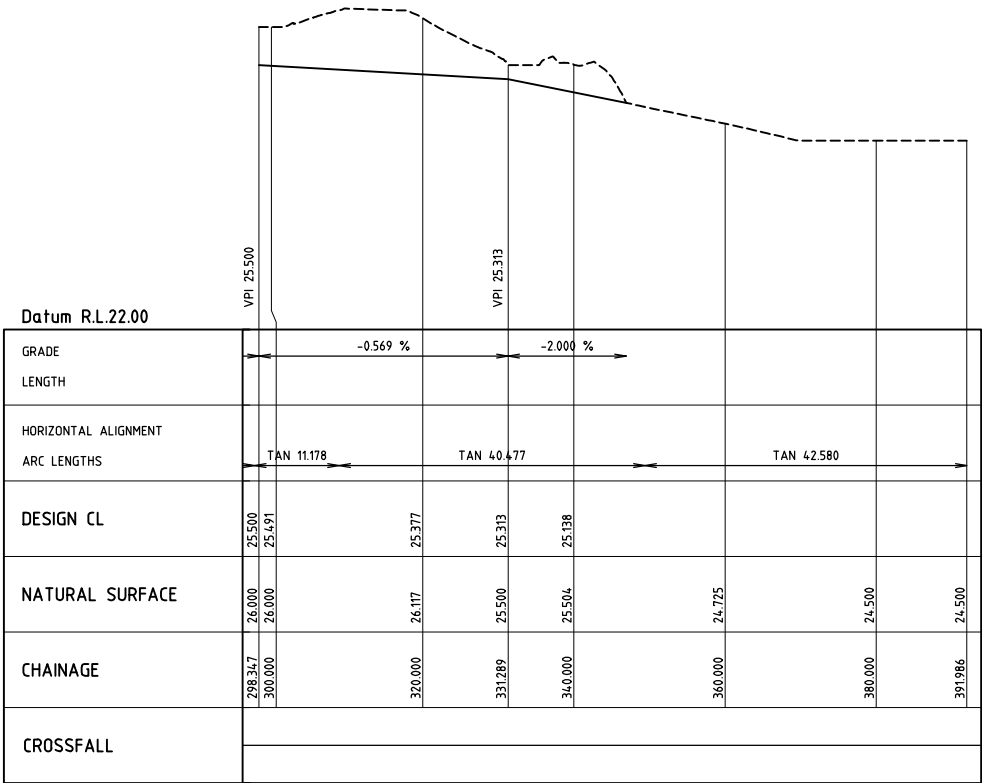
16026-0260

100mm AT FULL SIZE AT A1 SHEET SIZE



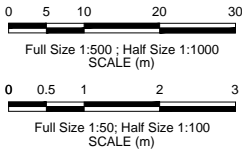
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| Datum R.L.22.00 | | | | | | | | | | | | | | | | | | | | | | VPI 25.500 | | | | | | | | | | | |
| GRADE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LENGTH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HORIZONTAL ALIGNMENT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ARC LENGTHS | | ← TAN 109.688 | | | | | | | | | | ← TAN 12.726 | | | | | TAN 149.797 | | | | | ← TAN 25.540 | | | | | | | | | | | |
| DESIGN CL | | | 26.742 | | 26.653 | | 26.564 | | 26.475 | | 26.385 | | 26.296 | | 26.207 | | 26.118 | | 26.028 | | 25.939 | | 25.850 | | 25.760 | | 25.671 | | 25.582 | | 25.500 | 25.491 | |
| NATURAL SURFACE | 27.754 | | 27.166 | | 27.296 | | 27.285 | | 27.016 | | 27.000 | | 27.000 | | 27.000 | | 27.000 | | 27.216 | | 27.000 | | 27.000 | | 27.000 | | 27.000 | | 26.321 | | 26.000 | 26.000 | |
| CHAINAGE | 0.000 | | 20.000 | | 40.000 | | 60.000 | | 80.000 | | 100.000 | | 120.000 | | 140.000 | | 160.000 | | 180.000 | | 200.000 | | 220.000 | | 240.000 | | 260.000 | | 280.000 | | 298.347 | 300.000 | |
| CROSSFALL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

DRAIN PROFILE H2
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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|----------------------|--|---------|------------|--|---------|------------|---------|--|---------|------------|---------|
| Datum R.L.22.00 | | | | | | | | | | | |
| GRADE | | | | | | | | | | | |
| LENGTH | | | | | | | | | | | |
| HORIZONTAL ALIGNMENT | | | | | | | | | | | |
| ARC LENGTHS | | | TAN 11.178 | | | TAN 40.477 | | | | TAN 42.580 | |
| DESIGN CL | | 25.500 | 25.491 | | 25.377 | | 25.313 | | 25.198 | | |
| NATURAL SURFACE | | 26.000 | 26.000 | | 26.117 | | 25.500 | | 25.504 | | 24.725 |
| CHAINAGE | | 298.347 | 300.000 | | 310.000 | | 331.289 | | 340.000 | | 360.000 |
| | | | | | | | | | | | 380.000 |
| | | | | | | | | | | | 391.986 |
| CROSSFALL | | | | | | | | | | | |

DRAIN PROFILE H2
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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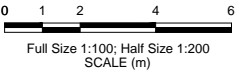
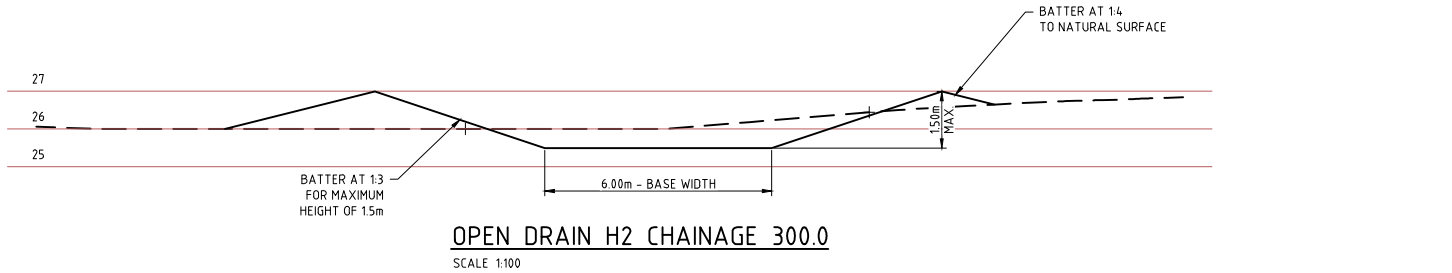
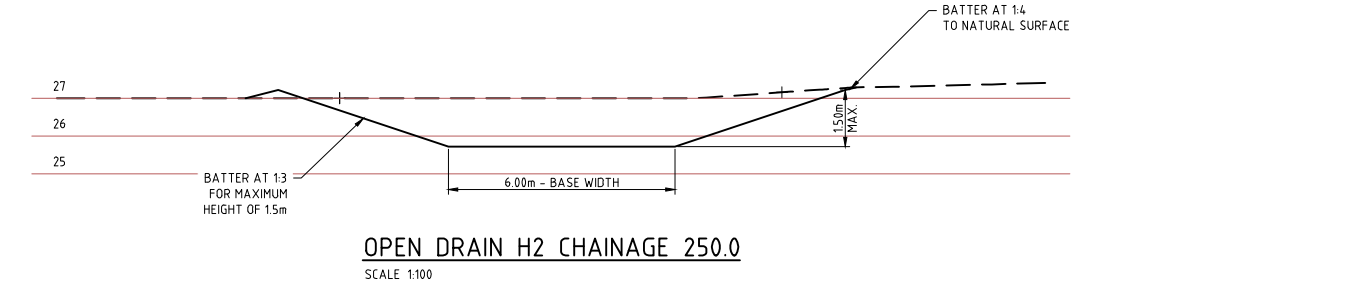
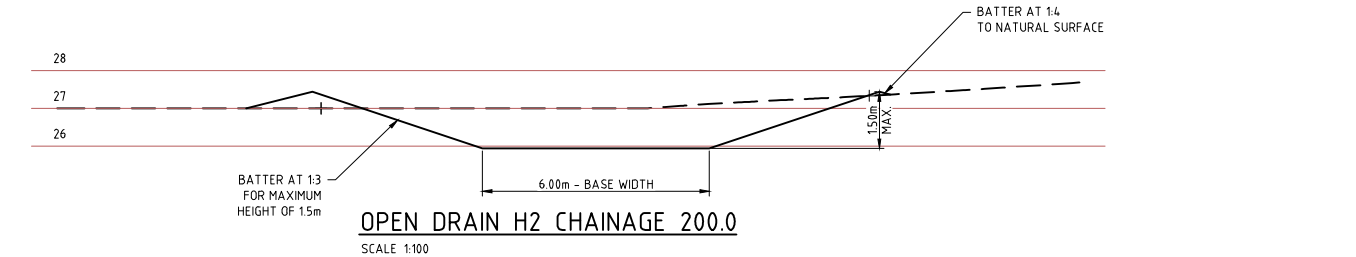
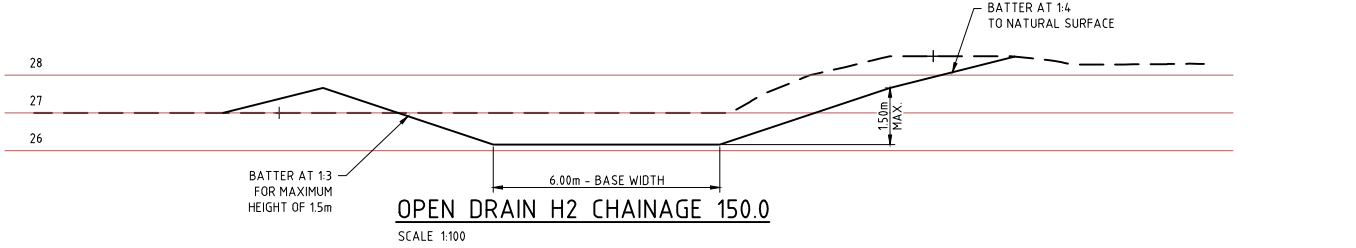
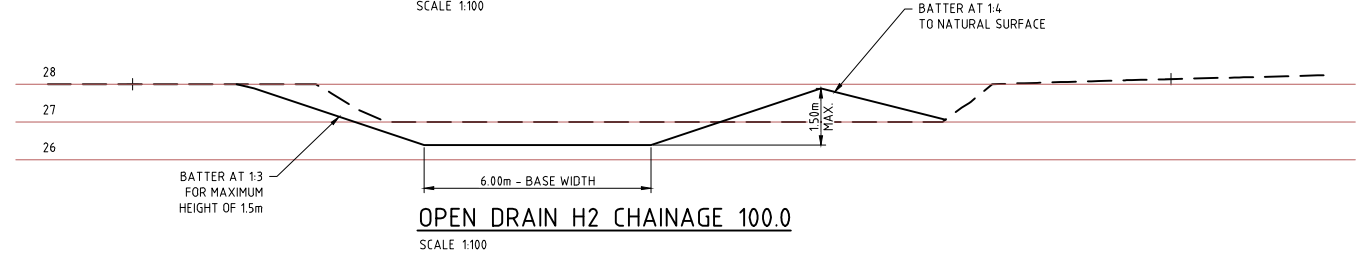
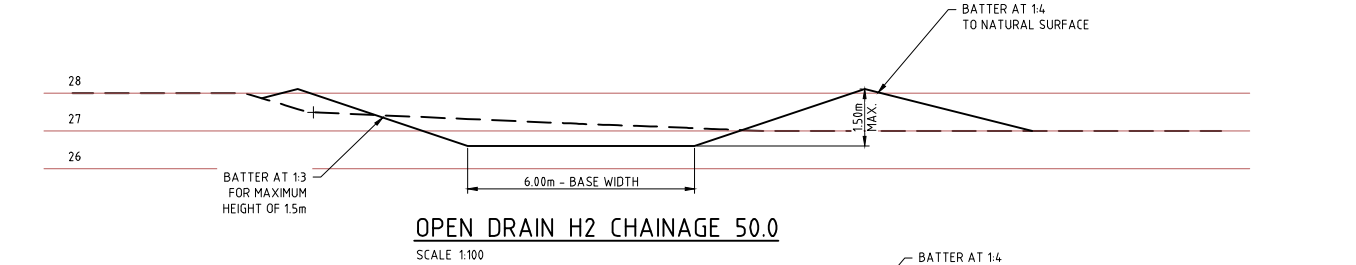
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| CLIENT | | CITY OF KARRATHA | | | |
| PROJECT | | DAMPIER DRAINAGE | | | |
| | | PROPOSED STORMWATER UPGRADE | | | |
| | | OPEN DRAINAGE REMEDIATION | | | |
| | | OPEN DRAIN H2 PROFILE | | | |
| SIZE | A1 | SCALE | AS SHOWN | DRAWING NUMBER | 16026-0260 |
| | | | | | REV. A |

16026-0260A

100mm AT FULL SIZE AT A1 SHEET SIZE



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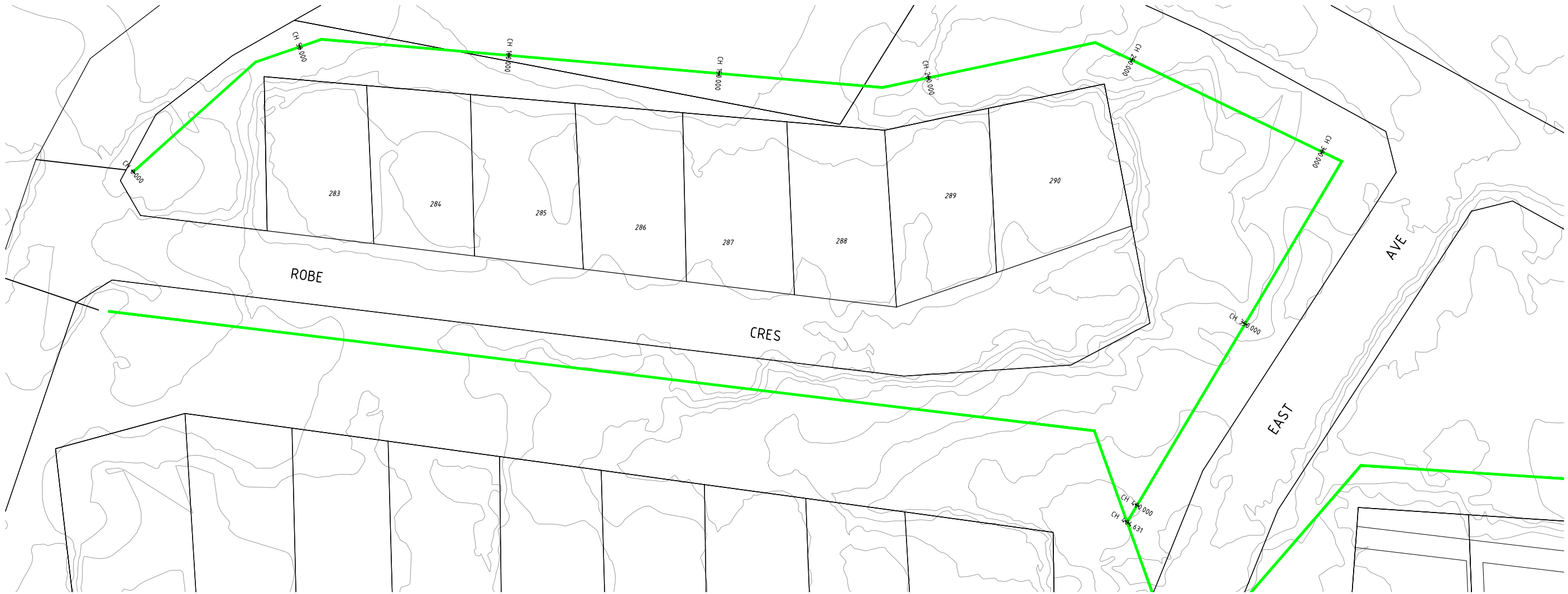
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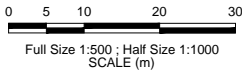
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H2 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0260A |
| | | REV. A |

16026-0261



DRAIN PROFILE H3
SCALE 1:500



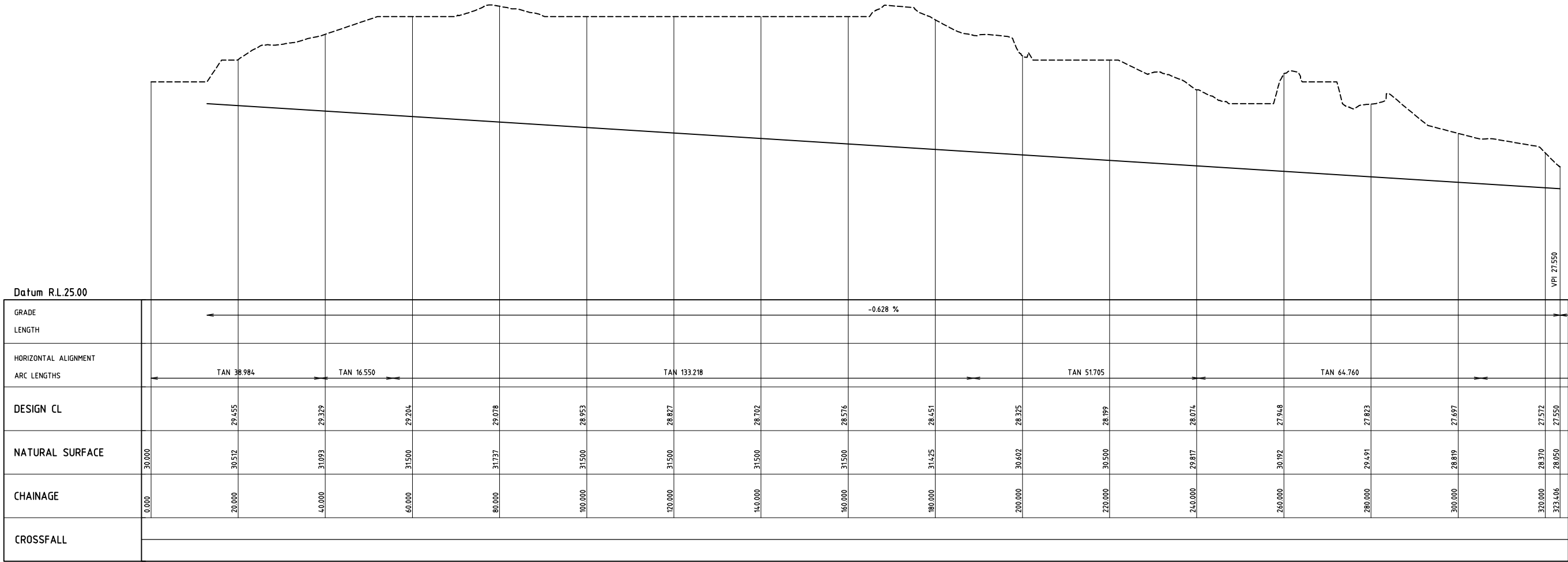
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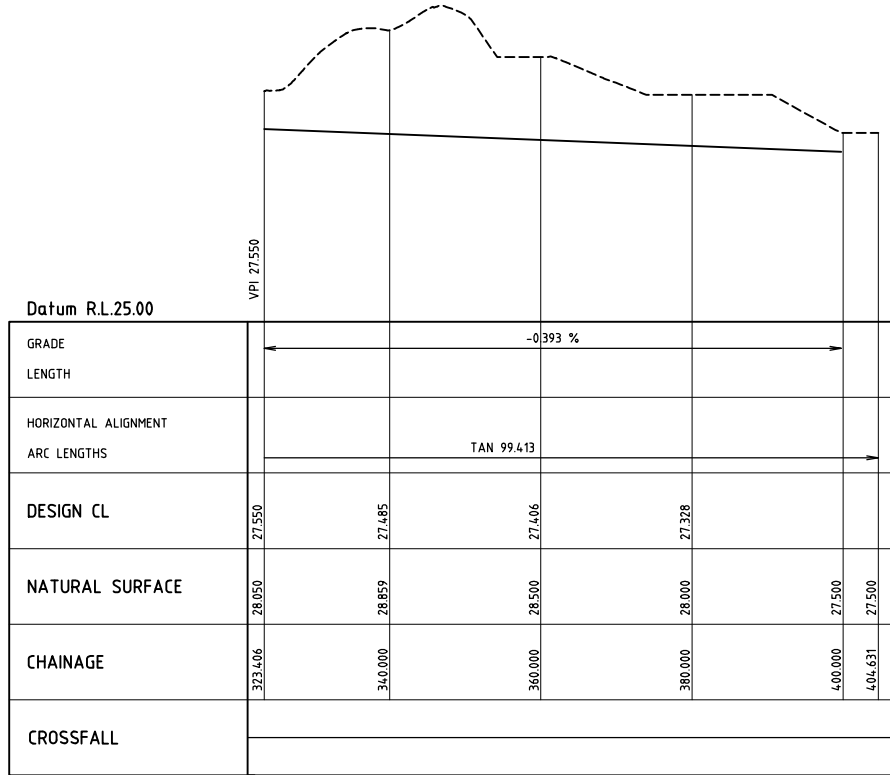
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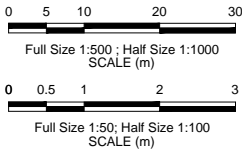
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H3 PLAN | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0261 | REV. A |



DRAIN PROFILE H1
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



DRAIN PROFILE H1
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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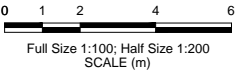
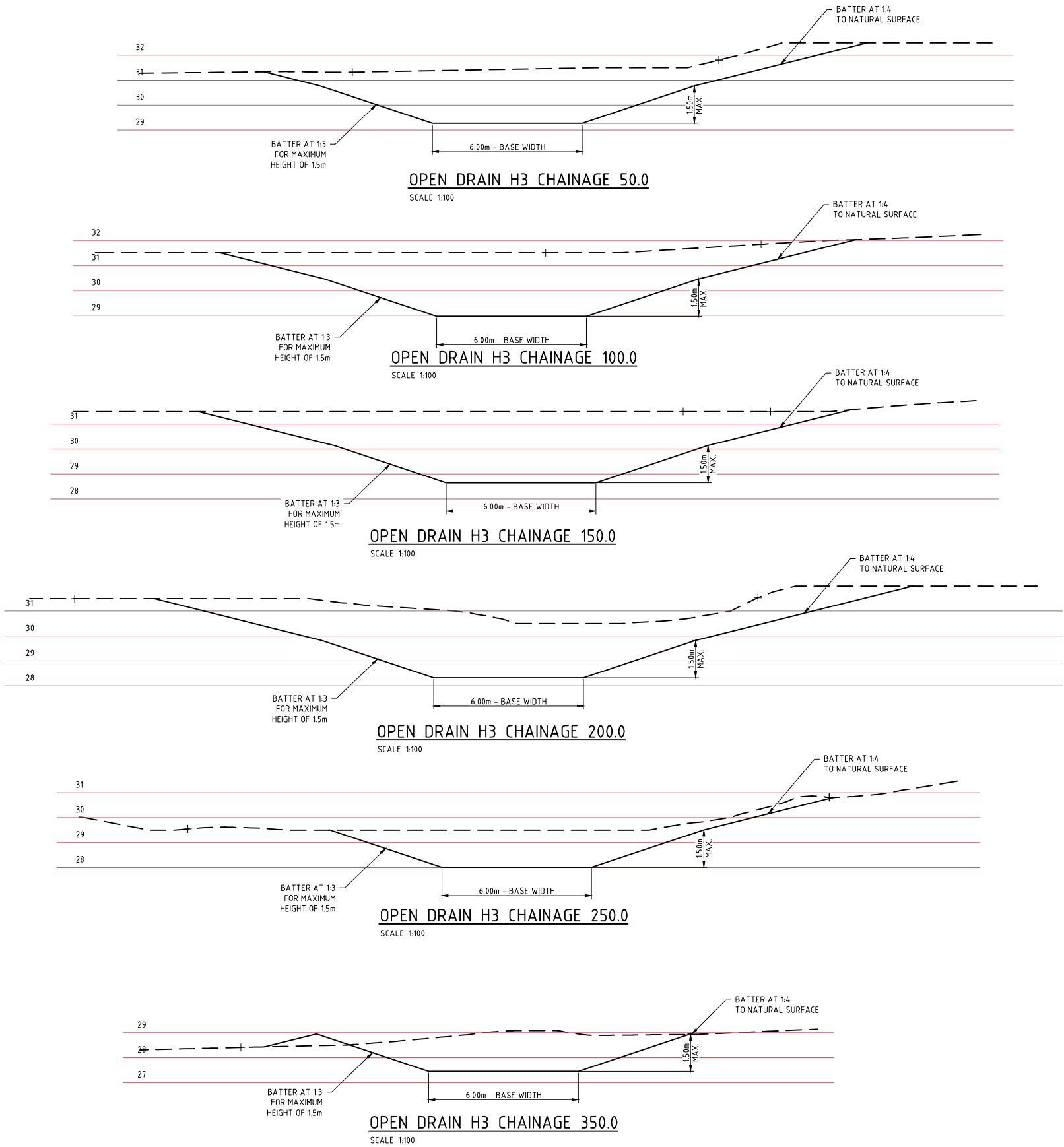
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H3 PROFILE | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0262 |
| | | REV. A |

16026-0262A



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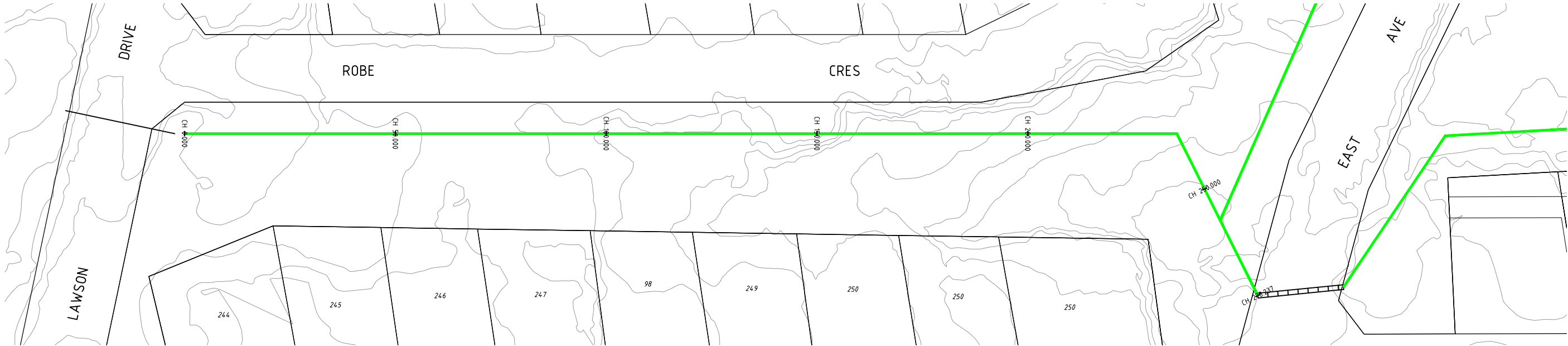


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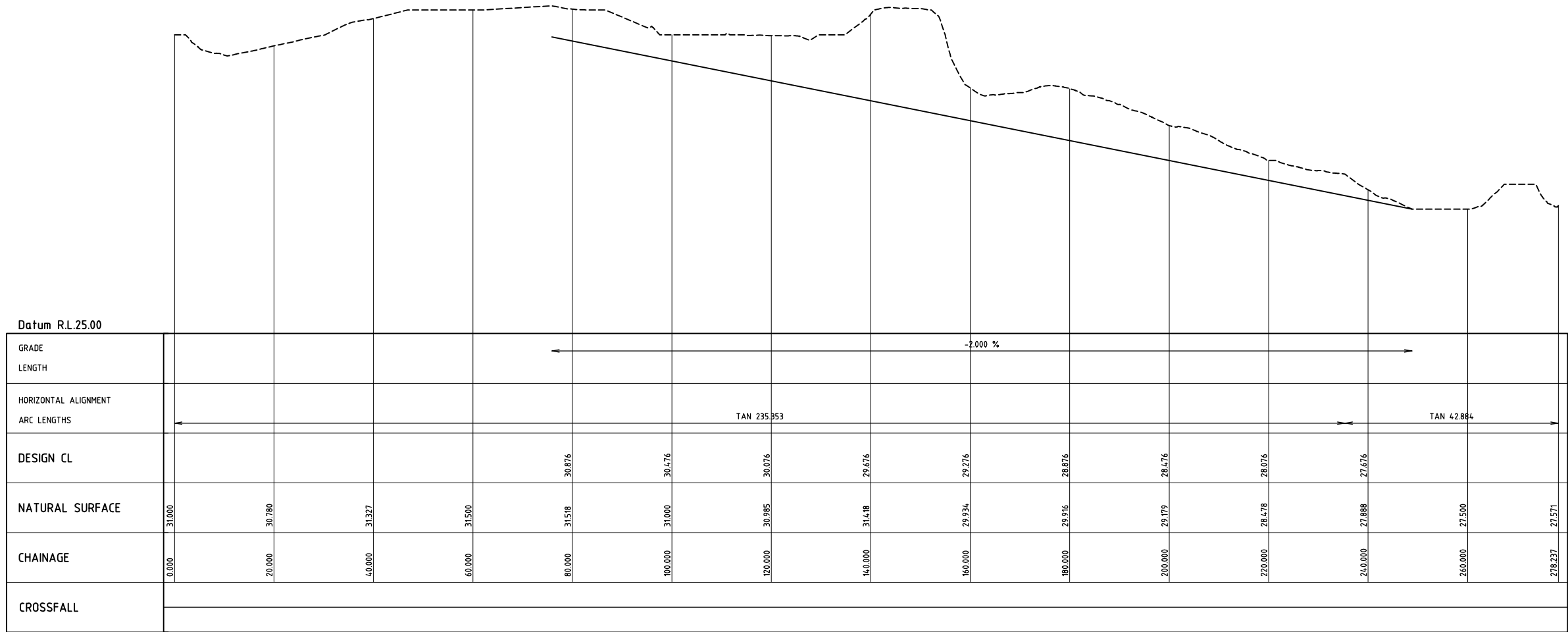
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H3 - CROSS SECTIONS | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0262A | A |

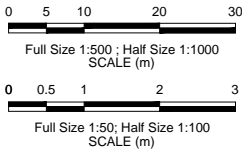
16026-0263



DRAIN PROFILE H4
SCALE 1:500



DRAIN PROFILE H4
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



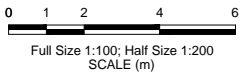
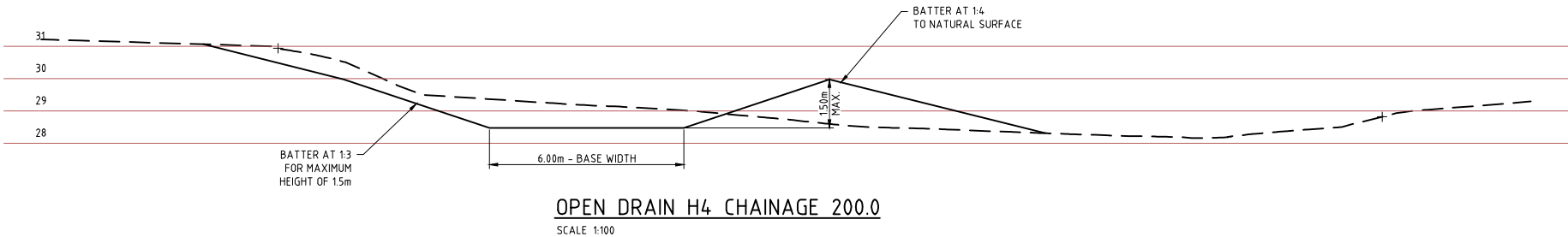
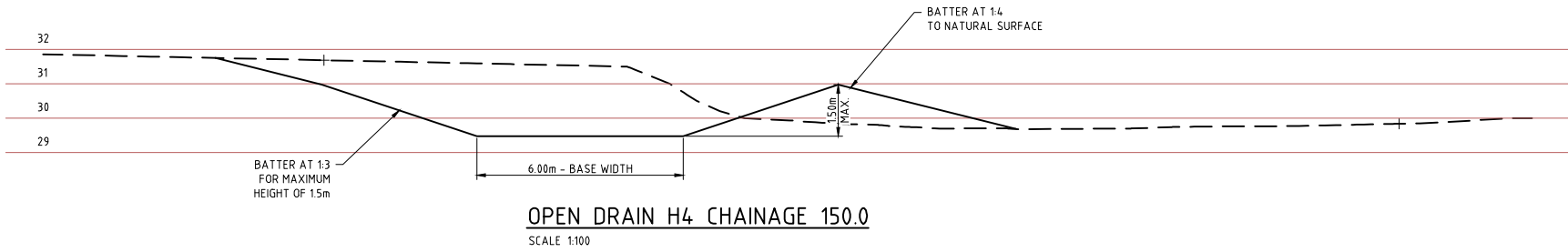
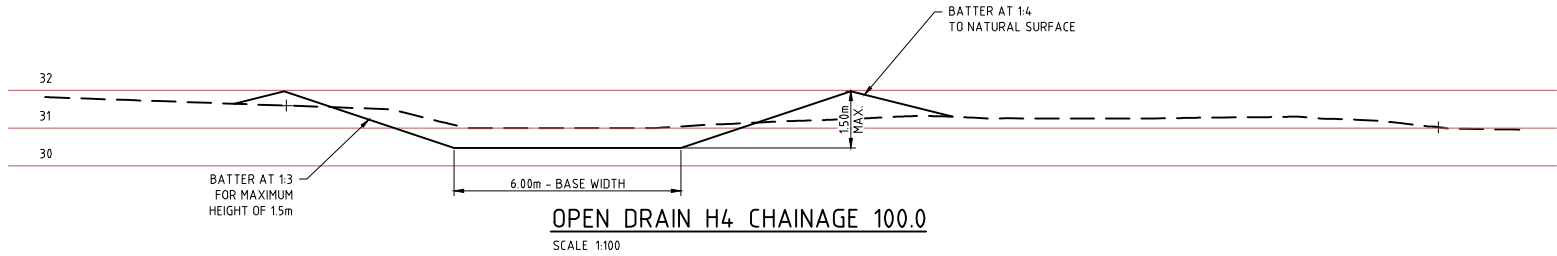
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| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE | | | |
| OPEN DRAINAGE REMEDIATION | | | |
| OPEN DRAIN H4 PLAN AND PROFILE | | | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0263 | A |



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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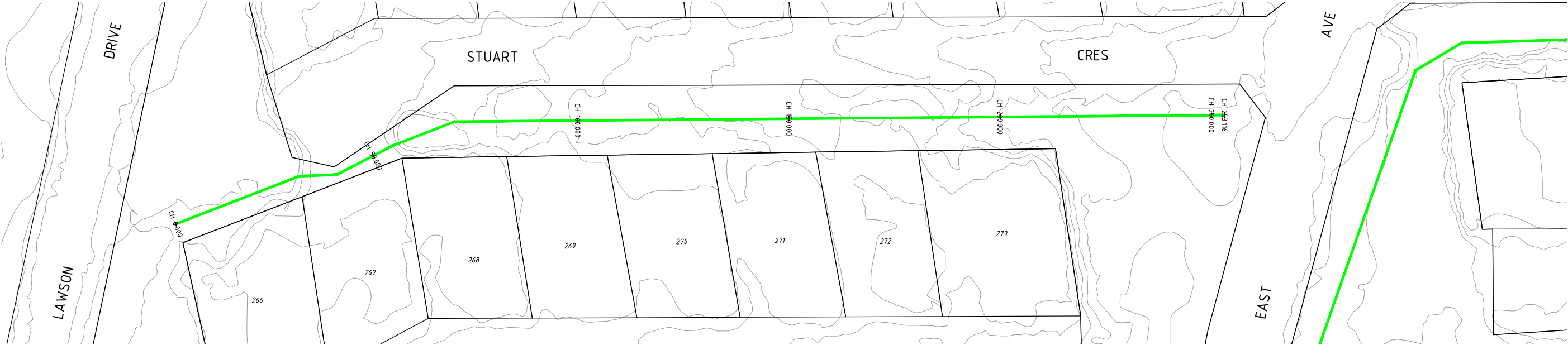


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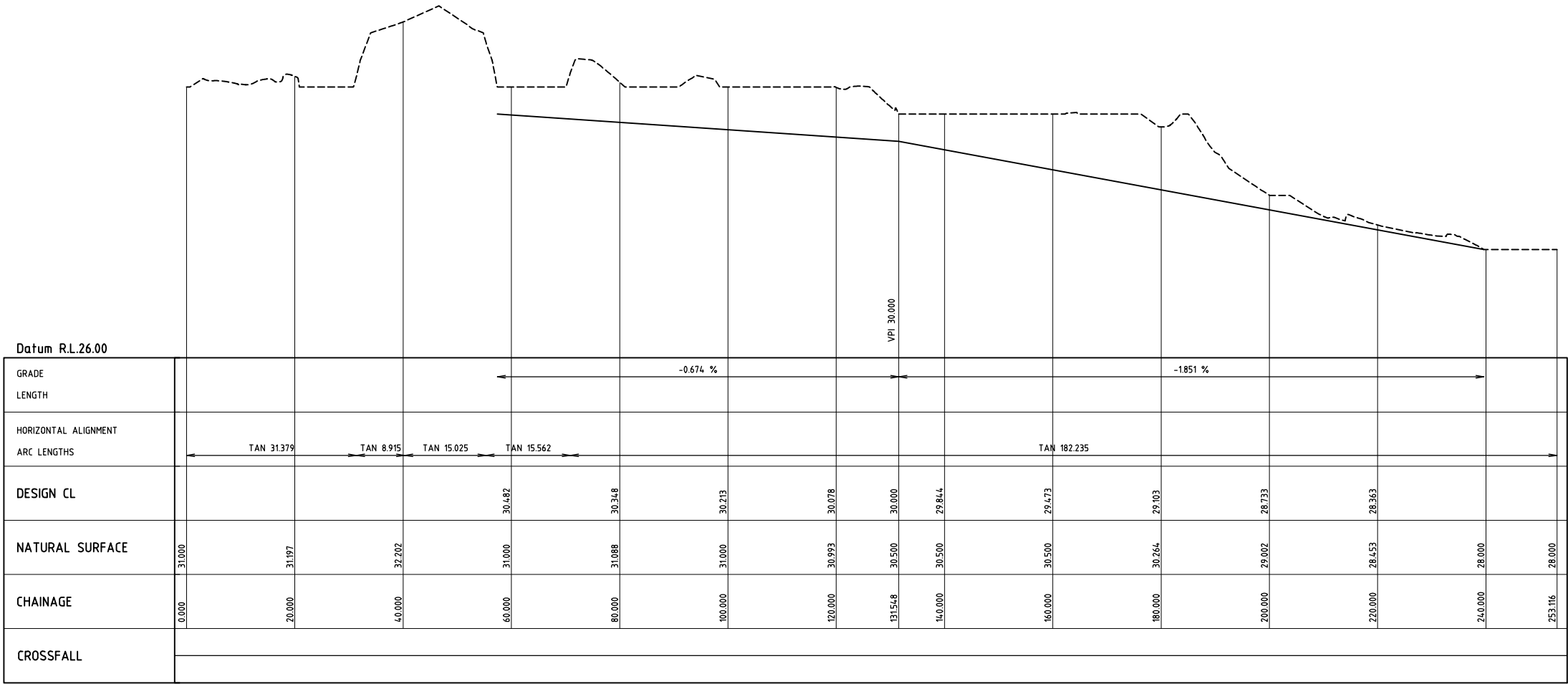
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H4 - CROSS SECTIONS | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0264 | REV. A |

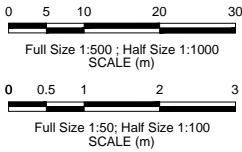
16026-0265



DRAIN PROFILE H5
SCALE 1:500



DRAIN PROFILE H5
SCALE 1500 HORIZONTAL
SCALE 150 VERTICAL



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| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |

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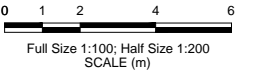
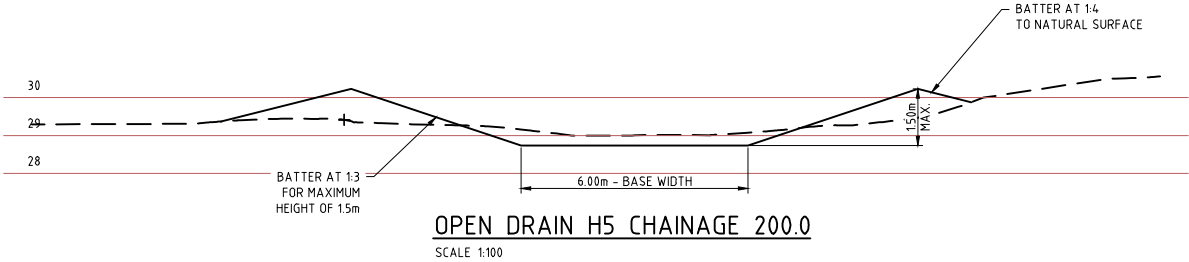
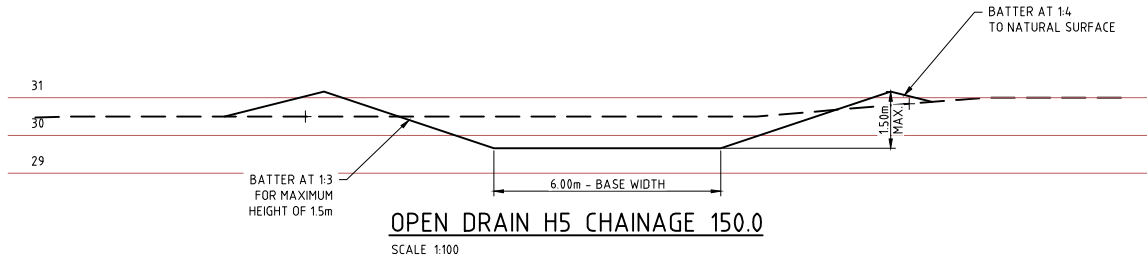
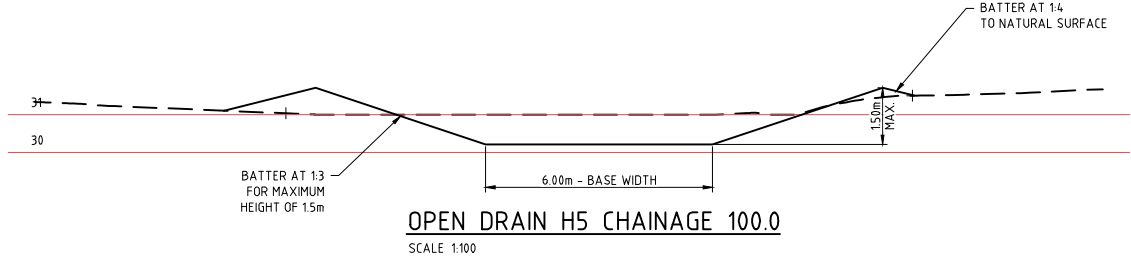
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| DRAWN | C.BENFIELD | DESIGNED | D.LUONG | APPROVED | |
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| CLIENT | CITY OF KARRATHA |
| PROJECT | DAMPIER DRAINAGE |
| | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H5 PLAN AND PROFILE |
| SIZE | A1 |
| SCALE | AS SHOWN |
| DRAWING NUMBER | 16026-0265 |
| REV. | A |

16026-0266

100mm AT FULL SIZE AT A1 SHEET SIZE



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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| A | 08/06/16 | ISSUED FOR INFORMATION | CB | | |
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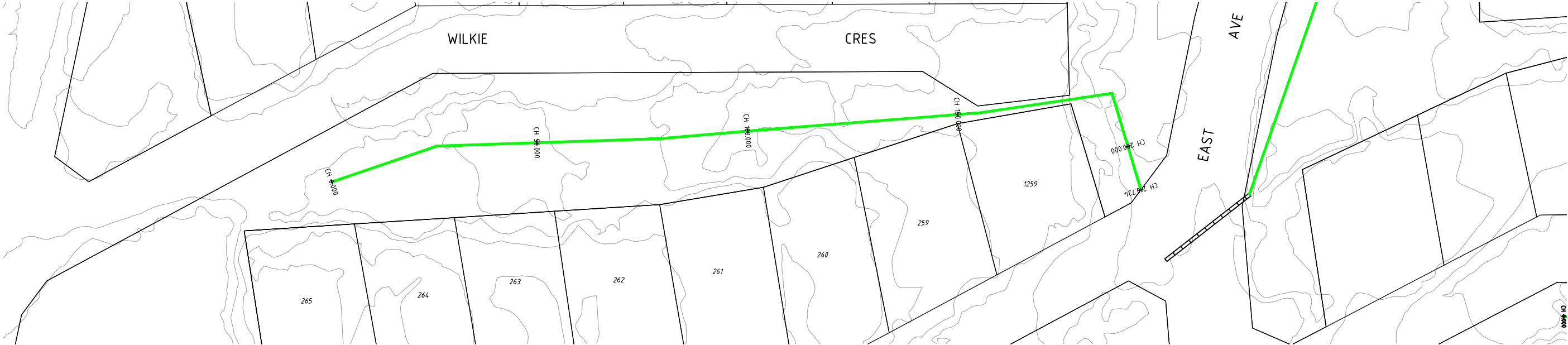
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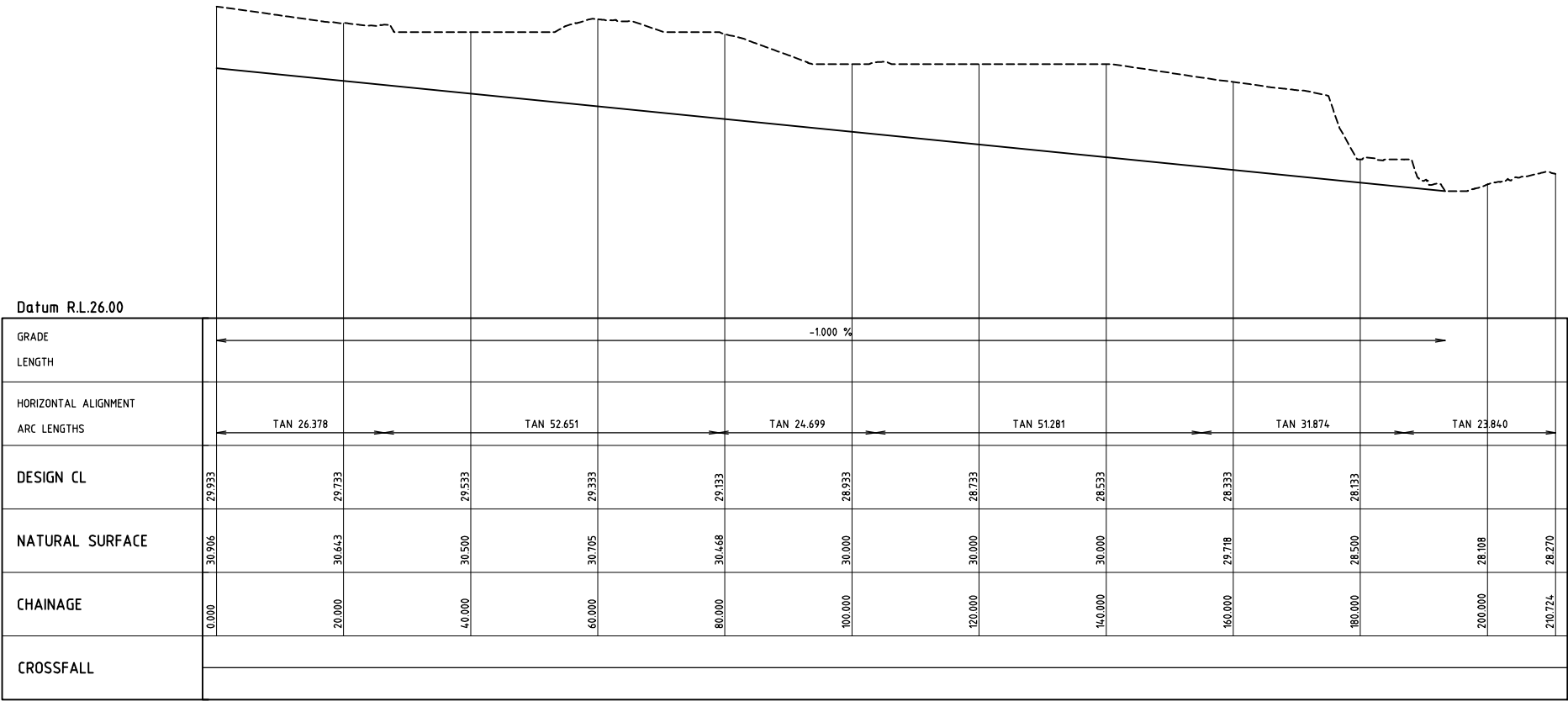
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H5 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0266 |
| | | REV. A |

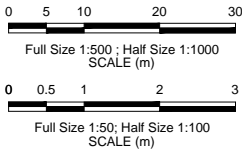
16026-0267



DRAIN PROFILE H6
SCALE 1:500



DRAIN PROFILE H6
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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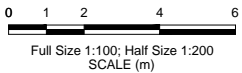
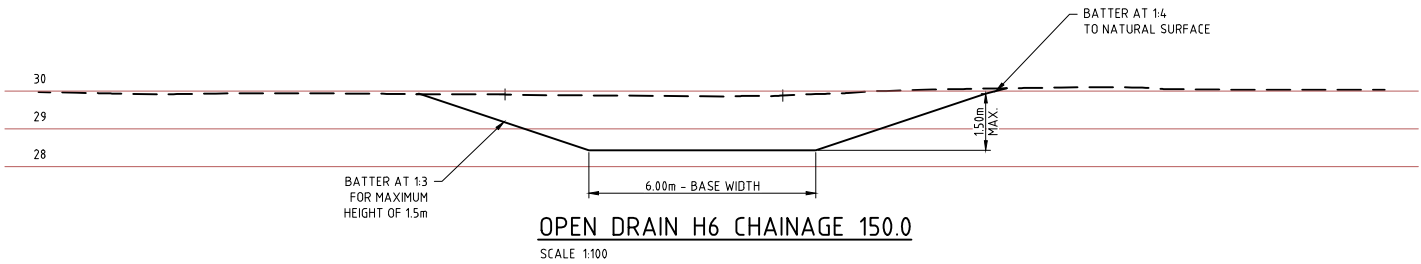
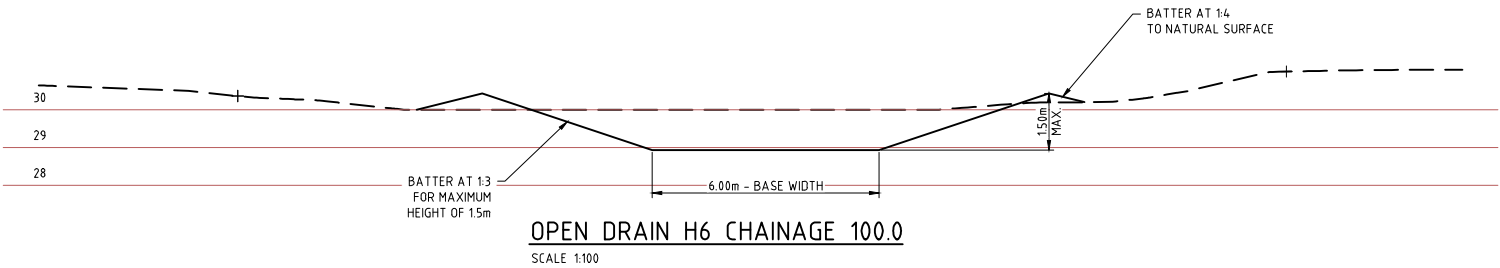
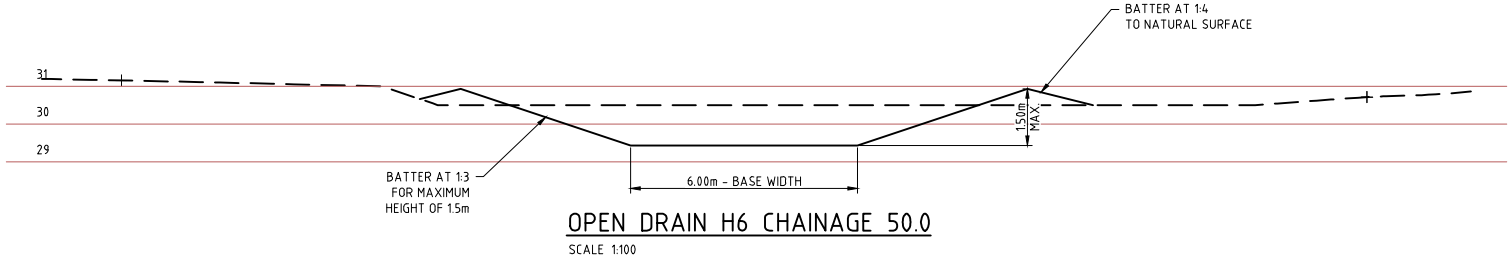
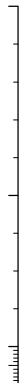
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| CLIENT | CITY OF KARRATHA | | |
| PROJECT | DAMPIER DRAINAGE | | |
| | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H6 PLAN AND PROFILE | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0267 | REV. A |

16026-0268

100mm AT FULL SIZE AT A1 SHEET SIZE



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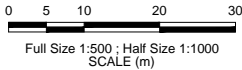
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H6 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0268 |
| | | REV. A |

16026-0269



DRAIN PROFILE H7
SCALE 1:500



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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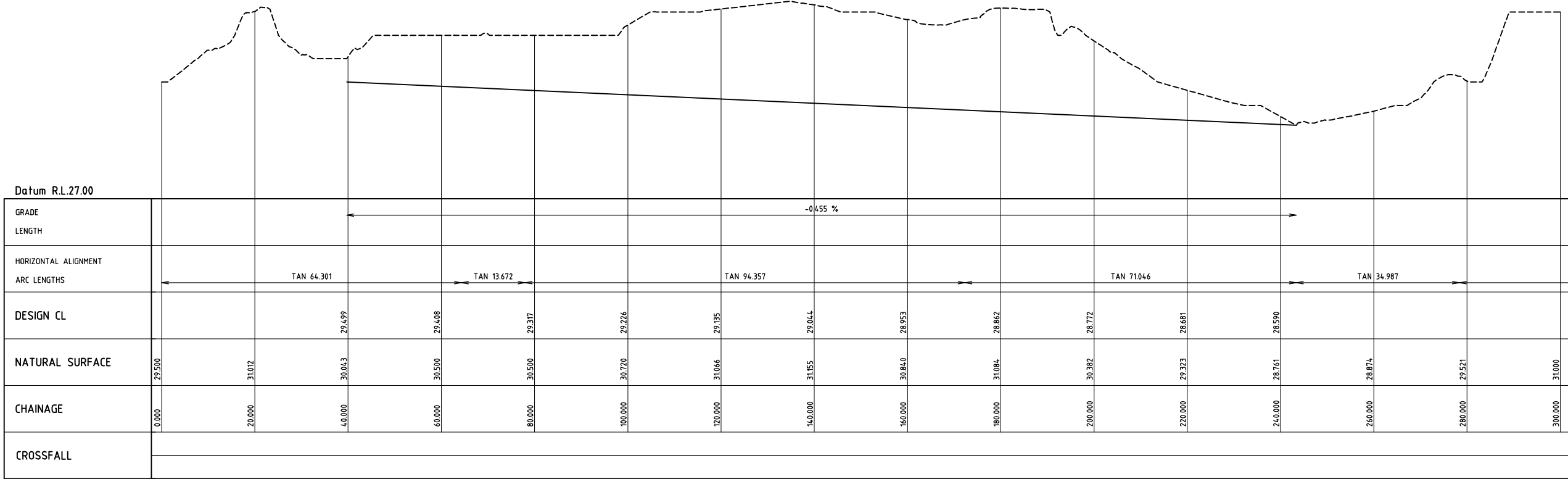
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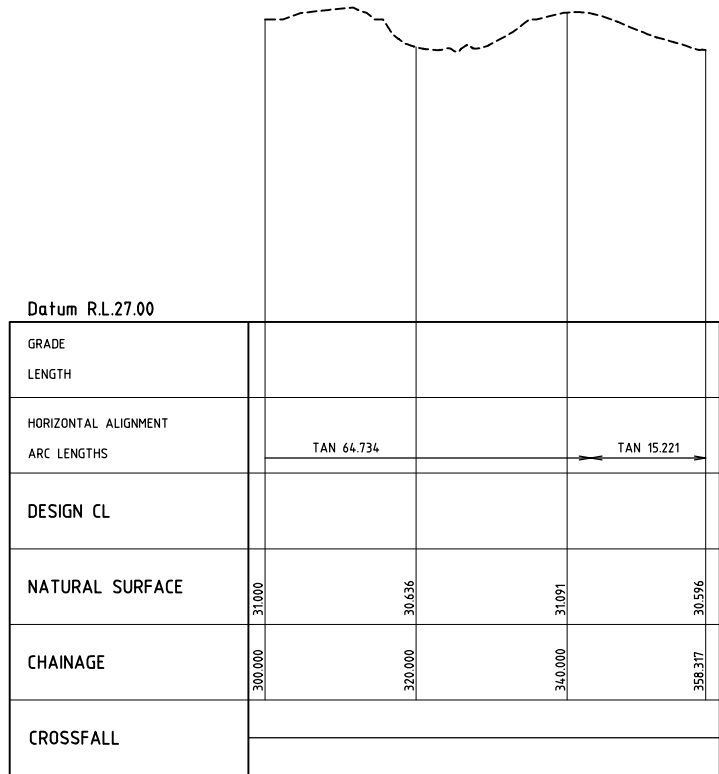
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| CLIENT CITY OF KARRATHA | | PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE | | OPEN DRAINAGE REMEDIATION | |
| OPEN DRAIN H7 PLAN | | DRAWING NUMBER 16026-0269 | |
| SIZE A1 | SCALE AS SHOWN | REV. A | |

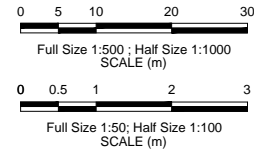
16026-0270



DRAIN PROFILE H7
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



DRAIN PROFILE H7
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
| NOTE: * INDICATES SIGNATURES ON ORIGINAL ISSUE OF DRAWING, OR LAST REVISION OF DRAWING | | | | | |

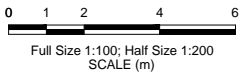
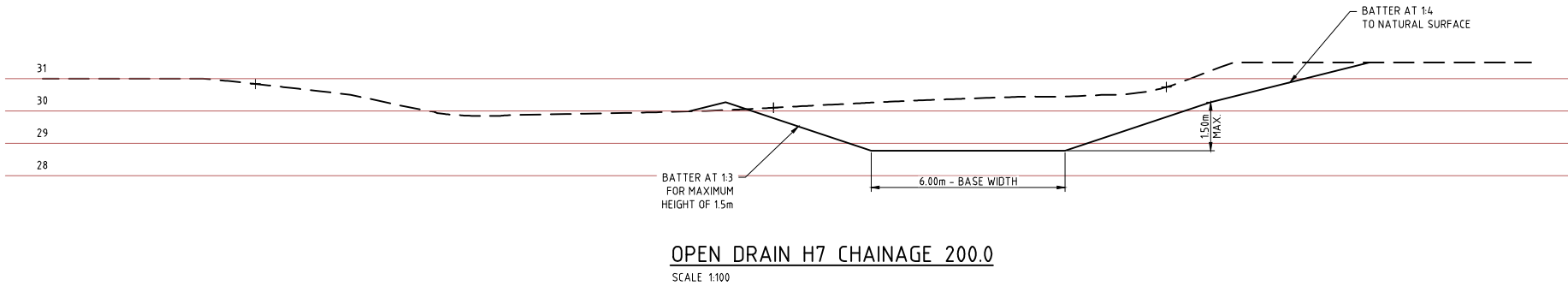
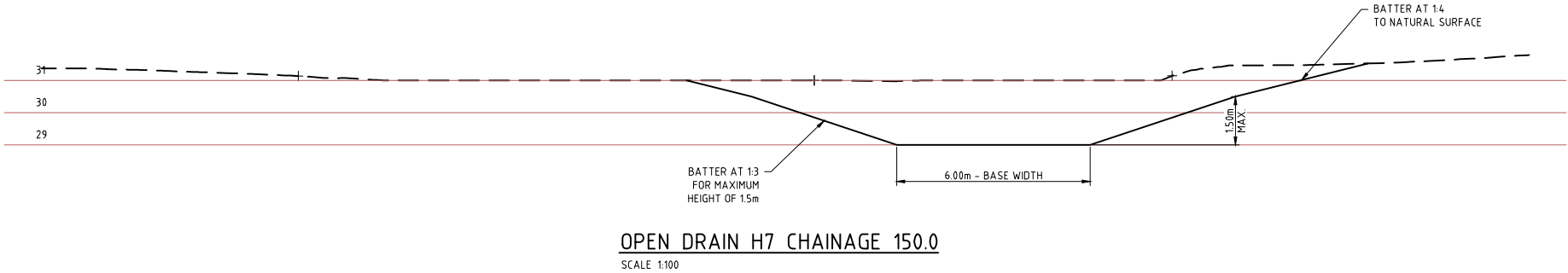
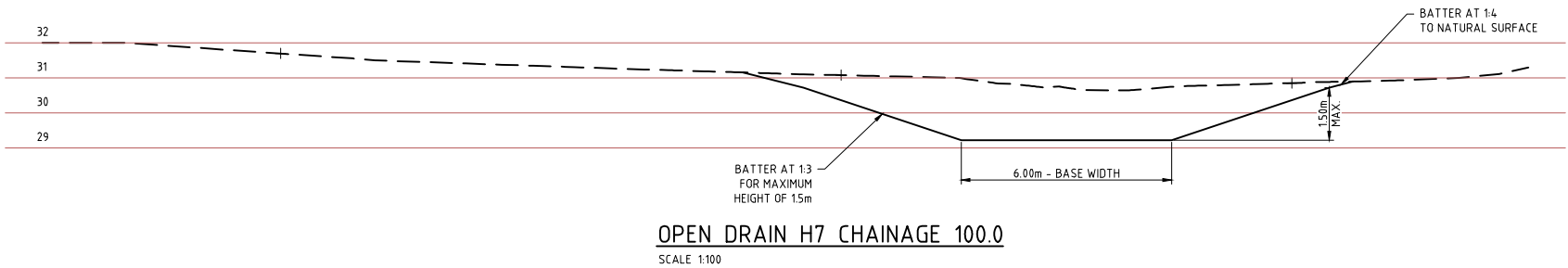
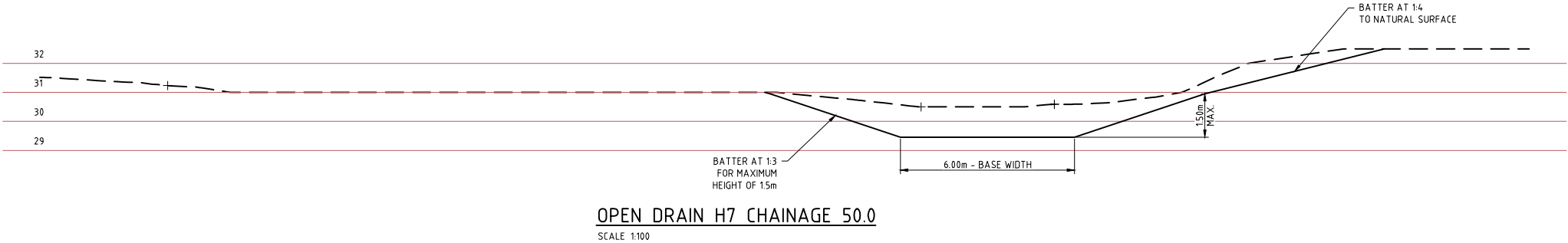
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| CLIENT | CITY OF KARRATHA | | |
| PROJECT | DAMPIER DRAINAGE | | |
| | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H7 PROFILE | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0270 | REV. A |

16026-0271



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| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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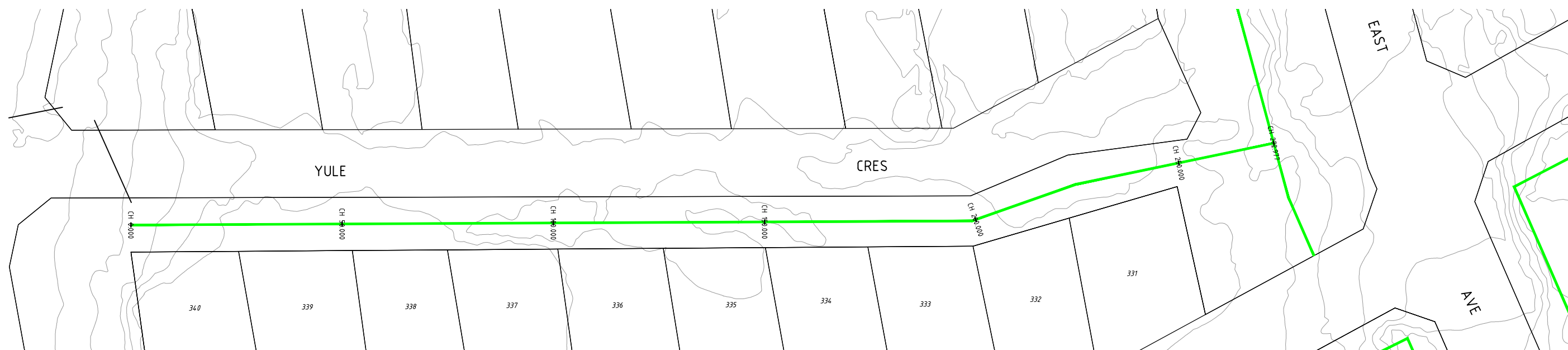
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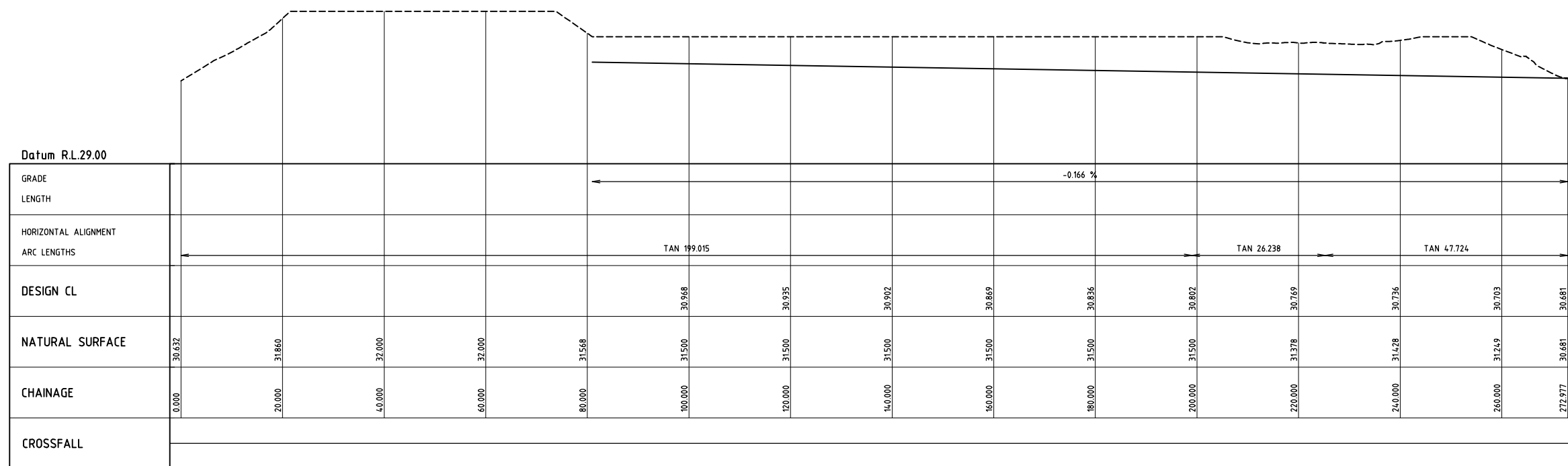
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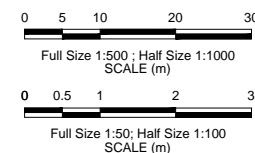
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H7 - CROSS SECTIONS | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0271 | REV. A |



SCALE 1:500



SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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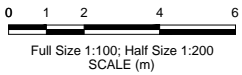
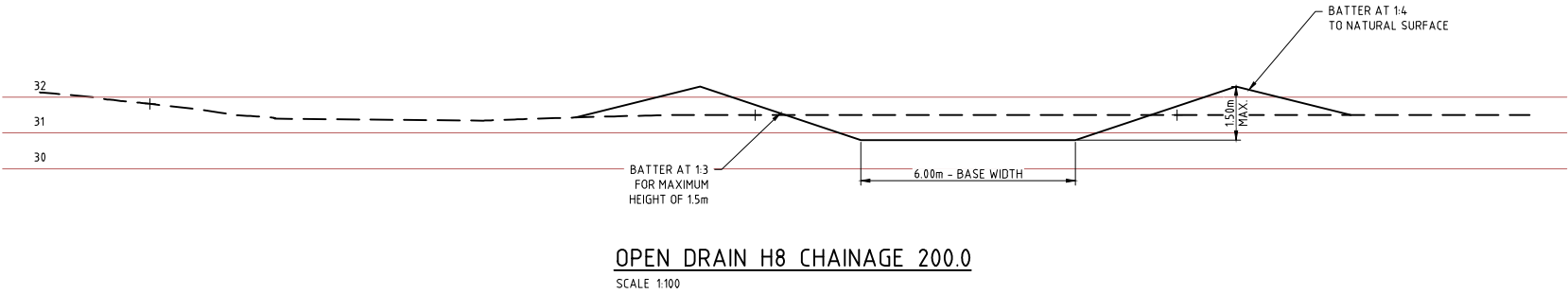
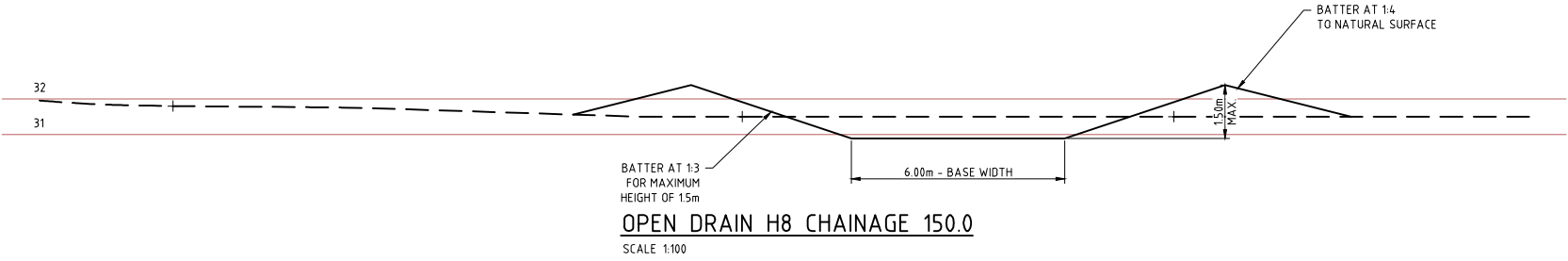
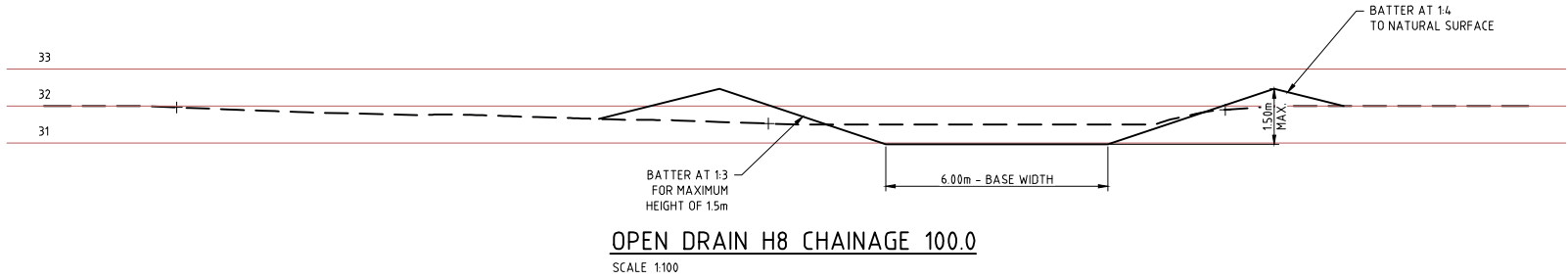
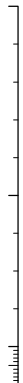
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STROMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H8 PLAN AND PROFILE | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0272 | A |

16026-0273

100mm AT FULL SIZE AT A1 SHEET SIZE



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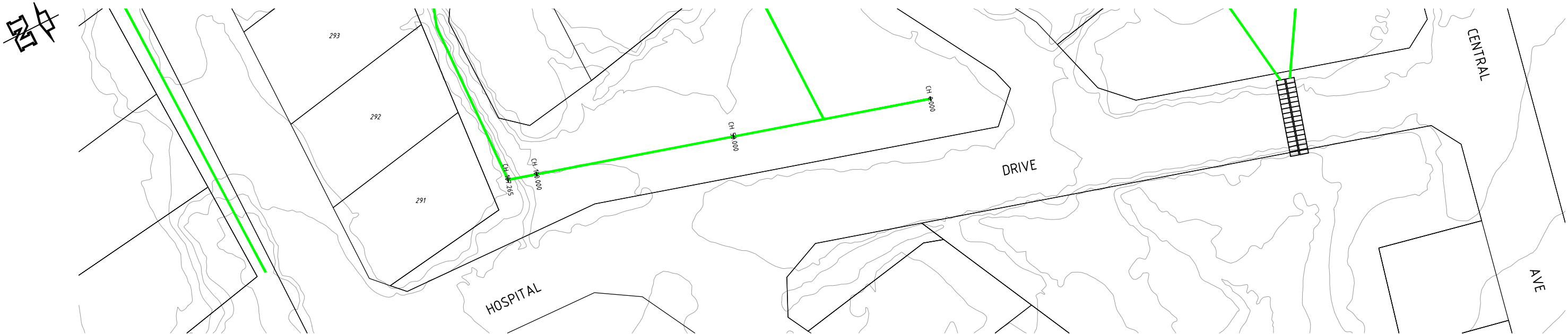
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN H8 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0273 |
| | | REV. A |

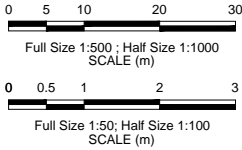
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DRAIN PROFILE I1
SCALE 1:500



DRAIN PROFILE I1
SCALE 1500 HORIZONTAL
SCALE 150 VERTICAL



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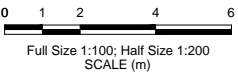
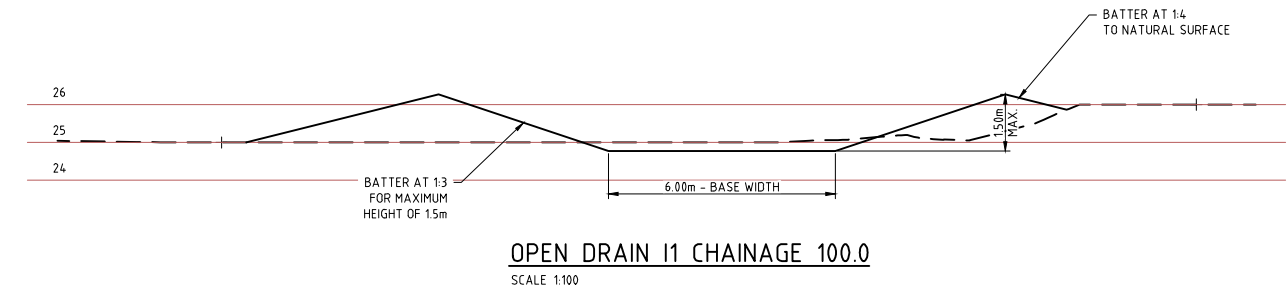
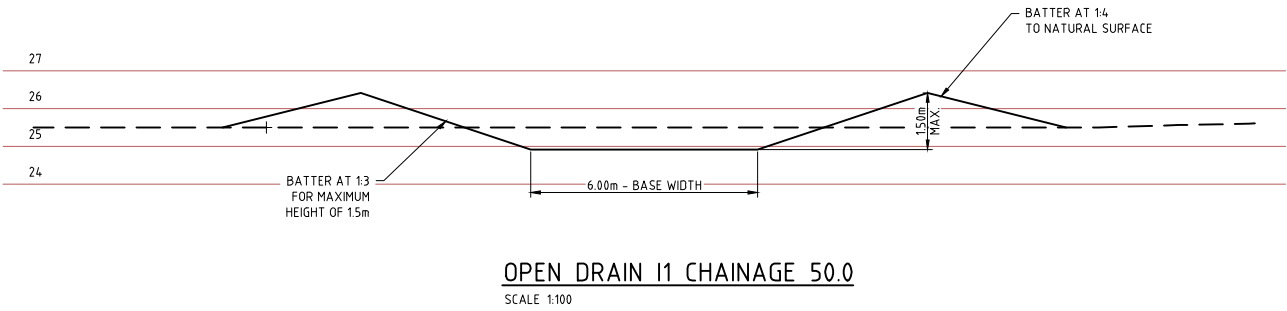


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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN I1 PLAN AND PROFILE | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0274 |
| | | REV. A |



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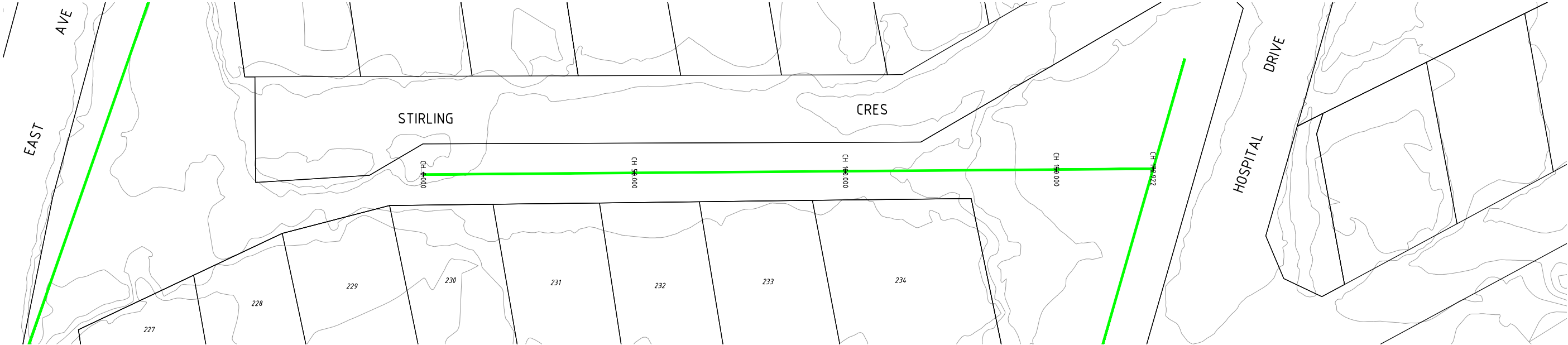


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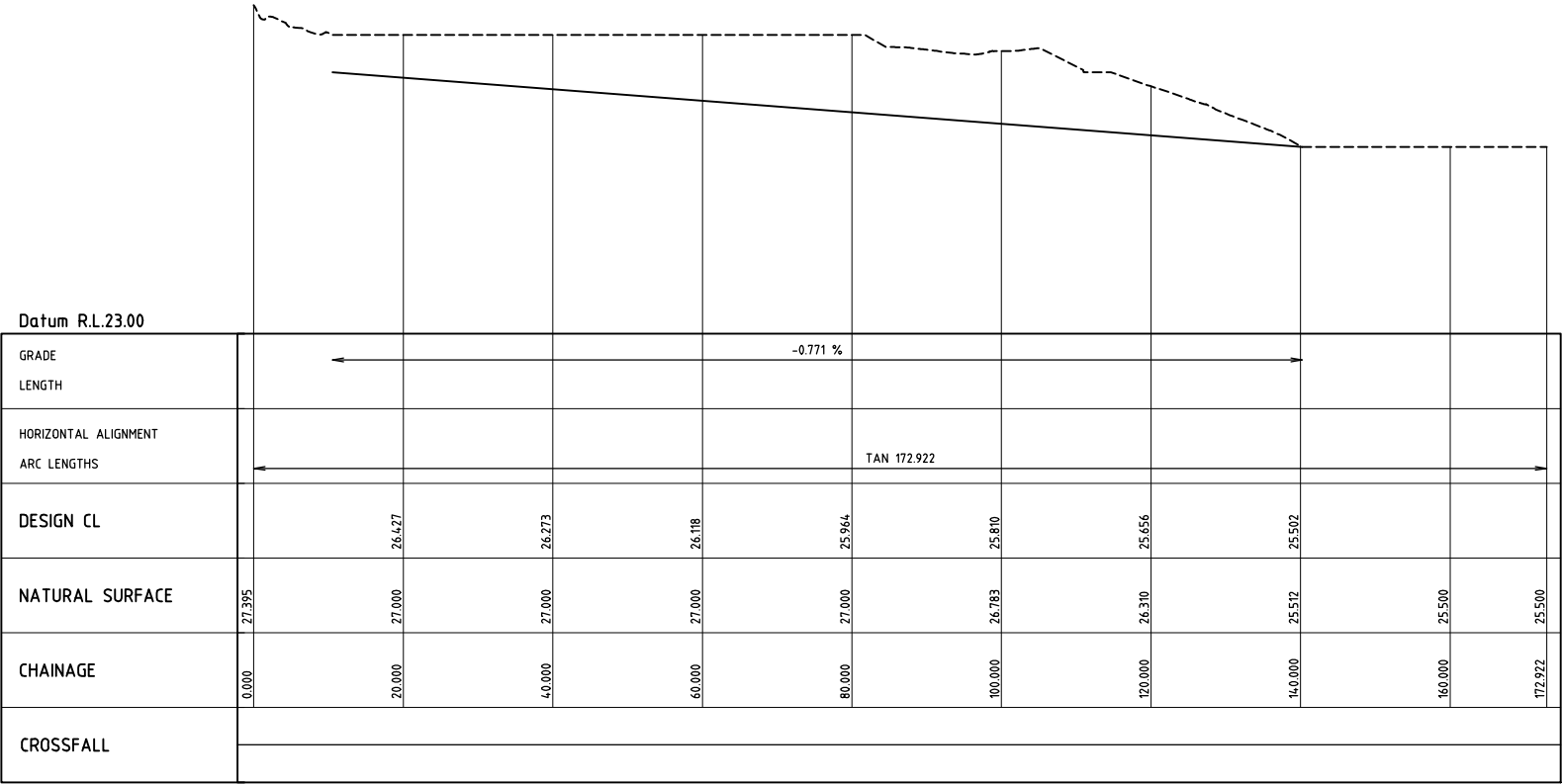
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN I1 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0275 |
| | | REV. A |

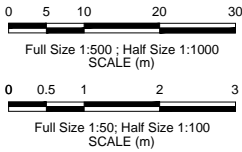
16026-0276



DRAIN PROFILE 12
SCALE 1:500



DRAIN PROFILE 12
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



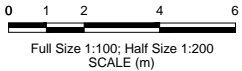
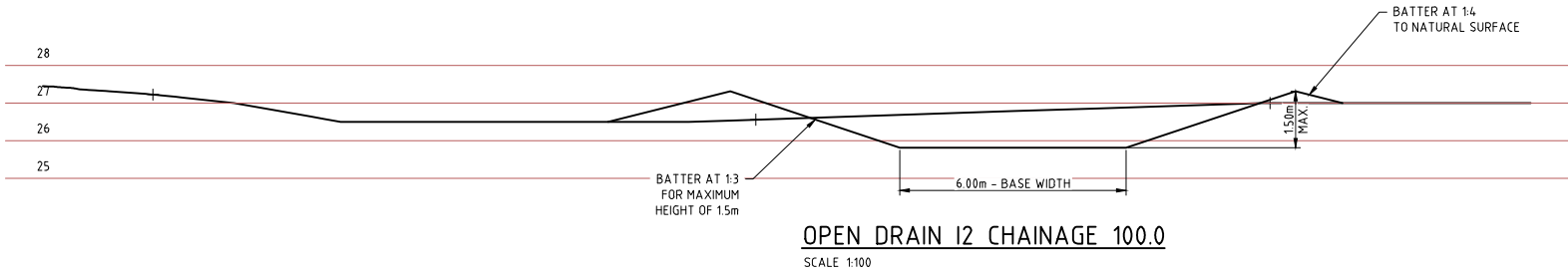
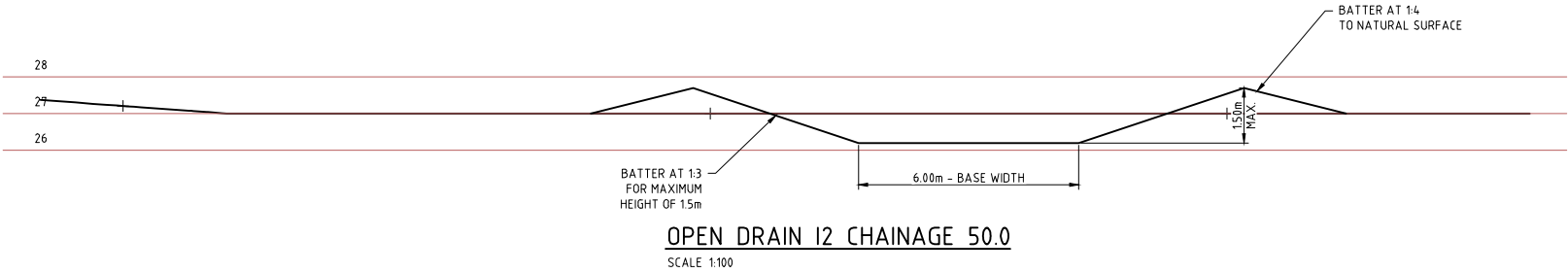
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| CLIENT | CITY OF KARRATHA | | |
| PROJECT | DAMPIER DRAINAGE | | |
| | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN 12 PLAN AND PROFILE | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0276 | REV. A |



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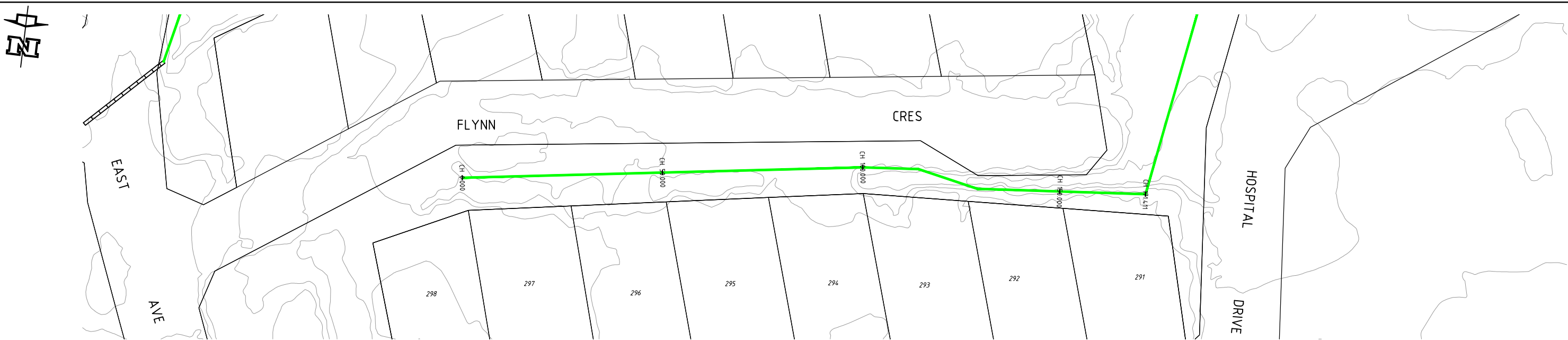
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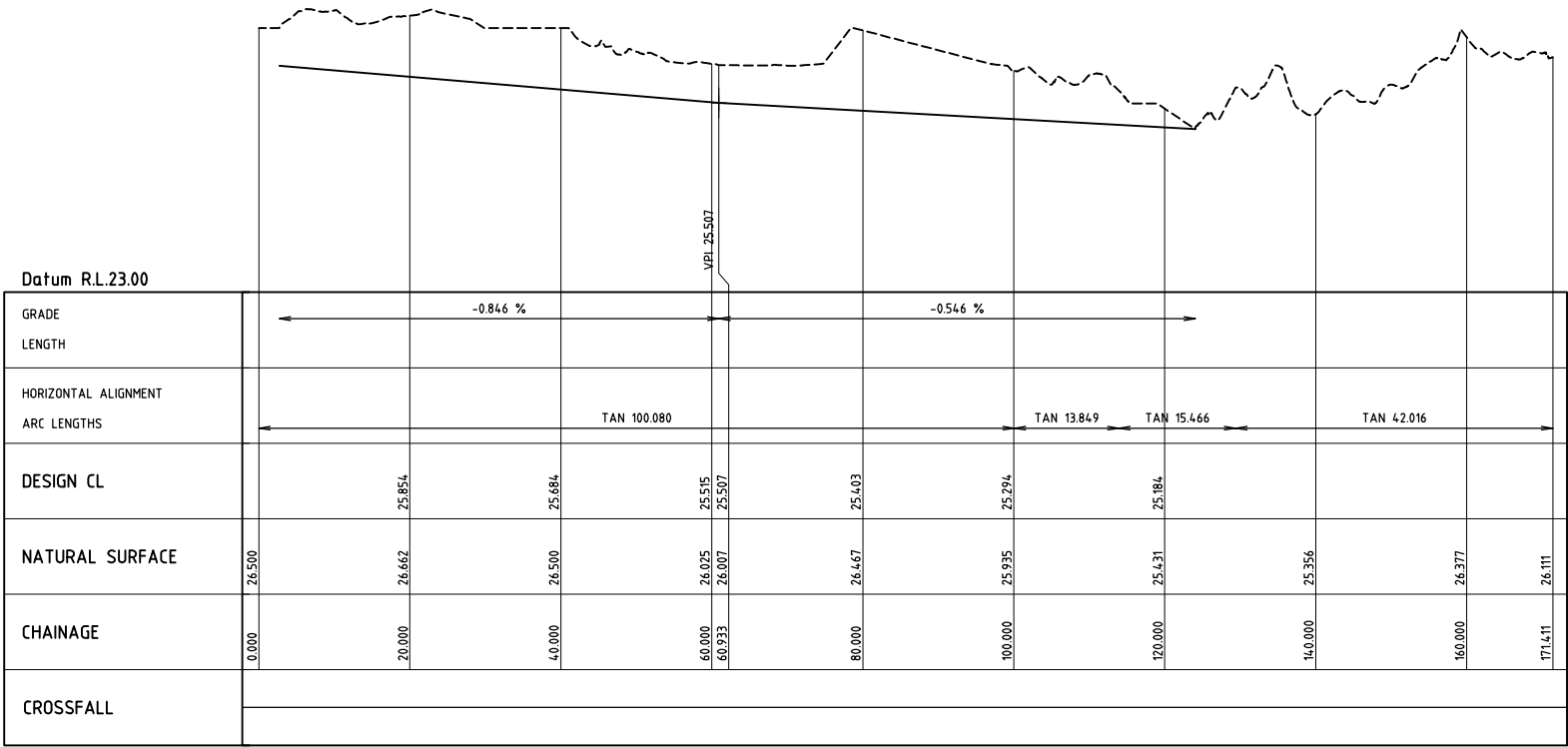
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN I2 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0277 |
| | | REV. A |

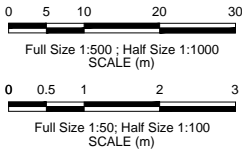
16026-0278



DRAIN PROFILE I3
SCALE 1:500



DRAIN PROFILE I3
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



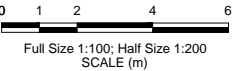
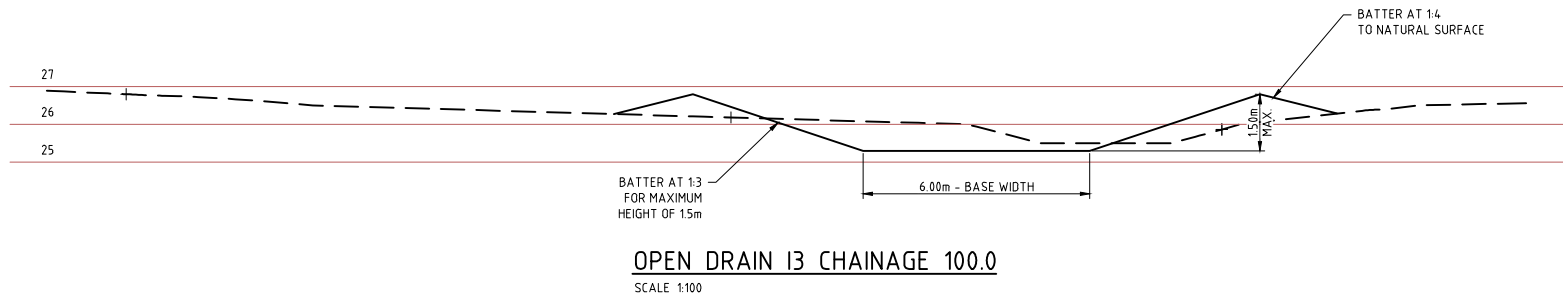
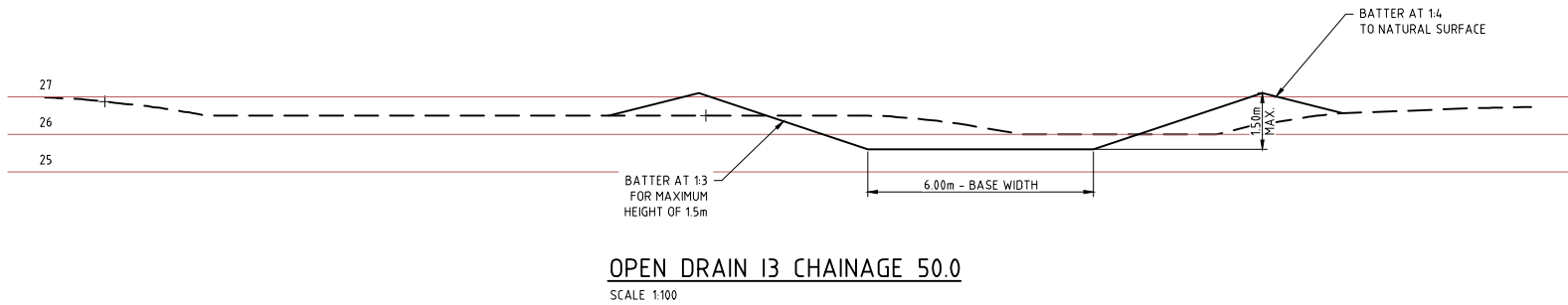
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| CLIENT | CITY OF KARRATHA | | |
| PROJECT | DAMPIER DRAINAGE | | |
| | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN I3 PLAN AND PROFILE | | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
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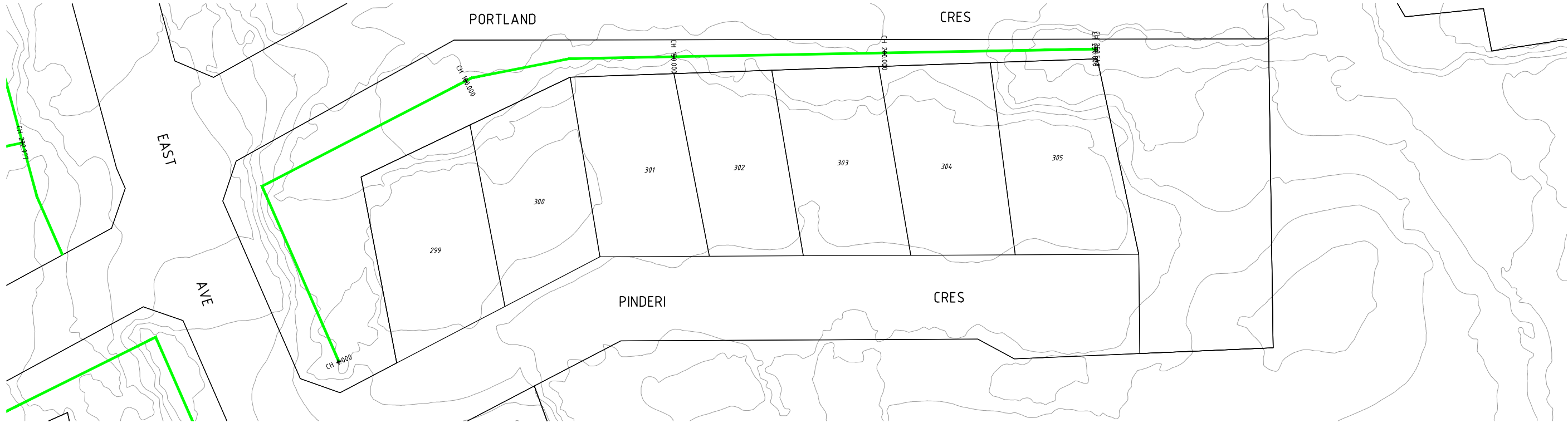


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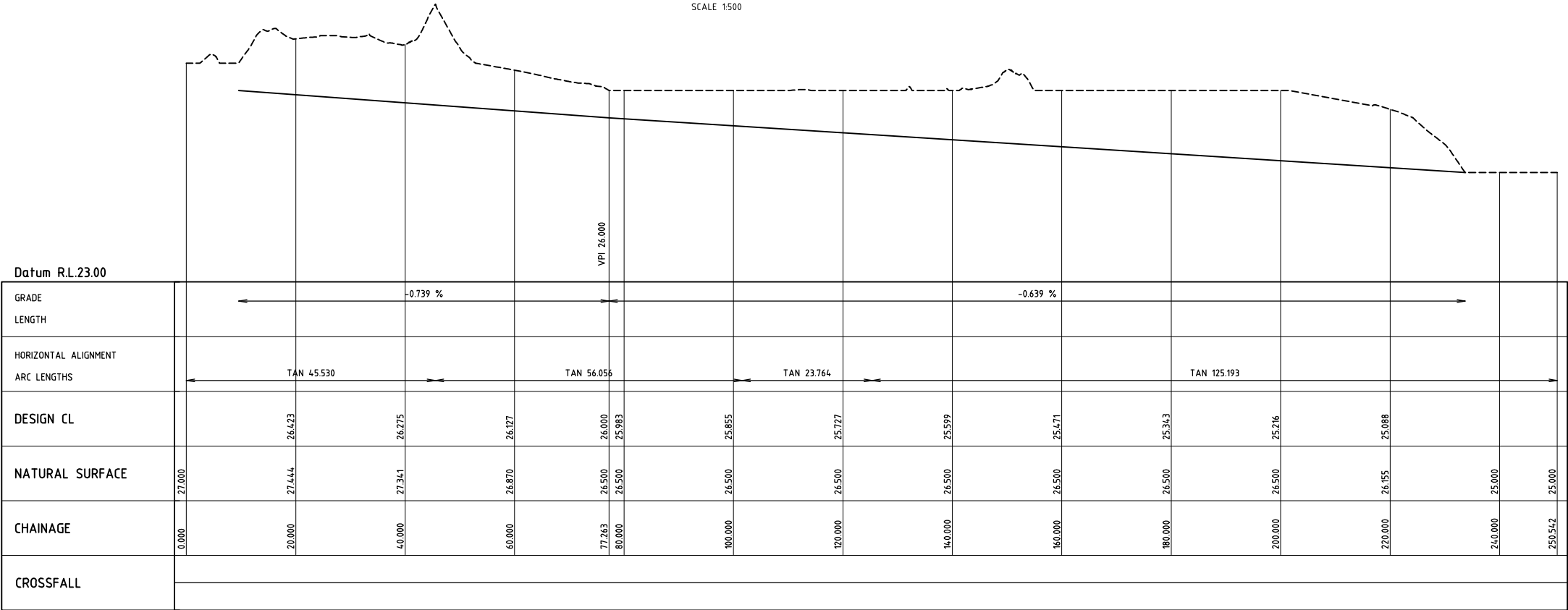
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| CLIENT | | | CITY OF KARRATHA | | |
| PROJECT | | | DAMPIER DRAINAGE | | |
| | | | PROPOSED STORMWATER UPGRADE | | |
| | | | OPEN DRAINAGE REMEDIATION | | |
| | | | OPEN DRAIN I3 - CROSS SECTIONS | | |
| SIZE | SCALE | DRAWING NUMBER | REV. | | |
| A1 | AS SHOWN | 16026-0279 | A | | |

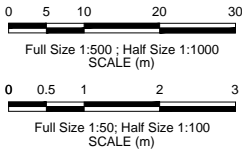
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DRAIN PROFILE J1
SCALE 1:500



DRAIN PROFILE J1
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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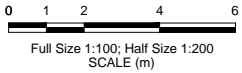
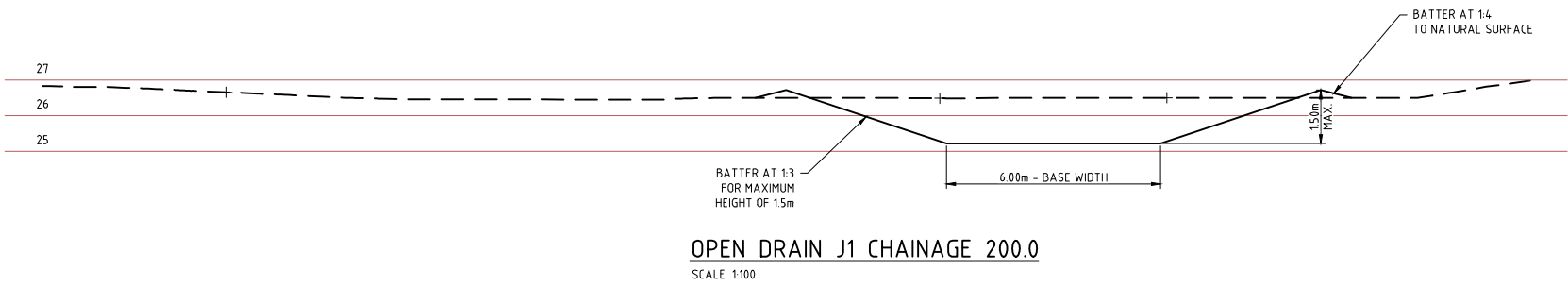
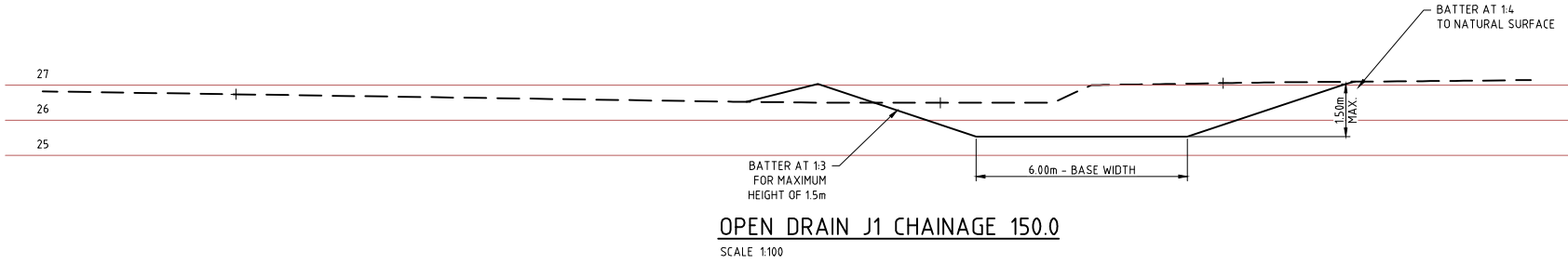
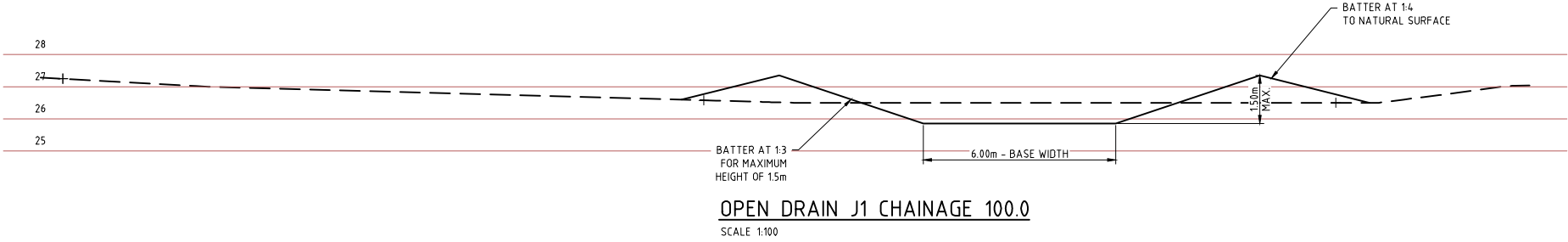
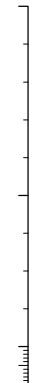
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN J1 PLAN AND PROFILE | | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0280 | REV. A |

16026-0281

100mm AT FULL SIZE AT A1 SHEET SIZE



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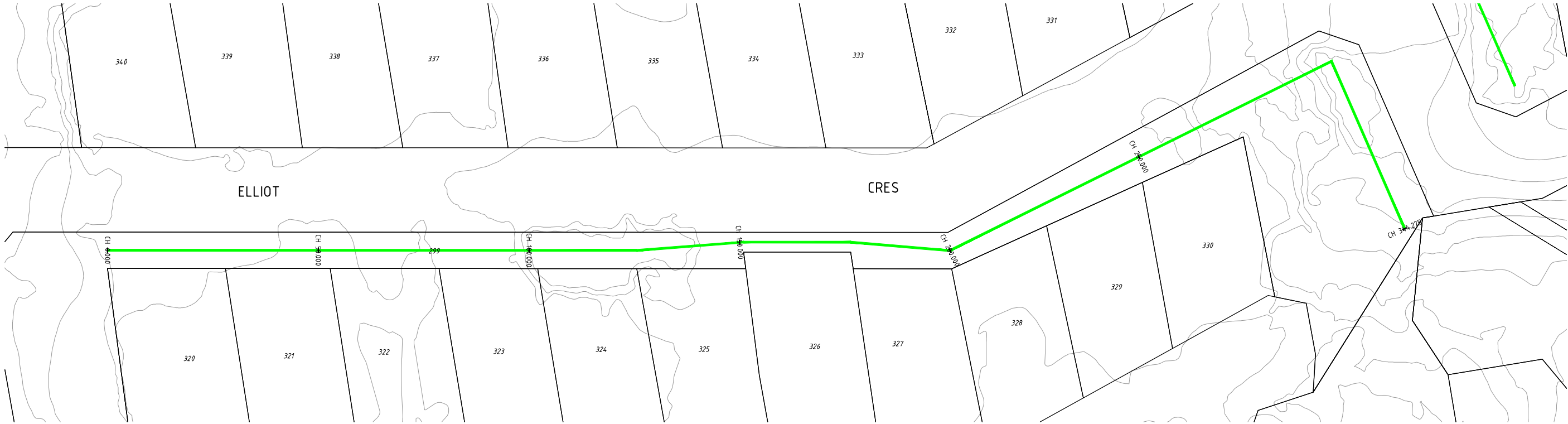
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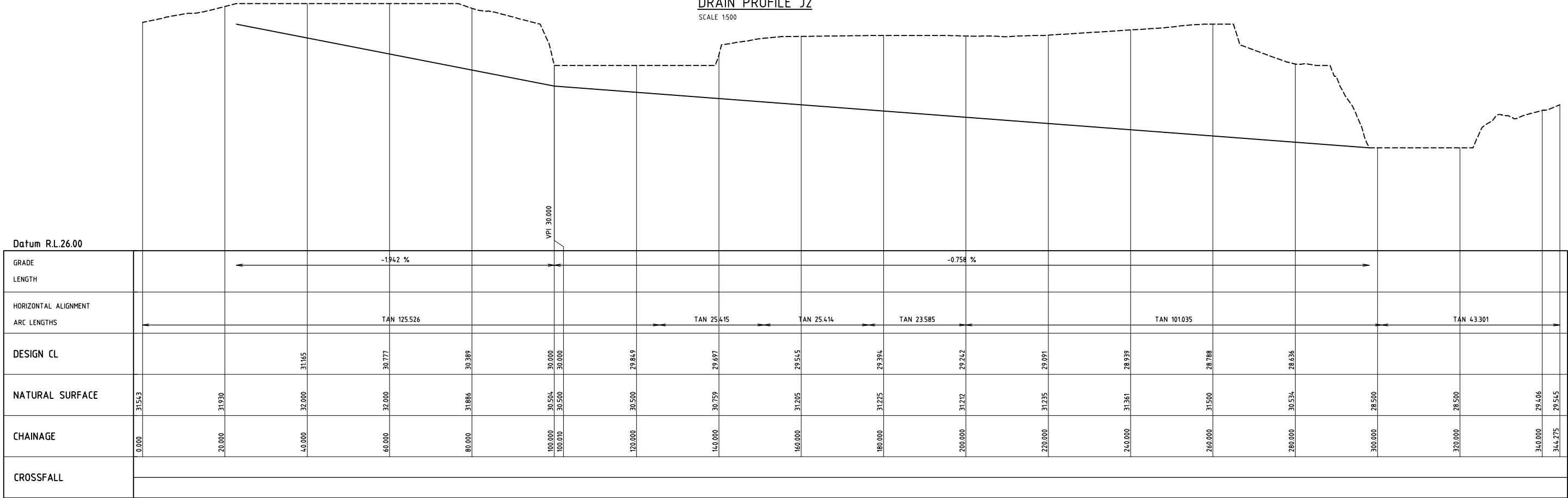
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| CLIENT CITY OF KARRATHA | | | |
| PROJECT DAMPIER DRAINAGE | | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN J1 - CROSS SECTIONS | | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0281 | REV. A |

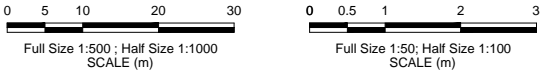
16026-0282



DRAIN PROFILE J2
SCALE 1:500



DRAIN PROFILE J2
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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| A | 08/06/16 | ISSUED FOR INFORMATION | CB | | |
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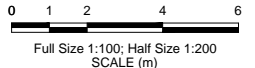
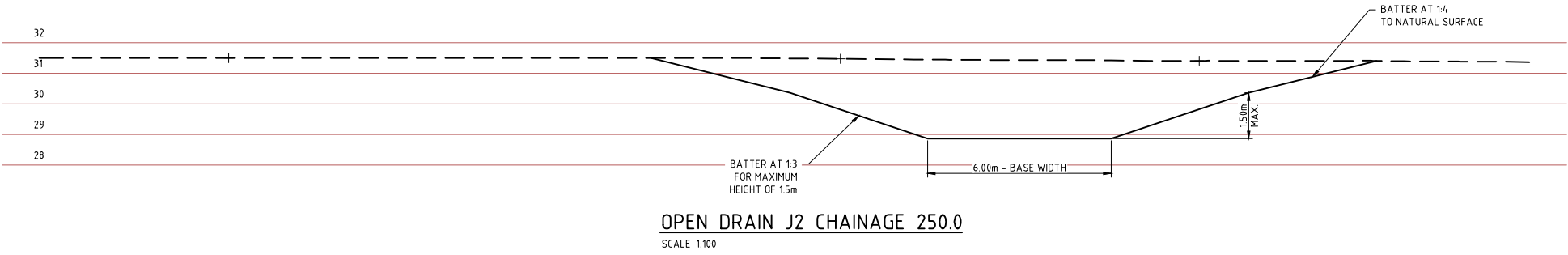
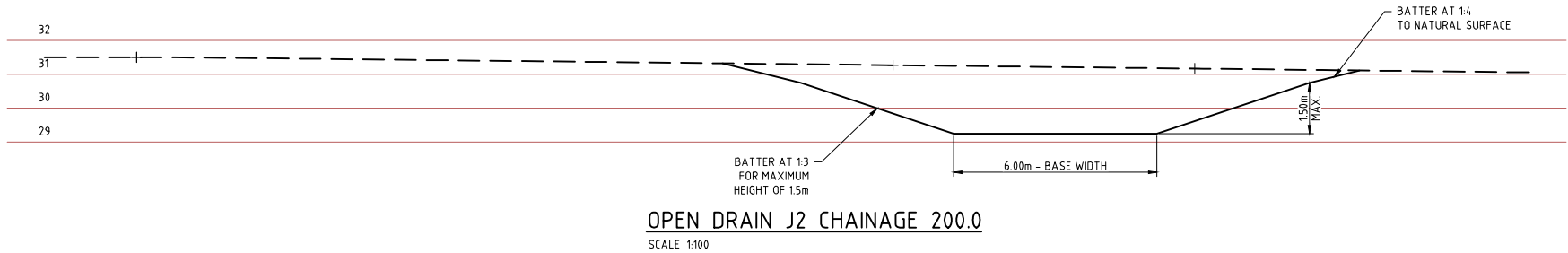
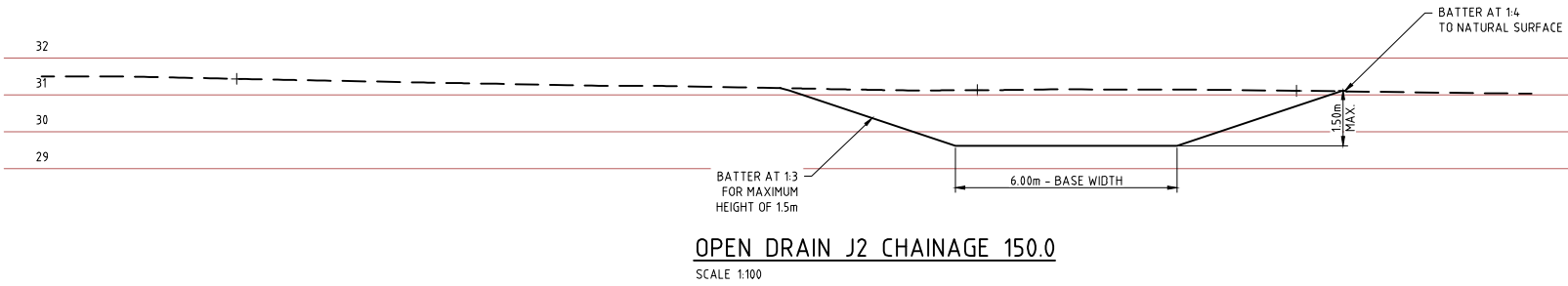
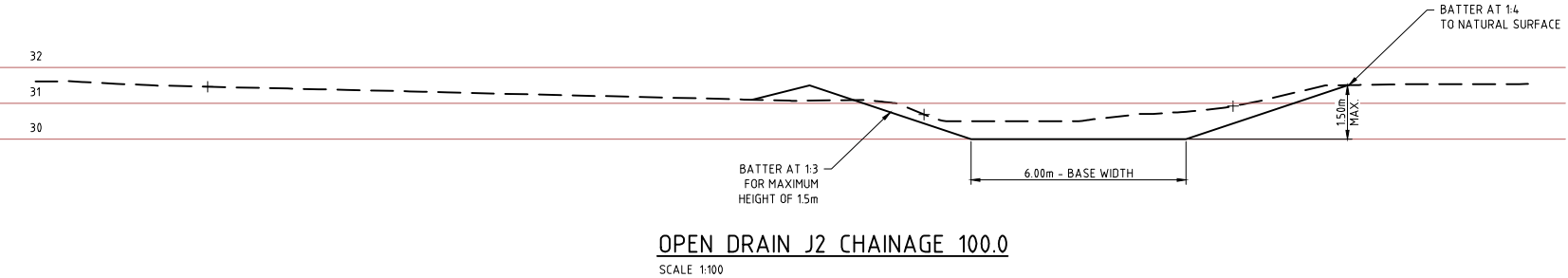
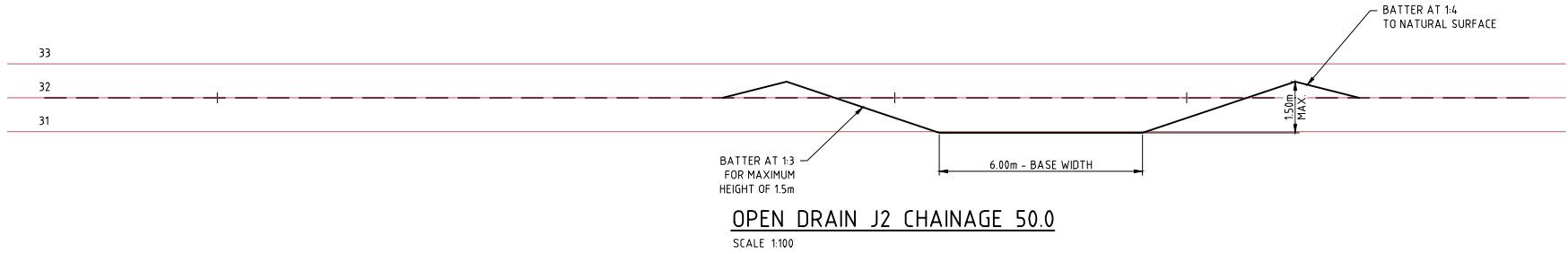
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN J2 PLAN AND PROFILE | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0282 | REV. A |

16026-0283



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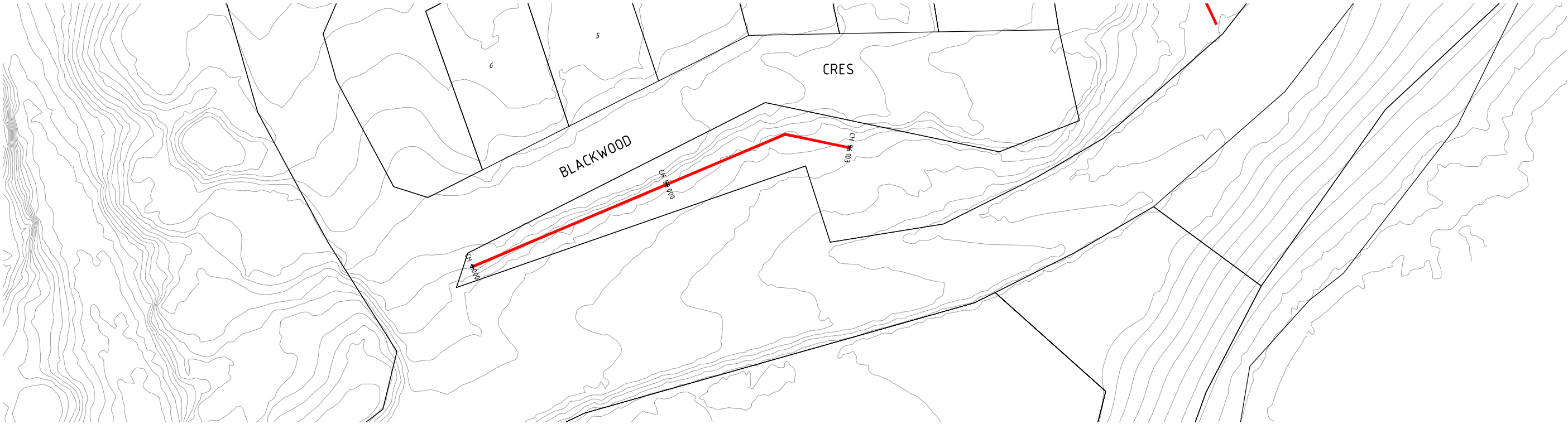
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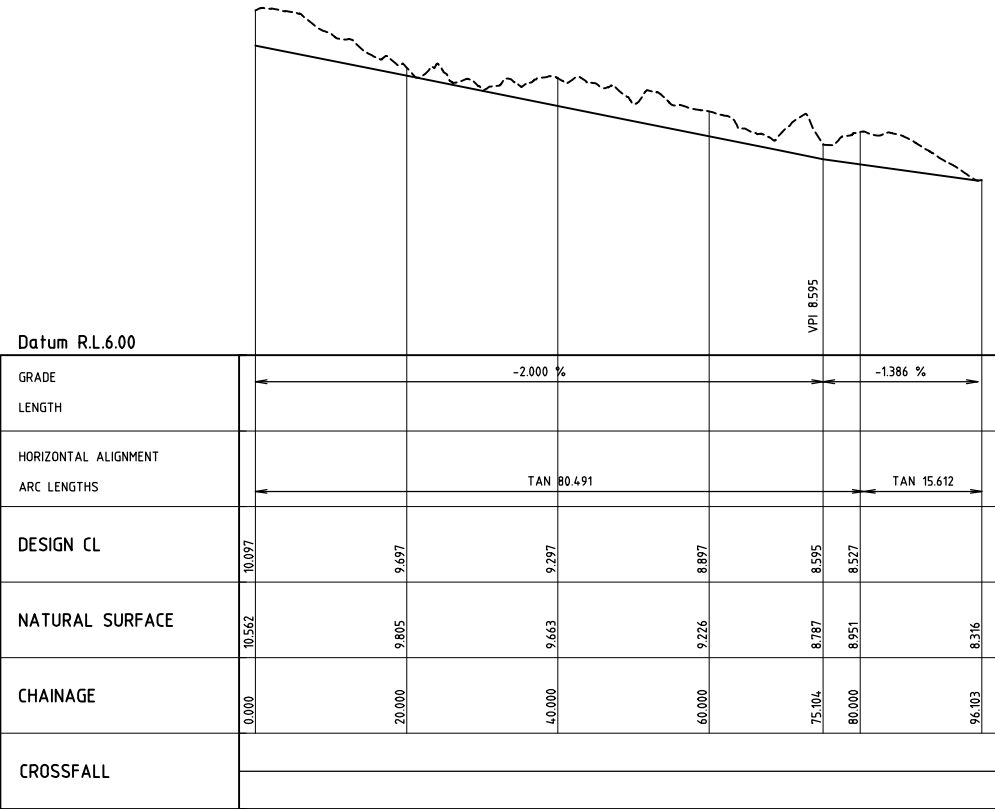
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| CLIENT | CITY OF KARRATHA | | |
| PROJECT | DAMPIER DRAINAGE | | |
| | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN J2 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0283 | REV. A |

16026-0284



DRAIN PROFILE K1
SCALE 1:500



DRAIN PROFILE K1
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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| A | 08/06/16 | ISSUED FOR INFORMATION | CB | | |
| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |

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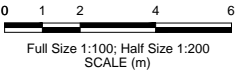
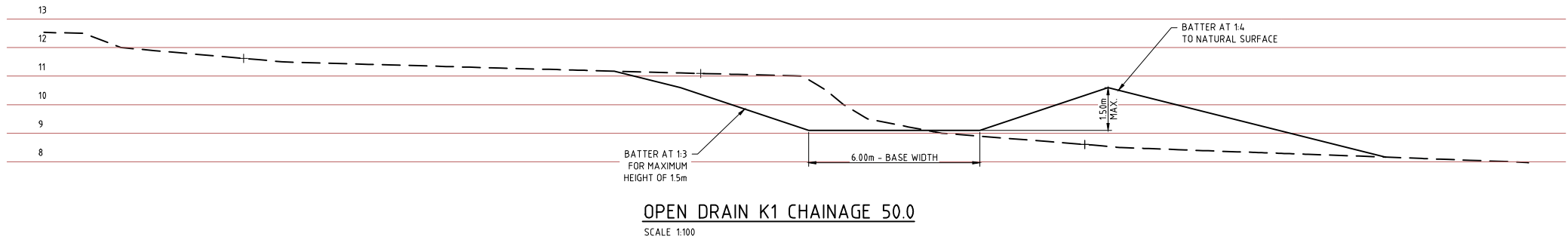


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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STORMWATER UPGRADE | |
| | | OPEN DRAINAGE REMEDIATION | |
| | | OPEN DRAIN K1 PLAN AND PROFILE | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0284 | A |



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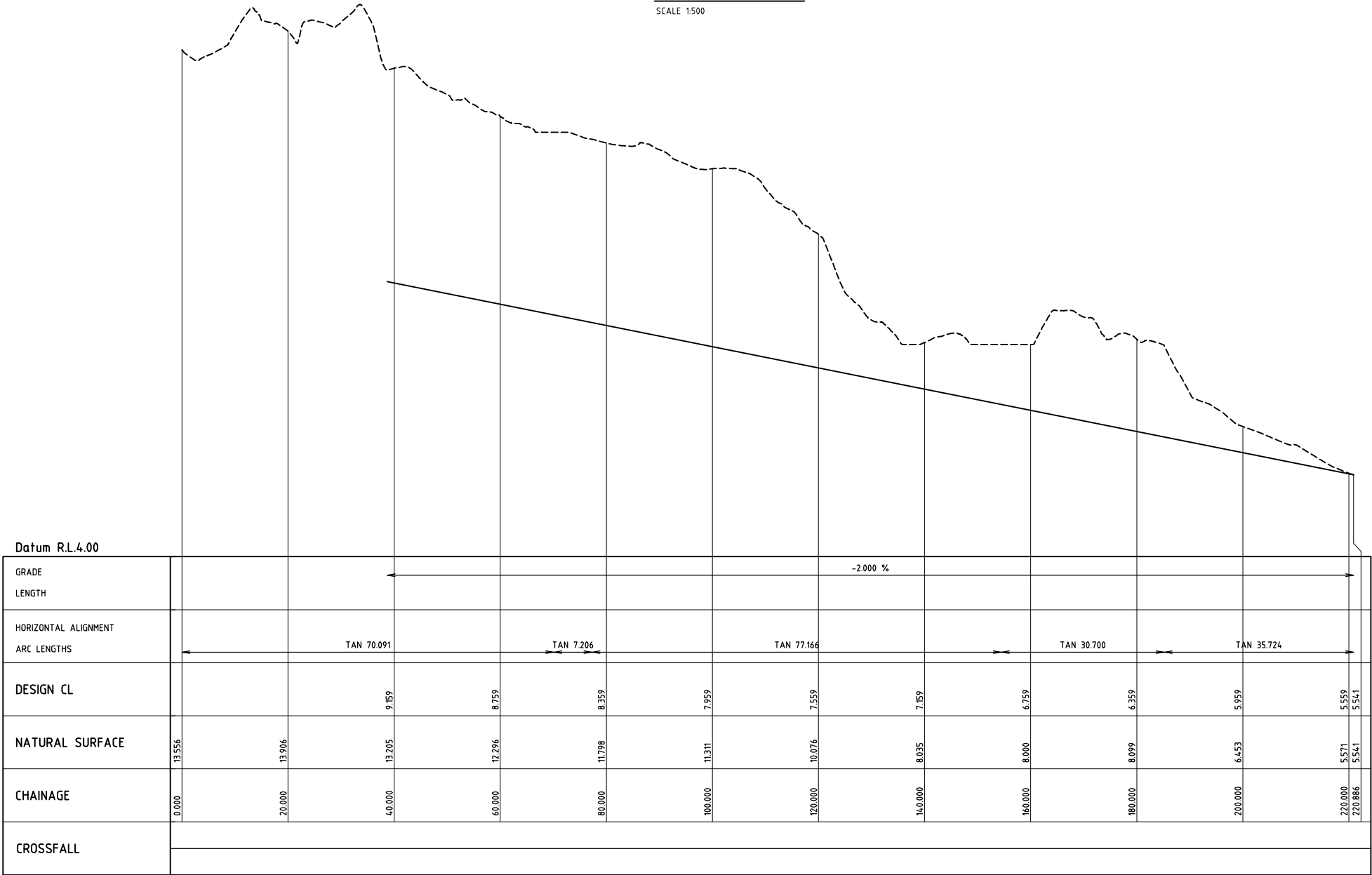
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STROMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN K1 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0285 |
| | | REV. A |

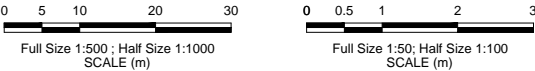
16026-0286



DRAIN PROFILE K2
SCALE 1:500



DRAIN PROFILE K2
SCALE 1500 HORIZONTAL
SCALE 150 VERTICAL



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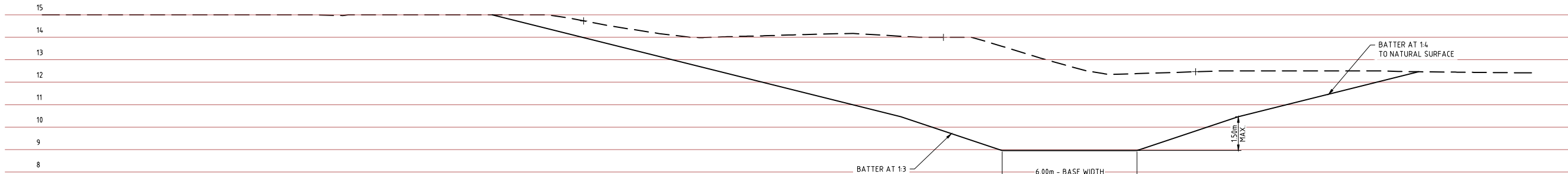
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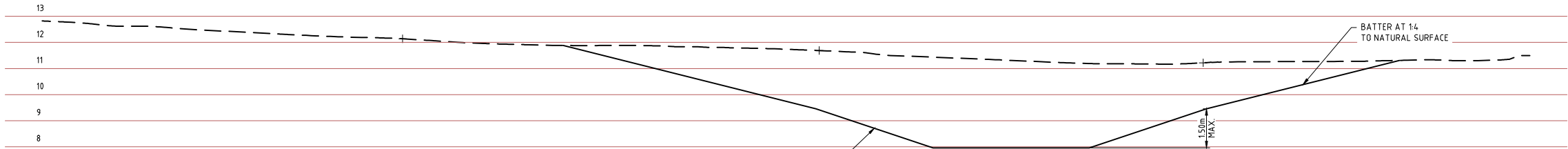
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN K2 PLAN AND PROFILE | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0286 | REV. A |

16026-0287

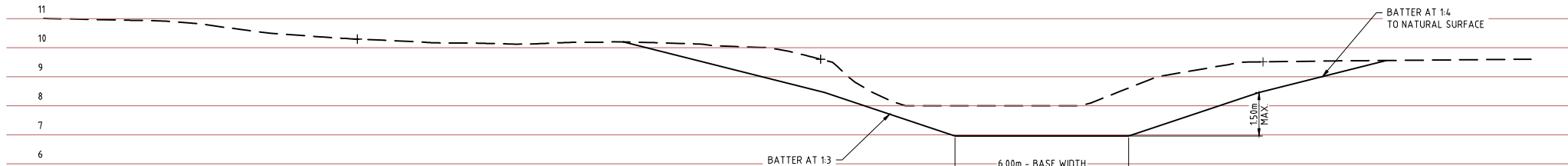
100mm AT FULL SIZE AT A1 SHEET SIZE



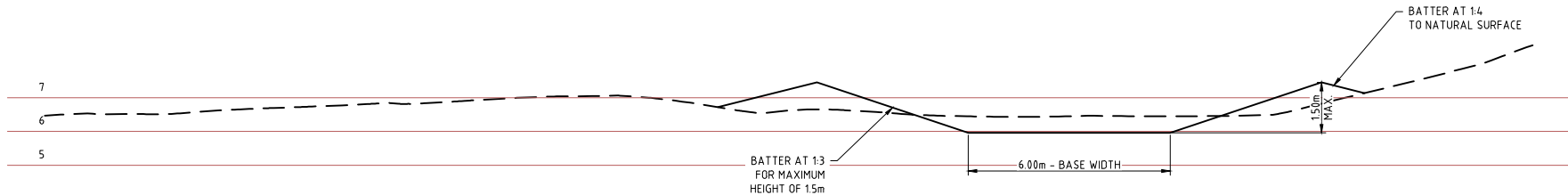
OPEN DRAIN K2 CHAINAGE 50.0
SCALE 1:100



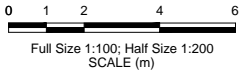
OPEN DRAIN K2 CHAINAGE 100.0
SCALE 1:100



OPEN DRAIN K2 CHAINAGE 150.0
SCALE 1:100



OPEN DRAIN K2 CHAINAGE 200.0
SCALE 1:100



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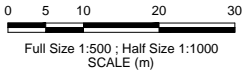
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN K2 - CROSS SECTIONS | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0287 | REV. A |

16026-0288



DRAIN PROFILE L1
SCALE 1:500



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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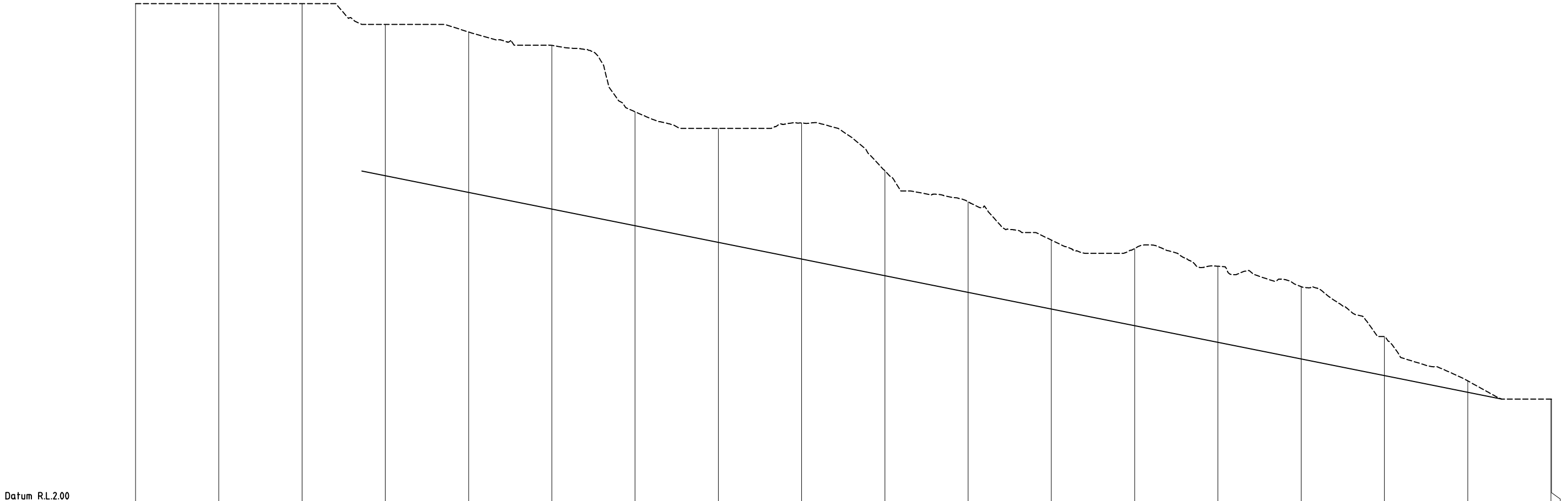
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN L1 PLAN | | | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0288 | A |

16026-0289

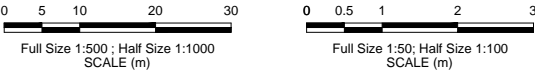
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Datum R.L.2.00

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| GRADE LENGTH | <div>← -2.000 % →</div> | | | | | | | | | | | | | | | | | |
| HORIZONTAL ALIGNMENT | | | | | | | | | | | | | | | | | | |
| ARC LENGTHS | <div>← TAN 39.009 → TAN 42.033 → TAN 18.382 → TAN 39.220 → TAN 32.929 → TAN 30.761 → TAN 37.792 →</div> | | | | | | | | | | | | | | | | | |
| DESIGN CL | | | | 9.863 | 9.463 | 9.063 | 8.663 | 8.263 | 7.863 | 7.463 | 7.063 | 6.663 | 6.263 | 5.863 | 5.463 | 5.063 | 4.663 | |
| NATURAL SURFACE | 14.000 | | 14.000 | | 14.000 | 13.500 | | 13.318 | | 12.995 | | 11.401 | | 11.000 | 8.263 | 7.863 | | 7.463 |
| CHAINAGE | 0.000 | | 20.000 | | 40.000 | 60.000 | | 80.000 | | 100.000 | | 120.000 | | 140.000 | 11.000 | 160.000 | | 180.000 |
| CROSSFALL | | | | | | | | | | | | | | | | | | |
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DRAIN PROFILE L1
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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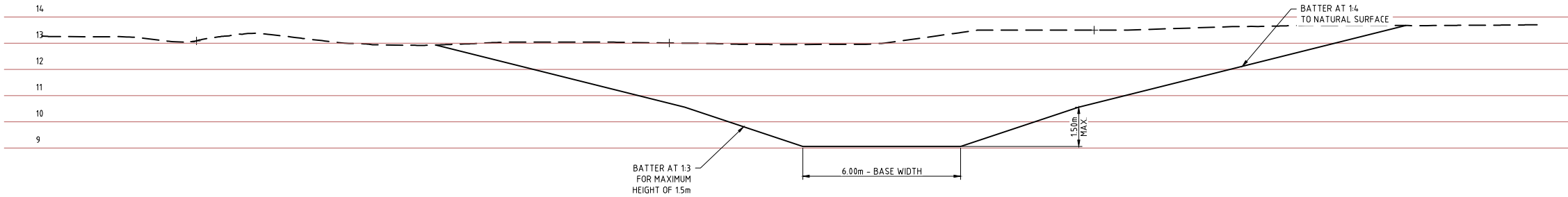


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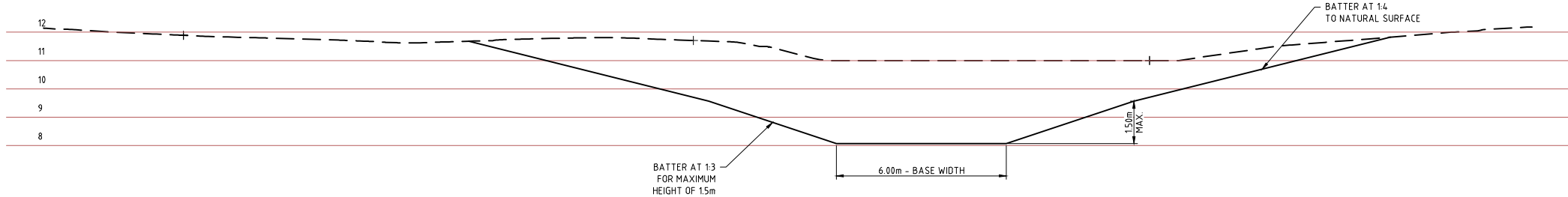
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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN L1 PLAN AND PROFILE | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0289 |
| | | REV. A |

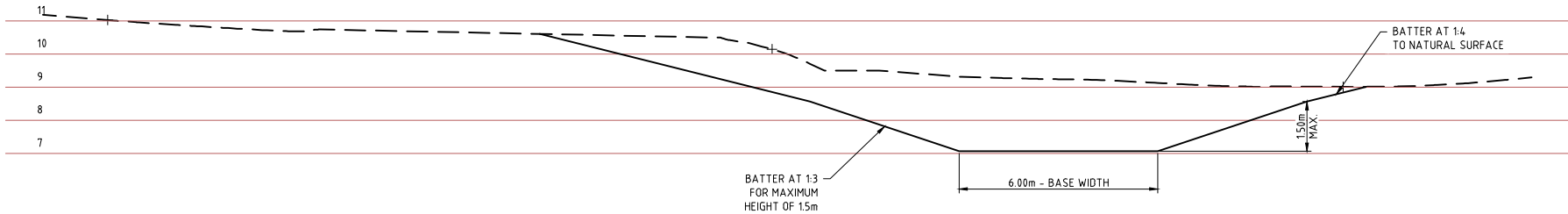
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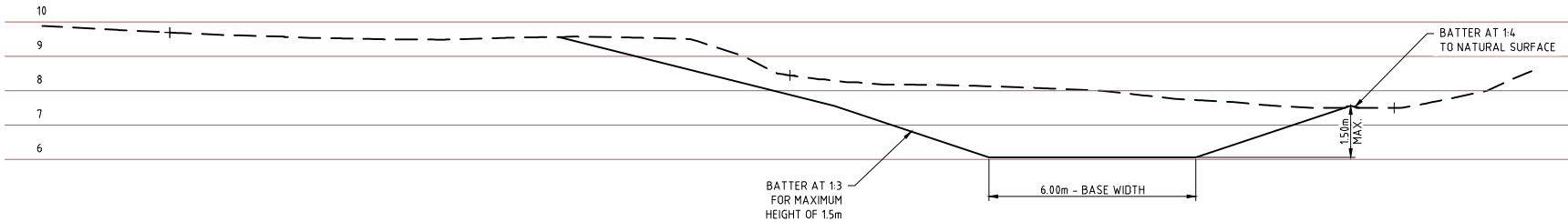
OPEN DRAIN L1 CHAINAGE 100.0
SCALE 1:100



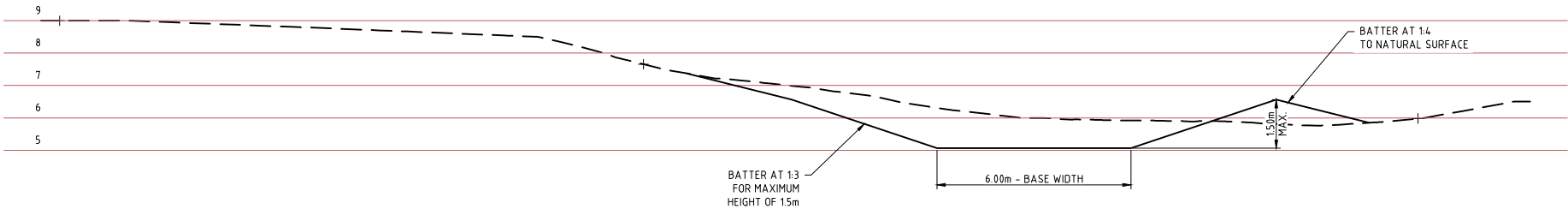
OPEN DRAIN L1 CHAINAGE 150.0
SCALE 1:100



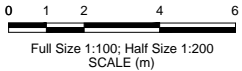
OPEN DRAIN L1 CHAINAGE 200.0
SCALE 1:100



OPEN DRAIN L1 CHAINAGE 250.0
SCALE 1:100



OPEN DRAIN L1 CHAINAGE 300.0
SCALE 1:100



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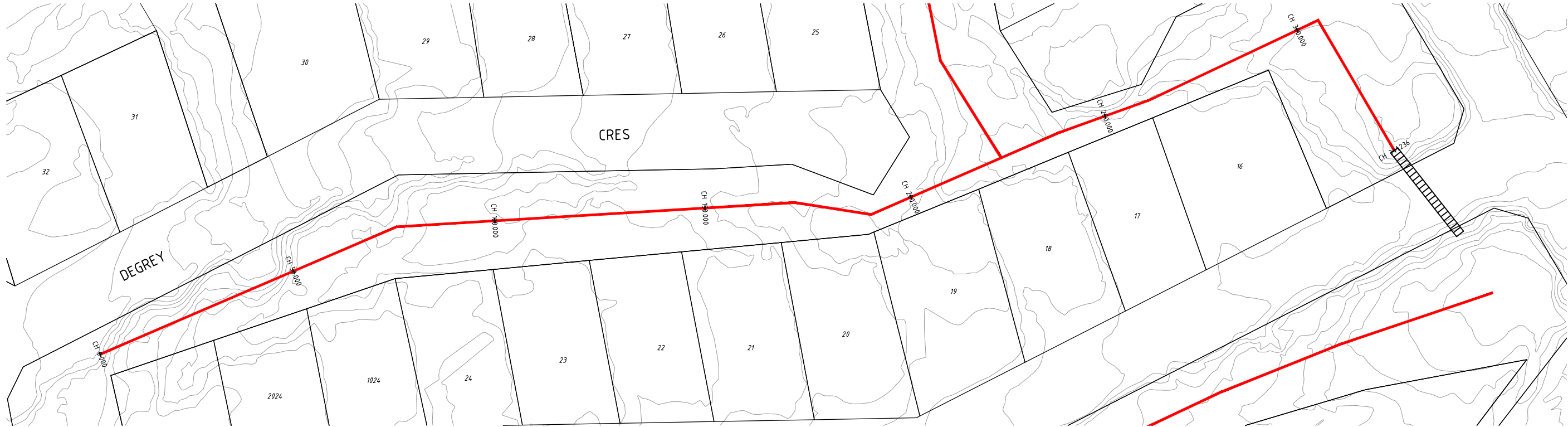
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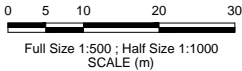
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| CLIENT | CITY OF KARRATHA | | |
| PROJECT | DAMPIER DRAINAGE | | |
| | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN L1 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0290 | REV. A |

16026-0291



DRAIN PROFILE L2
SCALE 1:500



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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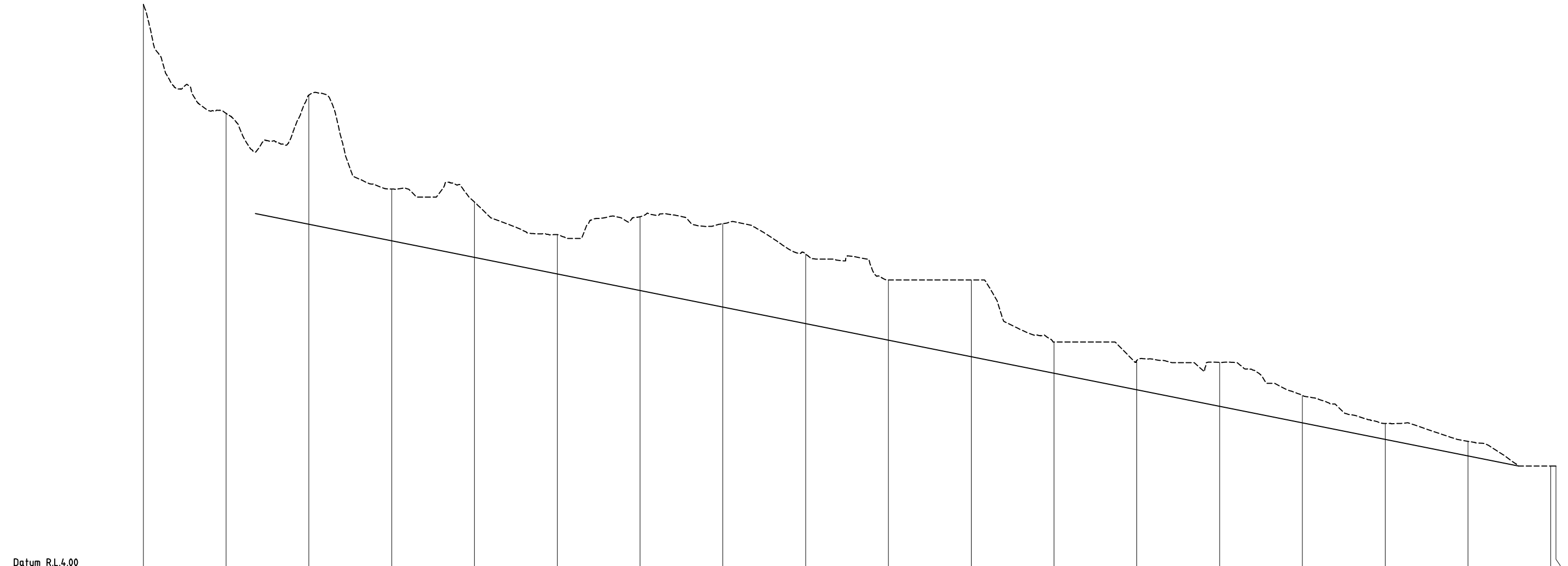
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN L2 PLAN | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0291 | REV. A |

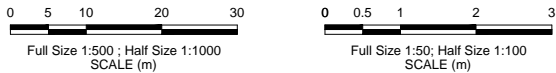
16026-0292

100mm AT FULL SIZE AT A1 SHEET SIZE



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| Datum R.L.4.00 | |
| GRADE | |
| LENGTH | |
| HORIZONTAL ALIGNMENT | |
| ARC LENGTHS | |
| DESIGN CL | |
| NATURAL SURFACE | |
| CHAINAGE | |
| CROSSFALL | |

DRAIN PROFILE L2
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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| A | 08/06/16 | ISSUED FOR INFORMATION | CB | | |
| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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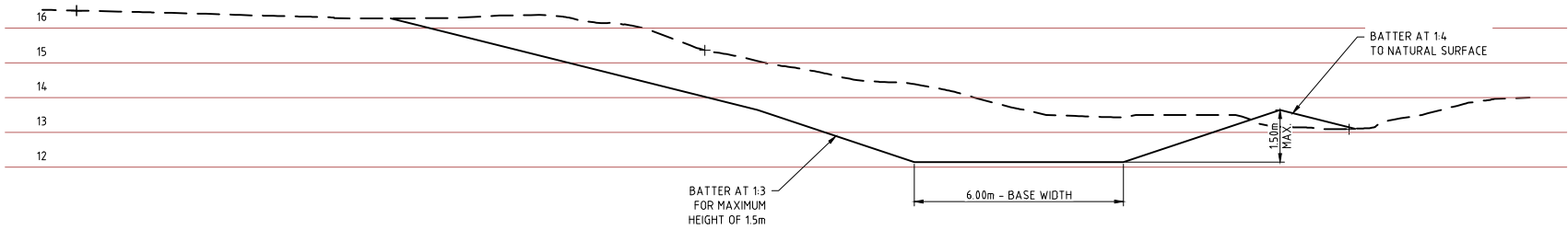
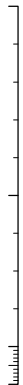
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| C.BENFIELD | D.LUONG | |
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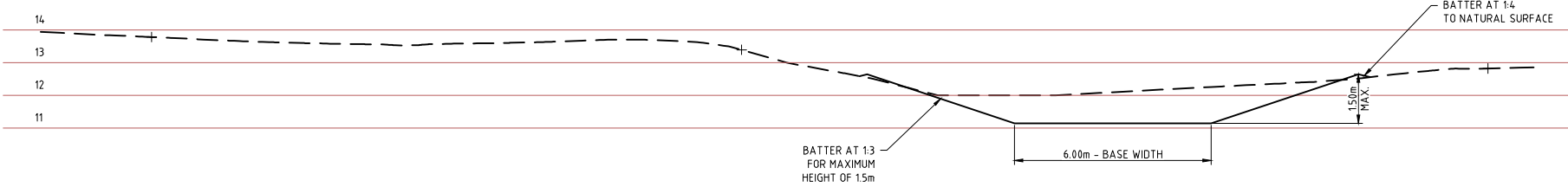
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|---------|----------|----------------|-----------------------------|--|
| CLIENT | | | CITY OF KARRATHA | |
| PROJECT | | | DAMPIER DRAINAGE | |
| | | | PROPOSED STORMWATER UPGRADE | |
| | | | OPEN DRAINAGE REMEDIATION | |
| | | | OPEN DRAIN L2 PROFILE | |
| SIZE | SCALE | DRAWING NUMBER | | |
| A1 | AS SHOWN | 16026-0292 | REV. A | |

16026-0293

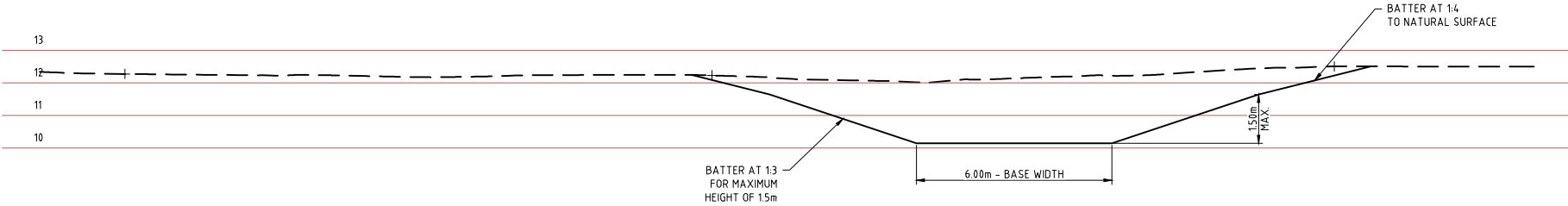
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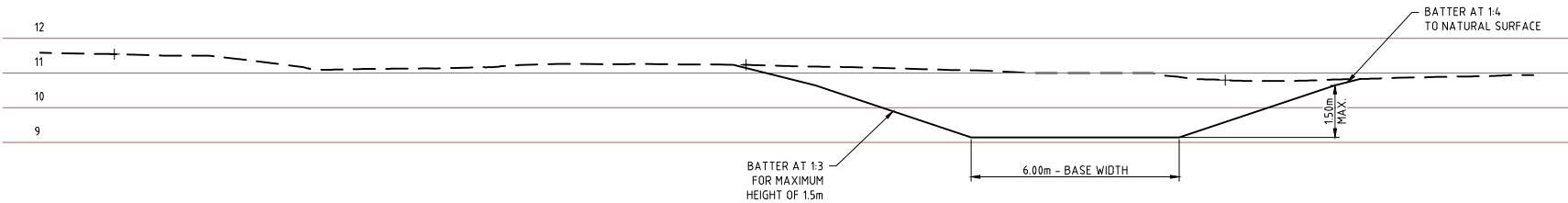
OPEN DRAIN L2 CHAINAGE 50.0
SCALE 1:100



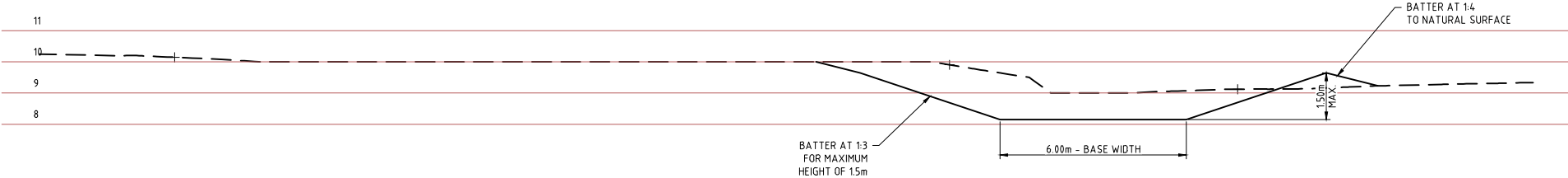
OPEN DRAIN L2 CHAINAGE 100.0
SCALE 1:100



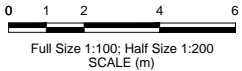
OPEN DRAIN L2 CHAINAGE 150.0
SCALE 1:100



OPEN DRAIN L2 CHAINAGE 200.0
SCALE 1:100



OPEN DRAIN L2 CHAINAGE 250.0
SCALE 1:100



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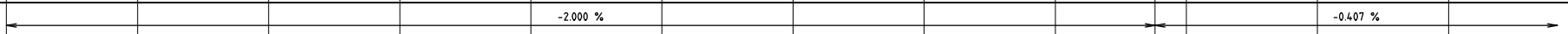
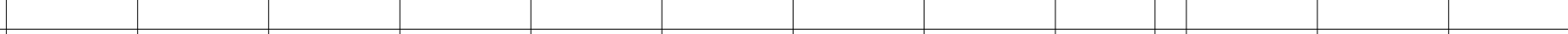
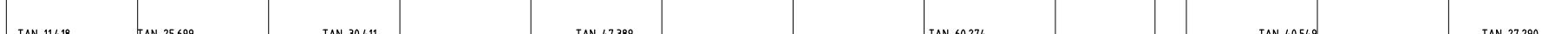
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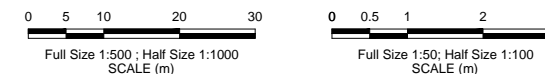
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|--|-------------------|
| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN L2 - CROSS SECTIONS | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0293 | REV. A |



Datum R.L.7.00

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| SECTION 12.17.00 | | | | | | | | | | | | | | |
| GRADE LENGTH |  | | | | | | | | | | | | | |
| HORIZONTAL ALIGNMENT |  | | | | | | | | | | | | | |
| ARC LENGTHS |  | | | | | | | | | | | | | |
| DESIGN CL | 13.254 | 12.854 | 12.454 | 12.054 | 11.654 | 11.254 | 10.854 | 10.454 | 10.054 | 9.750 | 9.731 | 9.649 | 9.568 | |
| NATURAL SURFACE | 16.346 | 15.702 | 15.403 | 14.779 | 13.352 | 12.318 | 11.889 | 11.636 | 11.000 | 10.000 | 10.386 | 10.704 | 10.000 | 9.500 |
| CHAINAGE | 0.000 | 20.000 | 40.000 | 60.000 | 80.000 | 100.000 | 120.000 | 140.000 | 160.000 | 175.224 | 180.000 | 200.000 | 220.000 | 240.000 |
| CROSSFALL | | | | | | | | | | | | | | |

SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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| REV | DATE | DESCRIPTION | | DRAWN | CHECKED |
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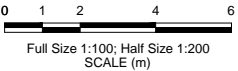
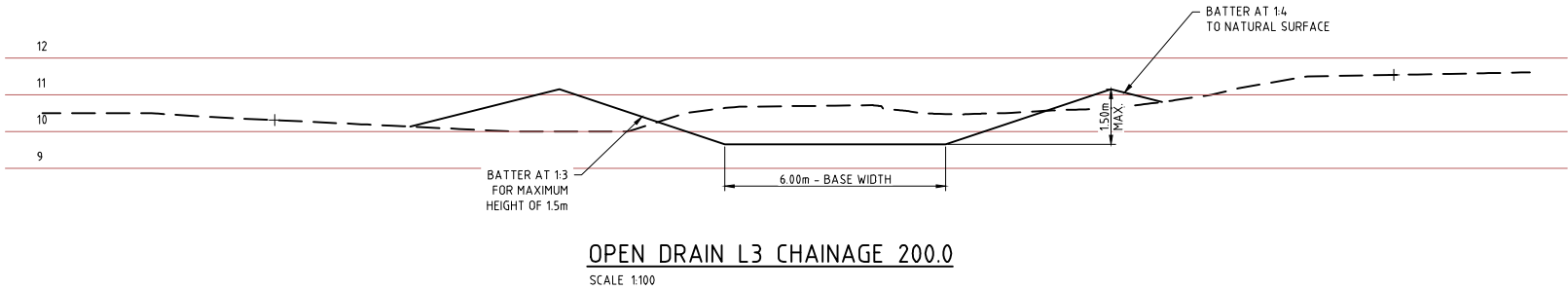
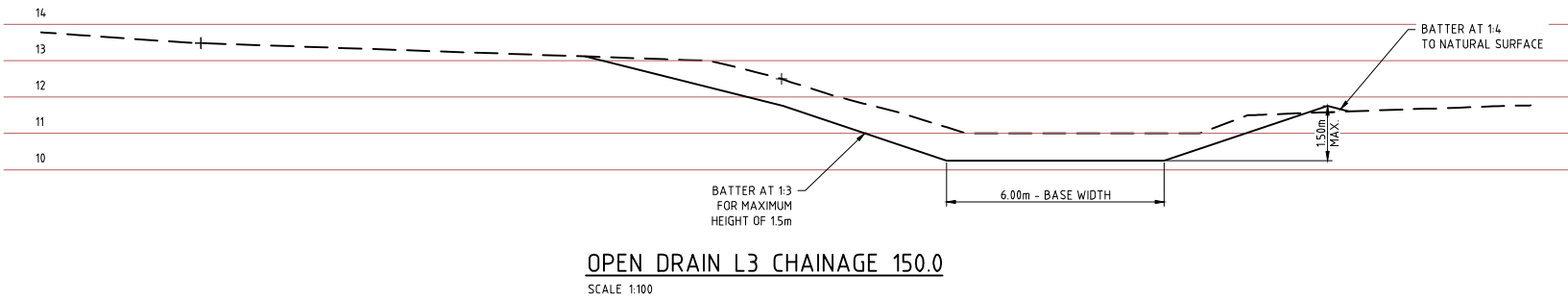
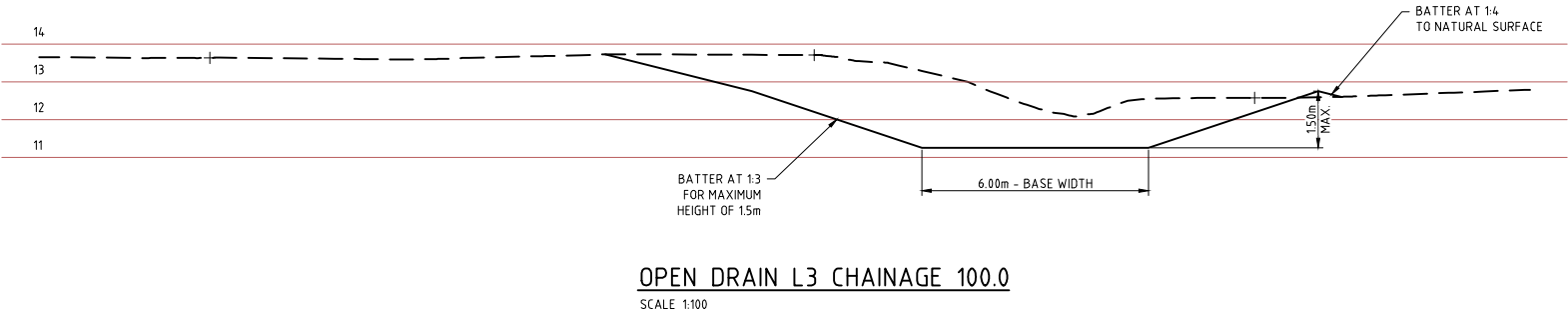
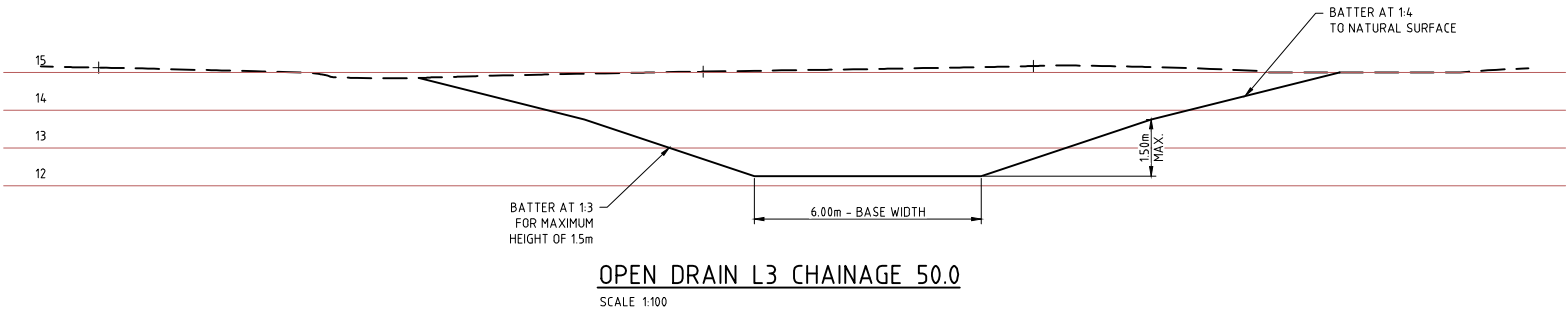


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| C.BENFIELD | D.LUONG | |
| DRAW. CHECK | DES. CHECK | _____ |
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STORMWATER UPGRADE | |
| | | OPEN DRAINAGE REMEDIATION | |
| | | OPEN DRAIN L3 PLAN AND PROFILE | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0294 | A |



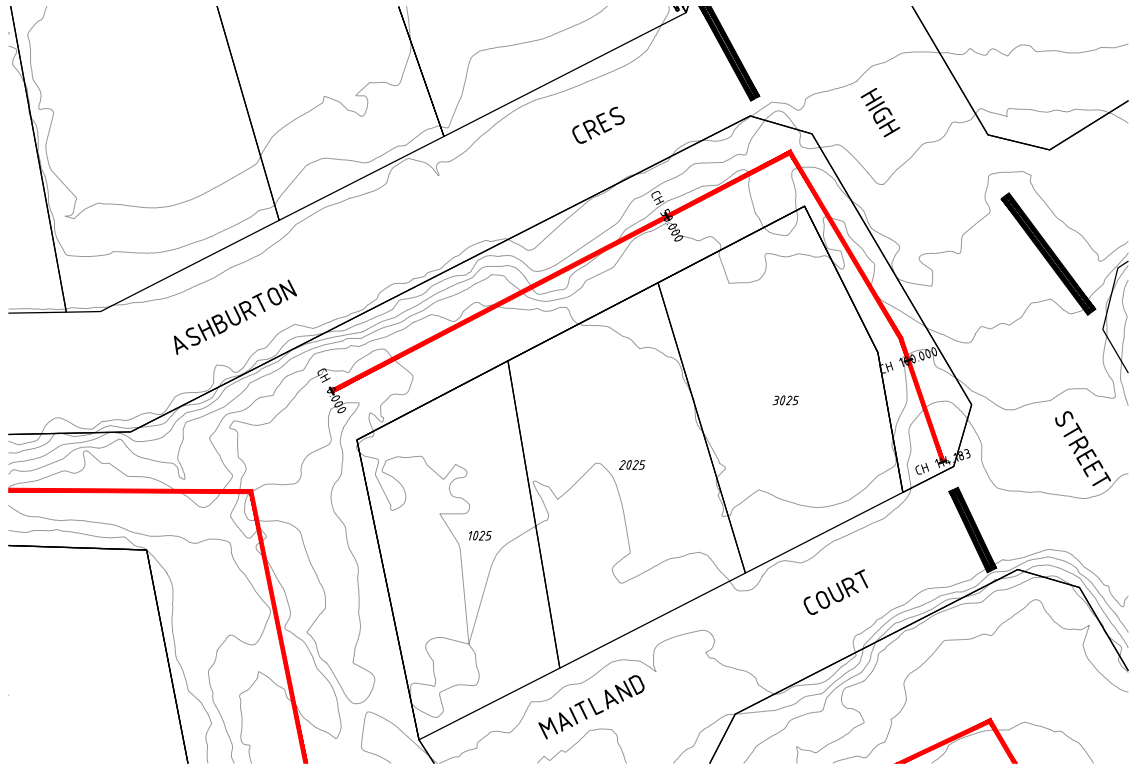
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| REV | DATE | DESCRIPTION | | DRAWN | CHECKED |
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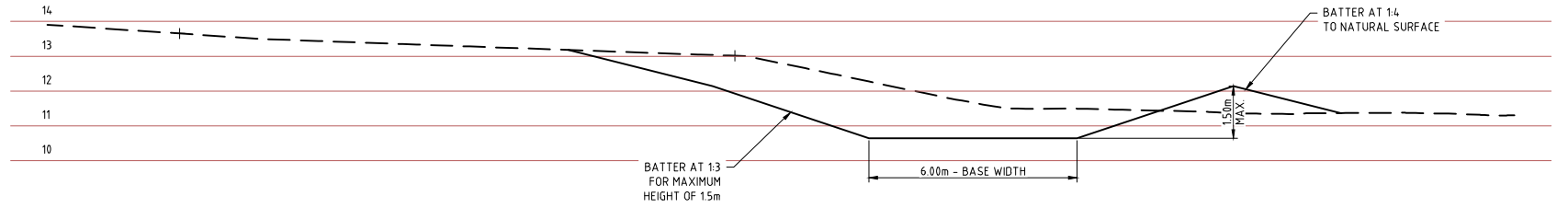
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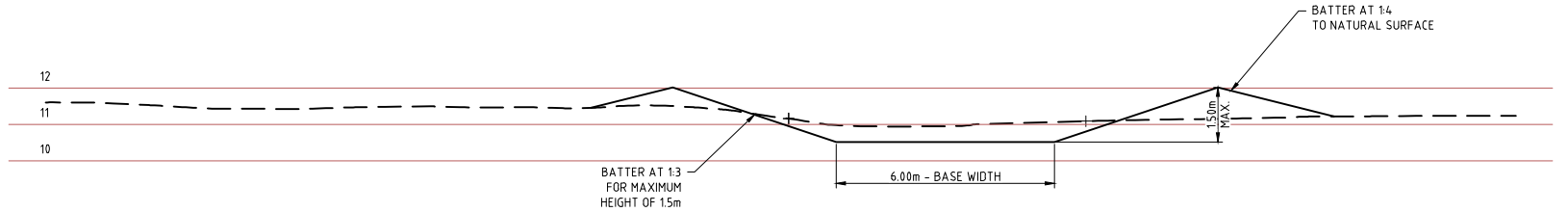
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN L3 - CROSS SECTIONS | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0295 | REV. A |



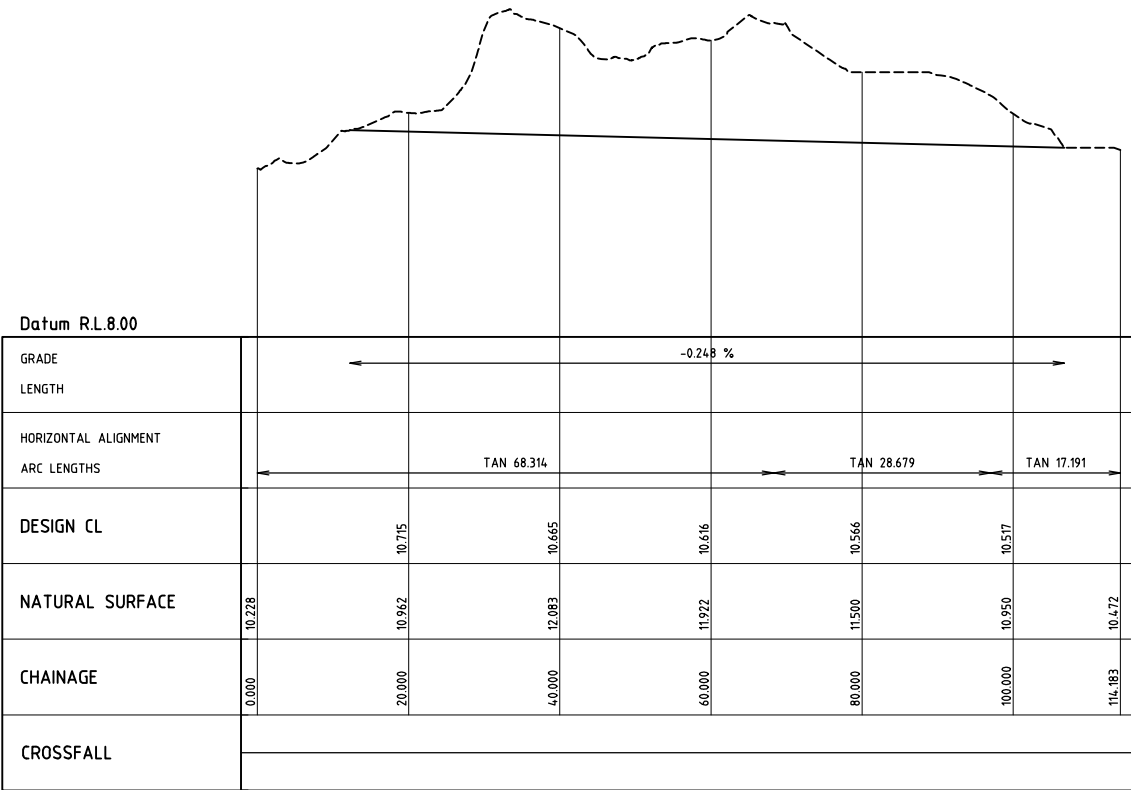
DRAIN PROFILE L4
SCALE 1:500



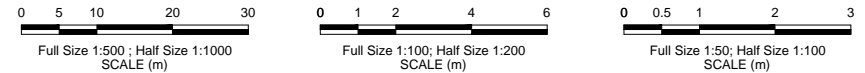
OPEN DRAIN L4 CHAINAGE 50.0
SCALE 1:100



OPEN DRAIN L4 CHAINAGE 100.0
SCALE 1:100



DRAIN PROFILE L4
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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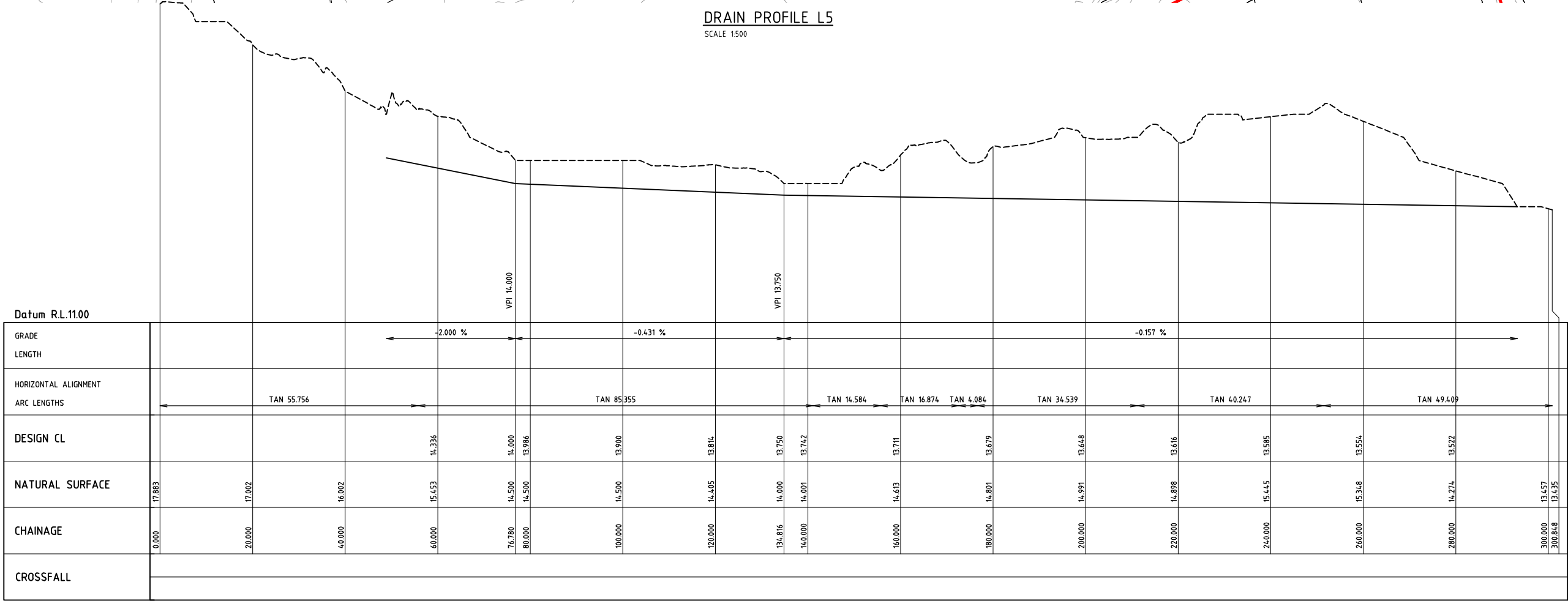
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| CLIENT CITY OF KARRATHA | |
| PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN L4 PLAN, PROFILE AND CROSS SECTIONS | |
| SIZE A1 | SCALE AS SHOWN |
| DRAWING NUMBER 16026-0296 | REV. A |

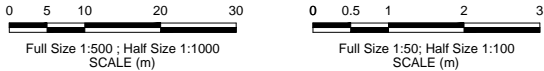
16026-0297



DRAIN PROFILE L5
SCALE 1:500



DRAIN PROFILE L5
SCALE 1:500 HORIZONTAL
SCALE 1:50 VERTICAL



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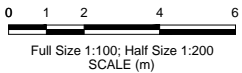
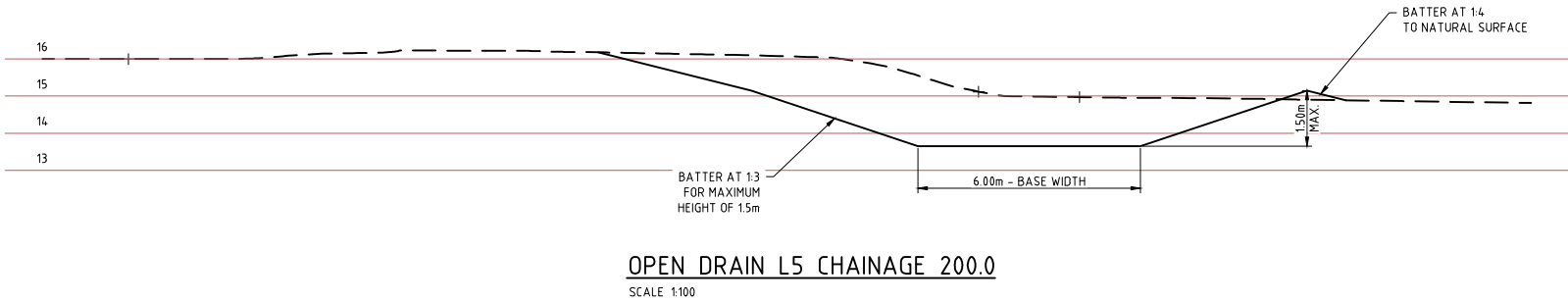
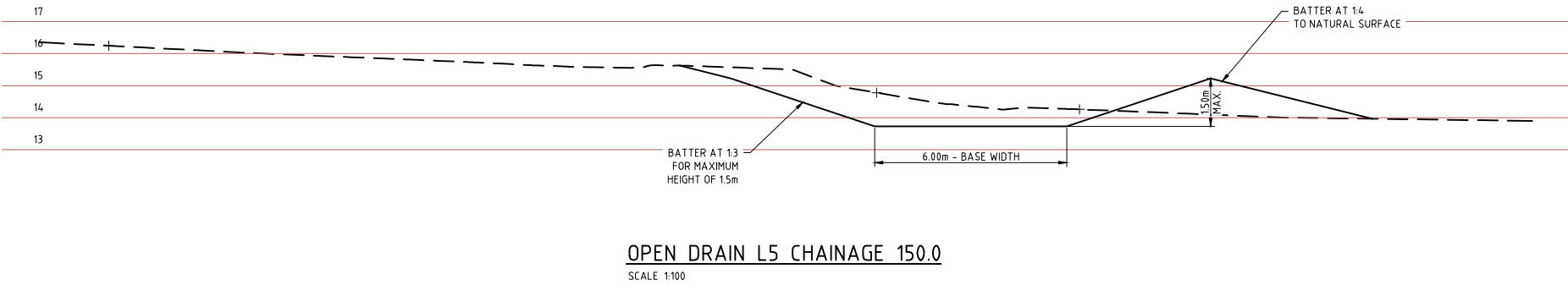
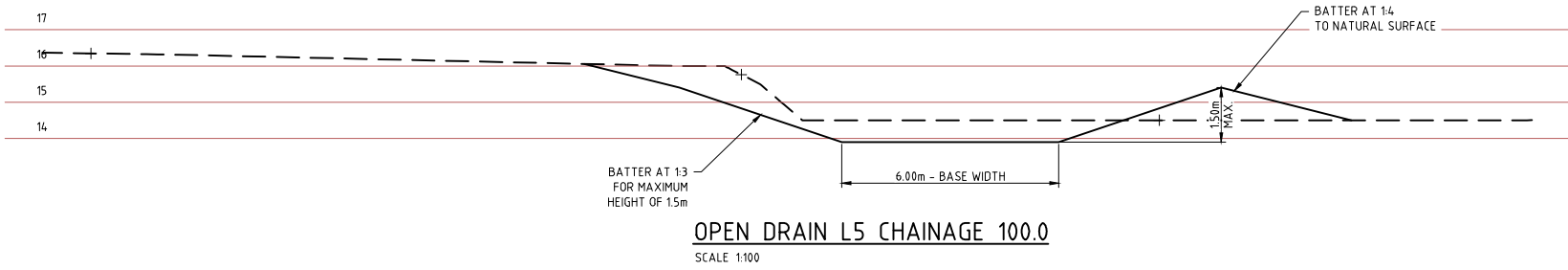
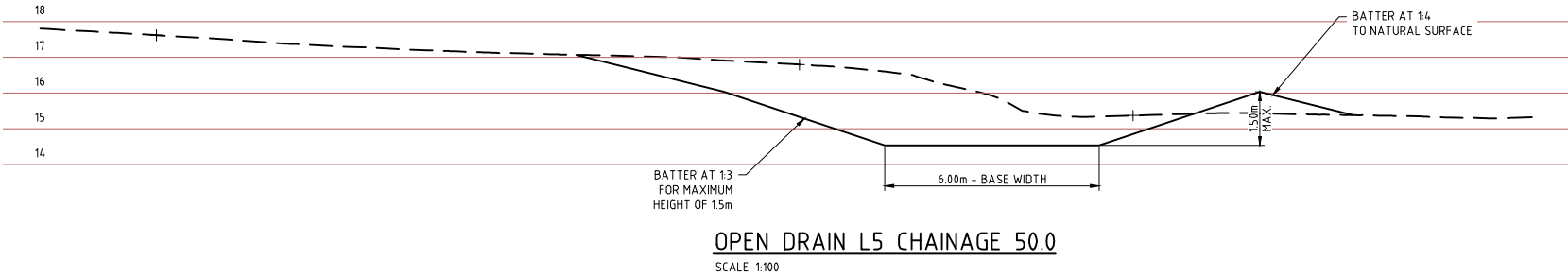


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| DRAWN C.BENFIELD | DESIGNED D.LUONG | APPROVED |
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| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE | | | |
| OPEN DRAINAGE REMEDIATION | | | |
| OPEN DRAIN L5 PLAN AND PROFILE | | | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | AS SHOWN | 16026-0297 | A |



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| CLIENT CITY OF KARRATHA | | |
| PROJECT DAMPIER DRAINAGE | | |
| PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN L5 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0298 |
| | | REV. A |



DRAIN PROFILE L6

0 5 10 20 30

Full Size 1:500 ; Half Size 1:1000
SCALE (m)

0.5 1 2 3
Full Size 1:50; Half Size 1:100
SCALE (m)



WISE
WATER INFRASTRUCTURE
SCIENCE & ENGINEERING

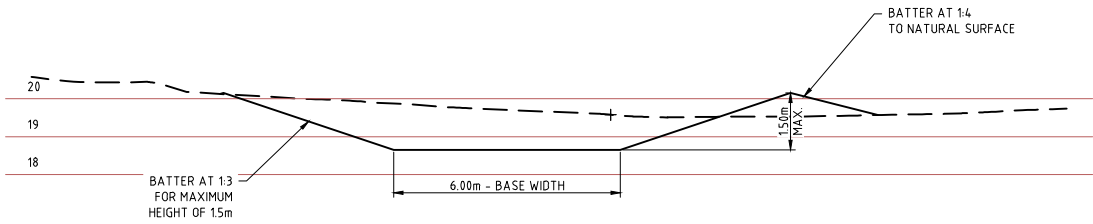
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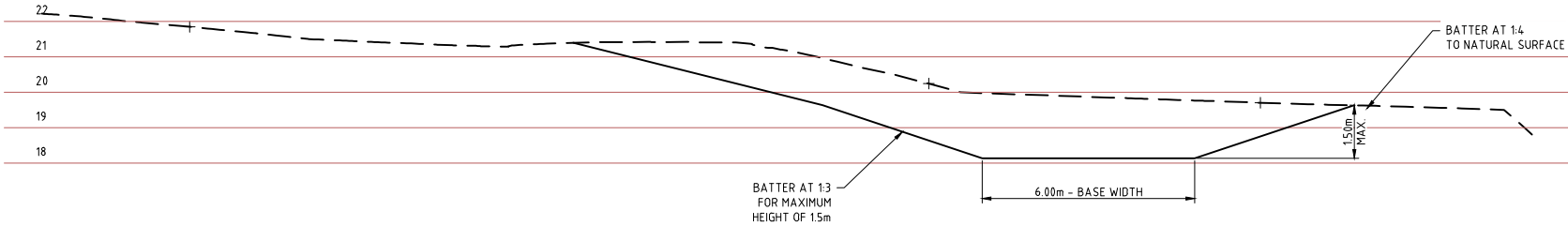
Plotted By: benny Plot Date: 10/07/16 - 10:46 Cad File: C:\P&D\010 - Karratha\CAD\16026-0299.dwg

16026-0299A

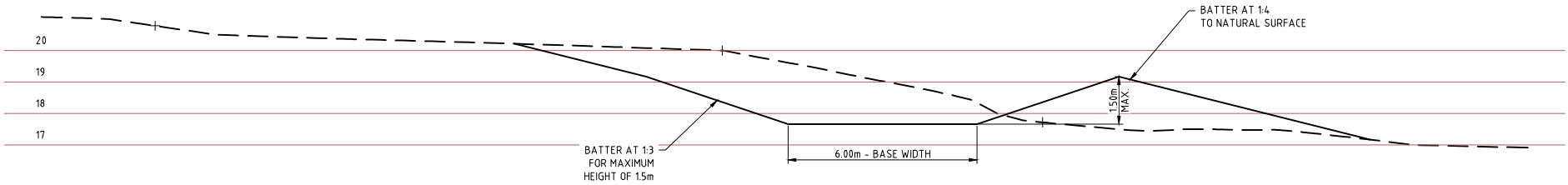
100mm AT FULL SIZE AT A1 SHEET SIZE



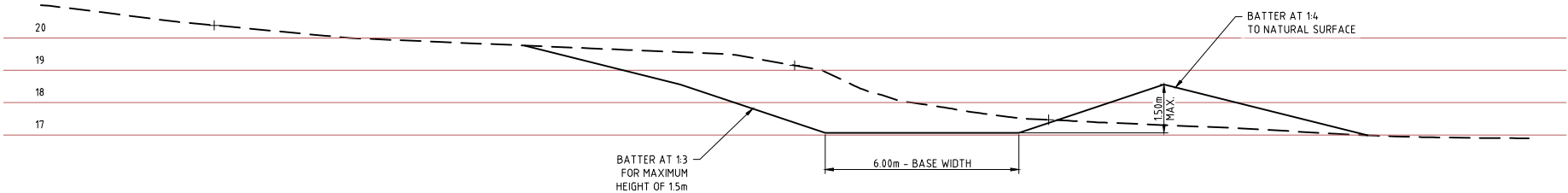
OPEN DRAIN L6 CHAINAGE 50.0
SCALE 1:100



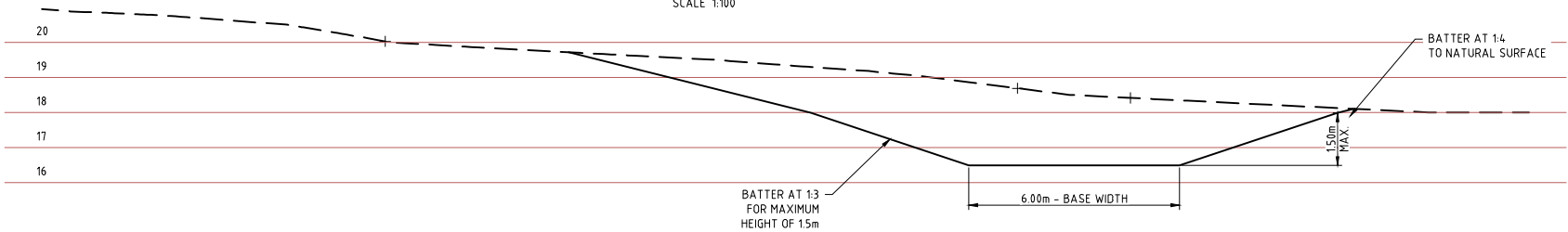
OPEN DRAIN L6 CHAINAGE 100.0
SCALE 1:100



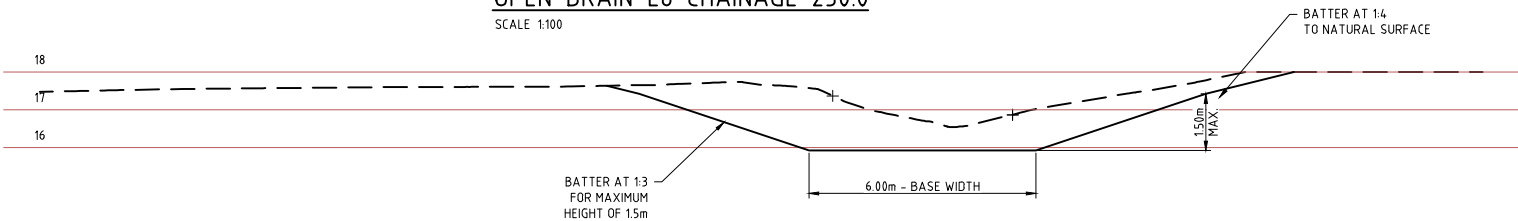
OPEN DRAIN L6 CHAINAGE 150.0
SCALE 1:100



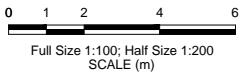
OPEN DRAIN L6 CHAINAGE 200.0
SCALE 1:100



OPEN DRAIN L6 CHAINAGE 250.0
SCALE 1:100



OPEN DRAIN L6 CHAINAGE 300.0
SCALE 1:100



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|------------|--|-------------------------------|-----------|
| CLIENT | CITY OF KARRATHA | | |
| PROJECT | DAMPIER DRAINAGE | | |
| | PROPOSED STORMWATER UPGRADE OPEN DRAINAGE REMEDIATION OPEN DRAIN L6 - CROSS SECTIONS | | |
| SIZE A1 | SCALE AS SHOWN | DRAWING NUMBER 16026-0299A | REV. A |

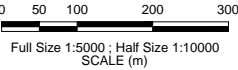


16026-0300



CULVERT SCHEDULE:

| NAME | LOCATION | WORKS DESCRIPTION |
|-----------------|----------------------------|-----------------------------------|
| CULVERT No. 336 | HAMPTON DVE / LOCKYER CRES | INSTALL NEW 1xØ600mm CLASS 4 RCP |
| CULVERT No. 318 | YULE CRES | INSTALL NEW 1xØ600mm CLASS 4 RCP |
| CULVERT No. 319 | LAWSON DVE / YULE CRES | INSTALL NEW 1xØ600mm CLASS 4 RCP |
| CULVERT No. 334 | HAMPTON DVE | INSTALL NEW 4xØ600mm CLASS 4 RCP |
| CULVERT No. 335 | HAMPTON DVE | INSTALL NEW 4xØ600mm CLASS 4 RCP |
| CULVERT No. 323 | WEST AVE | INSTALL NEW 4xØ600mm CLASS 4 RCP |
| CULVERT No. 206 | HOSPITAL DVE | INSTALL NEW 7xØ600mm CLASS 4 RCP |
| CULVERT No. 332 | LAWSON DVE / ROBE CRES | INSTALL NEW 1xØ600mm CLASS 4 RCP |
| CULVERT No. 333 | LAWSON DVE / ROBE CRES | INSTALL NEW 1xØ600mm CLASS 4 RCP |
| CULVERT No. 2 | MINILYA CRES | INSTALL NEW 2xØ1050mm CLASS 4 RCP |
| CULVERT No. 4 | MAITLAND CRT | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 5 | NEILSEN CRT | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 6 | ASHBURTON CRES | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 10 | YANNARIE CRES | INSTALL NEW 1xØ600mm CLASS 4 RCP |
| CULVERT No. 18 | HUON ST | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 21 | EAST AVE / WILKIE CRES | INSTALL NEW 2xØ450mm CLASS 4 RCP |
| CULVERT No. 25 | PATTERSON CRES | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 29 | EAST AVE / HARTOG CRES | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 34 | DAMPIER DVE / CENTRAL AVE | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 36 | DAMPIER DVE / PRINSEP CRES | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 39 | BOOLGEEDA CRT | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 40 | BOOLGEEDA CRT | INSTALL NEW 1xØ600mm CLASS 4 RCP |
| CULVERT No. 49 | THYSSEN CRES | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 57 | BERKELEY CRES | INSTALL NEW 4xØ600mm CLASS 4 RCP |
| CULVERT No. 59 | HAMPTON DVE / DAWSON RD | INSTALL NEW 1xØ600mm CLASS 4 RCP |
| CULVERT No. 61 | HARDY CRES | INSTALL NEW 1xØ450mm CLASS 4 RCP |
| CULVERT No. 63 | LYNDON CRES | INSTALL NEW 1xØ600mm CLASS 4 RCP |
| CULVERT No. 62 | WEST AVE / LYNDON CRES | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 64 | ASHBURTON CRES | INSTALL NEW 1xØ600mm CLASS 4 RCP |
| CULVERT No. 65 | HARDY CRES | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 67 | WEST AVE / NAMATJIRA RD | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 68 | WEST AVE / WOORAMEL CRES | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 69 | WOORAMEL CRES | INSTALL NEW 2xØ600mm CLASS 4 RCP |
| CULVERT No. 71 | FLINDERS CRES | INSTALL NEW 2xØ600mm CLASS 4 RCP |



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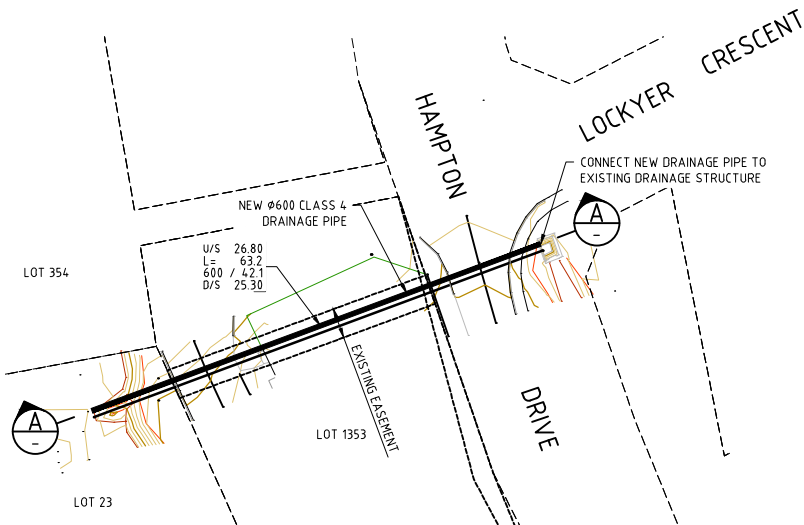


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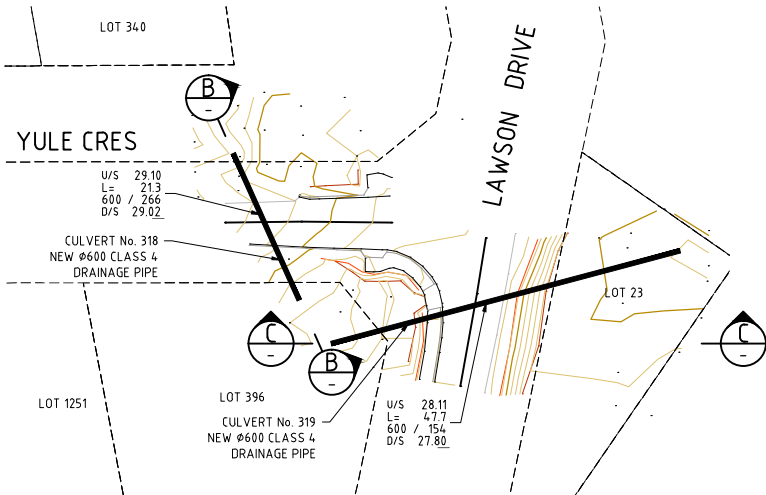
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| | | | |
|--|-----------------|------------------------------|-----------|
| CLIENT CITY OF KARRATHA | | | |
| PROJECT DAMPIER DRAINAGE | | | |
| PROPOSED STORMWATER UPGRADE CULVERT UPGRADE OVERALL CULVERT LAYOUT | | | |
| SIZE A1 | SCALE 1:1000 | DRAWING NUMBER 16026-0300 | REV. A |

16026-0301



CULVERT No. 336
SCALE 1:500



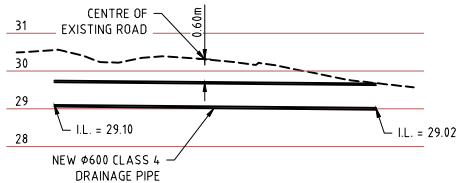
CULVERT No. 318 AND 319
SCALE 1:500

NOTES:

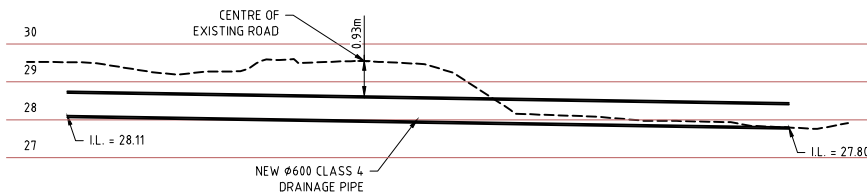
1. ALL WORKS SHALL BE CARRIED OUT TO THE REQUIREMENTS OF THE LOCAL AUTHORITY, WHERE THEIR REQUIREMENTS ARE IN CONFLICT WITH WHAT IS SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL OBTAIN DIRECTION FROM THE SUPERINTENDENT PRIOR TO PROCEEDING WITH THE CONSTRUCTION.
2. THE CONTRACTOR SHALL COMPLY WITH LOCAL AUTHORITY CONDITIONS IN REGARDS TO SAND-DRIFT, STABILISATION AND THE REQUIREMENT OF WATER CARTS TO MINIMISE DUST BLOW TO NEIGHBOURING PROPERTIES.
3. THE CONTRACTOR SHALL PROTECT AND MAINTAIN EXISTING TREES, POWER LINES, POLES AND OTHER SERVICES ALONG EXISTING ROADS AT ALL TIMES.
4. THE CONTRACTOR SHALL ALLOW FOR AND CARRY OUT STABILISATION OF ALL EARTHWORKED AREAS INCLUDING ROAD VERGES, AND ANY DISTURBED AREAS - USING HYDROMULCH WITHOUT SEED, UNLESS OTHERWISE DIRECTED OR DISCUSSED WITH THE SUPERINTENDENT ON SITE.
5. ALL LEVELS SHALL BE BASED ON BENCHMARKS AS SUPPLIED BY SURVEYOR.
6. CONTRACTOR SHALL LOCATE ALL EXISTING SERVICES, PRIOR TO WORKS COMMENCING AND PROTECT FOR THE DURATION OF THE WORKS. ANY DAMAGE TO SERVICES IS THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR IN ACCORDANCE WITH THAT SERVICE AUTHORITY REQUIREMENTS. ANY DETAILS OF EXISTING SERVICES SHOWN ON THE DRAWINGS ARE INDICATIVE ONLY.
7. ALL PIPES SHALL BE CLASS (4) REINFORCED CONCRETE (RRJ) UNLESS OTHERWISE NOTED.
8. THE CONTRACTOR SHALL NOTIFY THE SUPERINTENDENT WHERE 400mm MINIMUM COVER IS NOT ACHIEVED.
9. CONTRACTOR SHALL CONTACT SUPERINTENDENT PRIOR CONSTRUCTION, WHEN AN INCORRECT INVERT LEVEL OR GRADE IS FOUND. (INVERT LEVELS OVER-RIDE GRADES GIVEN)
10. DRAINAGE PIPES SHALL BE PILED AND KEELED WHERE THEY CROSS ABOVE SEWER LINES. THE PILE AND KEEL DETAIL SHALL BE AS ADOPTED BY THE WATER CORPORATION.
11. BACKFILL SHALL BE PLACED AND COMPACTED IN LIFTS NOT EXCEEDING 300mm. CONTRACTOR SHALL NOTIFY SUPERINTENDENT PRIOR TO COMMENCING NEXT LIFT. ALL COMPACTION MUST BE TO 95% MDD.
12. THE CONTRACTOR SHALL PROVIDE 'AS-CONSTRUCTED' INFORMATION FOR DRAINAGE IN COMPLIANCE WITH THE LOCAL AUTHORITY'S LATEST REQUIREMENTS.

LEGEND:

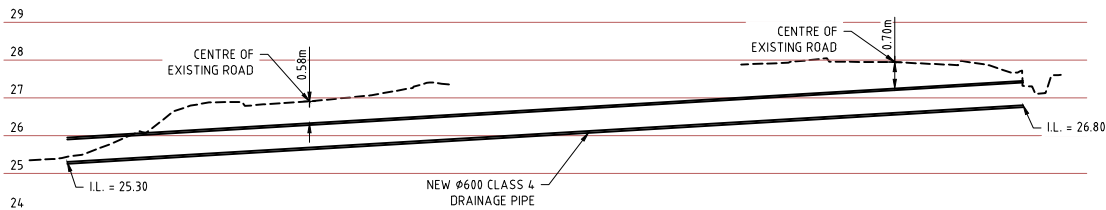
| | |
|--|----------------------------|
| | PROPOSED DRAINAGE |
| | ROAD KERBING |
| | PIPE CLASS |
| | UPSTREAM INVERT LEVEL |
| | PIPE LENGTH |
| | PIPE DIAMETER / PIPE GRADE |
| | DOWNSTREAM INVERT LEVEL |



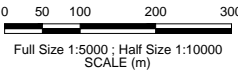
SECTION A
SCALE: 1:250H/1:100V



SECTION B
SCALE: 1:250H/1:100V



SECTION C
SCALE: 1:250H/1:100V



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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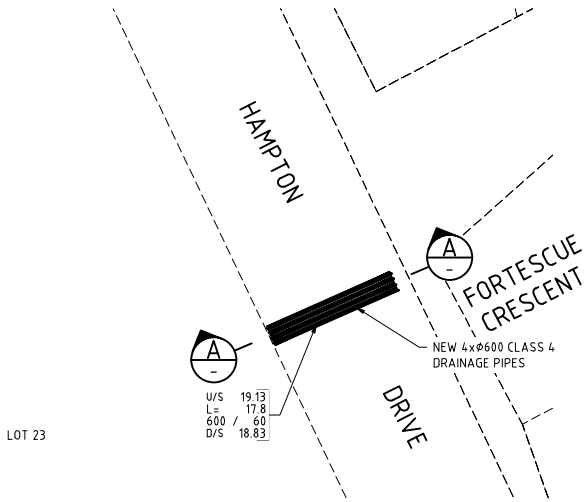
| | | | |
|---------|--------|-----------------------------|------|
| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STROMWATER UPGRADE | |
| | | CULVERT UPGRADE | |
| | | SHEET 1 OF 10 | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | 1:1000 | 16026-0301 | A |

16026-0302

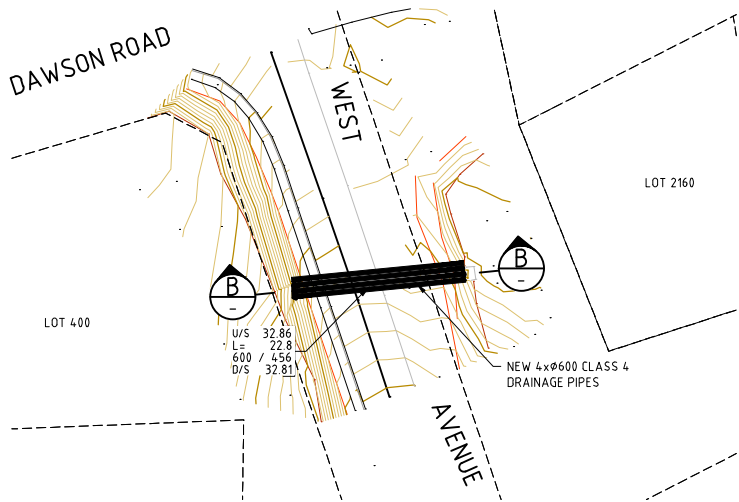


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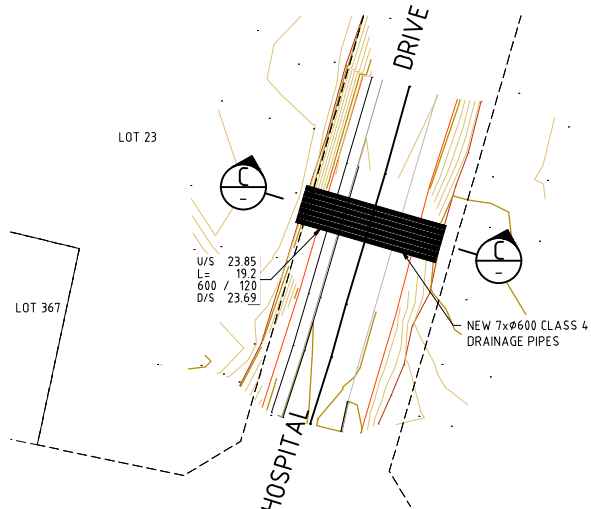
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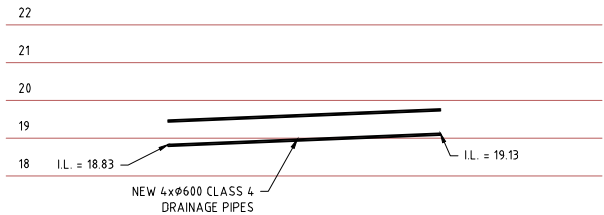
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SCALE 1:500



CULVERT No. 323
SCALE 1:500



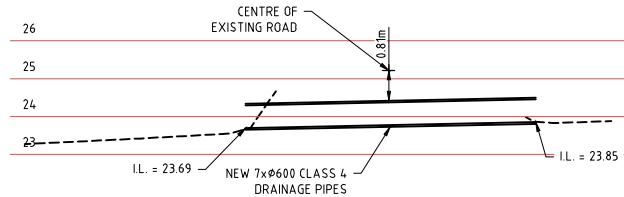
CULVERT No. 206
SCALE 1:500



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SECTION B
SCALE: 1:250H/1:100V

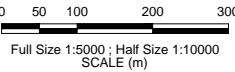


SECTION C
SCALE: 1:250H/1:100V

CONTRACTOR TO CONFIRM EXISTING DRAINAGE INFRASTRUCTURE
AND REPORT TO SUPERINTENDENT PRIOR TO CONSTRUCTION



The Essential First Step



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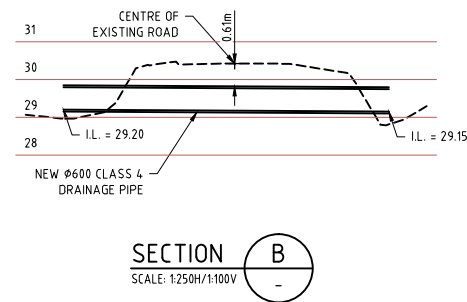
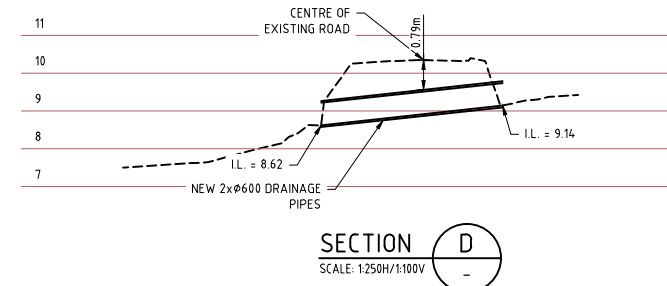
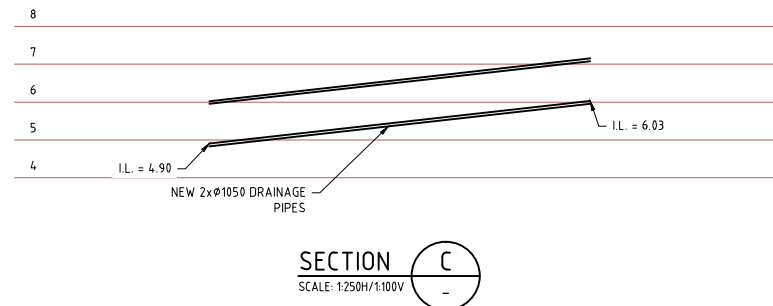
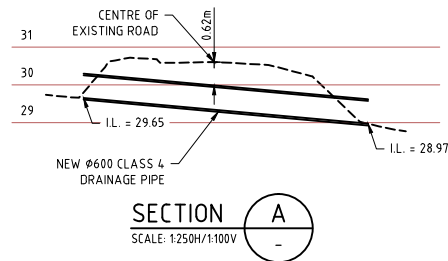
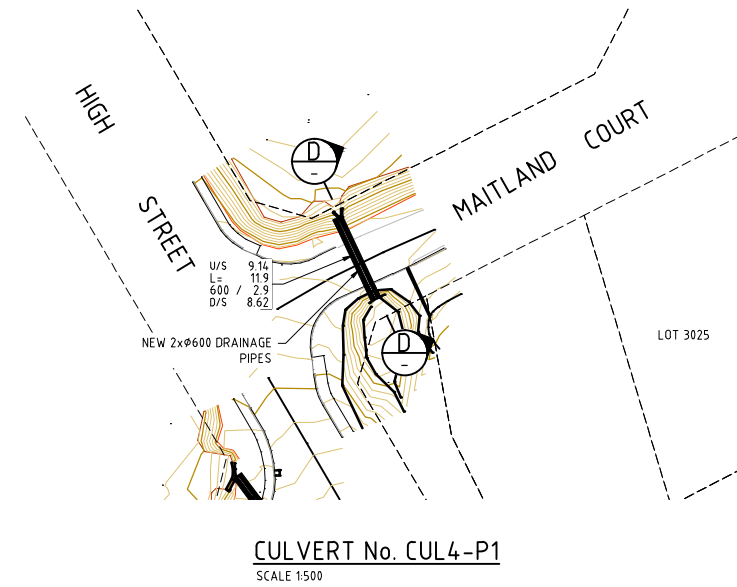
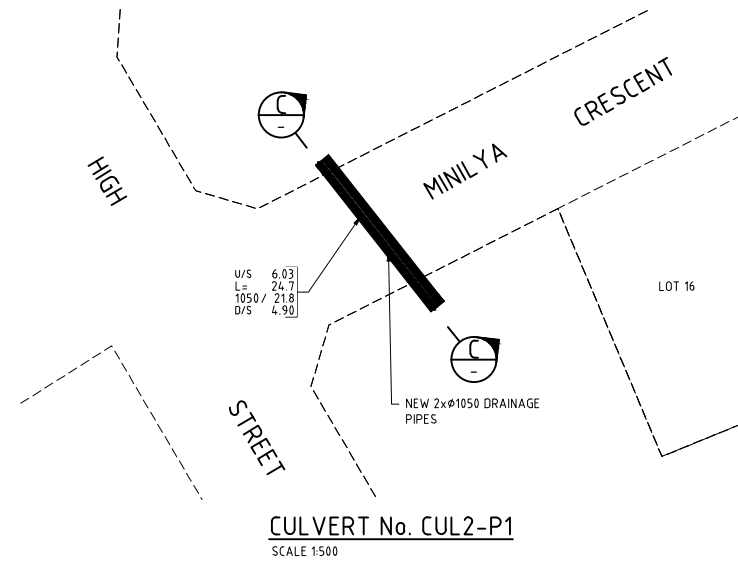
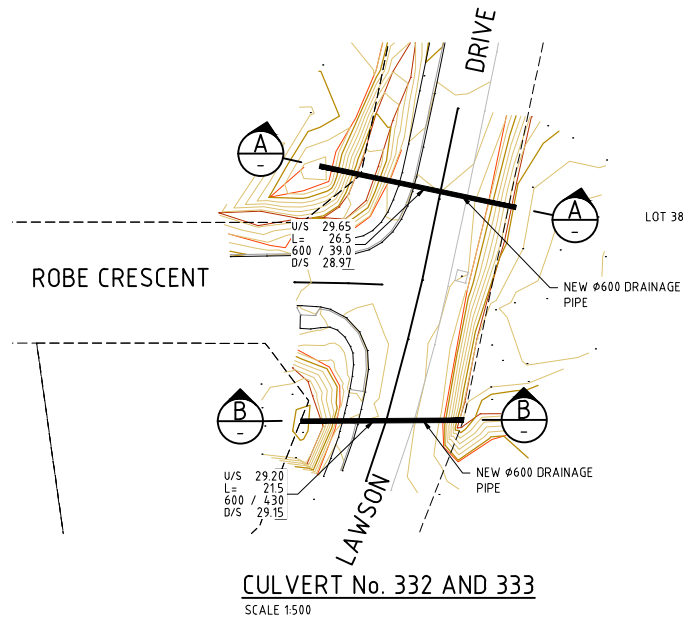
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| | | | |
|-----------------------------|-----------------|------------------------------|-----------|
| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| PROPOSED STROMWATER UPGRADE | | | |
| CULVERT UPGRADE | | | |
| SHEET 2 OF 10 | | | |
| SIZE A1 | SCALE 1:1000 | DRAWING NUMBER 16026-0302 | REV. A |

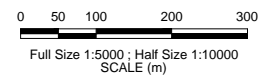


NOTES:

1. REFER DRAWING 16026-0301 FOR NOTES AND LEGEND.



CONTRACTOR TO CONFIRM EXISTING DRAINAGE INFRASTRUCTURE
AND REPORT TO SUPERINTENDENT PRIOR TO CONSTRUCTION



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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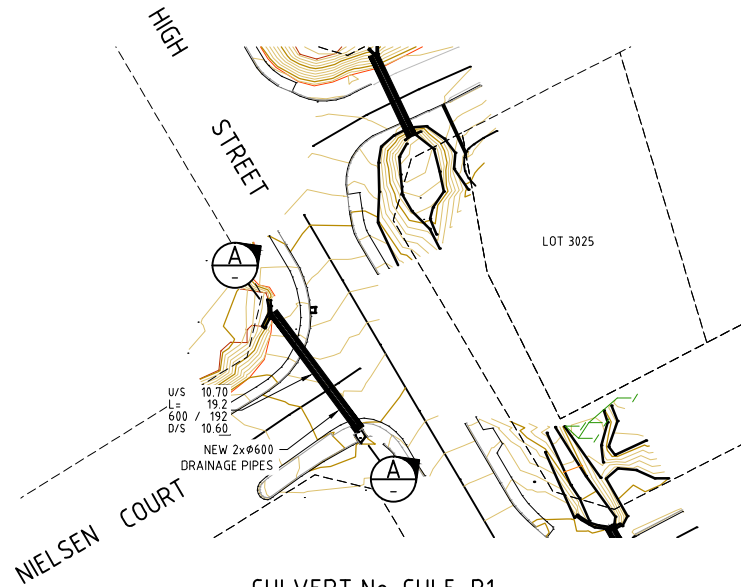
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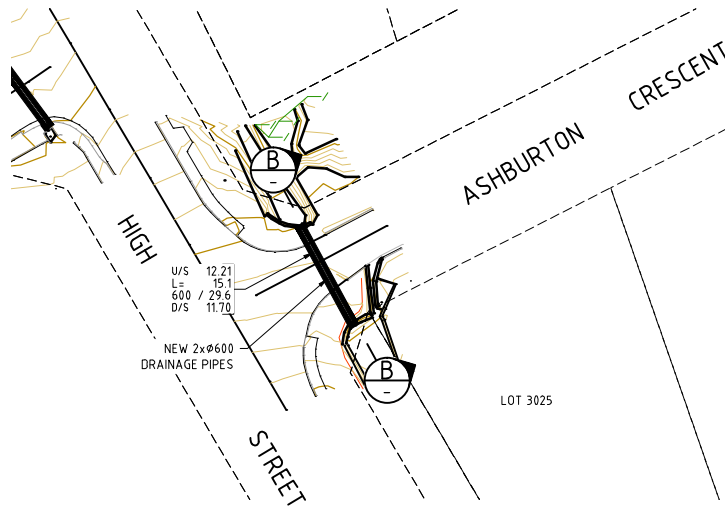
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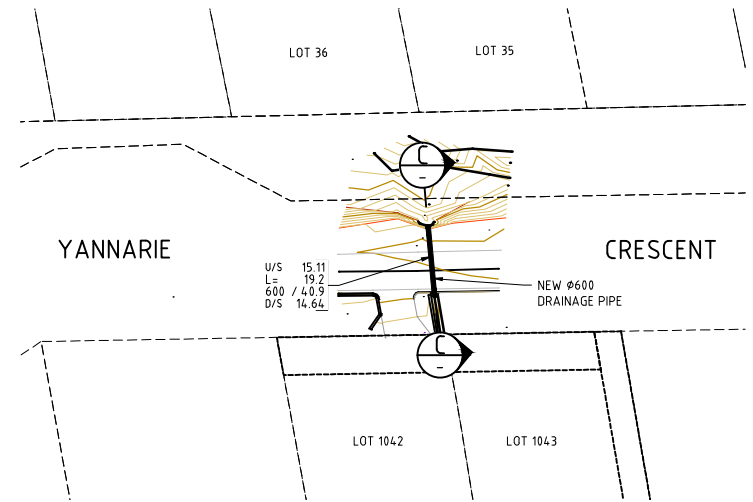
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|---------|--------|-----------------------------|------|
| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| | | PROPOSED STROMWATER UPGRADE | |
| | | CULVERT UPGRADE | |
| | | SHEET 3 OF 10 | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | 1:1000 | 16026-0303 | A |



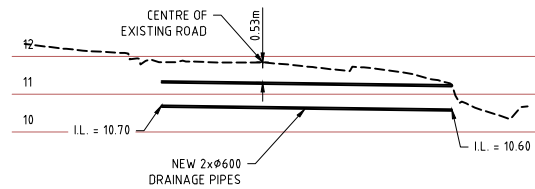
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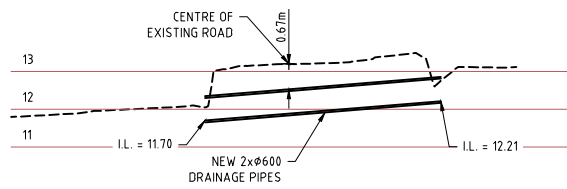
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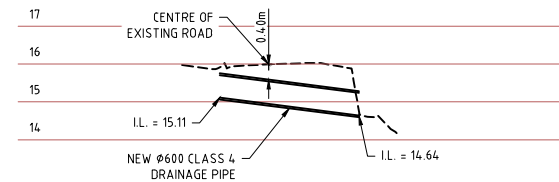
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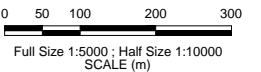
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SCALE: 1:250H/1:100V



SECTION B
SCALE: 1:250H/1:100V



SECTION C
SCALE: 1:250H/1:100V



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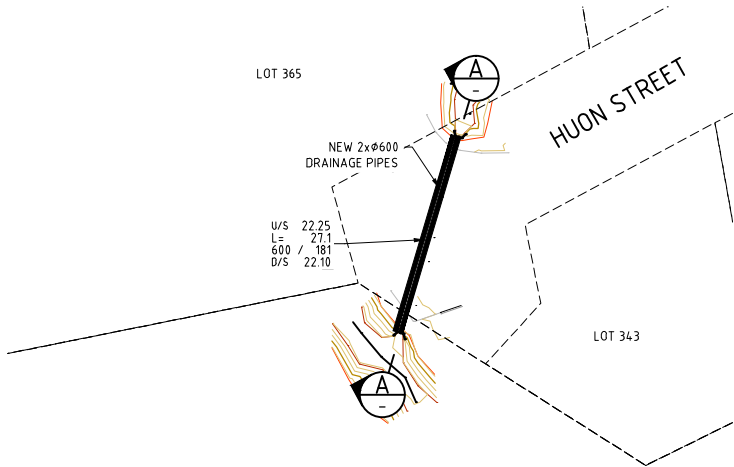
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|----------------------------|--|------------------------------|-----------|
| CLIENT CITY OF KARRATHA | PROJECT DAMPIER DRAINAGE PROPOSED STORMWATER UPGRADE CULVERT UPGRADE SHEET 4 OF 10 | | |
| SIZE A1 | SCALE 1:1000 | DRAWING NUMBER 16026-0304 | REV. A |

16026-0305

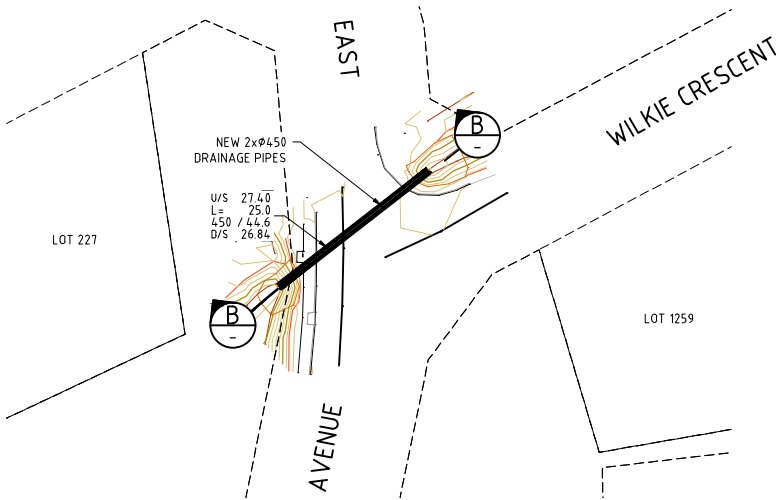


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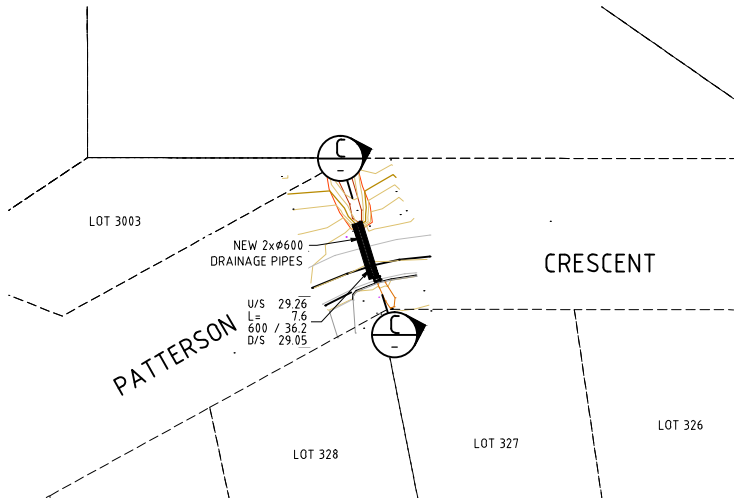
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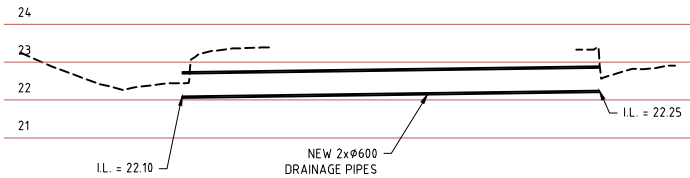
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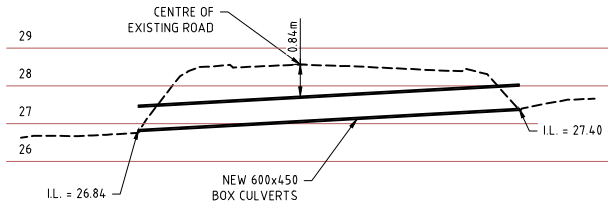
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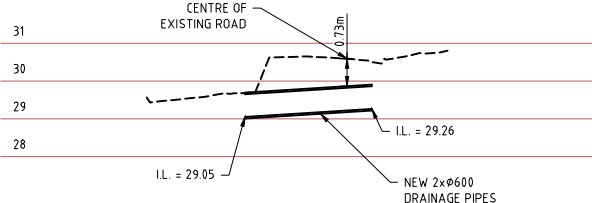
CULVERT No. CUL25-P1
SCALE 1:500



SECTION A
SCALE: 1:250H/1:100V

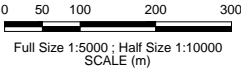


SECTION B
SCALE: 1:250H/1:100V



SECTION C
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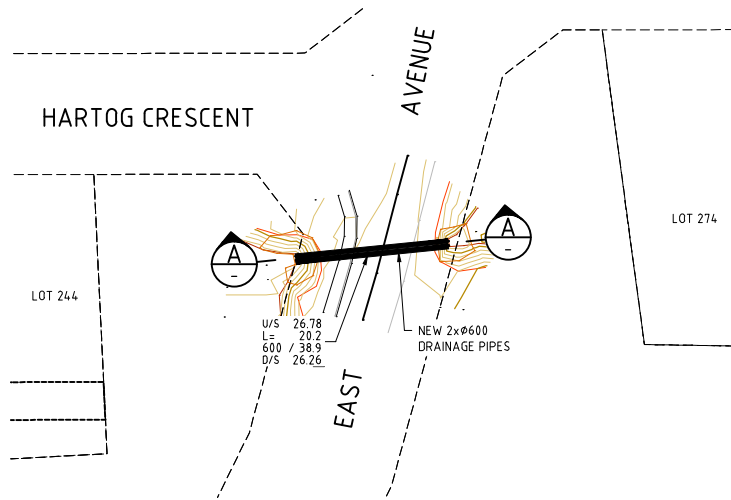
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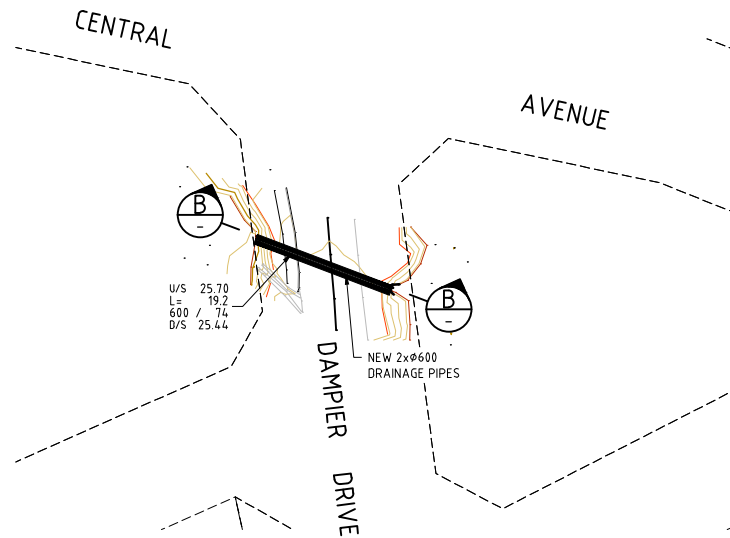
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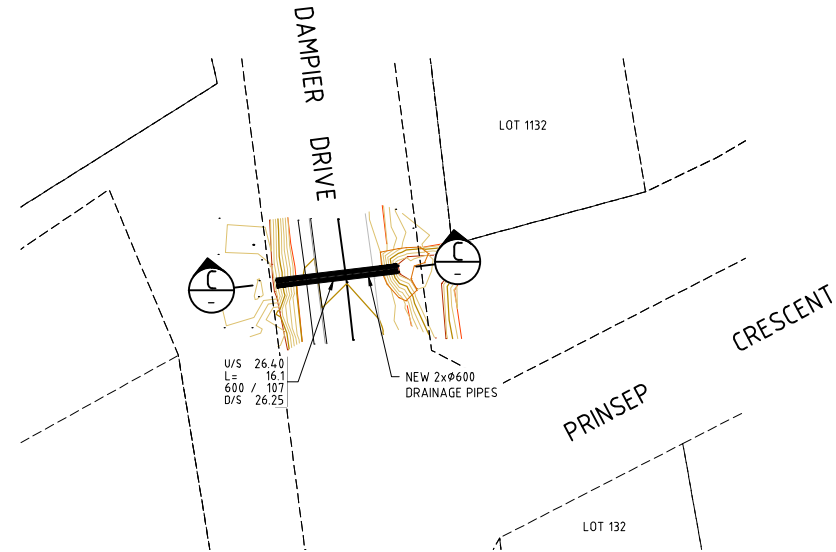
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| CLIENT CITY OF KARRATHA | PROJECT DAMPIER DRAINAGE PROPOSED STORMWATER UPGRADE CULVERT UPGRADE SHEET 5 OF 10 | | |
| SIZE A1 | SCALE 1:1000 | DRAWING NUMBER 16026-0305 | REV. A |



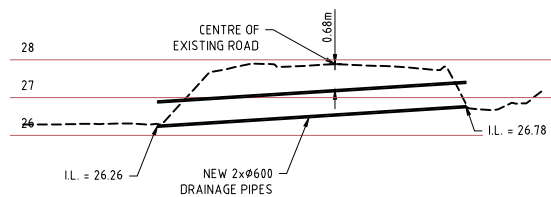
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SCALE 1:500



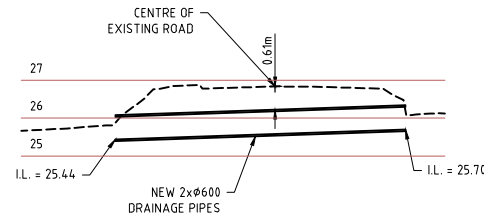
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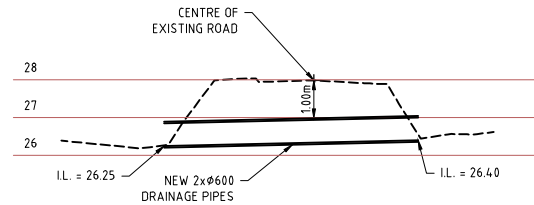
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SECTION A
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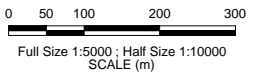
SECTION B
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SECTION C
SCALE: 1:250H/1:100V



The Essential First Step



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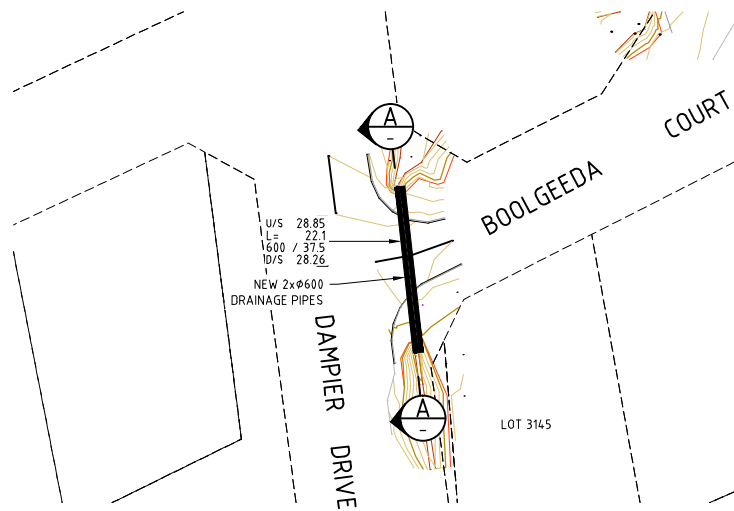
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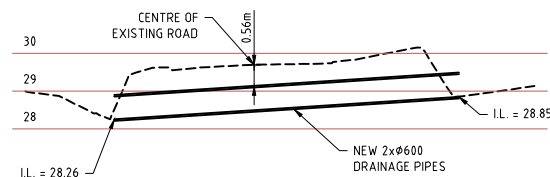
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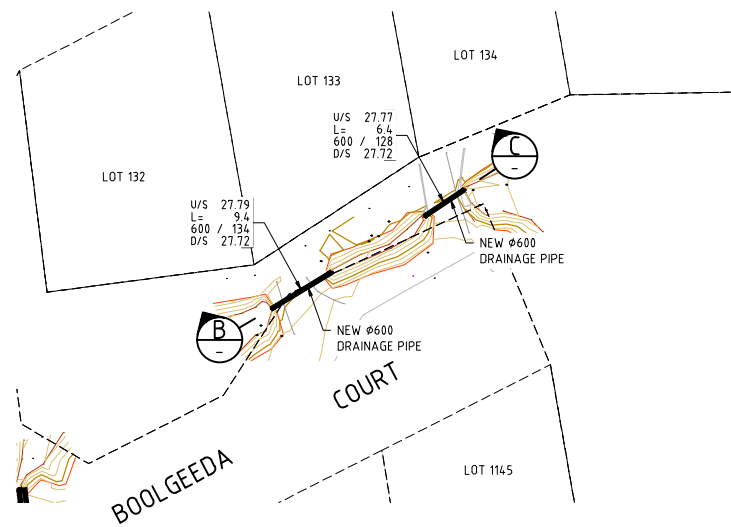
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| PROPOSED STORMWATER UPGRADE | | CULVERT UPGRADE | |
| PRECINCT X - SHEET 6 OF X | | DRAWING NUMBER 16026-0306 | |
| SIZE A1 | SCALE 1:1000 | REV. A | |



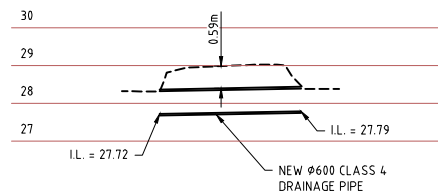
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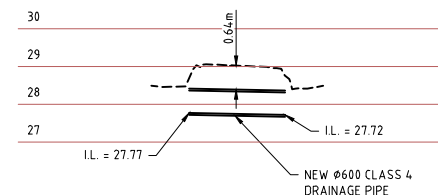
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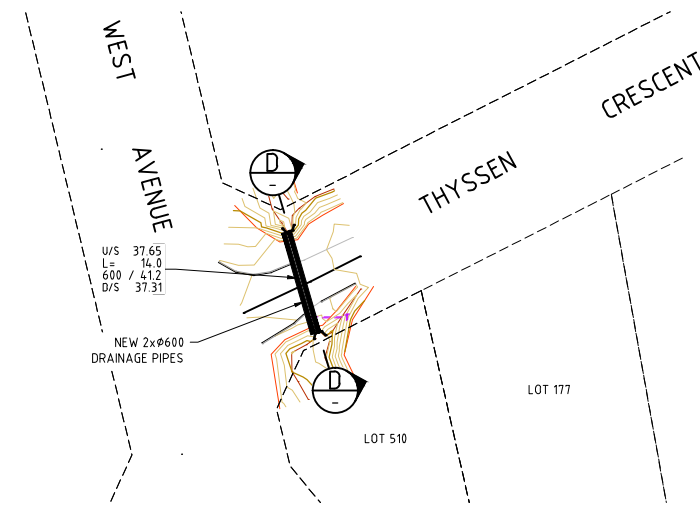
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SCALE 1:500



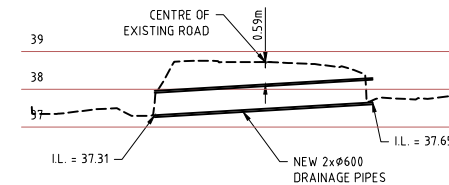
SECTION B
SCALE: 1:250H/1:100V



SECTION C
SCALE: 1:250H/1:100V



CULVERT No. CUL49-P1
SCALE 1:500



SECTION D
SCALE: 1:250H/1:100V



The Essential First Step

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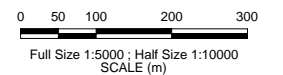
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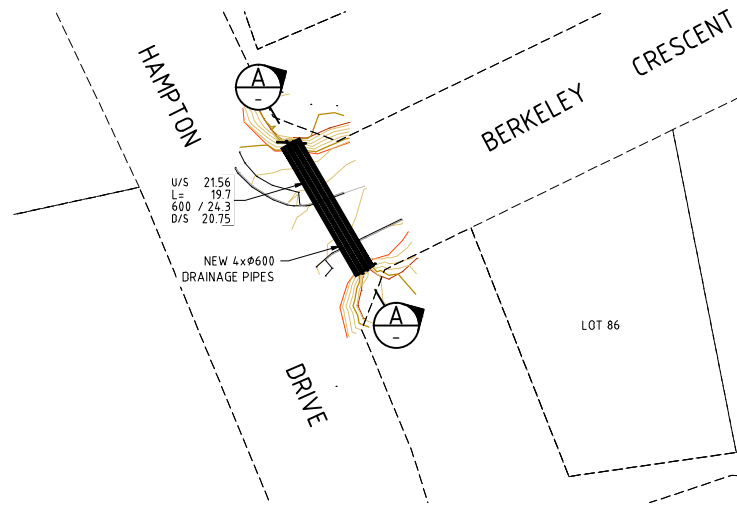
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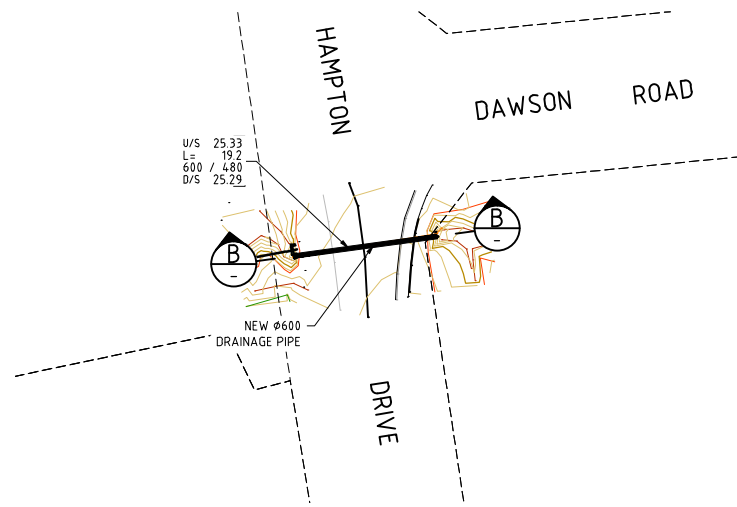
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| SIZE A1 | SCALE 1:1000 | DRAWING NUMBER 16026-0307 | REV. A |



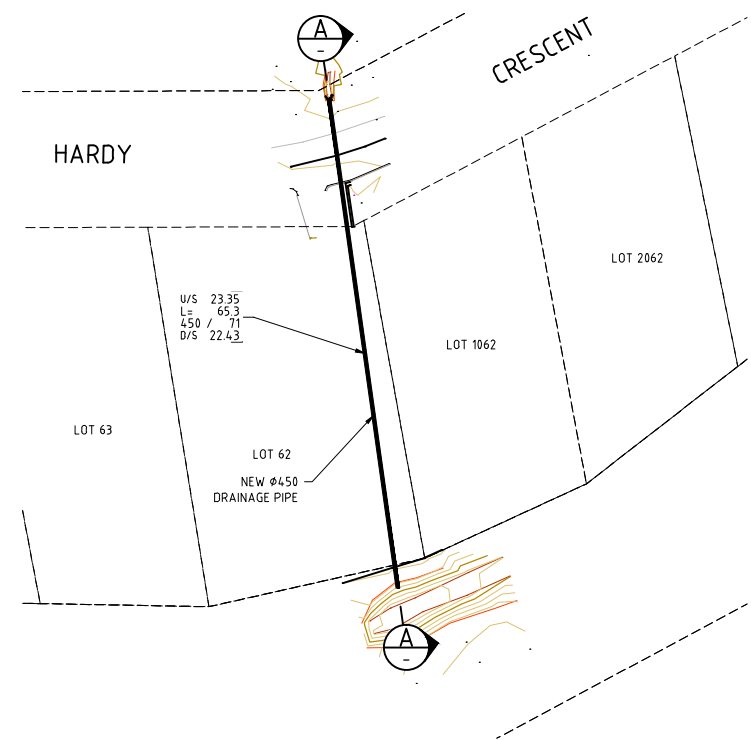
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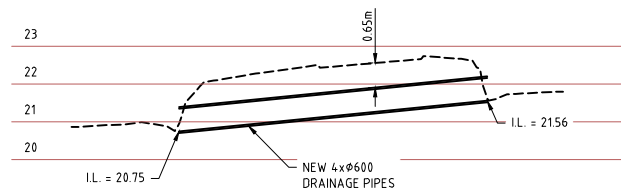
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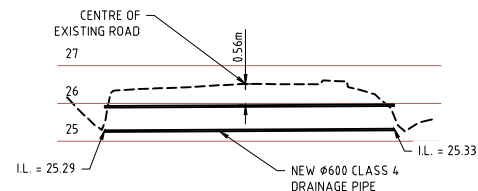
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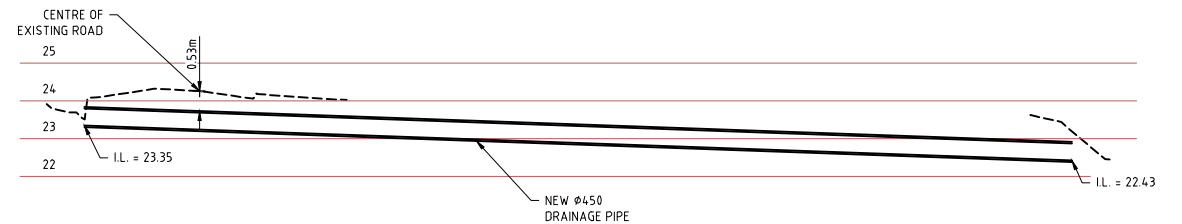
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SECTION A
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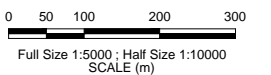
SECTION B
SCALE: 1:250H/1:100V



SECTION C
SCALE: 1:250H/1:100V



The Essential First Step



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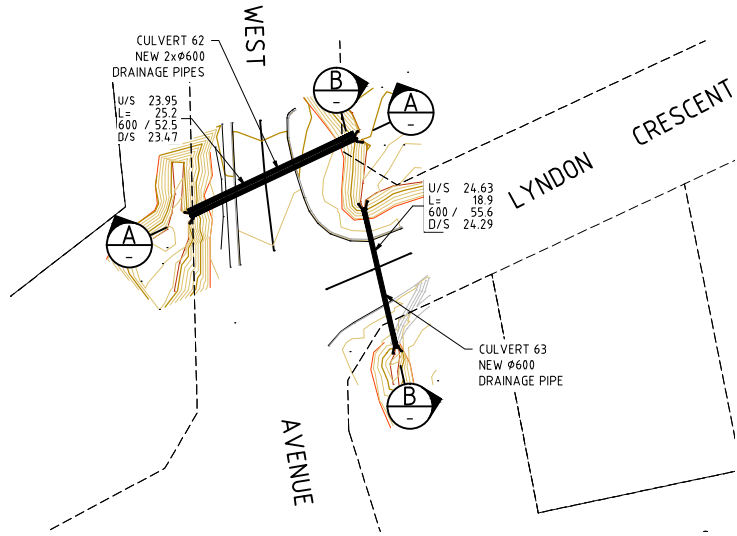


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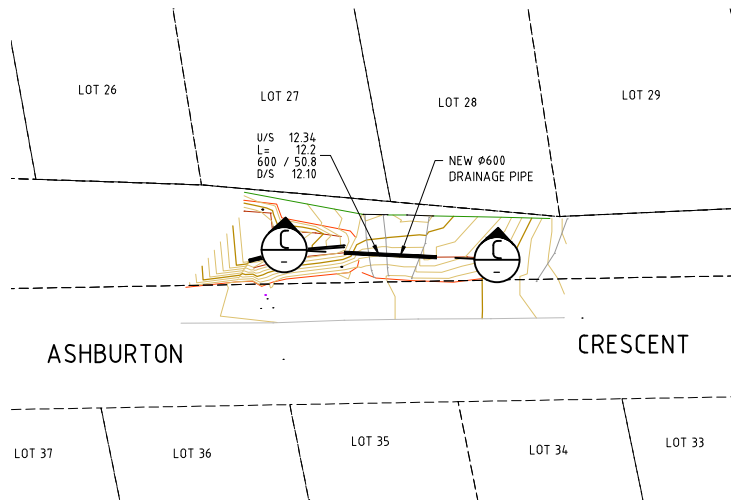
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| CLIENT CITY OF KARRATHA | | PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE | | SHEET 8 OF 10 | |
| SIZE A1 | SCALE 1:1000 | DRAWING NUMBER 16026-0308 | REV. A |

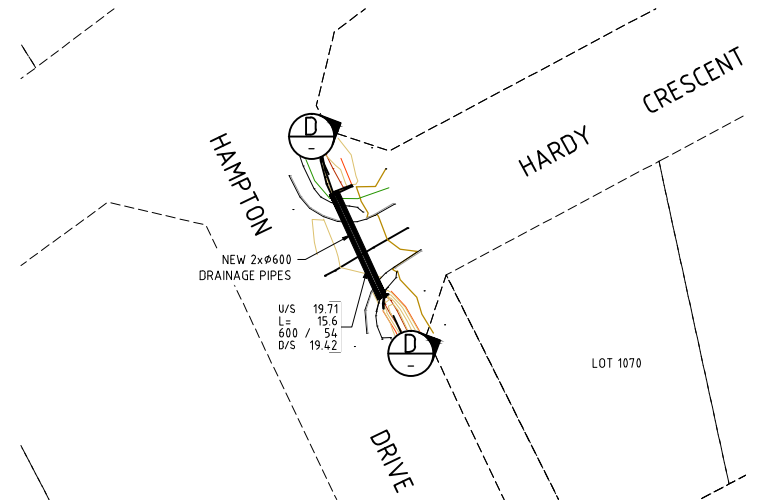
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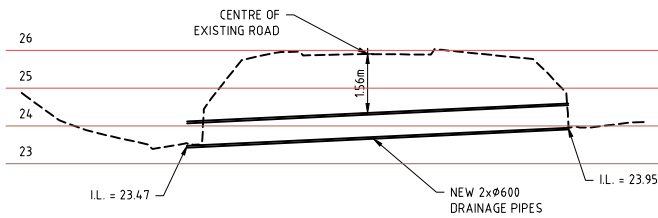
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SCALE 1:500



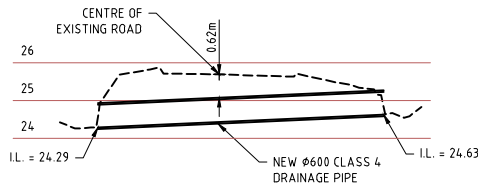
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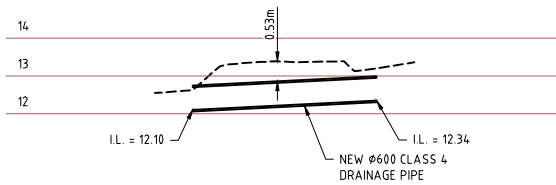
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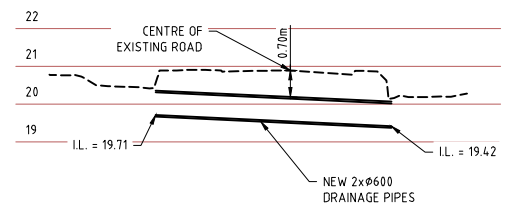
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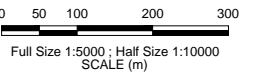
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SECTION C
SCALE: 1:250H/1:100V



SECTION D
SCALE: 1:250H/1:100V



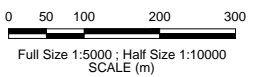
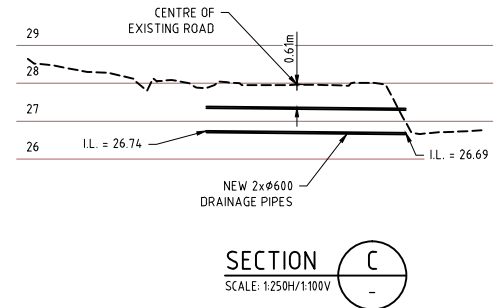
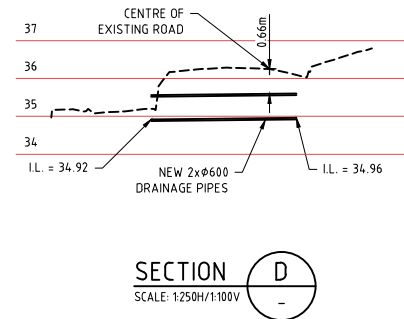
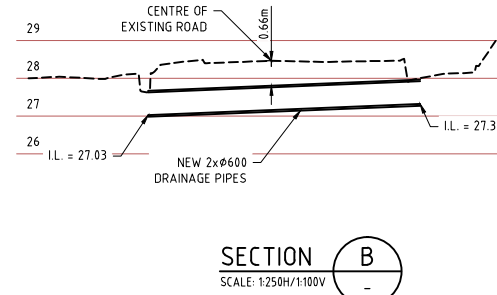
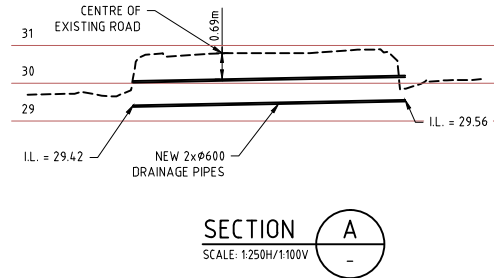
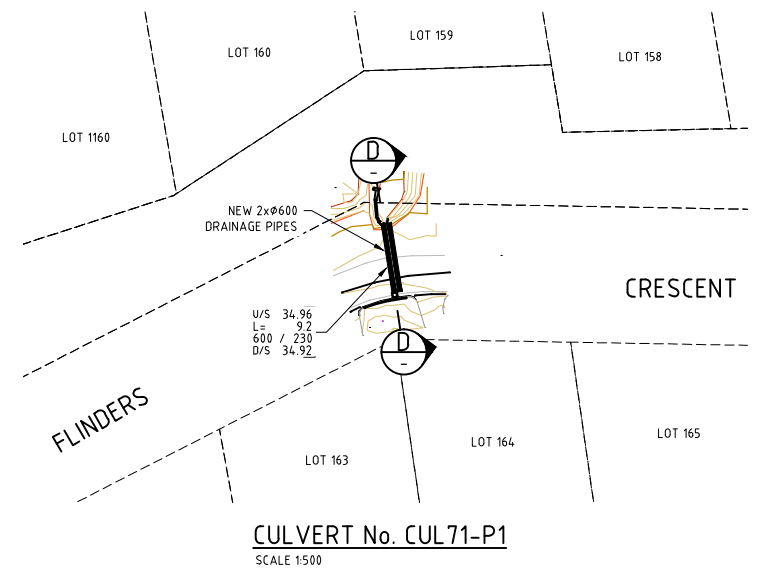
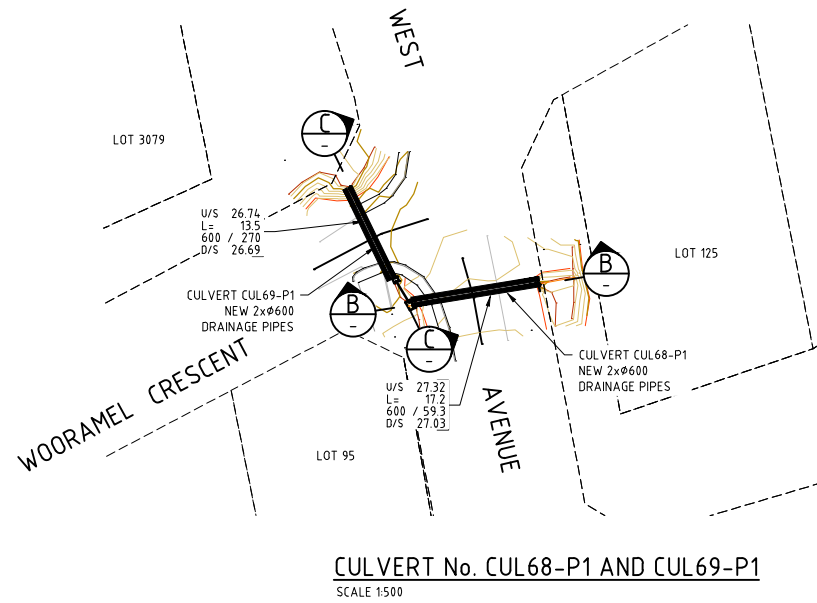
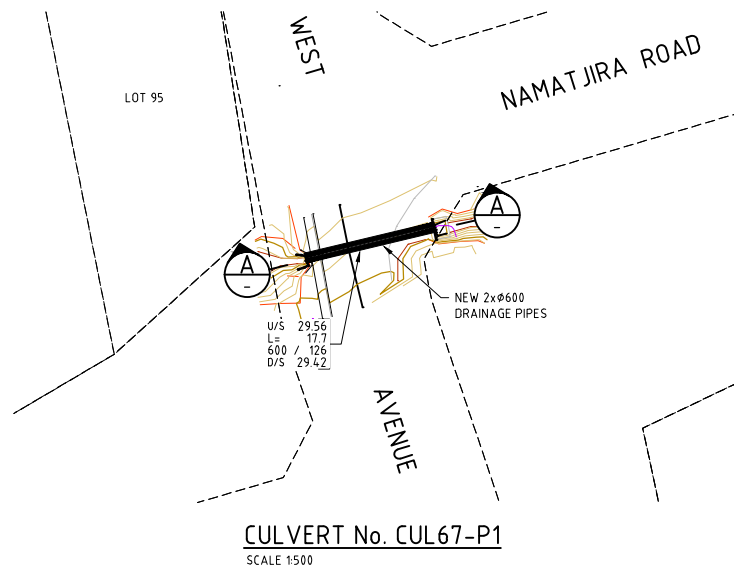
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| PROPOSED STORMWATER UPGRADE | | PRECINCT X - SHEET 9 OF X | |
| SIZE A1 | SCALE 1:1000 | DRAWING NUMBER 16026-0309 | REV. A |



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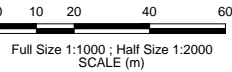
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| CLIENT CITY OF KARRATHA | | | |
| PROJECT DAMPIER DRAINAGE | | | |
| PROPOSED STORMWATER UPGRADE CULVERT UPGRADE SHEET 10 OF 10 | | | |
| SIZE A1 | SCALE 1:1000 | DRAWING NUMBER 16026-0310 | REV. A |

16026-0400



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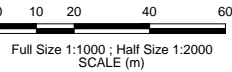


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| CLIENT CITY OF KARRATHA | | | |
| PROJECT DAMPIER DRAINAGE | | | |
| PROPOSED STORMWATER UPGRADE CROSS OVER UPGARDE CROSS OVER LAYOUT PLAN - SHEET 1 OF 5 | | | |
| SIZE A1 | SCALE 1:1000 | DRAWING NUMBER 16026-0400 | REV. A |



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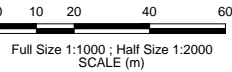


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| CLIENT CITY OF KARRATHA | | PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE | | CROSS OVER UPGARDE | |
| CROSS OVER LAYOUT PLAN - SHEET 2 OF 5 | | DRAWING NUMBER 16026-0401 | |
| SIZE A1 | SCALE 1:1000 | REV. A | |



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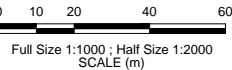
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| SIZE | A1 | SCALE | 1:1000 | DRAWING NUMBER | 16026-0402 |

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|---------|---------------------------------------|--|--|--|--|
| CLIENT | CITY OF KARRATHA | | | | |
| PROJECT | DAMPIER DRAINAGE | | | | |
| | PROPOSED STORMWATER UPGRADE | | | | |
| | CROSS OVER UPGARDE | | | | |
| | CROSS OVER LAYOUT PLAN - SHEET 3 OF 5 | | | | |
| REV. | A | | | | |



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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|---------------------------------------|-----------------|------------------------------|-----------|
| CLIENT CITY OF KARRATHA | | PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE | | CROSS OVER UPGRAD | |
| CROSS OVER LAYOUT PLAN - SHEET 4 OF 5 | | | |
| SIZE A1 | SCALE 1:1000 | DRAWING NUMBER 16026-0403 | REV. A |



0 10 20 40 60
Full Size 1:1000 ; Half Size 1:2000
SCALE (m)

| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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DO NOT SCALE THIS DRAWING. USE SPECIFIED DIMENSIONS ONLY. VERIFY ALL DIMENSIONS ON SITE.

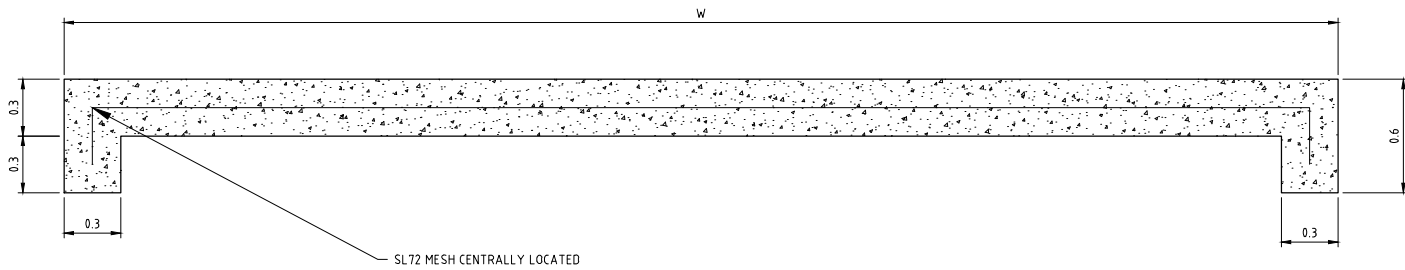
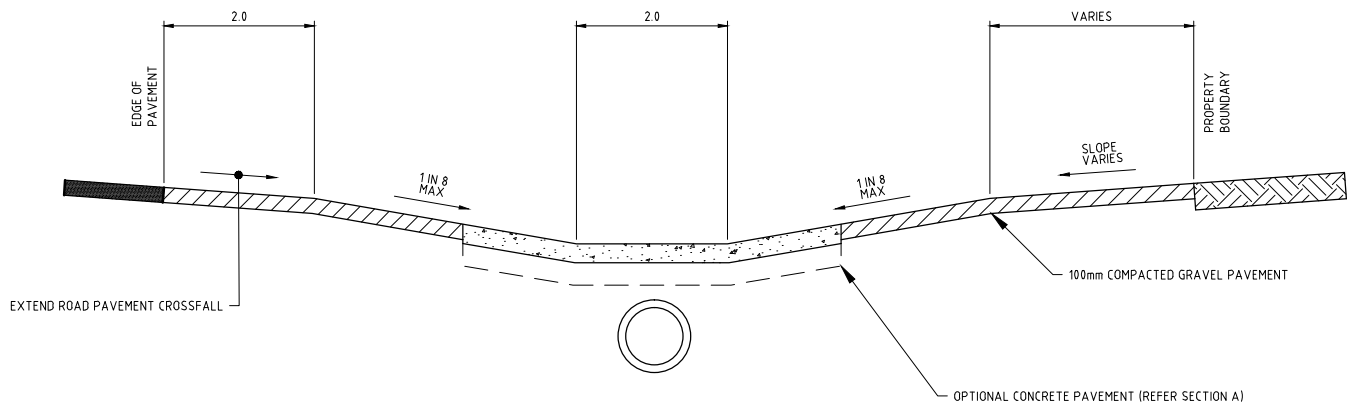
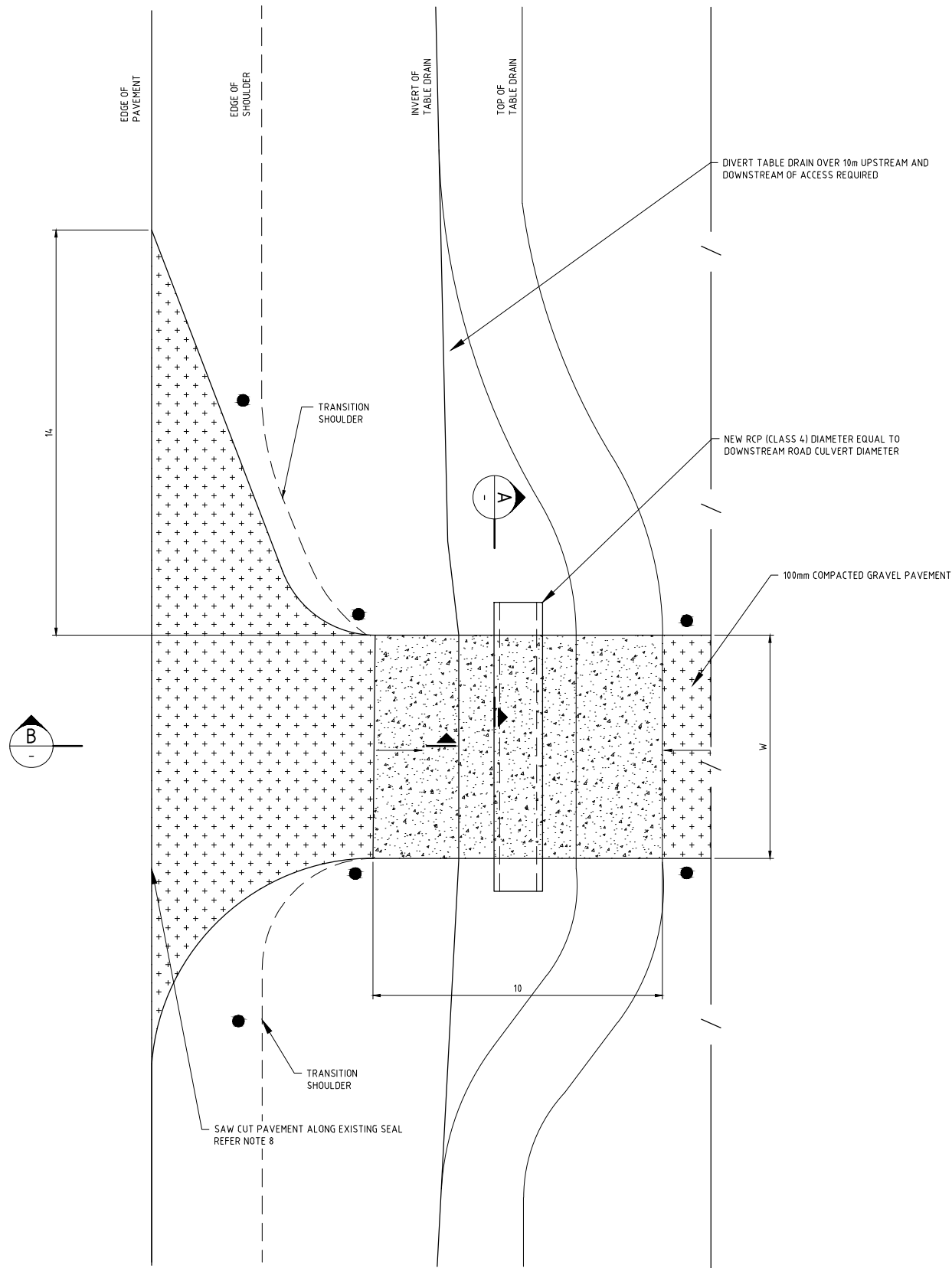


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|---------------------------------------|-----------------|------------------------------|-----------|
| CLIENT CITY OF KARRATHA | | PROJECT DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE | | CROSS OVER UPGARDE | |
| CROSS OVER LAYOUT PLAN - SHEET 5 OF 5 | | | |
| SIZE A1 | SCALE 1:1000 | DRAWING NUMBER 16026-0404 | REV. A |



| REV | DATE | DESCRIPTION | DRAWN | CHECKED | APPROVED |
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| | | | |
|---|--------|------------------|------|
| CLIENT | | CITY OF KARRATHA | |
| PROJECT | | DAMPIER DRAINAGE | |
| PROPOSED STORMWATER UPGRADE CROSS OVER UPGARDE CROSS OVER DETAILS | | | |
| SIZE | SCALE | DRAWING NUMBER | REV. |
| A1 | N.T.S. | 16026-0405 | A |