SH25A Taparahi Slip

Remediation Options Report

Prepared for Waka Kotahi NZ Transport Agency - Hamilton
Prepared by Beca Limited

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Contents

Appendices

Revision History

Revision Nº	Prepared By	Description	Date
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Document Acceptance

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Executive Summary

The significant weather events of Auckland/ Northland Anniversary weekend, and cyclone Gabrielle two weeks later caused a major slip on State Highway 25a (SH25a), also known as the “Kopu-Hikuai Road”. The road was initially partially closed to traffic on 16 January 2023 when significant cracking was detected. The road subsequently failed on 28 January 2023 with a large slip forming affecting over 60m of road carriageway. The road carriageway failed again on 1 February increasing the extent of loss to around 110m. Ongoing minor losses have subsequently occurred within the slip area though no increase in the overall extent has occurred since this time.

Waka Kotahi New Zealand Transport Agency (Waka Kotahi NZTA) has requested Beca Ltd (Beca), to assess permanent options to restore SH25a. There are three broad groups of options that have been considered: realignment, bridging and earthworks/retaining.

This report sets out five proposed remediation options for Waka Kotahi NZTA to consider in terms of programme, cost and risk. The expected cost and programme for these options is set out in Table 1. A number of other remediation options were also considered but were found to be unsuitable.

Table 1: Remediation Option Cost and Programme Summary

Option	Option Name	Estimated Cost (P50 to P95)	Programme
6a	Steel Bridge	$23M to $28M	11 to 13 Months
6b	Concrete Bridge	$21M to $26M	12 to 14 Months
7	Realignment	$35M to $54M	24 to 36 Months
10a	Rockfill Embankment	$24M to $33M	12 to 24 Months
10c	Tied-back Pile Retaining Wall	$24M to $32M	12 to 16 Months

A review of the materials and the geology for the site considered liquefaction risk and it was agreed with the geotechnical peer reviewer (Earthtech), and with the Waka Kotahi geotechnical subject matter expert, that liquefaction was unlikely. This will require a departure from the Waka Kotahi Bridge Manual given the agreed assessment approach differs from the methodology as set out in the Bridge Manual.

All options would need to be able to accommodate the existing poor site conditions and marginal slope stability within the slip area. All require some stabilisation works to accommodate the slope instability hazard.

- *Bridge option:*
- Potential forms of a steel bridge and concrete bridge were evaluated (Option 6a and Option 6b). Both have similar costs and programme.
- *Realignment:*

  An earthwork bypass option (Option 7) was found to be the costliest option, have the longest programme and has two issues that are significant risks to programme; compliance with the legislative requirements of the Wildlife Act and a lack of suitable spoil disposal sites. This option is not being considered further unless all other options are found to be unsuitable.
- *Embankment Option:*

  A rockfill embankment (Option 10a) option has a similar expected cost to the bridge option though a higher estimated cost when risks were considered. Significant programme risks for the option are the uncertain volume and rate of removal of spoil materials from with the slip site, and the impacts of winter weather. The rockfill toe position is sensitive to the depth of slip debris, with a risk that the toe or extent of slip debris excavation needed to form the toe could affect the adjoining private landowner (Maori freehold land) to the south.

- *Retaining Option:*

  A tied back retaining option (Option 10c) was found to be a little more expensive and to take longer to construct (than the bridge option). Key programme differences are increased risk associated with ground conditions variability affecting the design, procurement of materials and increased working within the slip area with an accompanying increased risk of delays.

Waka Kotahi has specified the cost, programme and risk profile informing the priorities for decision-making on the preferred option. Programme is a key driver for Waka Kotahi, recognising the significant social and community costs of this road being closed. A bridge is recommended as the preferred remedial solution reflecting the cost, programme and risks. The bridge option is preferable mainly due to its relatively small footprint within the slip area and the associated reduction in cost and risk associated with working in a smaller area, especially in winter conditions.

Initial investigations indicate a steel bridge could have some advantages over a concrete bridge however the final form and material selection will be developed under an early contractor involvement (ECI) contract arrangement with an experienced designer to allow the fastest build time.

Several options were assessed to temporarily reinstate SH25a while a permanent repair was designed and constructed. All potential temporary options assessed were found to unfeasible due to the difficult site conditions, construction duration and potential to conflict and delay the permanent solution.

1 Introduction

A section of SH25a has been severed by the slope instability and loss of a 110m section of highway supported on a fill embankment after a period of exceptionally heavy rainfall over the preceding months.

Waka Kotahi New Zealand Transport Agency (Waka Kotahi NZTA) has requested Beca Ltd (Beca), to assess permanent options to restore SH25a. This report sets out four proposed remediation options for Waka Kotahi NZTA to consider in terms of programme, cost and risk.

This report provides an update to an earlier report prepared by Beca on remediation options for Waka Kotahi NZTA, issued on 10 February 2023, and incorporates the outcome of additional investigations, interpretation and concept design completed. The findings of this report supersede those presented in the earlier report.

A draft report was issued to Waka Kotahi NZTA in May 2023. A final report was issued in July 2023. This revision incorporated feedback from Waka Kotahi, requesting additional detail of the different concept options considered during the design to be documented.

This report has been prepared by Beca in collaboration with a number of contractors including (in alphabetical order) Brian Perry Civil Limited (Brian Perry), Fulton Hogan Limited (Fulton Hogan), Higgins Contractors Limited (Higgins) and McConnell Dowell Constructors Limited (McConnell Dowell). Both Fulton Hogan and McConnell Dowell have provided input regarding programme and cost to the remediation options being considered.

Beca also acknowledge the input of Earthtech Consulting Limited (Earthtech) who have provided a peer review of the geotechnical aspects of the assessment and concept designs completed for the remediation options outlined in this report.

2 Purpose and Limitation

This report has been prepared to assist Waka Kotahi NZTA to determine suitable remediation measures to reinstate SH25a where the slip has occurred.

The design completed in support of the options presented has been limited, with focus given to identifying and better understanding critical risks associated with each option considered. Detailed design input will be needed for the adopted remediation option, with potential for adjustment of the option to reflect design development.

The estimated cost and duration of each option reflects the collaborative efforts of Beca and a number of contractors, as set out above. All costs and programme estimates include assumptions that will require further development to confirm. Allowances have been made in contingencies for both cost and programme for currently identified uncertainties.

Planning approvals and statutory requirement aspects have been considered by Waka Kotahi NZTA's planning team.

3 Background

3.1 Instability Timeline

Initial cracking across both east and west bound lanes was first observed on 16 January 2023 at around 9.30am. Beca and Higgins re-inspected the site at around 3pm and observed cracking up to 30mm wide. Refer to Figure 3.1. Cracking continued to develop across both traffic lanes, increasing in width by around 5mm to 15mm a day in the following weeks until failure of the embankment occurred.

The use of SH25a was initially restricted to one lane to avoid the areas of significant cracking with constant observation in place to identify additional movement. The road was closed at night due to concerns that visibility would not be adequate to manage the risk to road users.

Initial geotechnical investigations were completed between 23 January and 25 January comprising three machine boreholes to depths between 20m and 25m in the cracked area of the westbound (outside) lane.

Increased cracking and vertical stepping of the cracked area were observed on Friday 27 January. This movement plus the heavy rainfall that had started prompted a decision to close the road to all traffic.

The embankment failed initially over a 60m length on Saturday 28 January. Refer to Figure 3.2.

A second failure increased the length of the slip to around 110m on Wednesday 1 February. The second failure included in situ soils within adjoining property to the east. Refer to Figure 3.3.

Ongoing minor losses have continued to occur in the over steepened parts of the embankment and surrounding in situ slopes, though no major additional losses have occurred.

Over steepened slopes around the margins of the slip scarp were trimmed back in March and April 2023. These site works also included forming site access tracks within and above the slip area to facilitate a more comprehensive geotechnical investigation.

Figure 3.1 – Initial cracking of pavement observed on Monday 16 January 2023.

Figure 3.2 – First failure of the embankment on Saturday 28 January 2023.

Figure 3.3 – Secondary failure of the embankment Wednesday 1 February 2023.

Figure 3.4 – Current condition of the slip scarp. Photo taken during geotechnical investigations 29 March 2023.

3.2 Current Extent of Instability

The current extent of slope instability is shown on the plan attached as Appendix A. Representative cross sections through the slip are shown in Appendix B.

The current extent of lost highway is around 110m. The existing scarp was locally trimmed back in March and April 2023 to remove over-steep materials and allow access. A remediation length of 125m has been adopted for design purposes, allowing for the likely loss of near surface soils at either end of the slip.

The depth of the slip below the pre-existing highway level is around 10m to 18m. The overall height of the reinstatement works is up to 20m to 25m when allowing for the slope into the base of the slip.

3.3 Rainfall

Measured rainfall in January 2023 was 1416mm at a nearby weather station (Pinnacles Station Rainfall Gauge), around seven times the typical monthly rainfall for that time of year. Typical monthly rainfall is 200mm to 300mm per month. The greatest previous monthly rainfall recorded at the Pinnacles Station gauge was 1055mm (since 1991). Rainfall within the Coromandel ranges can locally be higher due to topographic effects, with potential for the rainfall at the site to have been greater again.

While the overall monthly rainfall was exceptionally high, a high intensity rainfall event (i.e. mm per hour) was not noted. The highest rainfall intensity recorded was approximately equivalent to a three year return period event.

The existing culvert and drainage works were inspected by Beca when cracking was first observed. The culvert appeared to be in good working order. Run-off from the road to the east of the embankment plus surface water run-off from the slopes above the embankment were being discharged onto the slope to the north of the embankment. Water appeared to have been pooling in this area, in the order 100mm deep, due to a relatively flat grade of the area, potentially allowing more surface water to infiltrate into the embankment. An early action taken to try to save the embankment was to cut a more defined channel across the flat area to reduce the potential for ponding and infiltration. Seepage was observed at the toe of the embankment.

4 Statutory Requirements

Statutory requirement aspects were evaluated by Waka Kotahi NZTA.

4.1 Resource Management Act

The works that are required to repair the slip and to reopen State Highway 25A meet the requirements for emergency works in section 330(1) of the Resource Management Act (RMA). The highway has been affected by a sudden event which has caused serious damage to property. Immediate remedial measures are required to address the adverse effects on the environment caused by the sudden event, which include significant social and economic effects due to the very long detours which are required for access to and from the Coromandel Peninsula.

Many of these adverse effects, including the social and economic effects described above, are ongoing and will not be addressed until the road is repaired and access has been reinstated.

4.2 Wildlife Act

Options that impact on vegetation will require consideration of compliance with the Wildlife Act. Ecological assessments completed to date have identified that bat habitat and lizard habitat exist in the vegetated areas.

Expected procedures to protect any bats within vegetation clearance areas comprise monitoring to identify inhabited locations in potential roost trees and waiting for them to leave before felling the tree. This is expected to prevent vegetation clearance affecting potential roost trees between April and September.

Should lizards (or any other absolutely protected species) be encountered during the works, activities should cease while DoC is informed of the discovery, as a consent under s71 of the Wildlife Act will be required. To continue without consent would be a breach of section 65(1)(f) of the Wildlife Act.

At least 20 working days of consultation, plus additional approvals would be needed to obtain a wildlife permit handle to and relocate any animals affected by the works

4.3 Building Act

A building consent or building consent exemption is required with Thames Coromandel District Council. Waka Kotahi have approached Council in regard to obtaining an exemption which is expected to be granted and is not considered a significant risk.

5 Land Constraints

This section has been prepared with input from the Waka Kotahi NZTA property team.

The highway is position within the road corridor at the slip site. Land to the north of the slip site is managed by the Department of Conservation. The land to the south is Maori freehold land. Refer to the site plan (Appendix A) showing the road corridor boundaries.

If Waka Kotahi NZTA needed to acquire land from this property, the LINZ standards require an application to Māori Land Court for the appointment of an agent for Māori freehold land.

Waka Kotahi would then need to provide an application to the Māori Land Court for the Minister to execute.

The LINZ Guidelines also outlines the requirements for roadways over Māori freehold land. The Māori land court may pursuant to Section 316 Te Ture Whenua Māori Act 1993 lay roadways over Māori freehold land. Before an application is made Waka Kotahi NZTA would need to ensure that:

- Sufficient notice to the owners has been provide.
- Encouraged the owners to discuss and consider the proposal.
- There is a degree of support from the owners for the proposal.
- That the required consent under section 317 of Te Ture Whenua Māori Act 1993 has been obtained.

Both processes would take several months to work through, have significant risks affecting both time required and likelihood of completion of the process and the advice from the Waka Kotahi NZTA property team is that extending the roadworks footprint onto Maori land should be avoided.

6 Geotechnical Investigations

6.1 Overview

This section presents a summary of the geotechnical investigation completed as part of this assessment. This has included the following:

- Geotechnical investigations comprising machine boreholes, Cone Penetration Tests (CPTs) and test pits.
- A review of published geological maps and faults.
- A review of topographic maps and historical aerial photos.
- Field mapping of observed geological features.

This section presents the findings of these assessments.

6.2 Geology

The geological map shows the area of the landslide to be entirely within the Waiwawa Subgroup Andesite and Dacite, part of the Coromandel Group. These were deposited some 5 million to 10 million years ago. Minden Rhyolite Subgroup, part of the Whitianga Group, is mapped about 1km to the north/northeast of the site. Coroglen Subgroup Ignimbrite, part of the Whitianga Group, is mapped about 1km to the east, refer to Figure 4.1.

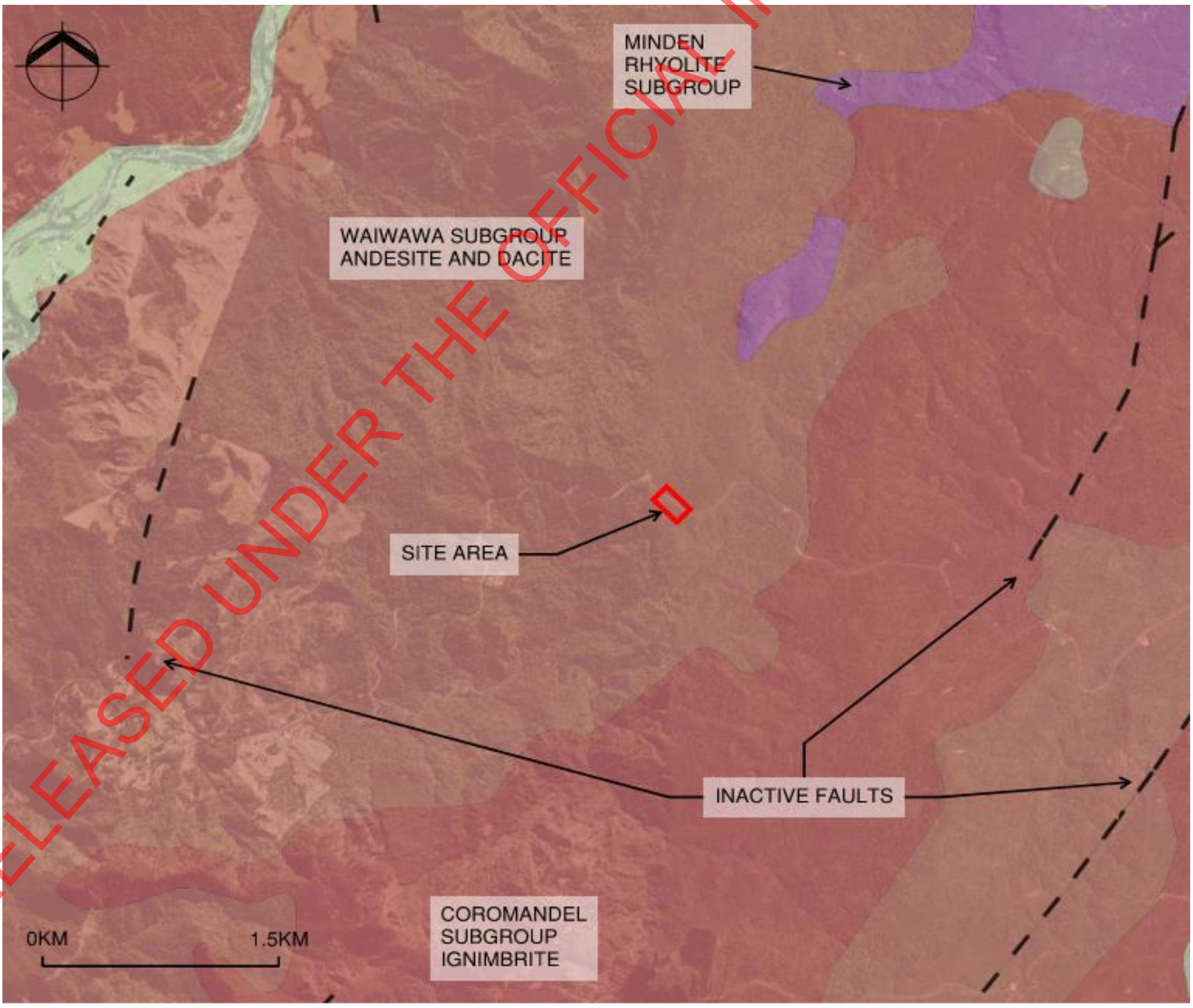


Figure 4.1 – Geological map of the area. The site area is identified as a red rectangle.

The published geological map also shows several inactive faults in the area, over 3km west and east of the slip site, aligned predominantly southwest-northeast, though occasionally north-south.

The nearest mapped active fault, sourced from the GNS Active Fault Database (2023) is the Kerepehi Fault, approximately 17km west of the slip site. The Kerepehi Fault is a normal fault with a recurrence interval of between 2,000 years and 3,500 years.

6.3 Review of Aerial Photos

The location of historical slope instability features (slip scarps, gullies etc.) and lineaments were mapped using historical aerial photographs. This included aerial photographic interpretation using stereopair photographs from 1965, plus a review of aerial photos dating from 1944 (prior to road construction), 1970 (following road construction), 1973, 1981, 1983 and recent to understand changes at the site through time. Selected aerial photographs are attached as Appendix C.

The earliest 1944 images showed a northeast-southwest aligned gully feature at the site. By 1961 there was a route traversing the gully with what appears to be some filling used to form the track. Beca understands that SH25a was constructed in the late 1960’s and was opened for use in 1968. The 1970 and 1973 images show the route to have been straightened and widened, with cut and fill batters evident along the route.

The filling across the gully appears to have extend at least 80m beyond the embankment shoulder. A review of LiDAR survey preceding the embankment failure suggests the main fill embankment was buttressed by a toe fill that extended further down the gully and that additional fill may have been placed around both the western and eastern margins of the gully.

The 1973 imagery show what appears to be an area of shallow instability on the shoulder of the road embankment.

6.4 Geotechnical Investigations

Geotechnical investigations were completed within and around the slip area during March and April 2023. The investigations comprised the following:

- 16 machine boreholes to depths of between 9.5m and 25.5m.
- Nine test pits to depths of between 2m and 4.5m.
- Nine standard Cone Penetration Tests (CPTs) to depths of between 1m and 20.5m.
- Four Seismic Cone Penetration Tests (sCPTs) to depths of between 1m and 8.5m.

A number of the CPTs completed refused above bedrock on less weathered rock within the slip debris or weathered Andesite. Several attempts were attempted at many locations where early refusal occurred, taking the deepest CPT record at each location into the assessment.

Laboratory testing is being completed to assess the fines content and grading of selected soil samples and to check the strength of rock samples recovered. This testing is not completed as at the issue date of this report. This information will be incorporated into the detailed design of the adopted option.

The geotechnical factual data will be presented as a separate deliverable to this report.

6.5 Geological Mapping and Geomorphology

The ground investigations predominantly encountered deeply weathered andesite, consistent with the mapped geology. A more basaltic andesite was encountered towards the western end of the site, observed in outcrops and boreholes in that area. The boundary between these rock types was noted to strike approximately northwest to southeast, approximately parallel to the mapped bedding orientation shown on the published geological map.

A review of the lineaments and historical instability features within the area using aerial photographs and topographic maps found that southwest-northeast lineaments dominate, with another influential set of lineaments in the southeast-northwest direction. Offsets in streams within the area indicate there has been past lateral displacement, potentially orientated roughly north-south and passing to the west of the slip site. This can be reasonably expected to have resulted from past tectonics and seismic activity that took place since the rock was first deposited. Refer to Appendix D for a plan showing identified lineaments.

Gullies have formed along many of these lineament features with evidence of historical instability and erosion, potentially as a result of weakening of the parent rock materials, weathering, rainfall and groundwater pressure development. The gully over which the SH25a embankment was formed is similar to other gullies in the wider area and is aligned with an identified lineament. The deep weathering profile across the site (between 10m and 15m depth in boreholes within the slip site area) indicates that the instability and erosion is episodic, with sufficient time between loss events to allow the parent material to weather in place to the depths encountered. Triggers for instability are likely to include severe wet weather events (elevated groundwater levels) and earthquakes. The recent wet weather did not trigger instability in the steep natural slopes above the failed embankment or in the in situ materials supporting the embankment.

Some persistent slickensided polished surfaces were observed on the eastern margin of the slip, dipping steeply toward the northwest and striking approximately southwest to northeast. These may locally influence the stability of the eastern side of the slip scarp.

Similar defects are widely noted in road cuttings formed in these materials, though these do not tend to be persistent and likely reflect the original deposition, cooling and any subsequent tectonics of the parent volcanic rock. No evidence of widespread defect-controlled instability at the site was noted in site observations, the review of aerial photographs or in the borehole logs. The steep profile of the slope above the slip, between 30 degrees and 40 degrees, and the depth of weathering, further indicate that a large-scale defect controlled instability mechanism is unlikely to be present.

7 Ground Model

The soil units adopted for the assessment are summarised in Table 5. The distribution of these materials across the slip site area is shown on geological sections, attached as Appendix B.

Unit 1 materials were sampled in three boreholes (BH01, BH02, BH03) completed prior to the embankment failing.

The recent slip debris, Unit 2, is very loose and typically saturated. Much of the material was too weak to be walked over or trafficked. This material will gain some additional strength over time as water levels drop within it but is likely to remain loose and sensitive to strength loss if trafficked or excavated.

Unit 3 was used to characterise a layer of historical slip debris mantling the in situ soils in the area. This reflects ongoing surficial instability and slope creep of the surficial soils on steep slopes. These materials were encountered in the base of the slip site, indicating the embankment failure was mainly confined to placed fill materials (Unit 1).

Exposures of Unit 4a materials appeared to be weakly cemented, likely as a result of the weathering in situ of the parent rock material. Unit 4b was characterised as a dense sand or extremely weak rock. Unit 4c and Unit 4d were both encountered as fractured rock.

The weathering profile appeared to be reasonably consistent across much of the site. Slightly weathered Andesite (Unit 4d) was commonly encountered between 10m and 15m depth below natural ground level. Completely weathered Andesite (Unit 4a), characterised by SPTs test less than 30 blows/300mm, tended to be a thick surficial layer. The intermediate Unit 4b and Unit 4c tended to be relatively thin and were variably absent in some locations.

Groundwater levels were measured in the geotechnical investigations and at observed seepage points within and above the slip site. Dissipation tests were completed in selected CPTs to check groundwater levels at these locations.

Table 5 Soil and Rock Units

Unit No.	Name	Description
1	SH25a Embankment Fill	Medium dense sand and stiff sandy silts
2	Recent Slip Debris	Very loose saturated silty sands with some clay.
3	Historical Slip Debris	Stiff to very stiff clayey silts
4a	Completely weathered Andesite	Loose to medium dense weakly cemented silty sands and sandy silts with some clay.
4b	Highly weathered Andesite	Dense weakly cemented silty sands and sandy silts with some clay plus extremely weak andesite rock.
4c	Moderately Weathered Andesite	Very weak Andesite
4d	Slightly Weathered Andesite	Weak to strong andesite

8 Geotechnical Interpretation

8.1 Soil Parameters

The material parameters adopted in this assessment are summarised in Table 6.1. The strength of Unit 4a and Unit 4b were assessed in part utilising back analysis of the existing natural slopes and cuttings. The back analysis of Unit 4a found that the required cohesion was between 8kPa and 10kPa. A value of 6kPa was adopted for the current design.

The mass strength of Unit 4c and Unit 4d were assessed using a Geological Strength Index (GSI) approach. Unit 4c has an adopted GSI of 30 to 40. A GSI of 30 was used to assess representative Mohr-Coulomb strength parameters. Unit 4d has an adopted GSI of 40 to 50. A GSI of 40 was used to assess representative Mohr-Coulomb strength parameters. Confining pressures equivalent to depths of between 10m to 15m were considered for both units.

Table 6.1 Adopted Soil Parameters

Soil Unit	Name	Unit Weight (kN/m^3)	Cohesion (kPa)	Friction Angle (degrees)	Undrained Shear Strength (kPa)
1	SH25a Embankment Fill	17	0	34	-
2	Recent Slip Debris	16	0	26	-
3	Historical Slip Debris	17	3	30	80
4a	Completely weathered Andesite	17	6-8	36	-
4b	Highly weathered Andesite	20	10	38	-
4c	Moderately Weathered Andesite	22	30	40	-
4d	Slightly Weathered Andesite	26	60	42	-

8.2 Groundwater

Groundwater levels shown on the geological cross sections (Appendix B) were adopted for design purposes.

Groundwater levels are expected to be near to the ground surface within the central slip area and near ground level at the base of the steep upper slopes above the slip scarp.

Groundwater levels are expected to be 5m to 10m below ground level within the steep slope above the slip and in the elevated spurs on either side of the gully.

8.3 Liquefaction Hazard

8.3.1 Seismic Design Criteria

The following seismic design criteria have been determined for this site:

- Design Life – 100 years
- Importance Level 3
- Site Subsoil Class - C

In accordance with the Bridge Manual the seismic loadings are summarised in Table 6.3 below.

Table 6.3 - Seismic Design Loadings

Design Event	Annual Probability of Exceedance	Return Period Factor (R_u)	Unweighted Peak Ground Acceleration (g)	Effective Magnitude (M_w)
DCLS	1/1000	1.3	0.35	5.8
SLS/ Minor	1/100	0.5	0.13	5.8

8.3.2 Liquefaction Susceptibility of Unit 4a

The in situ testing data collected in machine boreholes and CPTs indicated Unit 4a was potentially liquefiable. CPT testing typically found Unit 4a to have a q_c between 3MPa and 10MPa, tending to increase with depth. Assessed CPT I_c values in this unit tended to be between I_c=2.2 and 2.6+, indicating some soil plasticity is commonly encountered, though lower values were also encountered. In situ testing in boreholes typically recorded SPTs of N=10 to 30, also tending to increase with depth. One seismic CPT went to a reasonable depth with shear wave velocities in the region of 150m/s to 200m/s in Unit 4a. Other attempted sCPTs refused on core stones at a shallow depth.

The field data indicated that Unit 4a is suspectable to liquefaction where typical assessment tools are used, though the I_c values are in a range (I_c values above 2.2) where further testing is recommended to be completed to assess the influence of soil plasticity. The liquefaction hazard in volcanic soils in New Zealand commonly requires further assessment.

Laboratory testing was undertaken on Unit 4a materials to assess susceptibility to liquefaction. The tests included Atterberg tests and gradings. Some of the Plastic Limit tests reported zero values, though these were assessed to be un-representative due to the high proportion of fine sandy particles in the test making the low plastic limit difficult to measure. Linear Shrinkage (LS) tests consistently measured values of 4% to 8%, indicating plastic fine grained materials to be consistently present. The overall testing, including inferred PI from LS tests, indicated a PI in the range of 8% to 12%. Grading tests typically encountered a fines content of 20% to 30%. The grading data and PI tests indicated the material was potentially susceptibility to liquefaction when using conventional assessment criteria.

The Completely Weathered Andesite (Unit 4a) is not expected to be liquefiable given the age and origin of the materials. Geological mapping has not identified features that are consistent with past liquefaction (e.g. slope failures on shallow grades). The deep weathered soil profile measured in boreholes could not develop if the upper weathered soils were subject to liquefaction and associated slope instability.

The weathered andesite materials appear to retain some inherent strength that exceeds that predicted by conventional testing, which likely under-estimates the strength of the material due to voids within the structure as a result of weathering in place (e.g. SPTs consistent with a loose to medium dense soil vs. back analysis that indicates a weakly cemented rock), similar to issues identified in pumice soils.

As such, Unit 4a has been assessed to be non-liquefiable. This was discussed and agreed on 26 April 2023 with Earthtech, the geotechnical peer reviewer and with a Waka Kotahi NZTA geotechnical subject matter expert.

This will require a departure from the Waka Kotahi NZTA Bridge Manual given the agreed approach differs from the methodology as set out in the Manual.

8.3.3 Liquefaction Susceptibility of Unit 4b, Unit 4c and Unit 4d

Unit 4b was assessed to be non-liquefiable due to its relative density. Unit 4c and Unit 4d were assessed to be non-liquefiable due to their composition and strength.

8.4 Slope Stability Hazard

8.4.1 Embankment Failure Back Analysis

The failure of the SH25a embankment was back-analysed using the geotechnical data collected prior to the embankment failure (BH01, BH02 and BH03), and adopting a groundwater profile consistent with measurements within the boreholes and observations of seepage at the toe of the embankment.

The back analysis reasonably predicted the failure that occurred in January and February of 2023. The failure appears to have been largely confined to placed fill material used to form an embankment to support SH25a. Post failure geotechnical investigations within the slip area encountered what appeared to be the original ground surface in many investigation locations, indicating that the in situ soils had sufficient strength to prevent a deeper and larger failure from occurring.

The failure of the embankment appears likely to have been associated with the extreme rainfall that occurred in the preceding months, sufficient to allow water pressures to build up within the embankment to levels greater than would have been allowed for when the embankment was constructed in the 1960's.

The shallow instability noted on aerial photos from 1973 (Section 6.3) may have been caused by surface water runoff from the road discharging onto the embankment, causing localised elevated water pressures at that location. A kerb and channel was constructed along the embankment shoulder (date unknown) that may have been a measure to reduce the risk of further losses via this mechanism.

8.4.2 Current Stability within the Slip Area

The loose debris within the slip area (Unit 2) remains only marginally stable and has experienced localised slope movements during and following recent rainfall events. This material is likely to remain marginally stable over the coming winter of 2023.

The underlying weathered andesite slopes within the slip area are expected to have a low stability margin, that may improve if groundwater levels decrease over time. Benching and drainage is expected to be needed to form access into the slip area to facilitate repair. All remediation options developed have considered slope stability and include stabilisation measures to meet required design standards for slope stability for new infrastructure.

No movement of the steep natural slopes above the slip area was observed during the recent heavy rainfall events. Movement of these upper slopes is not expected to occur where groundwater levels drop to normal levels. Care will be needed during remediation to avoid undercutting at the base of these slopes or blocking existing seepage discharges that could cause water pressures to locally increase in the slopes above.

9 Concept Options

The following remediation options have been developed sufficiently for evaluation of programme and pricing:

- Option 6a: Steel Bridge. Construct a new steel bridge over the slip following the original road alignment.
- Option 6b: Concrete Bridge. Construct a new concrete bridge over the slip following the original road alignment.
- Option 7: Re-alignment. Form a new road to the north of the existing alignment by cutting into the existing slope behind the recent slip headscarp.
- Option 10a: Rockfill Embankment. Reinstate the road along a realigned horizontal alignment using a rockfill embankment benched into the underlying in situ soils.
- Option 10c: Tied-back Retaining Wall. Reinstate the road along a realigned horizontal alignment, supporting the new road using a tied back embedded retaining wall with ground anchors.

These options have all been assessed to be capable of meeting required design standards for new roading infrastructure as set out in the Waka Kotahi NZTA Bridge Manual, based on the assessment and design completed to date. Any selected option will require further design in order to develop a solution suitable for construction and to confirm current design assumptions.

Other options evaluated as part of the current design stage that were assessed to be not reasonably feasible are as summarised below:

- A rockfill embankment along the original road alignment was considered. This option does not fit within the property boundary towards the eastern end of the alignment where loose spoil is around 8m deep. However, constructing a section of rockfill embankment at the western end of a bridge option could allow the length of the bridge to be reduced and potentially also retain the merge width of the passing lane, by shifting the western abutment eastwards onto an embankment. This could be considered if a bridge option is selected.
- A mechanically stabilised earth (MSE) slope was considered following the original road alignment. This option was found to not meet global stability requirements unless the toe was supported by either a large rockfill platform (which did not fit within the road corridor at the eastern end of the site where 8m deep spoil is present) or shear piles (which became too big to be reasonably constructable).
- A mechanically stabilised earth (MSE) slope following a revised road alignment was assessed but found to not meet global stability requirements and could be difficult to construct due to the need for localised excavations into the existing slip scarp to accommodate the length of geogrids required.

The status and development history of current and previously considered options are summarised in Table 9.1.

A description of each of the five options being taken forward, together with cost, programme, risks and opportunities, is presented in the following sections of this report.

No option currently considers remediation of the slip area other than what would be needed to construct the remediation option.

Table 9.1 Option Assessment Summary

Option Id	Option Type	When Considered	Commentary	Option Status
1	Road Realignment	Initial Assessment (Feb 2023)	Superseded by Option 7 (same concept, smaller footprint, lower cost, shorter programme).	Not presented
2	Road Realignment	Initial Assessment (Feb 2023)	Superseded by Option 7 (same concept, smaller footprint, lower cost, shorter programme).	Not presented
3	Rockfill Embankment	Initial Assessment (Feb 2023) and Remediation Design (May 2023)	The footprint of the embankment encroached beyond the road corridor into private land to the south. Geotechnical stability issues due to depth of slip debris and ground profile. Superseded by Option 10a.	Not presented
4	Twin Pile Retaining Wall	Initial Assessment (Feb 2023)	This structure was relatively complex (two walls tied with anchors at several levels. A bridge option was identified as cheaper and faster. Superseded by Option 10c (similar concept, cheaper, faster). Not considered further.	Not presented
5	MSE Retaining Wall	Initial Assessment (Feb 2023) and Remediation Design (May 2023)	Initially identified as a potentially favourable option (prior to completing geotechnical investigations) if ground conditions were suitable. Subsequent design including geotechnical data found the option could not meet stability requirements (deep soils in the base of the slip) and had a high risk of needing earthworks outside of the southern road corridor boundary. Various sub-option checks completed to assess feasibility, including using shear piles, a rockfill base and pumice backfill where undertaken. Superseded by Option 10b.	Not presented
6	Bridge	Initial Assessment (Feb 2023) and Remediation Design (May 2023)	Option expected to be able to achieve required design standards. Expanded to Option 6a and Option 6b.	Presented for consideration
7	Road Realignment	Remediation Design (May 2023)	Preferred re-alignment option with a smaller footprint relative to Option 1 and Option 2. Option developed sufficient to compare to other options. Option	Presented for consideration

			expected to be able to achieve required design standards.	
8	Geotechnical Investigation Access	-	Geometric design of construction access for geotechnical investigations, checking the access track could gain access to Option 7 alignment.	Not presented
9	Geotechnical Investigation Access	-	Geometric design of construction access for geotechnical investigations, checking the access track could gain access to Option 7 alignment.	Not presented
10a	Rockfill Embankment	Remediation Design (May 2023)	Rockfill embankment for a realigned SH25a towards the northern edge of the slip. Option expected to be able to achieve required design standards.	Presented for consideration
10b	MSE Wall	Remediation Design (May 2023)	MSE Wall for a realigned SH25a towards the northern edge of the slip. The was assessed to be unlikely to achieve required stability design standards. Option 10c is preferable for a slope with flatter grades (cheaper and faster to construct). Temporary excavation needed to construct the geogrids required steep excavation into the slip scarp in some areas of the slip, presenting a high construction risk of triggering further slope instability.	Not presented
10c	Tied-back Retaining Wall	Remediation Design (May 2023)	Pile retaining wall supported with ground anchors for a realigned SH25a towards the northern edge of the slip. Option expected to be able to achieve required design standards.	Presented for consideration

10 Option 6a: Steel Bridge

This is one of two bridge options considered. Refer to Section 11 for discussion of a concrete bridge option.

10.1 Option Description

A new steel bridge would be constructed along the same alignment as the existing highway with an approximate total length of 125m between abutments. This option will have a similar footprint, substructure and foundation as Option 6b, the concrete bridge. The main difference between the two options is that the superstructure form is different.

The bridge would be a multi-span steel girder beam bridge, constructed using modular and accelerated bridge construction techniques. The bridge is expected to be 11m wide to allow for two 3.5m lanes,1.5m wide shoulders and TL5 Rigid concrete barriers.

The bridge is proposed to consist of four spans with three piers and two abutments. A span arrangement of 25m, 37m, 37m and 25m is currently proposed. Due to the steep topography, it is likely to be advantageous to minimise the number of piers, as this will reduce works on the steep slopes, and thus reduce safety and construction risk. Short span bridge options (for example hollowcore bridge beams) could be considered but would require more piers and a commensurate increase in the quantity of piles and groundworks required.

The superstructure is proposed to consist of four fabricated steel plate girders, supporting a reinforced concrete bridge deck. The bridge deck is proposed to be constructed using 275mm-300mm thick full depth precast deck panels, which will be modular and allow for rapid installation of the deck once the girders are constructed. This minimises the extent of in situ concrete pours and critical path of the project. The steel girders are proposed to be connected to the pier cap beams using pre-stressed high strength steel bars.

Steel bridge beams are expected to be fabricated into 20m long sections and spliced on site with bolted connections. The expected weight of steel beams is in the order of 14T per beam, meaning smaller cranes and temporary works will be required for a steel bridge option when compared to a concrete bridge (option 6b).

Steel beams will be lifted in pairs with permanent bracing installed and will be ready to receive the precast deck panels within a number of days. To speed up construction on site even further, full deck depth precast panels are proposed, meaning that in situ reinforcement and concrete placement will be minimised, which greatly reduces overall programme when compared to an in situ bridge deck (as is the case for Super Tee bridges) or partial depth precast bridge decking.

The superstructure will be supported by a precast reinforced concrete pier cap (or steel crosshead), which is made integral with steel cased circular bridge piers. The bridge pier columns will be supported on deep piles, with either a pile cap atop the piles or continuous with the piles. The piles will be founded in the slightly weathered rock. The estimated pile and pier column size is between 900mm to 1050mm in diameter.

Key to improving the constructability of a bridge option is to develop a design which minimises the weight of elements. A steel bridge option provides more opportunity for smaller and lighter components to be used in the design.

Available geotechnical information indicates that rock levels vary across the bridge footprint and dip to the south. The southern row of piles is estimated to be around 25m to 30m long and the northern row around 20m to 25m long.

The bridge abutment slopes are expected to require retention of the soils (upper 5m) and stabilisation. Embedded pile retaining walls have been allowed to provide this retention.

Some excavation of slip material will be required where it may laterally load the bridge piers. The volume of material that needs to be removed is estimated to be 3,000m^3 to 5,000m^3. Current estimates allow for 5,000m^3.

Existing slopes at each pier location were assessed not to meet required design standards for slope stability. The design allows to regrade each pier area and install counterfort drains to improve the local slope stability around each pier. Other drainage works will be needed to capture and divert seepage from the slopes above the piers. These measures alone are not expected to be adequate to meet required design standards. All piers are expected to need to be designed to resist some lateral soil loads, sufficient to meet required design standards. This is proposed to be achieved by founding piles sufficiently deep to gain moment fixity within the underlying slightly weathered rock. A pile cap will provide additional restraint at ground level. Additional shear piles have been included at each pier location as an option to carry lateral soil loads.

Some localised retaining works (e.g. soil nail retained cuts) are expected to be required at Pier D in order to form a working platform.

Refer to Appendix E for sketches of this option.

Key Parameters for Option 6a:

- Carriageway width: 10m (2 x 3.5m lane, 2 x 1.5m shoulder)
- Bridge width: 11m
- Bridge length: 125m
- Footprint: 1,400m^2
- 1.5m deep steel plate girders
- 0.275m to 0.3m thick precast deck panels
- Precast concrete TL5 barriers
- 3 No. piers consisting each of precast pier caps, 3 No. 900mm dia. steel cased circular columns/pile, and pile cap.
- 2 No. In situ reinforced concrete abutments on 3 No. 900dia steel cased circular piles.
- Four 900mm diameter steel cased circular piles per pier to provide lateral slope support.
- Embedded pile retaining wall on abutment approaches.
- Soil nailed retained cut at Pier D.

10.2 Estimated Cost

The estimated cost for Option 6a is in the order of $23M(P50) to $28M(P95).

Costs are based on the basic quantities and sketches as attached and set out above and are subject to revision as a result of preliminary and detailed design. Costs include allowances for Preliminary and General, profit margin, design and management costs. The estimated cost of physical works was around $16M.

10.3 Estimated Programme

Option 6a is expected to take around 11 months to 13 months to design and construct.

Significant programme risks for Option 6a include the following:

- Slow progress due to construction over winter.
- Delays in procuring materials.
- The programme assumes bridge design and review proceeding in parallel with construction, risking procurement being delayed until design is completed.

The upper programme estimate includes an allowance of 2 months for these risks.

10.4 Risks and Opportunities

Risk and opportunities discussed here for Option 6a are similar to those for Option 6b. Differences in procurement and programme are discussed above.

10.4.1 Road Geometrics

The geometrics for Option 6a will be the same as the previous road.

The crossfall on the bridge will need to vary across the length to suit the required super elevation for the curve at the end of the eastern end of bridge. The bridge deck levels will be set to achieve the desired superelevation of the road.

This option would require modification of the existing passing lane to the east of the site.

10.4.2 Land Purchase

No land purchase is expected to be required.

10.4.3 Statutory Requirements

10.4.3.1 Wildlife Act

Option 6a does not require new areas of vegetation to be cleared for the project works and is therefore at a low risk of being affected by delays to construction associated with compliance with the envisaged protocols to manage bats and lizards.

10.4.3.2 Building Consent

A building consent or building consent exemption is required with Thames Coromandel District Council. Waka Kotahi has approached Council in regard to obtaining an exemption which is expected to be granted and is not considered a significant risk.

10.4.4 Geotechnical and Earthworks

The bridge option will require access to be formed to pier locations to allow pile construction. The access will require further excavation of slip debris and in situ soils. Existing access is limited to tracked mobile plant (e.g. excavator and bulldozers). An all-weather construction platform will be needed at each pier location to allow the piles and piers to be constructed, which will require specific temporary works.

A bridge option is likely to be at a lower risk of being affected by winter construction relative to other potential remediation options once access is formed and sub-structure construction completed.

11 Option 6b: Concrete Bridge

This is one of two bridge options considered. Refer to Section 10 for discussion of a steel bridge option.

11.1 Option Description

A new concrete bridge would be constructed along the same alignment as the existing highway with an approximate total length of 125m between abutments. This option will have a similar footprint and substructure and foundation as Option 6a. The main difference between the two options is that the superstructure form is different.

The bridge would be a multi-span precast concrete super tee bridge, constructed using modular and accelerated bridge construction techniques. The bridge width is expected to be 11m wide to allow for two lanes, shoulders and TL5 Rigid concrete barriers.

The bridge is proposed to consist of four spans, with three piers, and two abutments. The proposed span arrangement is four 30.5m spans. The superstructure is proposed to consist of five precast supertee girders, with an in situ reinforced concrete bridge deck. The precast bridge beams weigh in the order of 45T to 50T per beam for 30m spans. These precast elements are indivisible and thus must be transported to site and erected into position.

The superstructure will be supported by a precast reinforced concrete pier cap, which is supported by steel cased circular bridge pier columns.

In situ reinforced concrete diaphragms will be required at the piers to make the bridge structurally integral with piers. The bridge pier columns will be supported on deep piles, with either a pile cap atop the piles or continuous with the piles. The piles will be founded in the slightly weathered rock. It is estimated pile and pier sizes will be between 900mm to 1050m in diameter. It is expected an additional pile per pier may be required for this option when compared to 6a due to the heaver bridge weight and greater seismic demands, and/or deeper piles.

Available geotechnical information indicates that rock is encountered at varying depths across the project site. The southern row of piles is estimated to be around 30m long and the northern row around 25m long.

The bridge abutment slopes are expected to require retention of the soils (upper 5m) and stabilisation of the abutment slopes to provide adequate slope stability. Embedded pile retaining walls have been allowed for to provide this retention of the upper slopes.

Some excavation of slip material will be required where it may laterally load the bridge piers. The volume of material that needs to be removed is provisionally estimated to be 3,000m^3 to 5,000m^3. Current estimates allow for 5,000m^3.

Existing slopes at each pier location were assessed not to meet required design standards for slope stability. The design allows to regrade each pier area and install counterfort drains to improve the local slope stability around each pier. Other drainage works will be needed to capture and divert seepage from the slopes above the piers. These measures alone are not expected to be adequate to meet required design standards. All piers are expected to need to be designed to resist some lateral soil loads, sufficient to meet required design standards. This is proposed to be achieved by founding piles sufficiently deep to gain moment fixity within the underlying slightly weathered rock plus a pile cap to provide additional restraint at ground level. Additional shear piles have been included at each pier location as an option to carry lateral soil loads.

Some localised retaining works (e.g., soil nail retained cuts) are expected to be required at Pier D in order to form a working platform.

Refer to Appendix F for sketches of this option.

Key Parameters for Option 6b:

- Carriageway width: 10m (2 x 3.5m lane, 2 x 1.5m shoulders)
- Bridge width: 11m
- Bridge length: 125m
- Footprint: 1,400m^2
- 20 No. 1.2m supertee girders with 0.2m thick in situ concrete bridge deck.
- 3 No. piers consisting each of precast pier caps with in situ concrete diaphragms to make piers integral with beams, resting on 3 or 4 No. 900mm dia. steel cased circular columns/pile, and pile cap.
- 2 No. In situ reinforced concrete abutments on 3 or 4 No. 900 dia. steel cased circular piles.
- Precast concrete TL5 rigid concrete barriers on bridge
- Four 900mm diameter steel cased circular piles per pier to provide lateral slope support.
- Embedded pile retaining wall on abutment approaches.
- Soil nailed retained cut at Pier D.

11.2 Estimated Cost

The estimated cost for Option 6b is in the order of $21M(P50) to $26M(P95).

Costs are based on the basic quantities and sketches as attached set out above and are subject to revision as a result of detailed design. Costs include allowances for Preliminary and General, profit margin, design and management costs. The estimated cost of physical works was around $15M.

11.3 Estimated Programme

Option 6b is expected to take around 12 months to 14 months design and construct.

An allowance for a resource consent (if required) has not been included in this estimated duration.

Significant programme risks for Option 6b include the following:

- Slow progress due to construction over winter.
- Delays in procuring materials.
- The programme assumes bridge design and review proceeding in parallel with construction, risking procurement being delayed until design is completed.

The upper programme estimate includes an allowance of up to 2 months for these risks.

11.4 Risks and Opportunities

Risk and opportunities discussed here for Option 6b are similar to those for Option 6a. Differences in procurement and programme are discussed above.

11.4.1 Road Geometrics

The geometrics for Option 6b will be the same as the previous road.

The crossfall on the bridge will need to vary across the length to suit the required super elevation for the curve at the end of the eastern end of bridge. The bridge deck levels will be set to achieve the desired superelevation of the road.

This option would require modification of the existing passing lane to the east of the site.

11.4.2 Land Purchase

No land purchase is expected to be required.

11.4.3 Statutory Requirements

11.4.3.1 Wildlife Act

Option 6b does not require new areas of vegetation to be cleared for the project works and is therefore at a low risk of being affected by delays to construction associated with compliance with the envisaged protocols to manage bats and lizards.

11.4.3.2 Building Consent

A building consent or building consent exemption is required with Thames Coromandel District Council. Waka Kotahi has approached Council in regard to obtaining an exemption which is expected to be granted and is not considered a significant risk.

11.4.4 Geotechnical and Earthworks

The bridge option will require access to be formed to pier locations to allow pile construction, requiring further excavation of slip debris and in situ soils. Existing access is limited to tracked mobile plant (e.g. excavator and bulldozers). An all-weather construction platform will be needed at each pier location to allow the piles and piers to be constructed, which will require specific temporary works.

A bridge option is likely to be at a lower risk of being affected by winter construction relative to other potential remediation options once access is formed and sub-structure construction completed.

12 Option 7: Road Re-alignment

12.1 Option Description

This option comprises forming a new bypass of SH25a to the north of the slip scarp over a length of around 450m. This option would require cut slopes up to 23m deep along the alignment. Cuts would be formed using 10m high batters sloped at 1.25:1(horizontal:vertical) with 5m wide benches. The overall slope grade would be around 1.75:1(horizontal:vertical). The alignment of Option 7 was selected as one that had a smaller footprint relative to other bypass options considered previously.

The overall volume of excavation is estimated to be around 400,000m^3, with around 8% being rock excavation. Most excavation is estimated to be in soils or CW rock, as shown on the typical sections. An existing suitable location to dispose of this quantity of spoil was not identified. New spoil disposal sites would likely need to be to be identified/purchased and consented as part for the project works, potentially one on each side of SH25a to allow excavation to proceed at both ends.

The cut faces are assumed to be hydroseeded to assist in establishing vegetation. Drainage works within the large cutting would include swale drains running along each bench, plus inclined bored drains at locations where seepage was identified.

The footprint of the option encroaches into Department of Conservation land, requiring around 10,000m^2 to 20,000m^2 be acquired, subject to the final design of the slopes and allowances for a working corridor at the slope crest.

The option will require the existing slip scarp to be trimmed back to a more stable profile and counterfort drains to pick up seepage.

This option has not been developed to the same level of detail as others as a result of the identified high cost (refer Section 12.2), long programme (Section 12.3) and significant risks (Section 12.4) relative to other options being assessed. It remains in consideration as a technically feasible alternative if other proposed options were subsequently found not to be preferred.

Refer to Appendix G for a design model data, typical section sketches and estimated quantities for this option.

12.2 Estimated Cost

The estimated cost for this option is in the order of $35M(P50) to $54M(P95).

Costs are based on the basic quantities as set out above and are subject to refinement if this option is recommended to be considered further. Costs include allowances for Preliminary and General, margin, design and management costs.

Costs do not allow for land purchase and notice of requirement processes for this option.

12.3 Estimated Programme

Physical works for this option are expected to take around 24 months to 36 months to complete, depending on the rate of excavation and weather.

Additional time needed to allow agreements for access onto DoC land for construction (with acquisition following) and to comply with the requirements of the Wildlife Act would likely be in the order of 12 months or more and could cause further delays where habitat checks proceeded slower than envisaged, noting that no bats can be relocated between April and September. New resource consents are also expected to be needed for new spoil disposal sites as these are not covered under the Emergency provisions.

The envisaged overall duration for this option is in the order of 3 years to 4 years, longer than other options being considered.

12.4 Risks and Opportunities

12.4.1 Road Geometrics

The new road geometrics can meet or exceed the geometrics of the existing road (e.g. similar or higher design speed).

12.4.2 Land Purchase

New land acquisition would be required from existing landowner (Department of Conservation) and there may be a requirement for offset mitigation in respect of vegetation cleared for the new route.

12.4.3 Statutory Requirements

12.4.3.1 Resource Management Act

Option 7 would likely require a resource consent for one or two new spoil disposal sites to manage the expected volume of cut to waste for this option.

12.4.3.2 Wildlife Act

The significant disturbance footprint associated with Option 7 will require a significant amount of work to comply with requirements of the Wildlife Act as currently understood as well as the potential for other environmental requirements for native vegetation clearance within DoC land. This poses a notable limitation to completing the works quickly relative to the other options being considered.

12.4.3.3 Building Consent

A building consent is not expected to be required for this option.

12.4.4 Geotechnical and Earthworks

This option would require additional geotechnical investigations to check the ground conditions near the crest of the proposed cut excavation, needing an access track to be cut along an existing ridgeline.

The option requires extensive earthworks that would be adversely affected by wet weather. Establishing access would require all weather temporary access tracks to be established multiple times to suit the progressive excavation required.

There is a risk of increased cut volumes and/or slope retaining works (e.g., rock bolting) if adverse rock defects are encountered, with an accompanying high risk of delays to programme while retaining works are developed.

There is a risk of delays and increased costs if the rock is more extensive than currently estimated or is more difficult to excavate, with potential to require blasting.

The high volume of cut to waste will require a significant number of truck movements on the existing SH25a. This has the potential to damage the road and require additional pavement maintenance prior to re-opening SH25a.

13 Option 10a: Rockfill Embankment

13.1 Option Description

This option comprises re-constructing SH25a to the north of the existing alignment, placing the new state highway near the headscarp of the recent slip. The new highway would be supported on a rockfill embankment over a length of around 130m constructed on a slope. A new soil nail retained cut slope would be used at the eastern end of the realignment over a length of around 80m.

Excavation of slip material will be required to provide a suitable support for the rockfill, requiring access into the slip area. Access is likely to be made from the western end where grades are flatter and where land is available to stockpile construction materials, though a steeper access route is now also possible from the east. The volume of material that needs to be removed is estimated to be around 46,000m^3 based on current geotechnical data. This is significantly greater than previously assessed.

Current costs allow to cart the spoil to Leaches' Matatoki Quarry subject to any potential consenting requirements. Finding a closer and cheaper disposal site would likely reduce costs, though may require additional time to obtain necessary resource consents.

The rockfill is formed with a 2:1 (horizontal:vertical) slope. Large angular rock is to be used, sufficient to meet the strength and stability requirements. The rock size is envisaged to be 100mm to 400mm diameter. Rock would be procured from nearby quarries including Leaches' Matatoki Quarry to the west and Peninsular Aggregates' McBeths Quarry to the east. Both quarries may be used as an option to increase the rate of production. The placed rock fill volume required is estimated to be around 64,000m^3.

The rockfill will need to be free draining sufficient to prevent groundwater building up within the embankment and to discharge seepage from the surrounding natural slopes.

The proposed road alignment will require a new cut at the eastern end of the slip site over a length of around 80m. A soil nail retained cut with a reinforced concrete shotcrete facing is proposed to minimise the extent of excavation into existing vegetation and to meet project design standards for new cut slopes. Existing slopes above the soil nail retained cuts would be left at their current profile. This was discussed and agreed on 26 April 2023 with Earthtech, the geotechnical peer reviewer and with a Waka Kotahi NZTA geotechnical subject matter expert.

Drainage works for this option include counterfort drains below parts of the embankment, a free draining drainage blanket along the base of the embankment, and inclined bored drains installed into the slope above the embankment. Other localised drainage works will be needed to pick up and discharge identified seepage from in situ soils below the embankment. New swale drains and culvert will be needed to reinstate drainage of the surface water from the highway.

Pavement works are expected to include the construction of new pavements over the rockfill embankment, plus substantial realignment or reconstruction of the existing pavements over an extent of around 50m on either side.

Refer to Appendix H for design model data, typical section sketches and estimated quantities for this option.

13.2 Estimated Cost

The estimated cost for Option 10a is in the order of $24M(P50) to $33M(P95).

Costs are based on the basic quantities and sketches set out above and are subject to revision as a result of detailed design. Costs include allowances for Preliminary and General, profit margin, design and management costs.

13.3 Estimated Programme

Option 10a is expected to take around 12 months to 24 months to design and construct.

An allowance for a resource consent (if required) has not been included in this estimated duration.

Significant programme risks for Option 10a include the following:

- Slow progress in the excavation of spoil due to wet weather. Contractor feedback noted this to be a significant risk for the rockfill option due to uncertainties in methodology and weather. Both contractors commented that the potential programme impact could be around one year, allowing to use a second earthworks season to complete the work.
- Additional delay in forming suitable foundation for rockfill in wet weather and may require additional excavation/ undercut.
- Delays where the spoil location cannot receive adequate material or where a new spoil location cannot gain required necessary resource consents in time to suit the programme.
- Embankment design and review proceeding in parallel with construction, risking procurement being delayed until design is completed. This is a low risk relative to the bridge and retaining wall options due to the less complex design.

The upper programme estimate includes an allowance of 12 months for these risks.

13.4 Risks and Opportunities

13.4.1 Road Geometrics

The geometrics for Option 10a have adopted horizontal and vertical geometric standards consistent with the existing SH25a geometrics in that area and will maintain the existing design speed.

This option would require modification of the existing passing lane to the east of the site.

13.4.2 Land Purchase

No land purchase is expected to be required, though the rockfill toe position relative to the property boundary is sensitive to the depth of slip debris.

The toe of the rockfill embankment could potentially encroach in privately owned land to the south of the road corridor if the depth of slip debris in this area was deeper than indicated by current investigations. This risk could be managed by adjusting the alignment to increase the setback of the rockfill toe at the base of the slope.

The excavation of spoil from this within the road corridor area to construct the rockfill embankment could also affect slip debris within privately owned land (e.g. cause some of it to fall back into the site). Temporary works could potentially be needed to retain the excavation.

13.4.3 Statutory Requirements

13.4.3.1 Wildlife Act

Option 10a will require limited areas of vegetation clearance between Ch4000 and Ch4040 (around 600m^2) plus clearance of an existing cutting between Ch4040 and Ch100m (around 300m^2) to accommodate realignment in this area and construction of a soil nail retained cut. The expected procedures to manage bats and lizards are expected to be able to be completed for this small section without affecting the overall programme.

13.4.3.2 Building Consent

A building consent or building consent exemption is required with Thames Coromandel District Council. Waka Kotahi has approached Council in regard to obtaining an exemption which is expected to be granted and is not considered a significant risk.

13.4.4 Geotechnical and Earthworks

This option is expected to meet stability design standards where the base can be keyed into in situ soils. Excavation quantities and rock fill quantities could both increase if the depth to these materials is deeper than currently assessed based on current information. This risk may be managed by completing further geotechnical checks of the spoil thickness in the vicinity of the embankment toe, especially within the eastern end of the slip where the road corridor narrows.

Forming access tracks into the slip and excavating the slip debris, especially during winter, will be challenging and has been highlighted as a significant risk by contractors. Progressively excavating and placing initial rockfill materials to form access into the site may assist to manage this risk. Both contractors recommended allowing a generous allowance for delays associated with the difficult conditions and the sensitivity to weather conditions.

Much of the rock fill may be able to end-tipped into the excavation then pushed into place using a large excavator or bulldozer.

A disposal location for the cut to waste material will need to be confirmed. Off-site disposal is currently assumed in the Kopu area. Disposal on site likely requires co-operation of the adjoining private landowner and be subject to meeting resource consent requirements.

14 Option 10c Tied Back Retaining Wall

14.1 Option Description

This option comprises re-constructing the highway following realignment of SH25a to the northern edge of the slip scarp using a tied back bored pile retaining wall over a length of around 140m. A new soil nail retained cut slope would be used at the eastern end of the realignment over a length of around 80m.

The option utilises 900mm diameter piles spaced at 2.7m centres, requiring 52 piles. The retained face will be around 10m high over much of the extent of the structure. The wall would be backfilled with engineered hardfill (e.g. GAP65) plus drainage works to pick up seepage from the in situ retained soils.

The overall pile length will be around 24m, including a socket into Slightly Weathered Andesite (Unit 4d) to laterally restrain the toe of the pile, requiring boring into this unit. All piles would be connected at the top by a continuous pile cap and TL5 barrier.

Each pile would be laterally supported by two high strength strand anchors that would be grouted into Unit 4d rock.

Excavation of slip material and in situ soils for this option is estimated to be around 12,000m^3. Current costs allow to cart the spoil to Leaches' Matatoki Quarry.

The proposed road alignment will require a new cut at the eastern end of the slip site over a length of around 80m. A soil nail retained cut with a reinforced concrete shotcrete facing is proposed to minimise the extent of excavation into existing vegetation and to meet project design standards for new cut slopes. Existing slopes above the soil nail retained cuts would be left at their current profile. This was discussed and agreed on 26 April 2023 with Earthtech, the geotechnical peer reviewer and with a Waka Kotahi NZTA geotechnical subject matter expert.

Drainage works for this option include counterfort drains installed on the slope below the wall, a free draining drainage blanket along the base and back of the retained fill, and inclined bored drains installed into the slope above the wall. Other localised drainage works will be needed to pick up and discharge identified seepage from in situ soils below the embankment. New swale drains and culvert will be needed to reinstate drainage of the surface water from the highway.

Pavement works are expected to include the construction of new pavements above the retaining structure plus substantial realignment or reconstruction of the existing pavements over an extent of around 50m on either side.

Refer to Appendix I for design model data, typical section sketches and estimated quantities for this option.

14.2 Estimated Cost

The estimated cost for Option 10c is in the order of $24M(P50) to $32M(P95).

Costs are based on the basic quantities and sketches as attached and set out above and are subject to revision as a result of detailed design. Costs include allowances for Preliminary and General, profit margin, design and management costs.

14.3 Estimated Programme

Option 10c is expected to take around 12 months to 16 months to design and construct.

An allowance for a resource consent (if required) has not been included in this estimated duration.

Significant programme risks for Option 10c include the following:

- Slow progress due to wet weather. This risk is most significant during initial establishment and piling. This risk may be managed by forming temporary staging to support piling equipment and progressively backfilling behind the piles to form temporary access.
- Delays where the spoil location cannot receive adequate material or where a new spoil location cannot gain necessary resource consents in time to suit the programme. This is a reduced risk relative to Option 7 and Option 10a due to the smaller quantities involved.
- Wall design and review proceeding in parallel with construction, risking procurement being delayed until design is completed.

The upper programme estimate includes an allowance of 4 months for these risks.

14.4 Risks and Opportunities

14.4.1 Road Geometrics

The geometrics for Option 10a have adopted horizontal and vertical geometric standards consistent with the existing SH25a geometrics in that area and will maintain the existing design speed.

The option does not allow for the retention of the existing passing lane located to the west of the slip site.

14.4.2 Land Purchase

No land purchase is required.

14.4.3 Statutory Requirements

14.4.3.1 Wildlife Act

Option 10c will require limited areas of vegetation clearance between Ch4000 and Ch4040 (around 600m^2) plus clearance of an existing cutting between Ch4040 and Ch100m (around 300m^2) to accommodate realignment in this area and construction of a soil nail retained cut. Procedures to manage bats and lizards are expected to be able to be completed for this small section without affecting the overall programme.

14.4.3.2 Building Consent

A building consent or building consent exemption is required with Thames Coromandel District Council. Waka Kotahi has approached Council in regard to obtaining an exemption which is expected to be granted and is not considered a significant risk.

14.4.4 Geotechnical and Earthworks

The retaining wall design is influenced by variability in the ground conditions. The design completed to date is based on the greatest retained height envisaged and rock levels as assessed from completed boreholes. Delays could occur where rock levels were found to be deeper than current information indicates or where the effective retained height increases, requiring the design to be revised. This risk may be able to be reduced by completing additional geotechnical investigations along the wall alignment and managed by including allowances for uncertainty (e.g. redundancy) in the detailed design.

Forming suitable level access tracks into the slip along the wall location to allow pile construction and excavating the slip debris during winter will be challenging. The contractor methodology is expected to need to allow for an all-weather access track to be constructed and to utilise construction plant suited to the conditions. A piled construction platform may be needed to support the piling rig during initial pile placement. The wall piles, once constructed, are expected to be able to be used to support temporary access behind the wall.

15 Temporary Options

Several temporary options were assessed to reinstate SH25a while a permanent repair was undertaken. These options included an earthworks bypass, use of temporary staging to bridge over the slip and formation of a limited access track across the slip.

Excavation of a bypass option around the headscarp of the slip was found to require a large volume of earthworks, in the order of 150,000m^3, and to require an area of native vegetation to be cleared. The clearance of native vegetation would require compliance with the Wildlife Act as discussed in Section 4.2. Compliance requirements were expected to include ecological monitoring, searching for the presence of bats and delaying work until they had relocated of their own accord, and finding, catching and relocating lizards from the area prior to commencing earthworks. The overall programme to complete the temporary option, inclusive of the environmental compliance and earthworks for a temporary bypass option was assessed to be similar or longer than some permanent options being considered therefore temporary option to be unsuitable.

The temporary staging option comprised of reusable trafficable platforms supported by driven steel piles. This option conflicted with the construction of the proposed permanent options, increasing their construction period. Sections of the temporary piled staging traversing areas of high slope instability risk would require temporary works design and may require stabilisation treatments works in order to meet suitable design standards for public use. The timeframe to resolve these constraints and adverse effect on the programme of a permanent solution made this option unsuitable for consideration.

The potential use of Bailey Bridges (with longer spans) as temporary staging was also considered. This option was ruled out for the same reasons outlined above.

The construction of a temporary access track within the slip area was assessed but found to be unsuitable for safe public use due to steep profile, slope instability hazard within the slip area and depth of existing slip debris to be excavated. The road grades were too steep to be trafficable by public vehicles without significant earthworks.

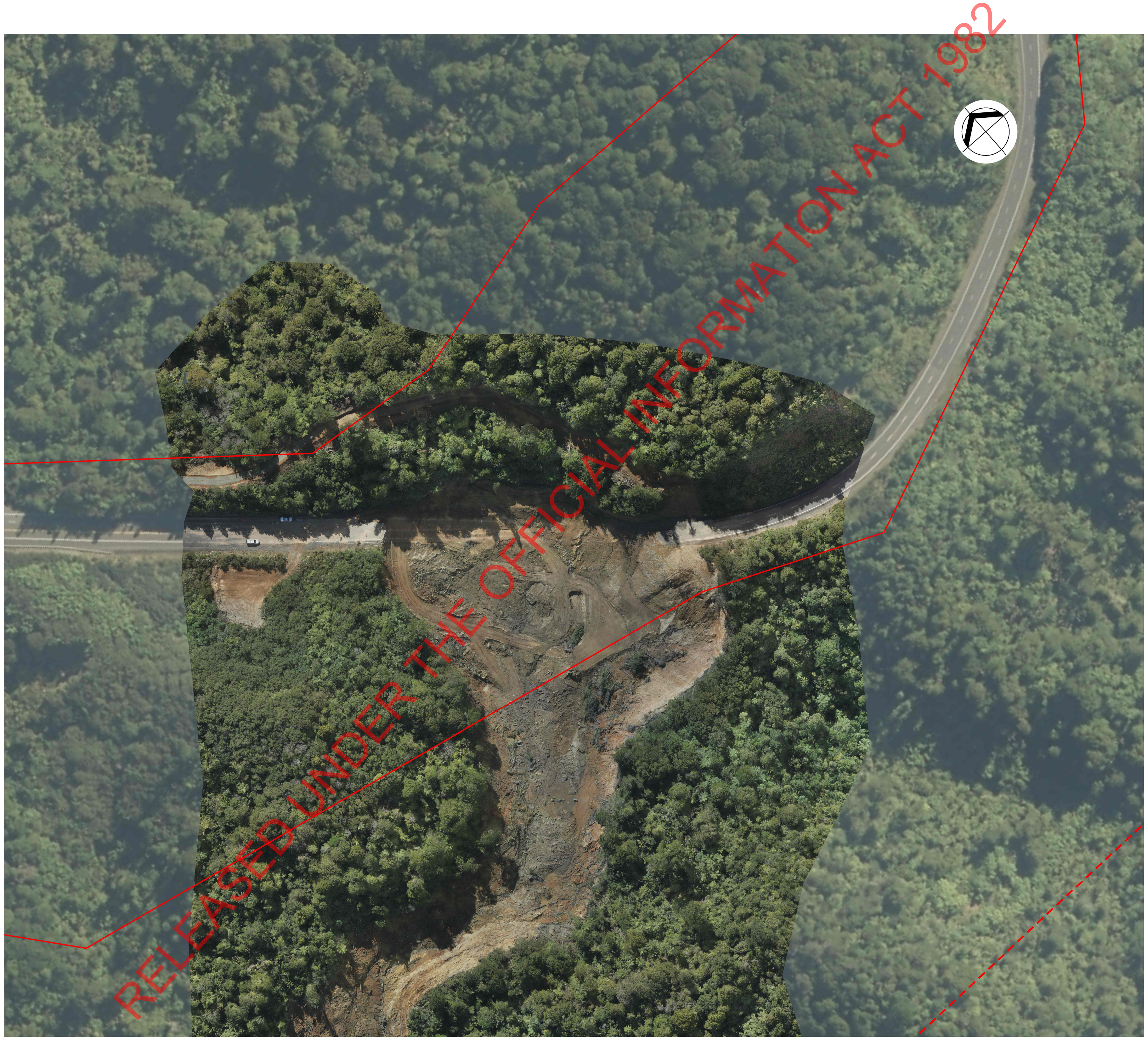
Waka Kotahi NZTA has elected to focus on procuring a permanent option only, given the timeframe and other difficulties associated with establishing a suitable temporary option to restore SH25a.

A

Appendix A – Site Plan

LEGEND

🟥 ROAD BOUNDARY



PLAN

A1 SCALE 1:1000

FOR INFORMATION
NOT FOR CONSTRUCTION

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Reduced Scale (A3) HALF SCALE

Design		
Drawn		
Dsg Verifier		
Dwg Check		

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: SITE PLAN

Discipline: CIVIL ENGINEERING

Drawing No. 3413292 - GI PLAN

Rev. A

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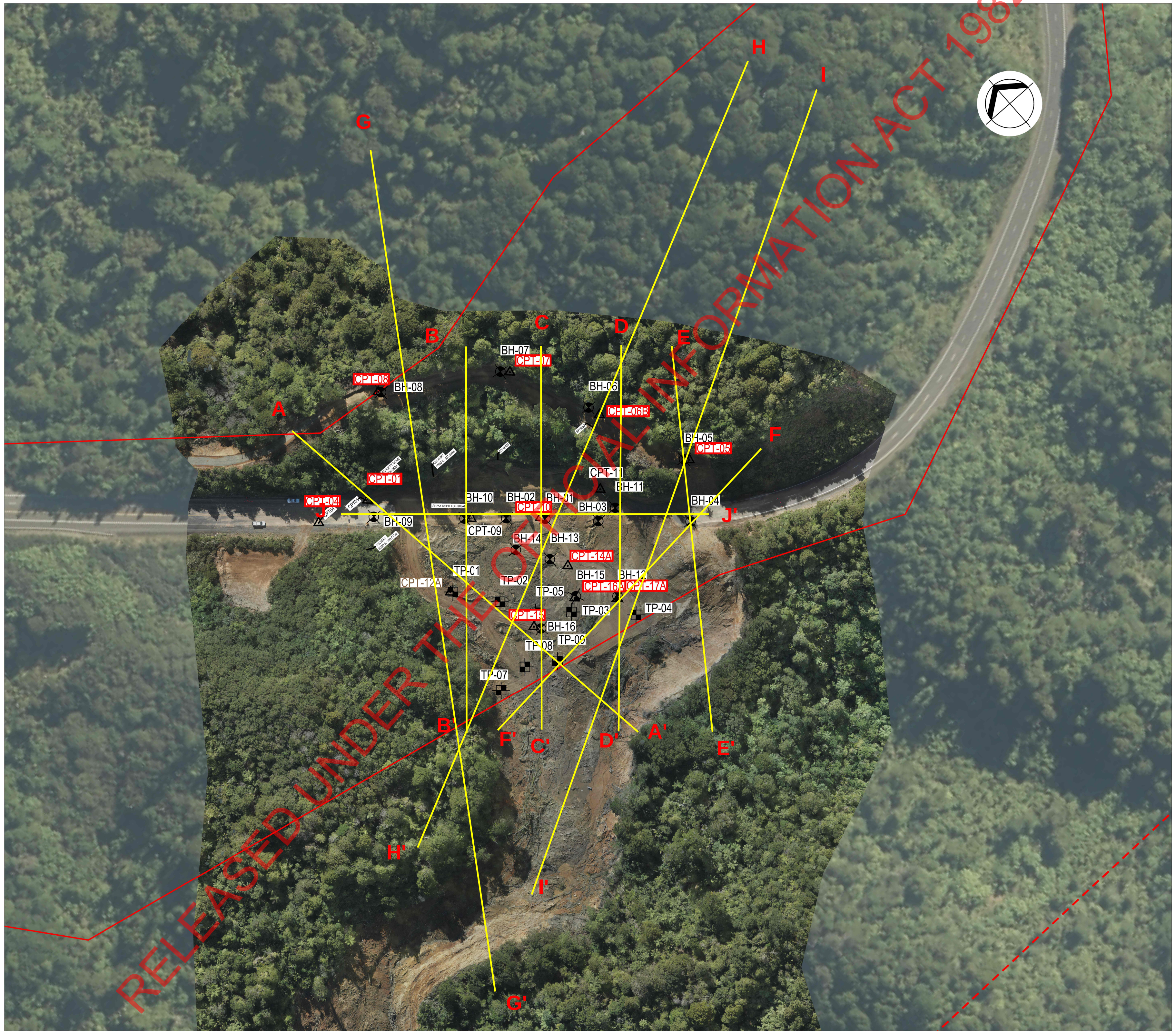
B

Appendix B – Geological Cross Sections

Drawing Plotted: 26/04/2023 1:56:03 PM

LEGEND

🟩	INDICATIVE EARTHWORKS EXTENT
🟥	ROAD CORRIDOR BOUNDARY
J — J'	SECTION LINE
⊗	BOREHOLE
△	CPT
⊞	TEST PIT



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Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
SITE PLAN

Discipline
GEOTECHNICAL

Drawing No.
3415236-GI PLAN

Rev.
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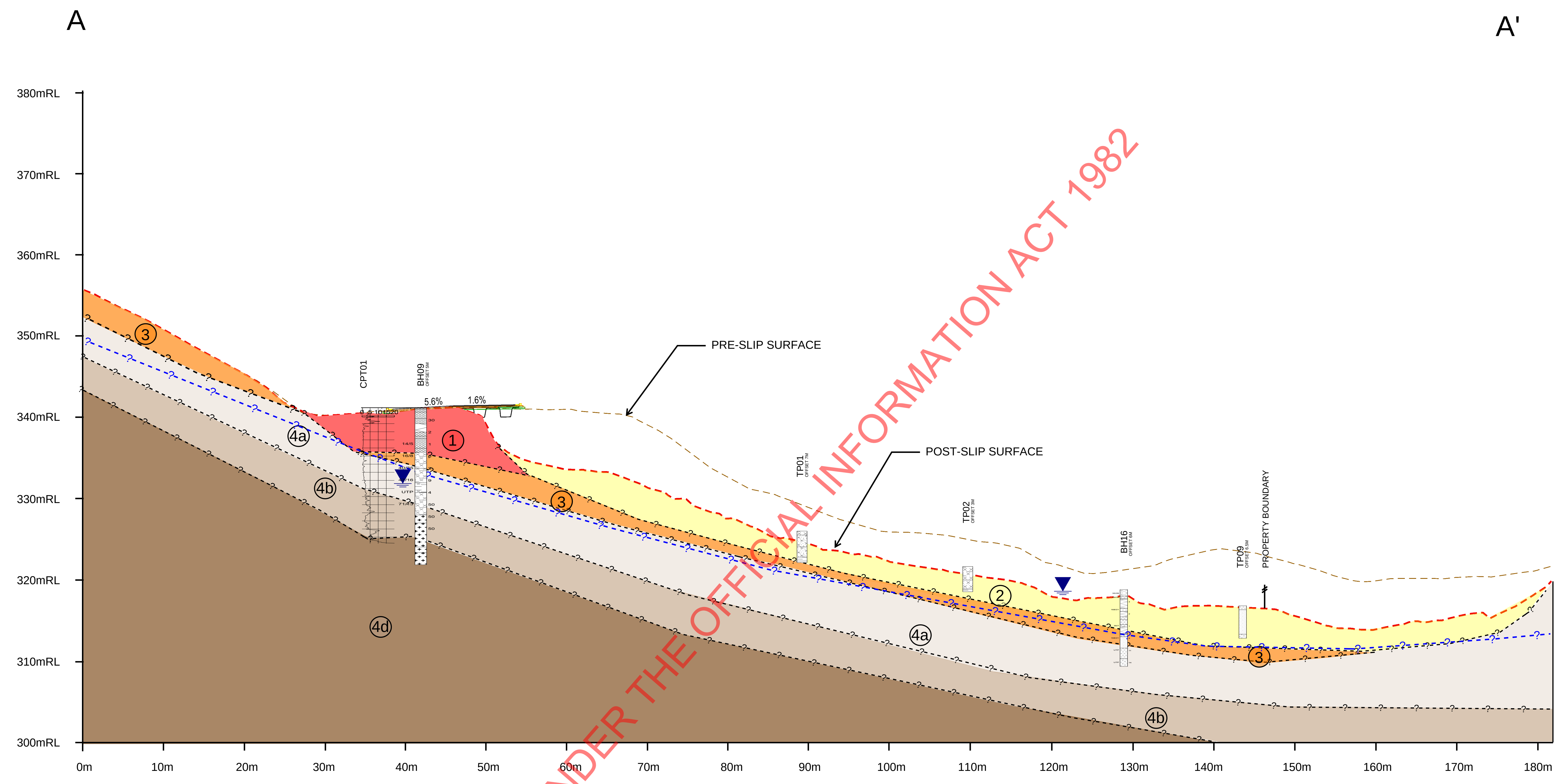

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(4b)	[HIGHLY WEATHERED ANDESITE]
(4c)	[MODERATELY WEATHERED ANDESITE]
(4d)	[SLIGHTLY WEATHERED ANDESITE]

- - -	Pre slip ground surface
- - -	Post slip ground surface
— ? —	Interpreted geological boundary
▼	Measured/dipped groundwater
— ? —	Interpreted groundwater level

H 1:500
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V 1:500
0 6.25 12.5 17.5 25m
Coord. System: NZTM
Height Datum: NZVD2016

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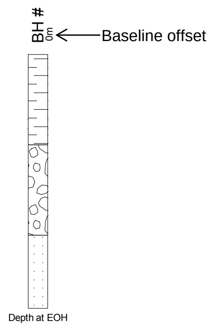

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Reduced Scale (A3)	Dsg Verifier	NM	12/04/23	
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* Refer to Revision 1 for Original Signature

Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
GEOLOGICAL SECTION A-A'
WEST ABUTMENT

Discipline
GEOTECHNICAL

Drawing No.
3415236-GE-0001

Rev.
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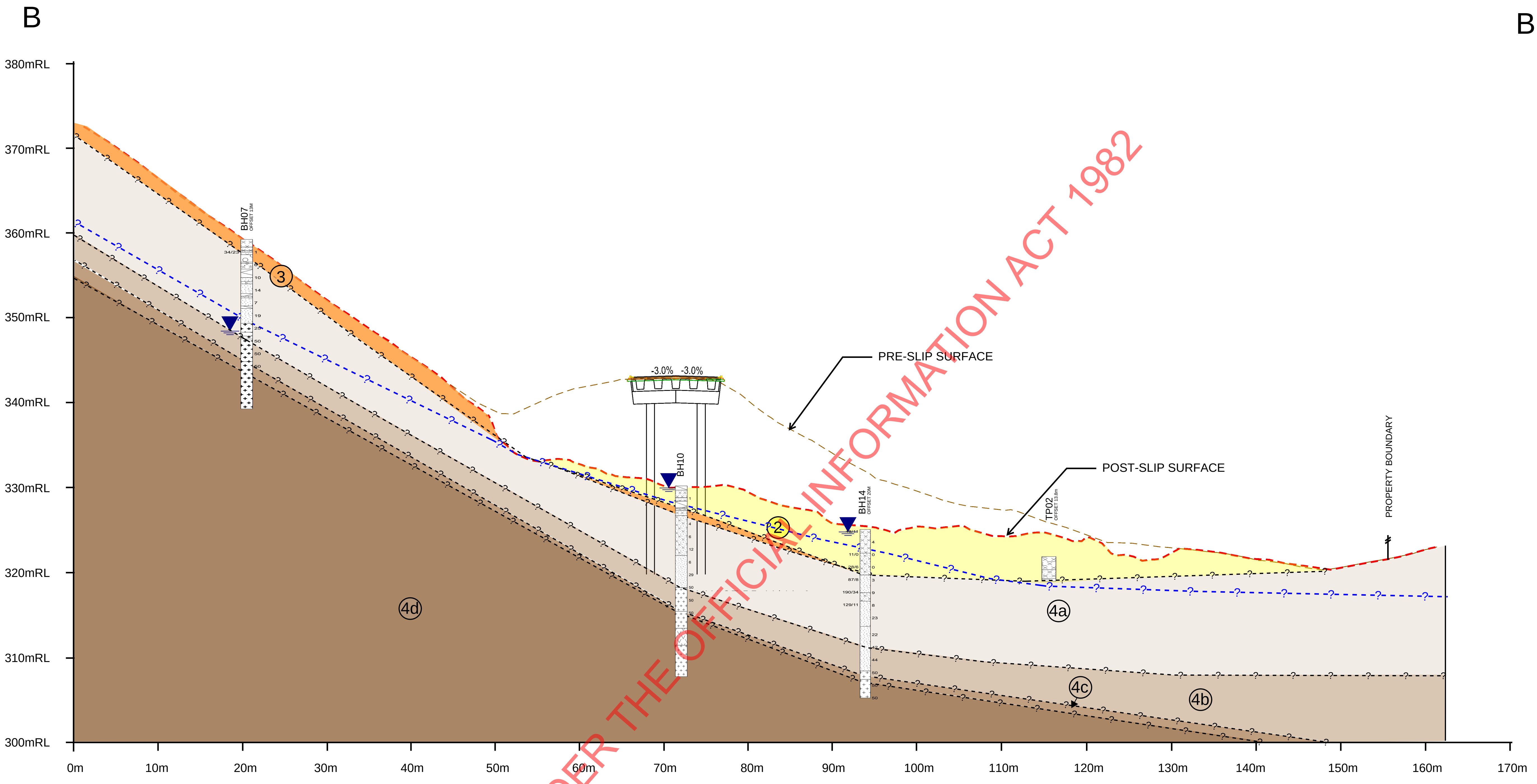

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- 4b [HIGHLY WEATHERED ANDESITE]
- 4c [MODERATELY WEATHERED ANDESITE]
- 4d [SLIGHTLY WEATHERED ANDESITE]

- Pre slip ground surface
- Post slip ground surface
- –?– Interpreted geological boundary
- ▼ Measured/dipped groundwater
- –?– Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m
V 1:500
0 6.25 12.5 17.5 25m

Coord. System: NZTM
Height Datum: NZVD2016

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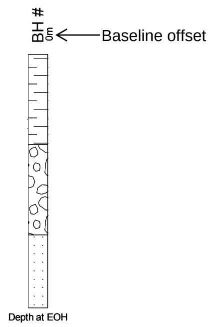

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Dsg Verifier	NM	12/04/23	
Dwg Check	JB	12/04/23	Date

* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

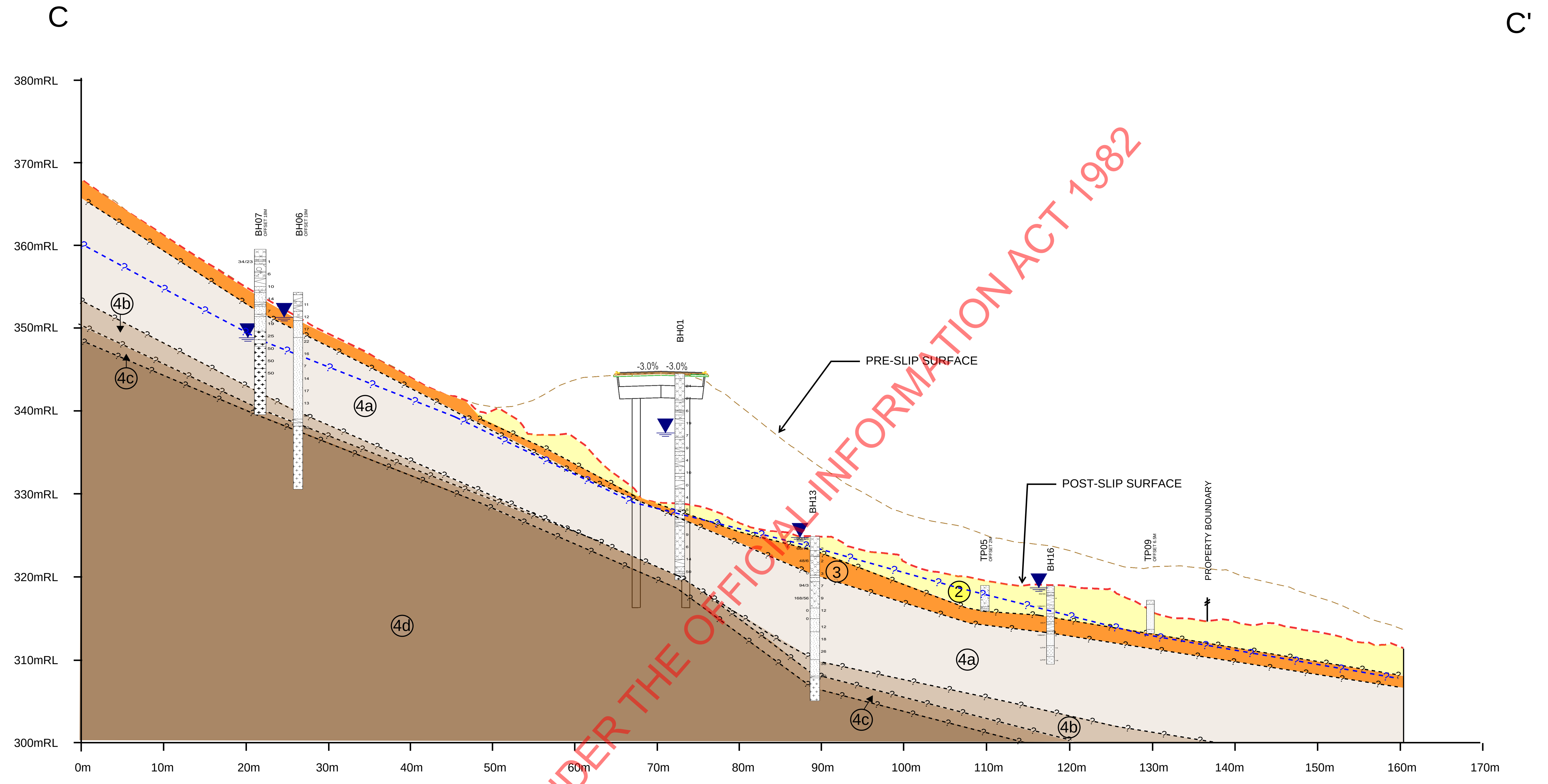
Project: SH25A TARAPAHI SLIP

Title: GEOLOGICAL SECTION B-B'
WESTERN END OF SLIP SCARP

Discipline: GEOTECHNICAL

Drawing No. 3415236-GE-0002

Rev. A



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(4b) [HIGHLY WEATHERED ANDESITE]

(4c) [MODERATELY WEATHERED ANDESITE]

(4d) [SLIGHTLY WEATHERED ANDESITE]

- - -	Pre slip ground surface
- - -	Post slip ground surface
—? —	Interpreted geological boundary
▼	Measured/dipped groundwater
—? —	Interpreted groundwater level

H 1:500
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V 1:500
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Height Datum: NZVD2016

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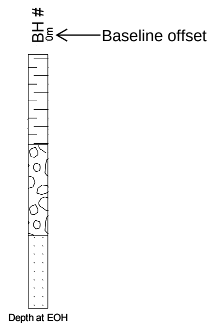

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1:500	Dwg Check	JB	12/04/23	Date
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Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
GEOLOGICAL SECTION C-C'
MIDDLE OF SLIP SCARP

Discipline
GEOTECHNICAL

Drawing No.
3415236-GE-0003

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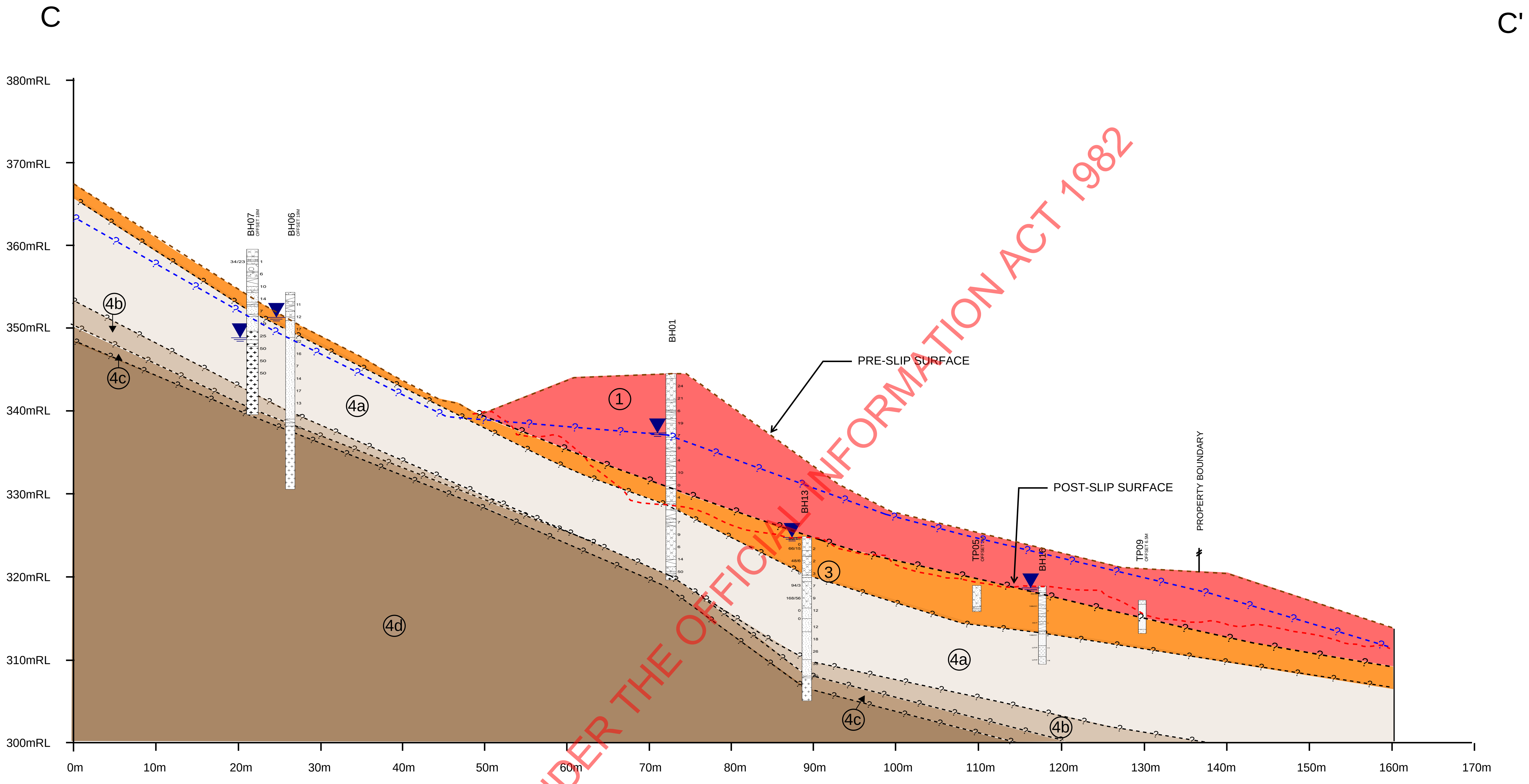

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4b [HIGHLY WEATHERED ANDESITE]

4c [MODERATELY WEATHERED ANDESITE]

4d [SLIGHTLY WEATHERED ANDESITE]

Pre slip ground surface

Post slip ground surface

—?— Interpreted geological boundary

Measured/dipped groundwater

—?— Interpreted groundwater level

H 1:500

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V 1:500

0 6.25 12.5 17.5 25m

Coord. System: NZTM

Height Datum: NZVD2016

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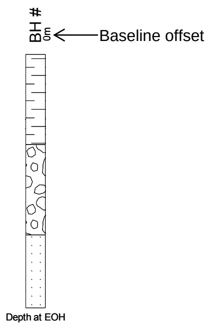

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Dsg Verifier	NM	12/04/23	
Dwg Check	JB	12/04/23	Date

* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: GEOLOGICAL SECTION C-C'
MIDDLE OF SLIP SCARP

Discipline: GEOTECHNICAL

Drawing No.: 3415236-GE-0004

Rev.: A

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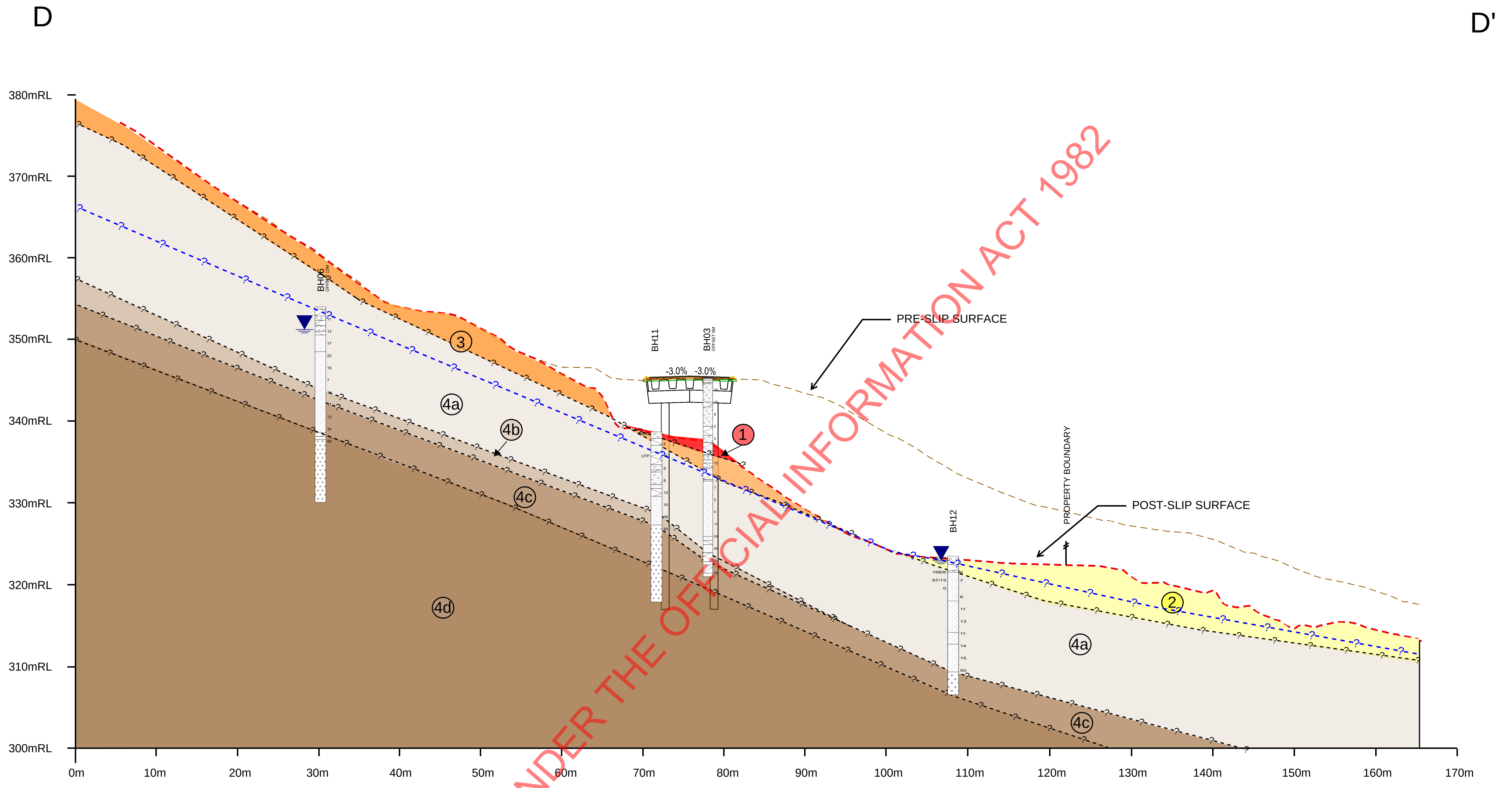

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- - - Pre slip ground surface

- - - Post slip ground surface

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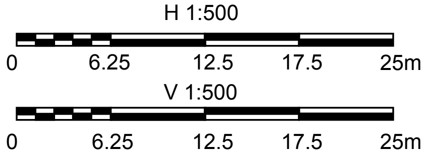
▼ Measured/dipped groundwater

–? – Interpreted groundwater level



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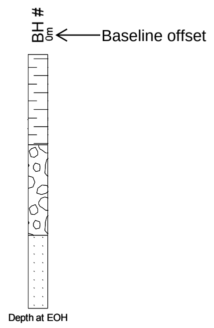

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	Dwg Check	JB	12/04/23	Date
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Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: GEOLOGICAL SECTION D-D'
EASTERN END OF SLIP SCARP

Discipline: GEOTECHNICAL

Drawing No. 3415236-GE-0005

Rev. A

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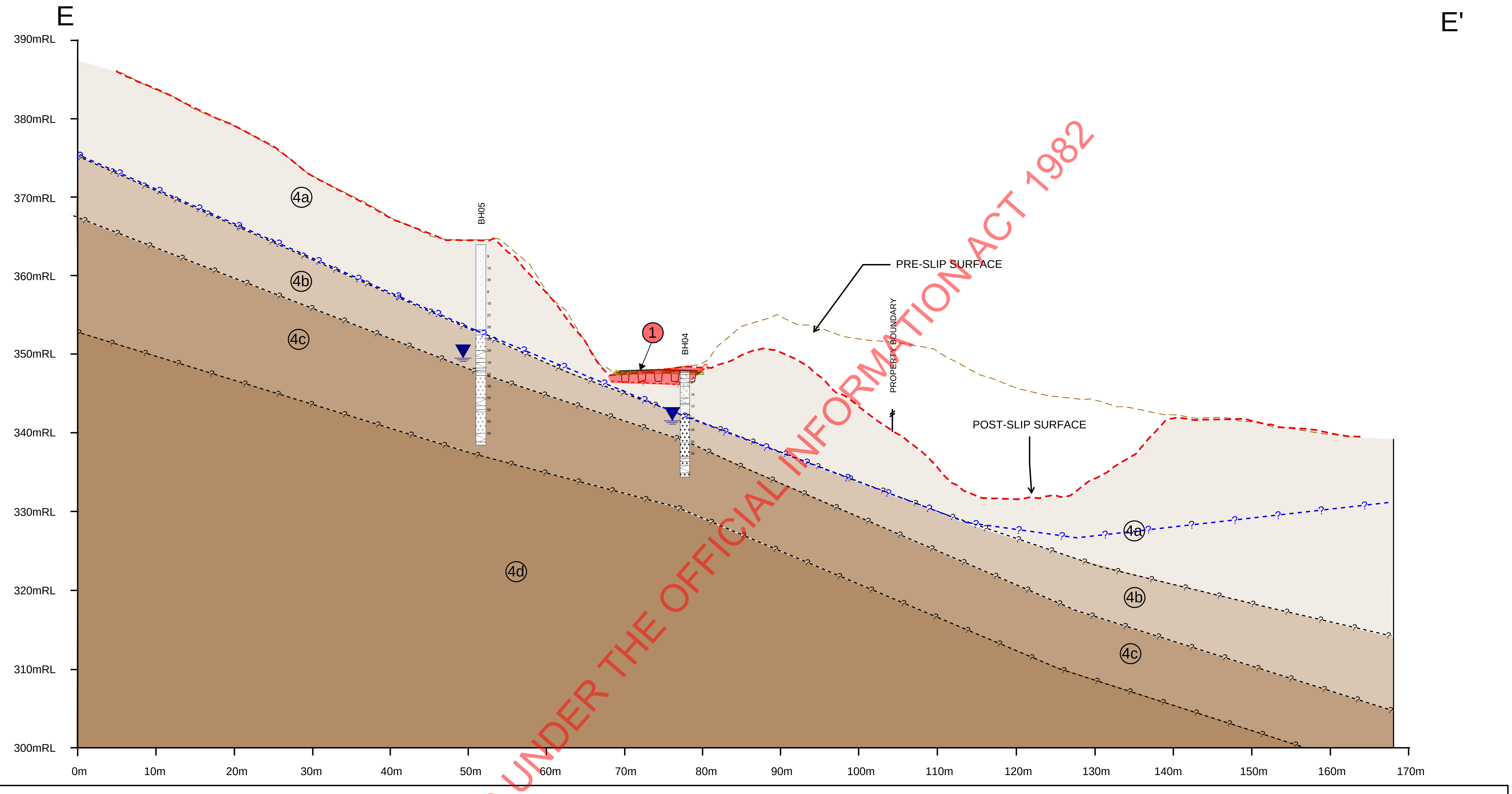

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③ [HISTORICAL SLIP DEBRIS]

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(4b) [HIGHLY WEATHERED ANDESITE]

(4c) [MODERATELY WEATHERED ANDESITE]

(4d) [SLIGHTLY WEATHERED ANDESITE]

- - - -	Pre slip ground surface
- - - -	Post slip ground surface
—? —	Interpreted geological boundary
▼	Measured/dipped groundwater
—? —	Interpreted groundwater level

H 1:500

0 6.25 12.5 17.5 25m

V 1:500

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Coord. System: NZTM Height Datum: NZVD2016

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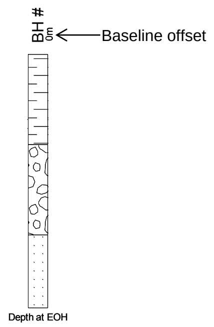

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Drawing Originator: Beca

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	* Refer to Revision 1 for Original Signature			

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: GEOLOGICAL SECTION E-E'
EASTERN SLOPE ABOVE ROAD

Discipline: GEOTECHNICAL

Drawing No. 3415236-GE-0006

Rev. A

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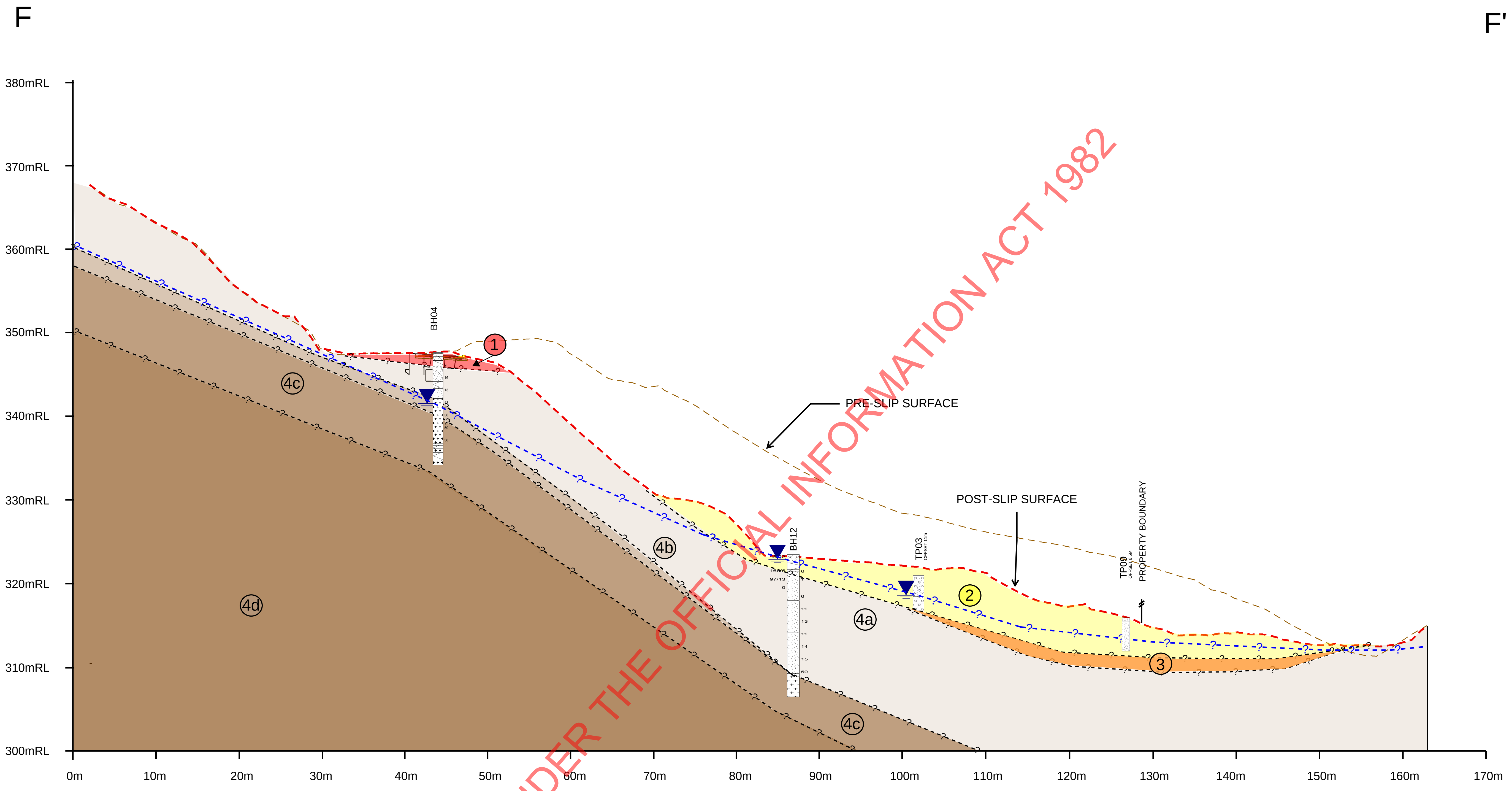

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4c [MODERATELY WEATHERED ANDESITE]
4d [SLIGHTLY WEATHERED ANDESITE]

Pre slip ground surface
Post slip ground surface
Interpreted geological boundary
Measured/dipped groundwater
Interpreted groundwater level

H 1:500
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V 1:500
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Coord. System: NZTM
Height Datum: NZVD2016

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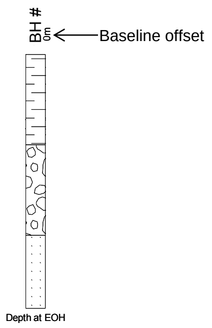

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* Refer to Revision 1 for Original Signature

Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
GEOLOGICAL SECTION F-F'
EASTERN ABUTMENT

Discipline: GEOTECHNICAL

Drawing No. 3415236-GE-0007

Rev. A

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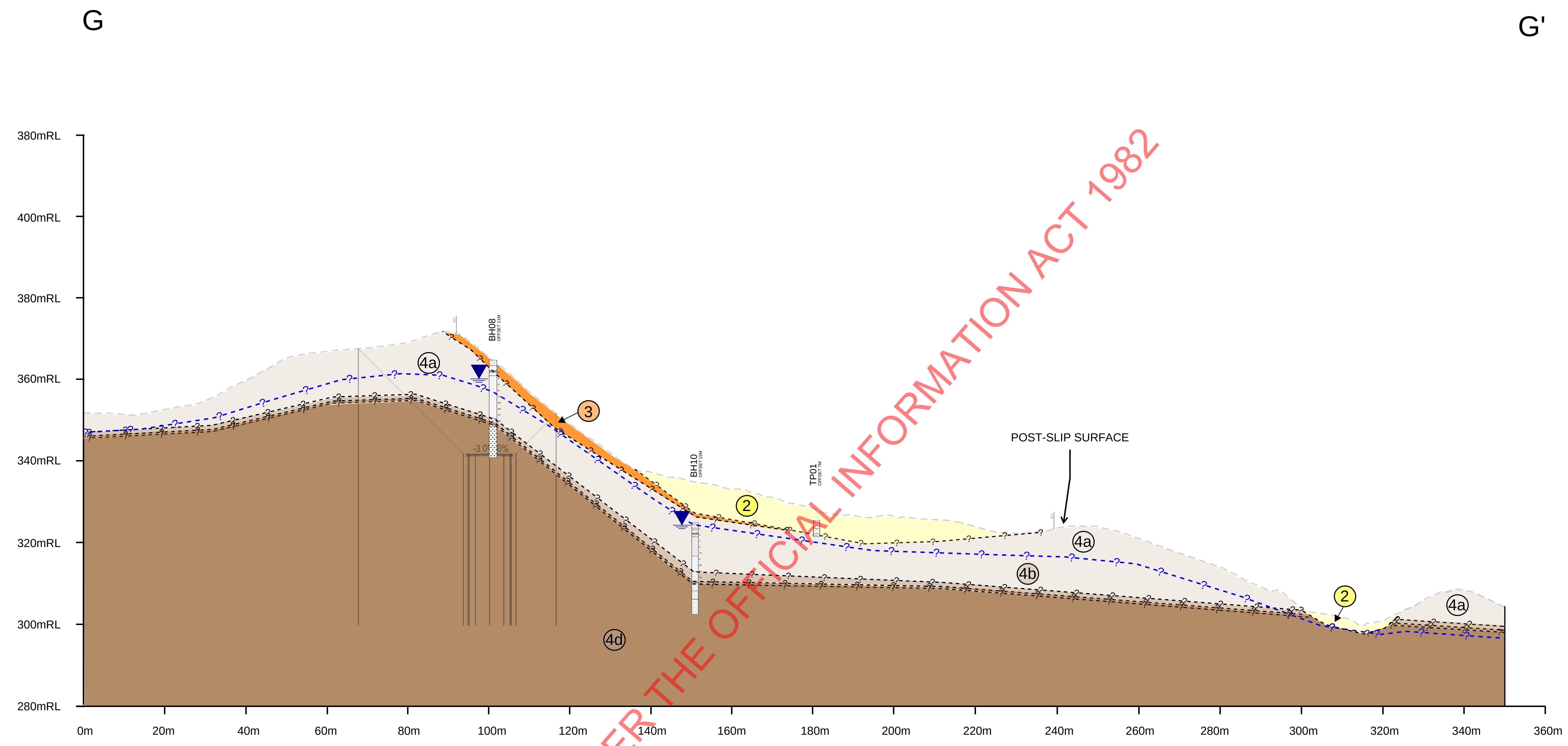

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③ [HISTORICAL SLIP DEBRIS]

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(4b) [HIGHLY WEATHERED ANDESITE]

(4c) [MODERATELY WEATHERED ANDESITE]

(4d) [SLIGHTLY WEATHERED ANDESITE]

- - - Post slip ground surface

—?— Interpreted geological boundary

▼ Measured/dipped groundwater

–?– Interpreted groundwater level

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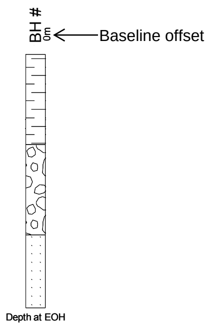

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* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

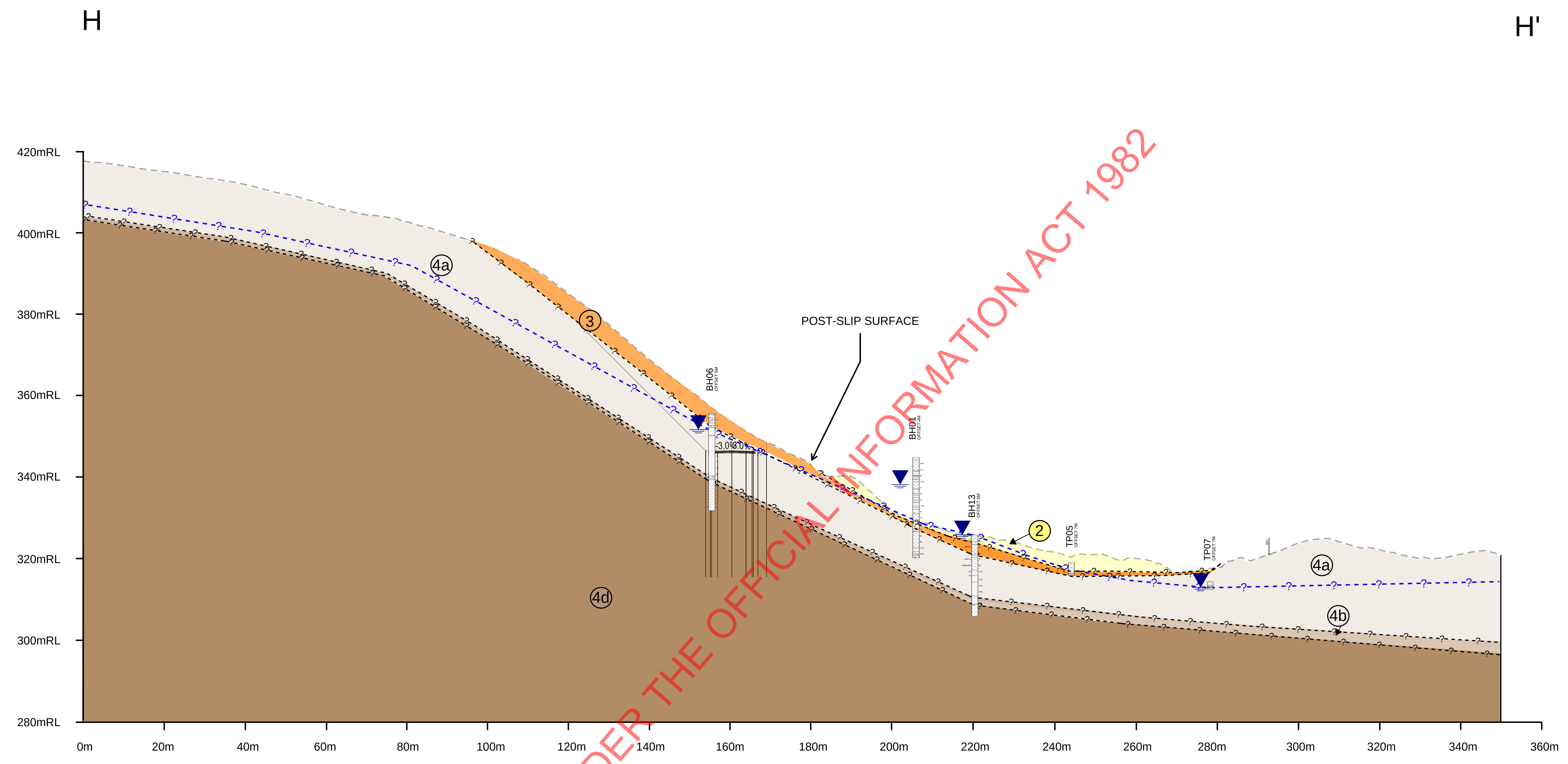
Project: SH25A TARAPAHI SLIP

Title: GEOLOGICAL SECTION G-G'
CH3940 OPTION 7

Discipline: GEOTECHNICAL

Drawing No. 3415236-GE-0008

Rev. A



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4d [SLIGHTLY WEATHERED ANDESITE]

- - - Post slip ground surface

—?— Interpreted geological boundary

▼ Measured/dipped groundwater

—?— Interpreted groundwater level

H 1:1000

0 12.5 25.0 35.0 50m

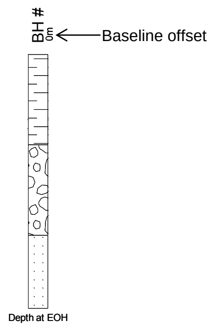
V 1:1000

0 12.5 25.0 35.0 50m

Coord. System: NZTM

Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB	NM	20/04/23

Drawing Originator: Beca

Original Scale (A1) Reduced Scale (A3) 1:1000	Design	ZL	12/04/23	Approved For Construction*
	Drawn	ZL	12/04/23	
	Dsg Verifier	NM	12/04/23	
	Dwg Check	JB	12/04/23	Date

* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: GEOLOGICAL SECTION H-H'
CH4020 OPTION 7

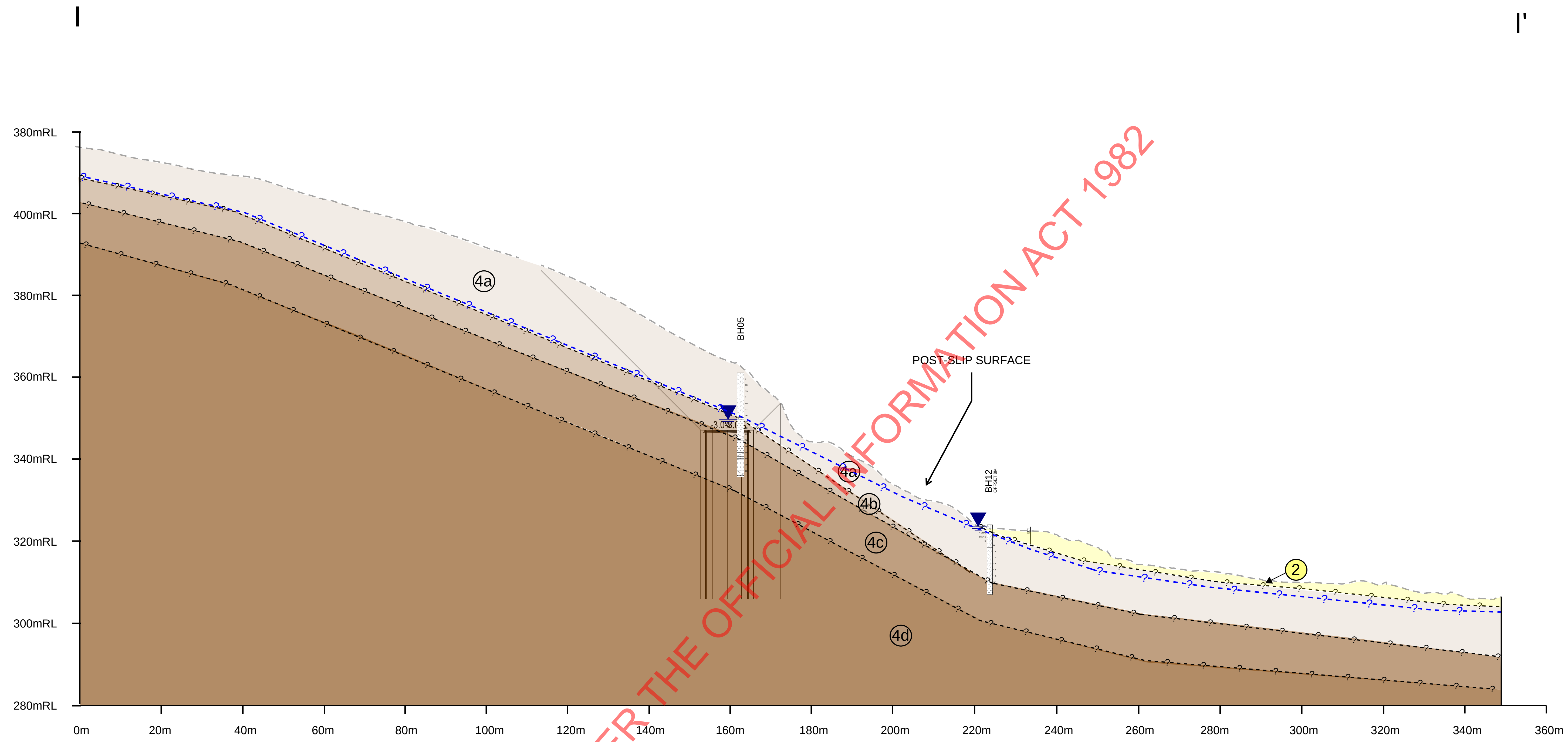
Discipline: GEOTECHNICAL

Drawing No.: 3415236-GE-0009

Rev.: A

DO NOT SCALE

IF IN DOUBT ASK.



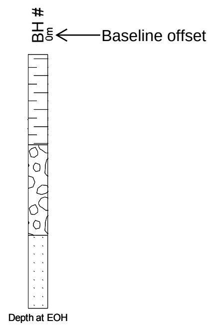
Legend

- ① [FILL]
- ② [RECENT SLIP DEBRIS]
- ③ [HISTORICAL SLIP DEBRIS]
- (4a) [COMPLETELY WEATHERED ANDESITE]
- (4b) [HIGHLY WEATHERED ANDESITE]
- (4c) [MODERATELY WEATHERED ANDESITE]
- (4d) [SLIGHTLY WEATHERED ANDESITE]

- - - - Post-slip ground surface
—? — Interpreted geological boundary
▼ Measured/dipped groundwater
—? — Interpreted groundwater level

H 1:1000
0 12.5 25.0 35.0 50m
V 1:1000
0 12.5 25.0 35.0 50m
Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB	NM	20/04/23

Drawing Originator:

Original Scale (A1)	Design	ZL	12/04/23
	Drawn	ZL	12/04/23
Reduced Scale (A3)	Dsg Verifier	NM	12/04/23
1:1000	Dwg Check	JB	12/04/23

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature 2

Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
GEOLOGICAL SECTION I-I'
CH4060 OPTION 7

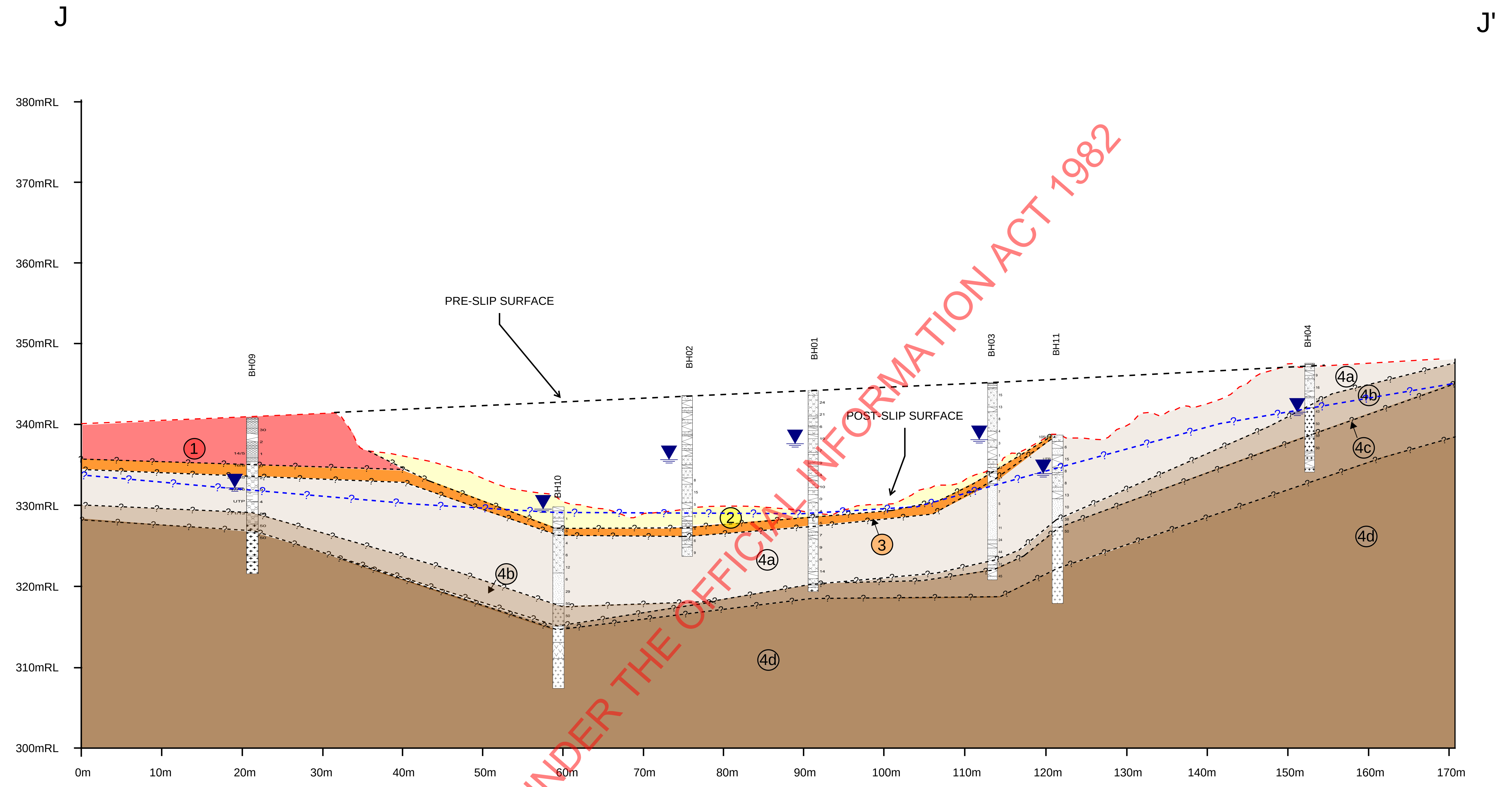
Discipline
GEOTECHNICAL

Drawing No.
3415236-GE-0010

Rev.
A

DO NOT SCALE

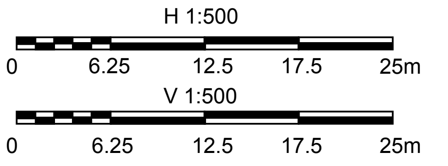
IF IN DOUBT ASK.



Legend

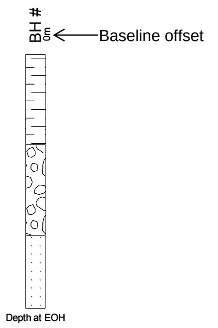
1	[FILL]
2	[RECENT SLIP DEBRIS]
3	[HISTORICAL SLIP DEBRIS]
4a	[COMPLETELY WEATHERED ANDESITE]
4b	[HIGHLY WEATHERED ANDESITE]
4c	[MODERATELY WEATHERED ANDESITE]
4d	[SLIGHTLY WEATHERED ANDESITE]

- - -	Pre slip ground surface
- - -	Post slip ground surface
— ? —	Interpreted geological boundary
▼	Measured/dipped groundwater
— ? —	Interpreted groundwater level



Coord. System: NZTM Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB	NM	20/04/23

Drawing Originator: Beca

Original Scale (A1)	Design	ZL	12/04/23	Approved For Construction*
	Drawn	ZL	12/04/23	
Reduced Scale (A3) 1:500	Dsg Verifier	NM	12/04/23	
	Dwg Check	JB	12/04/23	Date
	* Refer to Revision 1 for Original Signature			

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: GEOLOGICAL SECTION J-J'
EXISTING ROAD ALIGNMENT

Discipline: GEOTECHNICAL

Drawing No.: 3415236-GE-0011

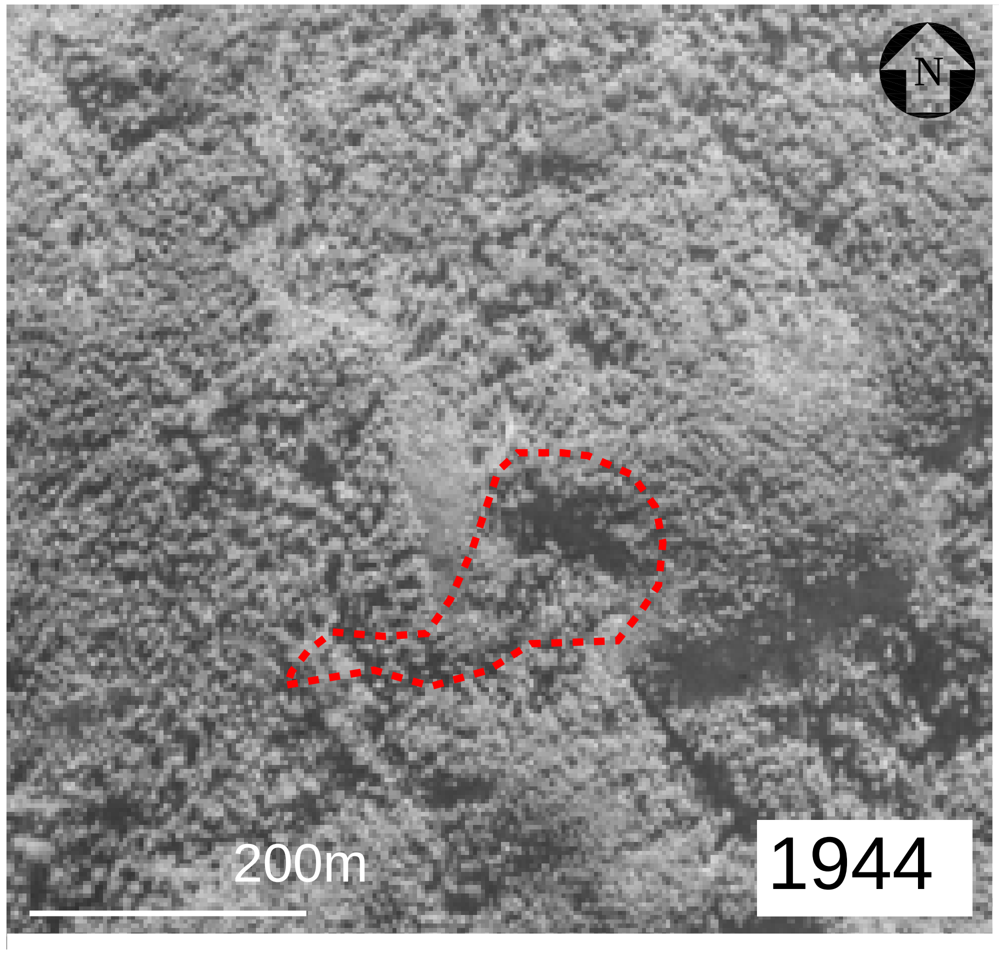
Rev.: A

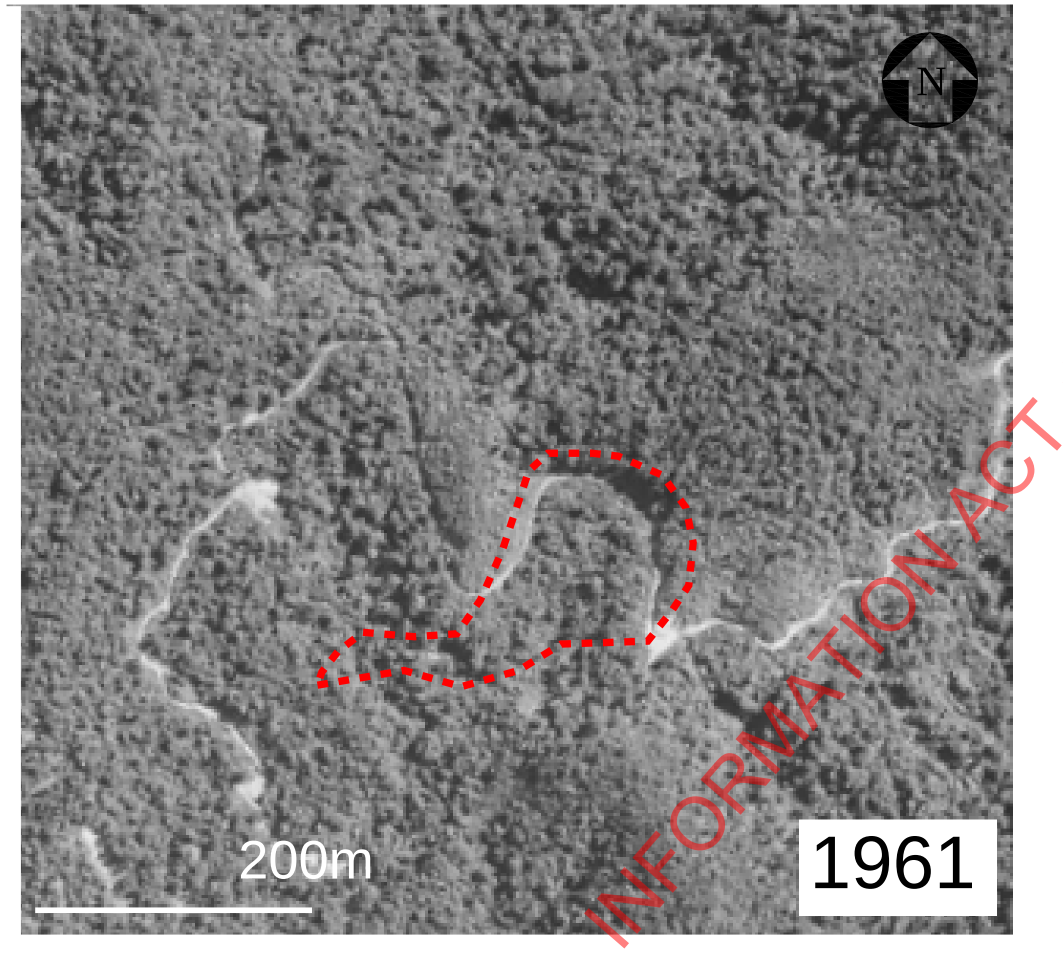
DO NOT SCALE

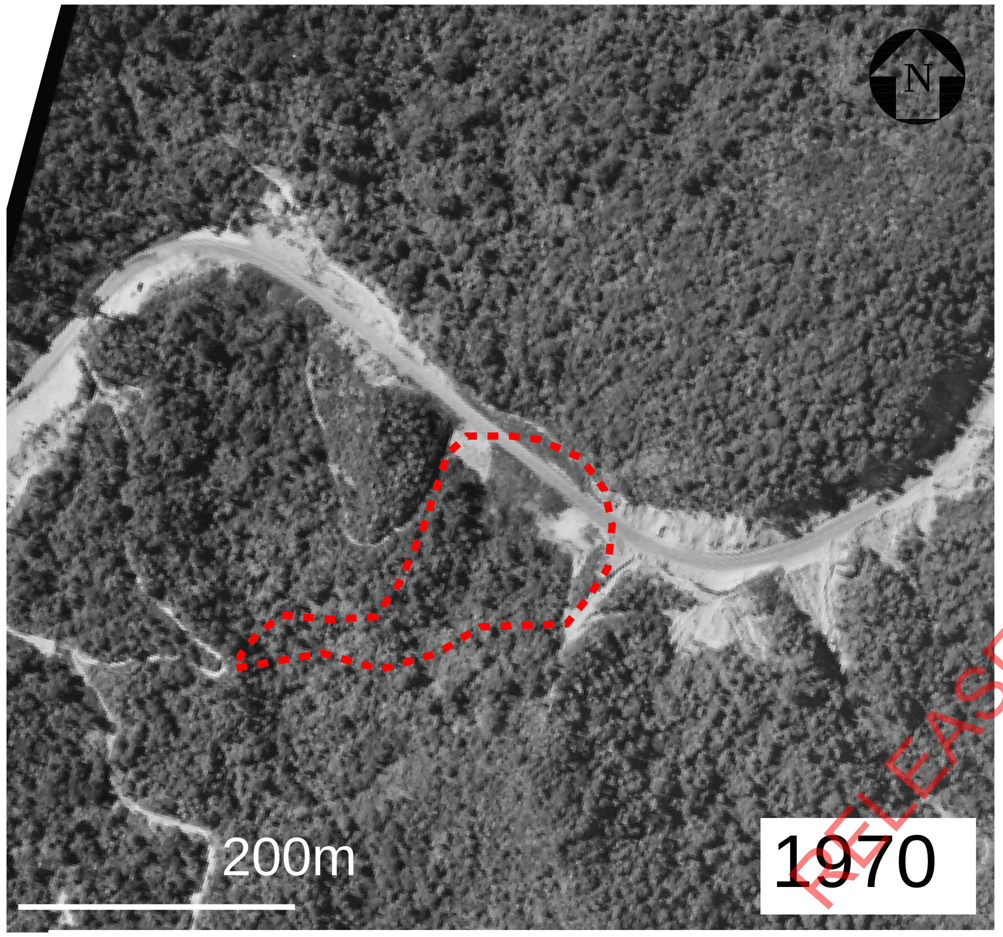
IF IN DOUBT ASK.

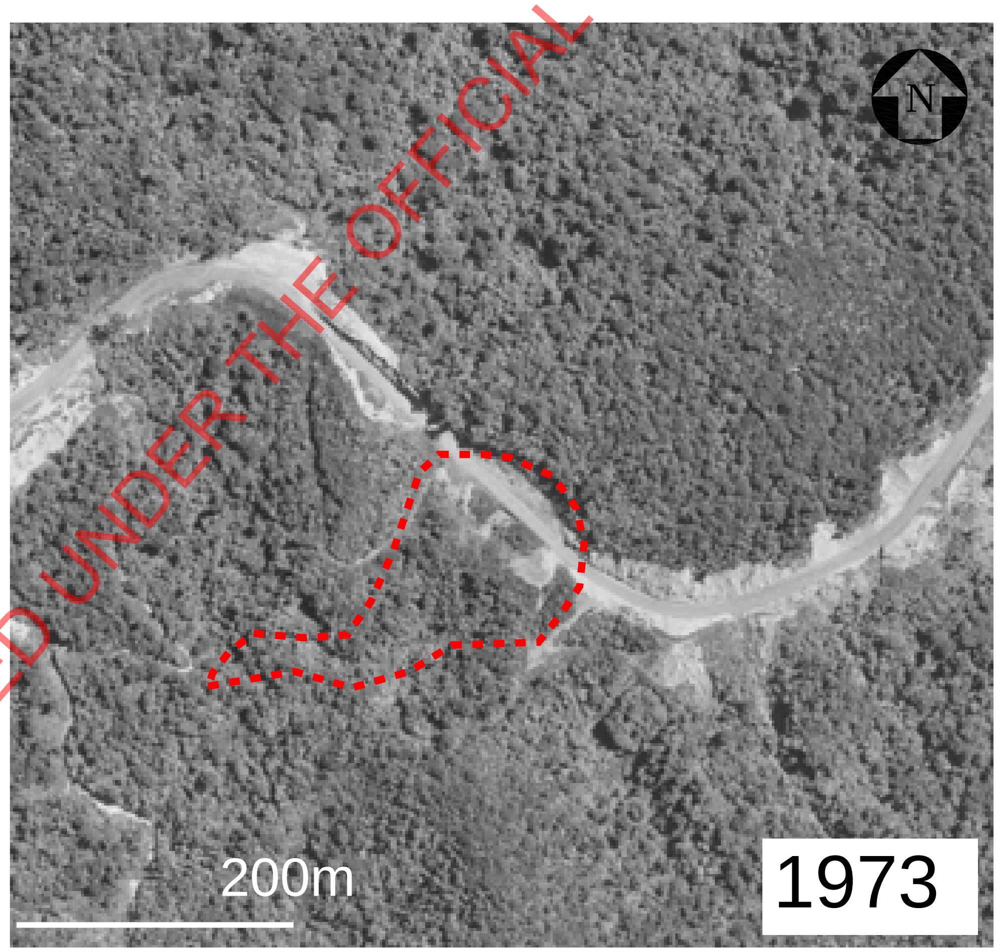
C

Appendix C – Historic Aerial Photographs









Legend:

Approximate slip location

Historical Aerial Imagery Sourced From:
http://retrolens.nz and licensed by LINZ CC-BY 3.0

Including survey numbers (SN) as follows:

1944 SN292 981/12
1961 SN1218 2978/12
1970 SN3231 C/3
1973 SN3269 4399/9

No.	Revision	By	Chk	Appd	Date

Drawing Originator: Beca

Original Scale (A1)	Design	JB	12/04/23
	Drawn	JB	12/04/23
Reduced Scale (A3)	Dsg Verifier		
	Dwg Check		

* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

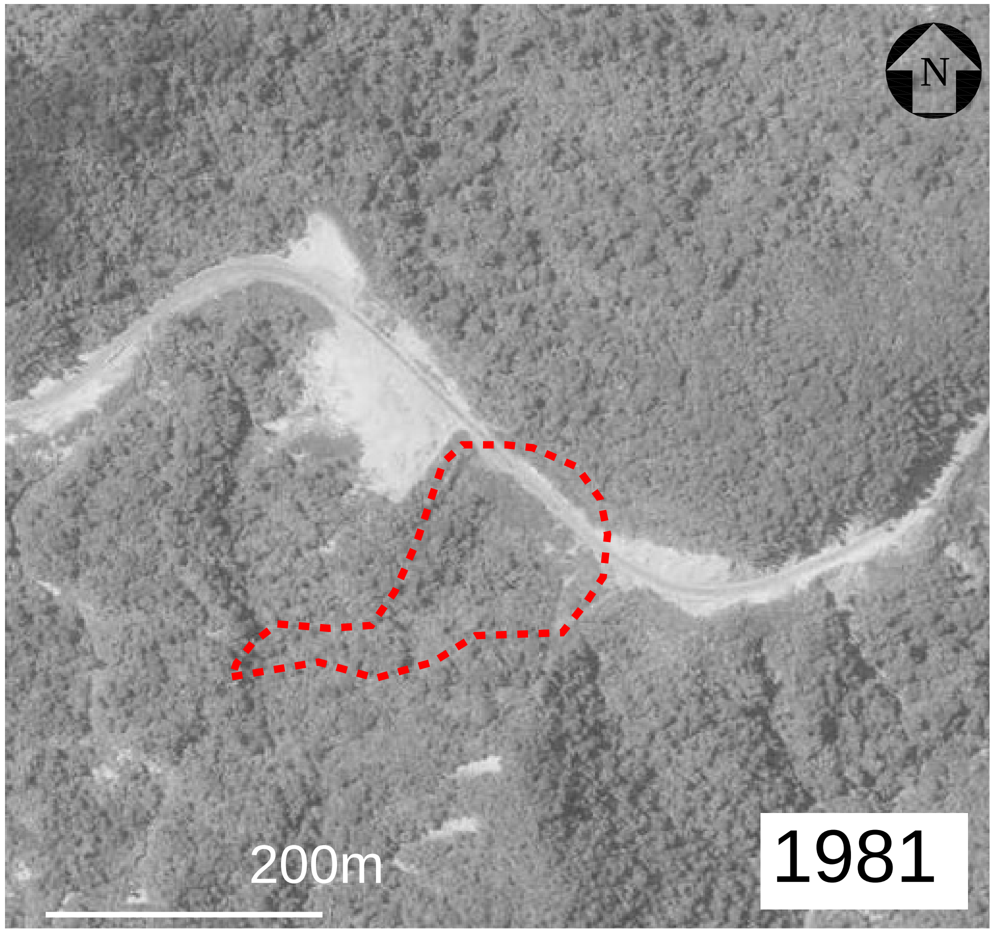
Project: SH25A TARAPAHI SLIP

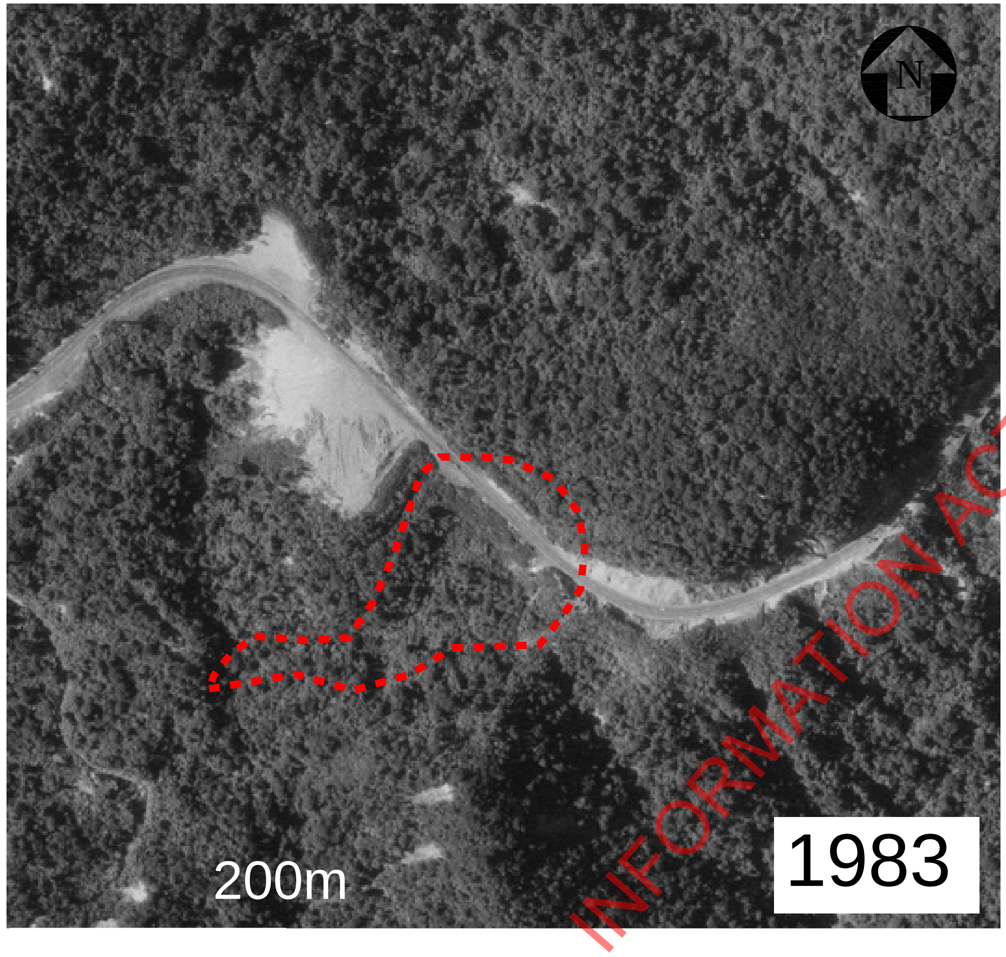
Title: HISTORICAL AERIAL IMAGERY

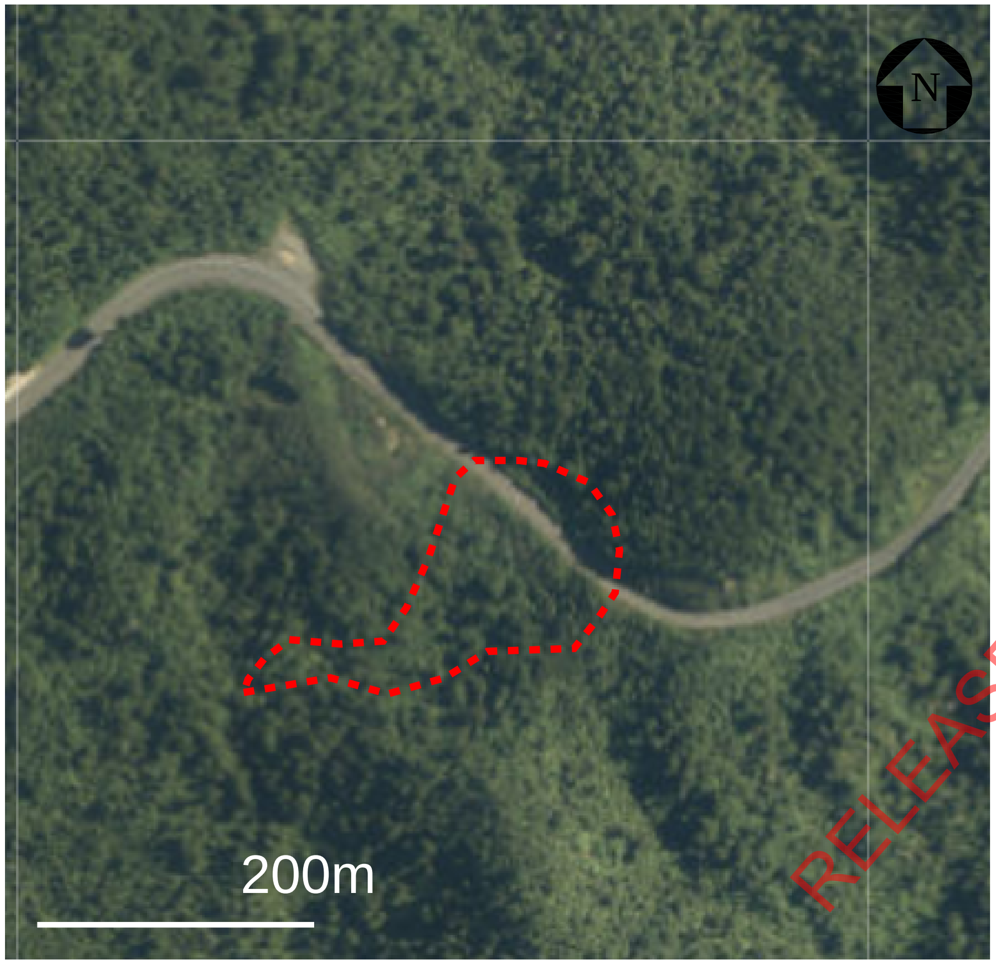
Discipline: GEOTECHNICAL

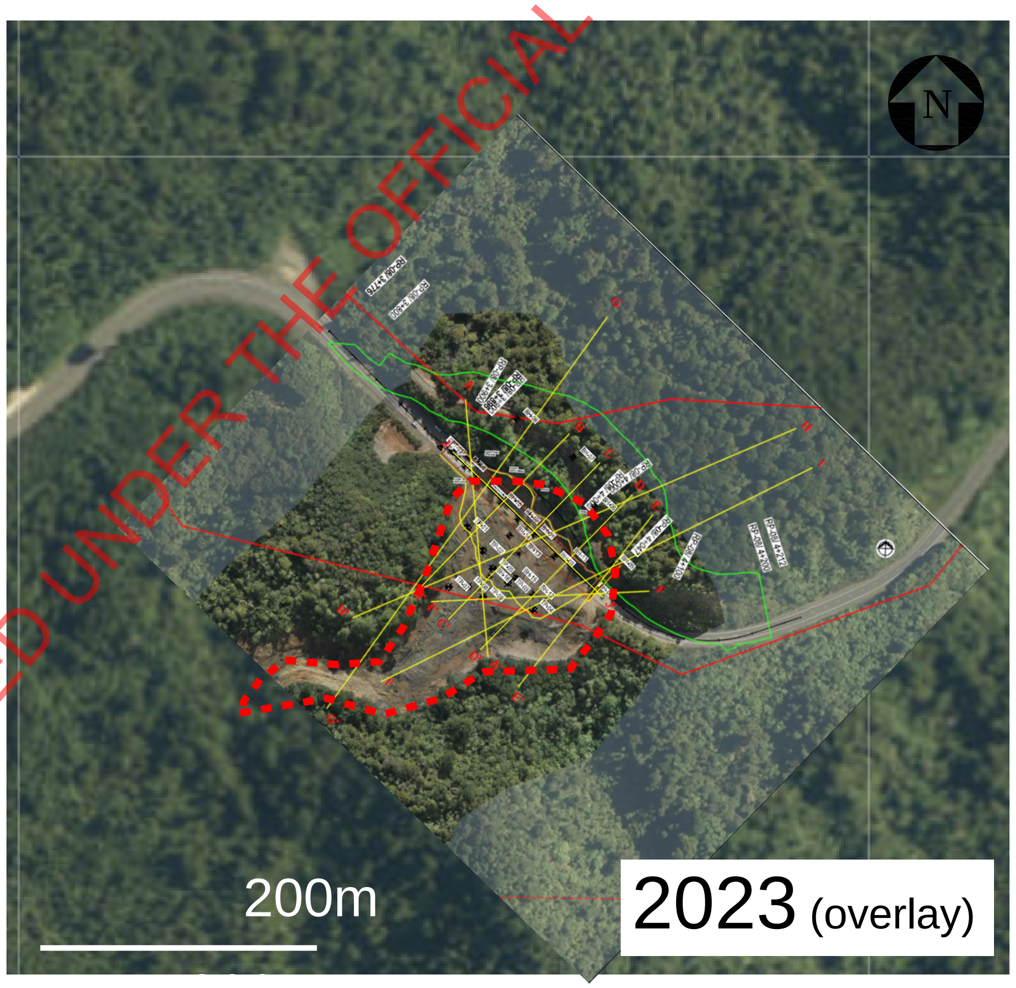
Drawing No.: SKETCH 01

Rev.: A









Legend:

🟥 Approximate slip location

Historical Aerial Imagery Sourced From:
http://retrolens.nz and licensed by LINZ CC-BY 3.0

Including survey numbers (SN) as follows:

1981 SN5845 B3
1983 SN8163 S7

Recent Aerial Imagery Sourced From:

Thames Coromandel District Council GIS
https://tcdc.maps.arcgis.com/apps/webappviewer

(date of imagery unknown but appears to be post-2014)

No.	Revision	By	Chk	Appd	Date

Drawing Originator: Beca

Original Scale (A1)	Design	JB	12/04/23
	Drawn	JB	12/04/23
Reduced Scale (A3)	Dsg Verifier		
	Dwg Check		

* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: HISTORICAL AERIAL IMAGERY

Discipline: GEOTECHNICAL

Drawing No.: SKETCH 01

Rev.: A

BLUEBEAM

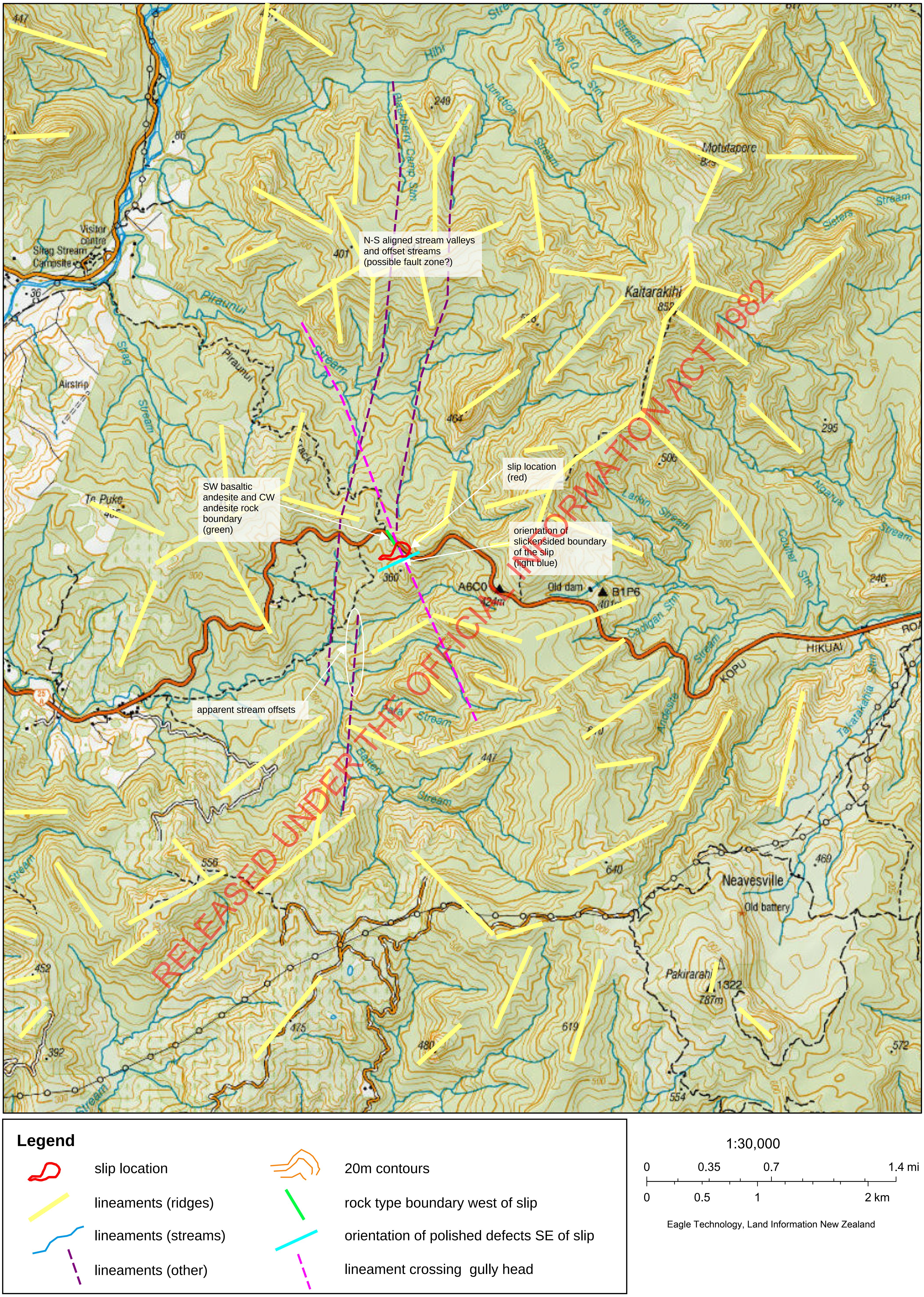
DO NOT SCALE

IF IN DOUBT ASK.

D

Appendix D – Geomorphic Mapping

SH25a Slip Geomorphology Map



N-S aligned stream valleys and offset streams (possible fault zone?)

slip location (red)

SW basaltic andesite and CW andesite rock boundary (green)

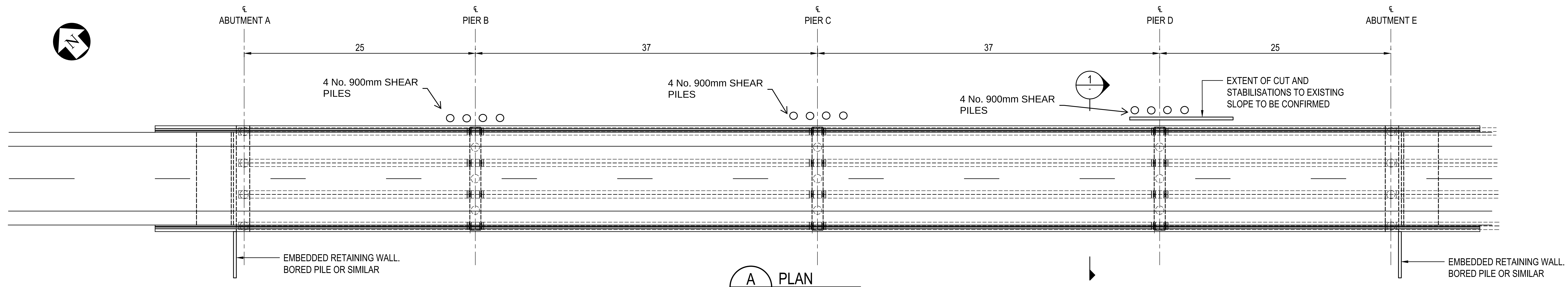
orientation of slickensided boundary of the slip (light blue)

apparent stream offsets

Thames-Coromandel District Council

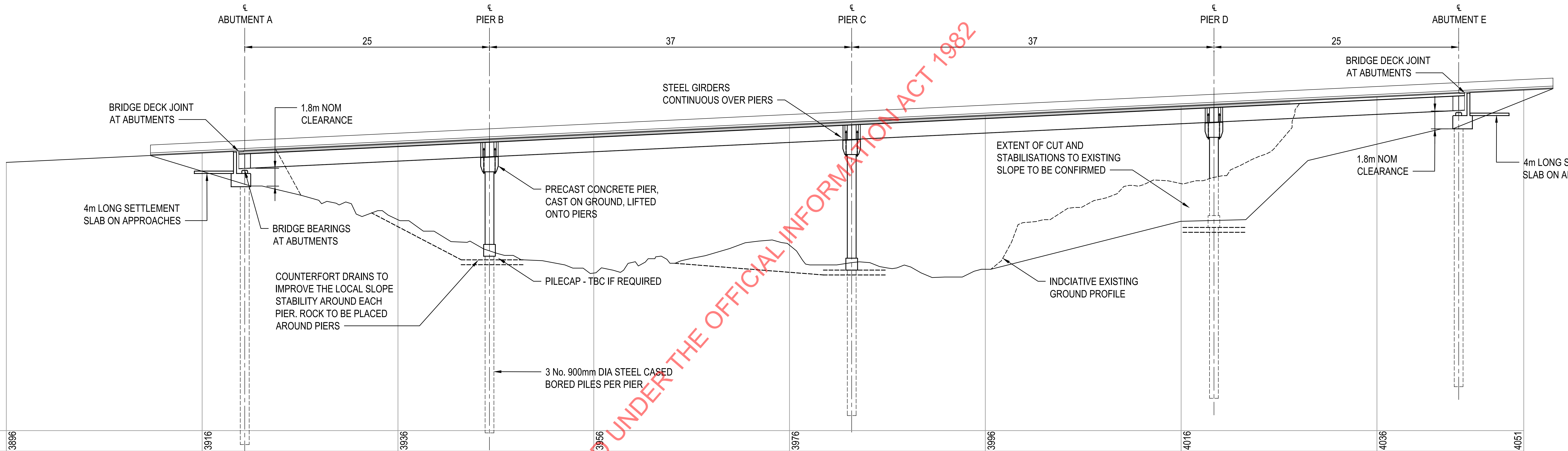
E

Appendix E – Option 6a Design Sketches



A - PLAN

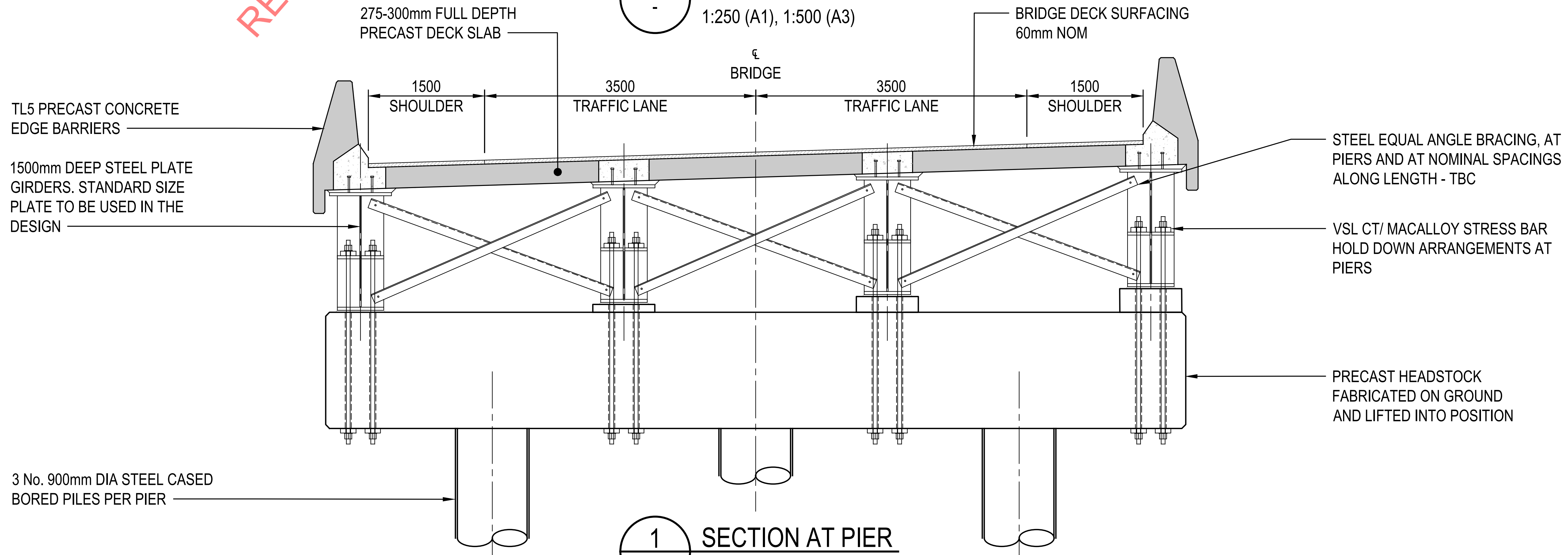
1:250 (A1), 1:500 (A3)



CHAINAGE (m)	3896	3916	3936	3956	3976	3996	4016	4036	4051
EXISTING LEVELS (RLm)	340.51	341.17	342.41	343.37	344.32	345.28	346.23	347.18	
DESIGN LEVELS (RLm)	340.51	341.46	335.10	329.55	332.38	329.38	338.62	347.13	

B - ELEVATION

1:250 (A1), 1:500 (A3)



1 - SECTION AT PIER

1:50 (A1), 1:100 (A3)

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	CONCEPT OPTIONS	PN	LE	CMK	01.05.23

Original Scale (A1) As Shown
Reduced Scale (A3) Half Shown

Design	L.E.	27.04.23
Drawn	P.N.	27.04.23
Dsg Verifier		
Drg Check		

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client: WAKA KOTAHI NZ TRANSPORT AGENCY

Project: SH25A - TAPARAHI SLIP MITIGATION

Title: OPTION 6a STEEL BRIDGE OPTION

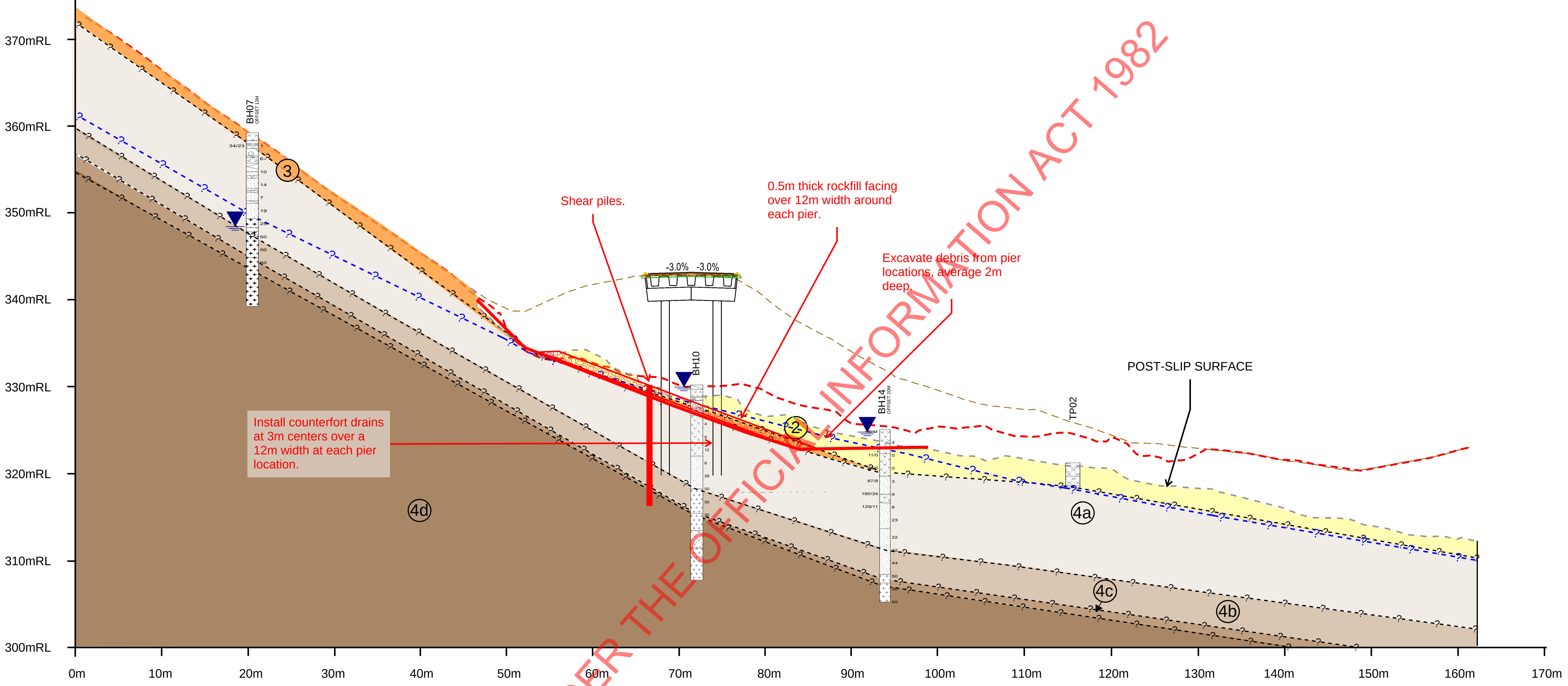
Discipline: STRUCTURAL ENGINEERING

Drawing No. 3415236-SE-0001

Rev. A

DO NOT SCALE FOR SET OUT DIMENSIONS

DESIGN SECTION CH3960
Option 6
(Section B-B')



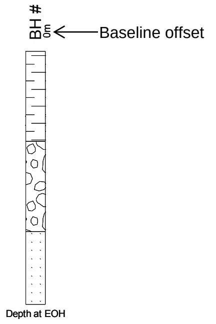
Legend

① [FILL]
② [RECENT SLIP DEBRIS]
③ [HISTORICAL SLIP DEBRIS]
(4a) [COMPLETELY WEATHERED ANDESITE]
(4b) [HIGHLY WEATHERED ANDESITE]
(4c) [MODERATELY WEATHERED ANDESITE]
(4d) [SLIGHTLY WEATHERED ANDESITE]

- - - Pre slip ground surface
- - - Post slip ground surface
—? — Interpreted geological boundary
▼ Measured/dipped groundwater
—? — Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m
V 1:500
0 6.25 12.5 17.5 25m
Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND



A	FOR ISSUE	ZL	JB		12/04/23
No.	Revision	By	Chk	Appd	Date

Drawing Originator: Beca

Original Scale (A1)	Design	ZL	12/04/23	Approved For Construction*
	Drawn	ZL	12/04/23	
Reduced Scale (A3)	Dsg Verifier		12/04/23	
1:500	Dwg Check	JB	12/04/23	Date
	* Refer to Revision 1 for Original Signature			

Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
DESIGN SECTION CH3960
WESTERN END OF SLIP SCARP

Discipline
GEOTECHNICAL

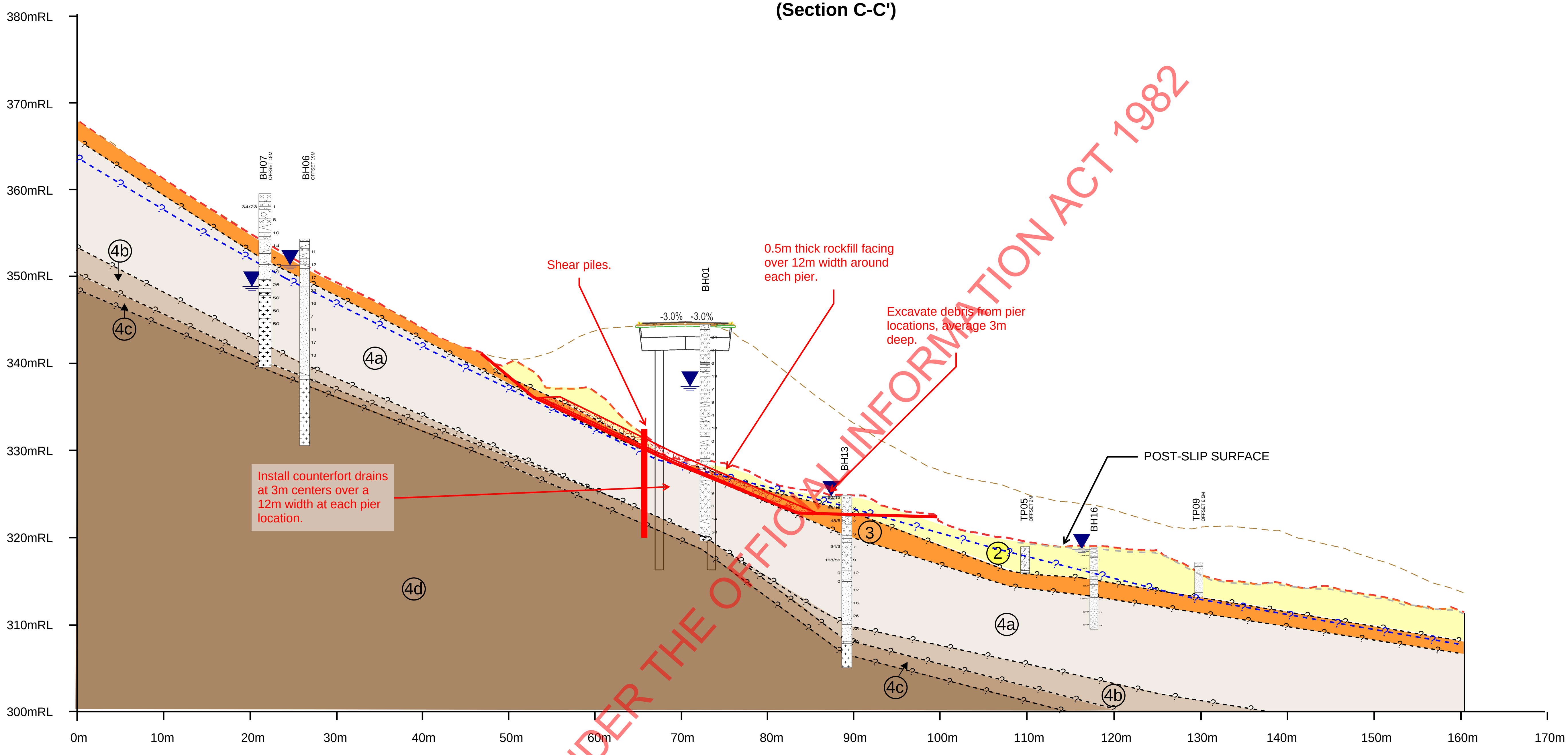
Drawing No.
3415236-GE-0002

Rev.
A

DO NOT SCALE

IF IN DOUBT ASK.

DESIGN SECTION CH3990
Option 6
(Section C-C')



Legend

1 [FILL]

2 [RECENT SLIP DEBRIS]

3 [HISTORICAL SLIP DEBRIS]

4a [COMPLETELY WEATHERED ANDESITE]

4b [HIGHLY WEATHERED ANDESITE]

4c [MODERATELY WEATHERED ANDESITE]

4d [SLIGHTLY WEATHERED ANDESITE]

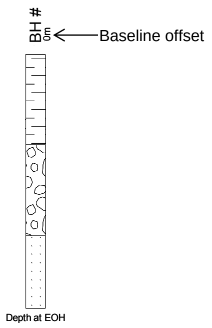
- - - -	Pre slip ground surface
- - - -	Post slip ground surface
—? —	Interpreted geological boundary
▼	Measured/dipped groundwater
—? —	Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m

V 1:500
0 6.25 12.5 17.5 25m

Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)	Design	ZL	12/04/23	Approved For Construction*
	Drawn	ZL	12/04/23	
Reduced Scale (A3)	Dsg Verifier		12/04/23	
1:500	Dwg Check	JB	12/04/23	Date

* Refer to Revision 1 for Original Signature

Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
DESIGN SECTION 3990
MIDDLE OF SLIP SCARP

Discipline
GEOTECHNICAL

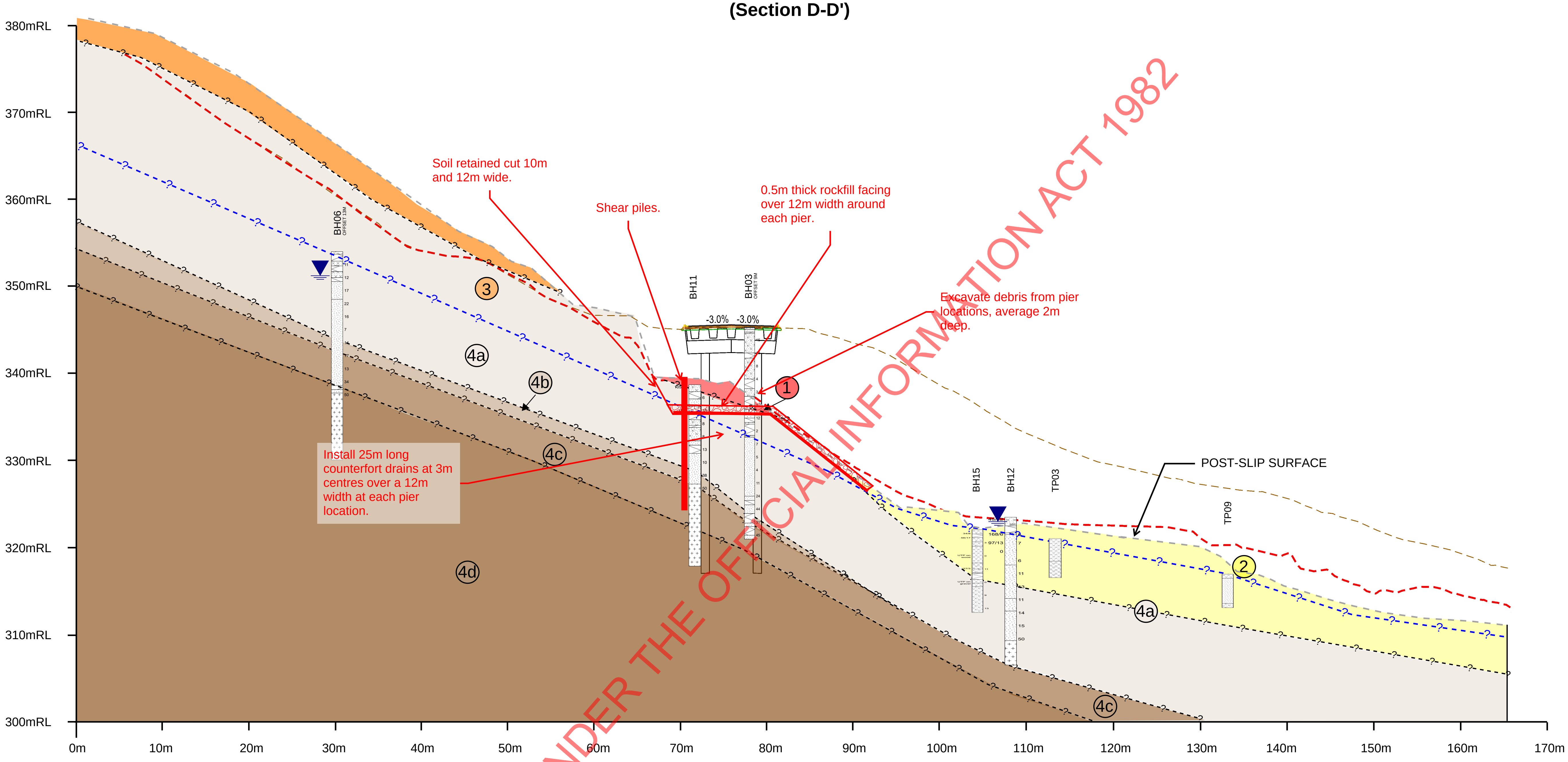
Drawing No.
3415236-GE-0003

Rev.
A

DO NOT SCALE

IF IN DOUBT ASK.

DESIGN SECTION CH4020
Option 6
(Section D-D')



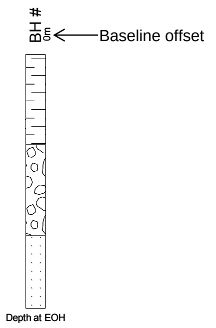
Legend

1 [FILL]
2 [RECENT SLIP DEPOSITS]
3 [HISTORICAL SLIP DEPOSITS]
4a [COMPLETELY WEATHERED ANDESITE]
4b [HIGHLY WEATHERED ANDESITE]
4c [MODERATELY WEATHERED ANDESITE]
4d [SLIGHTLY WEATHERED ANDESITE]

Pre slip ground surface
Post slip ground surface
–? – Interpreted geological boundary
▼ Measured/dipped groundwater
–? – Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m
V 1:500
0 6.25 12.5 17.5 25m
Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)
Reduced Scale (A3) 1:500

Design	ZL	12/04/23	Approved For Construction*
Drawn	ZL	12/04/23	
Dsg Verifier		12/04/23	
Dwg Check	JB	12/04/23	Date

* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: DESIGN SECTION CH4020
EASTERN END OF SLIP SCARP

Discipline: GEOTECHNICAL

Drawing No. 3415236-GE-0004

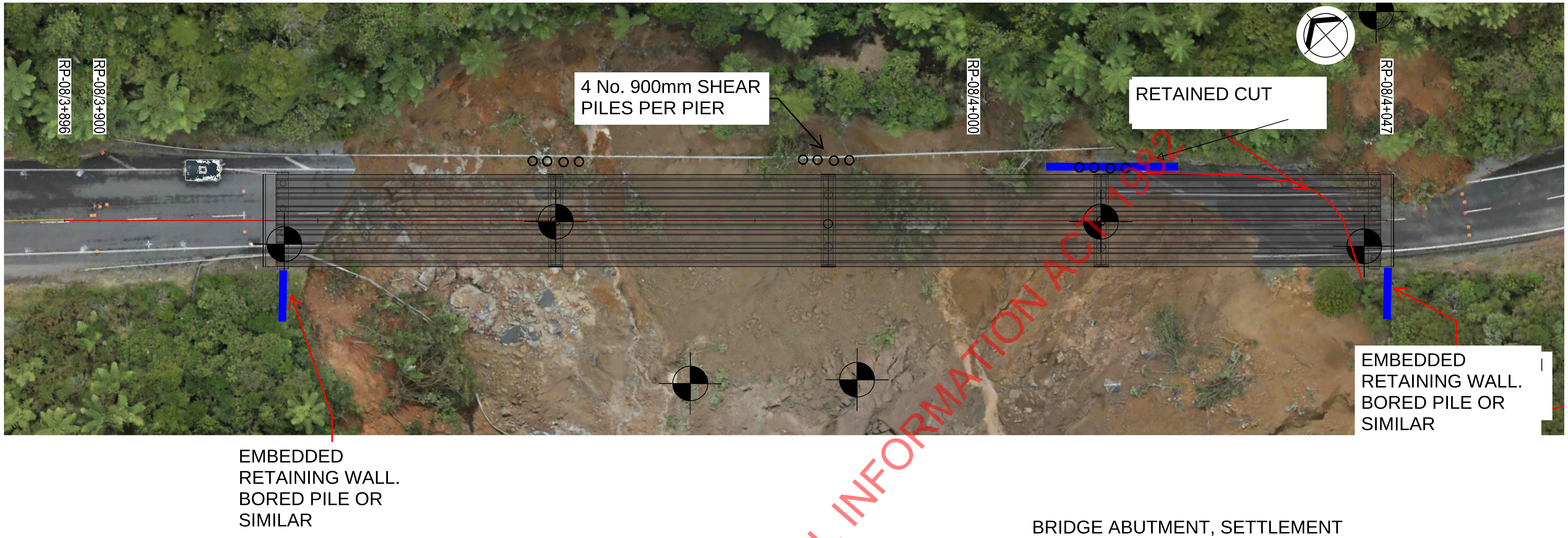
Rev. A

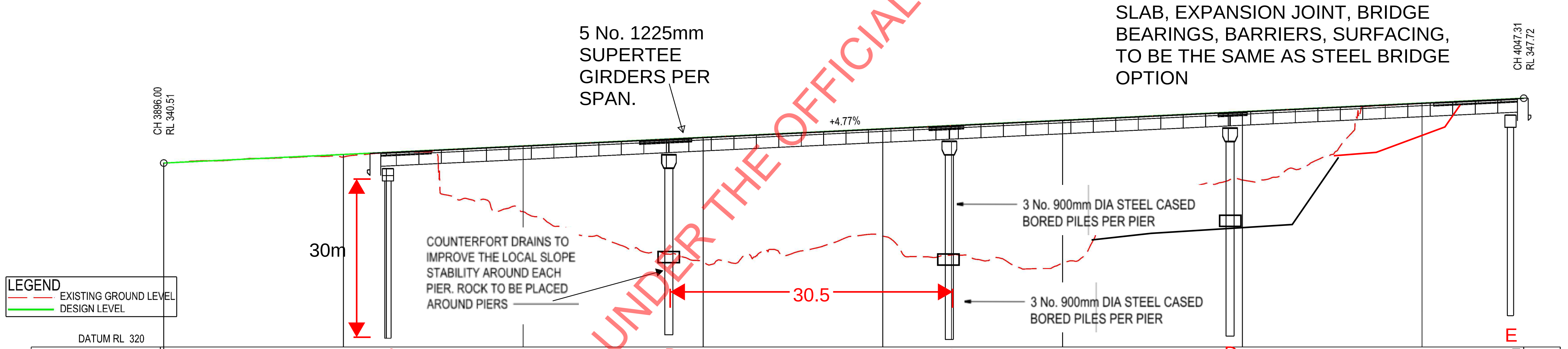
DO NOT SCALE

IF IN DOUBT ASK.

F

Appendix F – Option 6b Design Sketches





VERTICAL ALIGNMENT	G=4.77% L = 151.31								4047.31
HORIZONTAL ALIGNMENT	L = 151.31								4047.31
CUT / FILL	0.00	-0.29	-7.32	-13.82	-11.95	-15.89	-7.61	-0.05	0.00
DESIGN LEVELS	340.51	341.46	342.41	343.37	344.32	345.28	346.23	347.18	0.00
EXISTING LEVELS (at bridge centreline)	340.51	341.17	335.10	329.55	332.38	329.38	338.62	347.13	0.00
CHAINAGE	3896	3916	3936	3956	3976	3996	4016	4036	4051

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	CONCEPT OPTIONS				

Original Scale (A1) AS SHOWN
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client: WAKA KOTAHI NZ TRANSPORT AGENCY

Project: SH25A - TAPARAHI SLIP MITIGATION

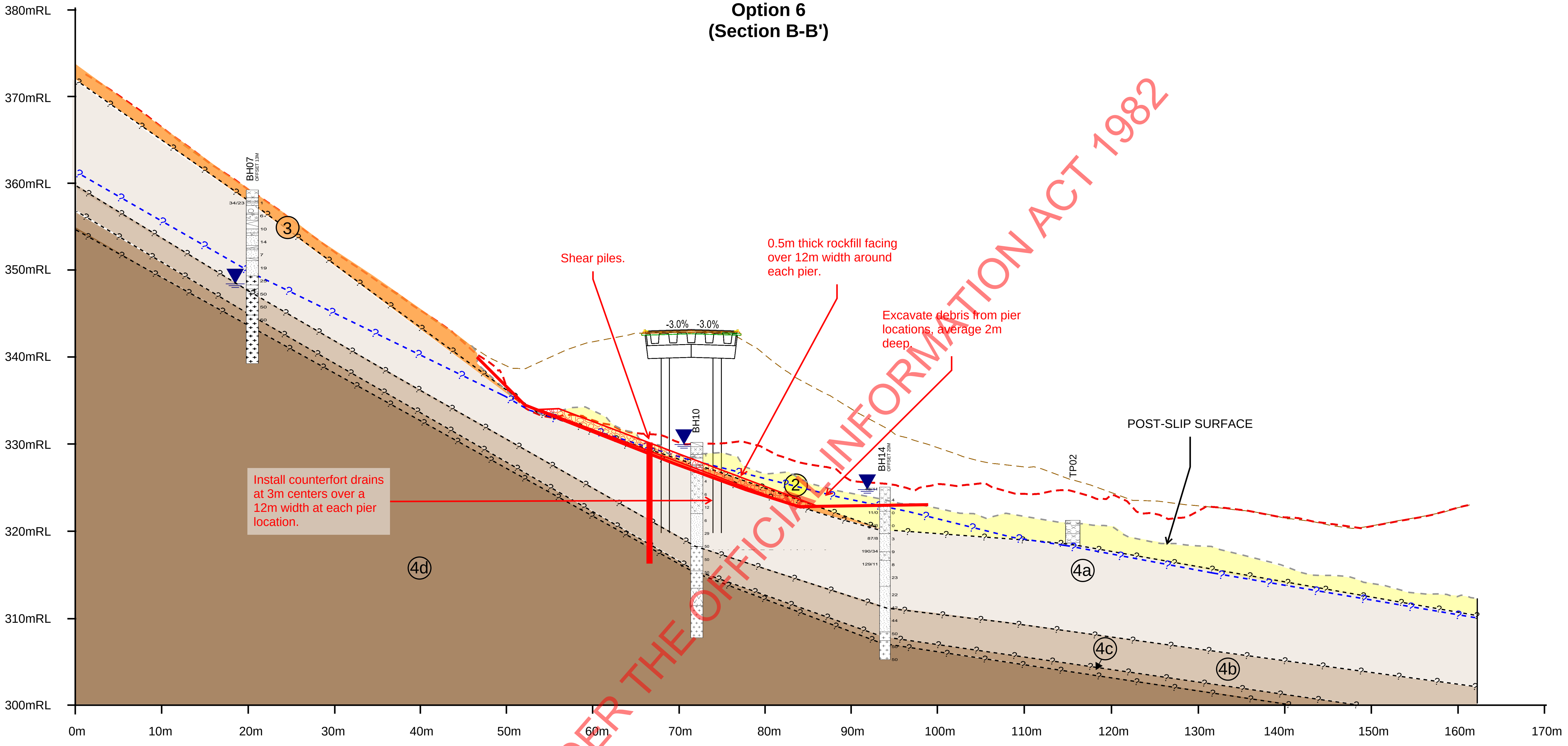
Title: PLAN & LONGITUDINAL SECTION
OPTION 6B - CONCRETE BRIDGE

Discipline: STRUCTURAL ENGINEERING

3415236-SE-SKT-0002

Rev. A

DESIGN SECTION CH3960
Option 6
(Section B-B')



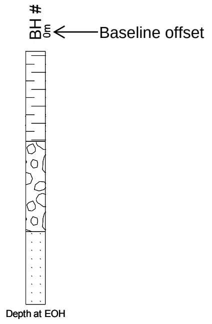
Legend

① [FILL]
② [RECENT SLIP DEBRIS]
③ [HISTORICAL SLIP DEBRIS]
4a [COMPLETELY WEATHERED ANDESITE]
4b [HIGHLY WEATHERED ANDESITE]
4c [MODERATELY WEATHERED ANDESITE]
4d [SLIGHTLY WEATHERED ANDESITE]

- - - Pre slip ground surface
- - - Post slip ground surface
— ? — Interpreted geological boundary
▼ Measured/dipped groundwater
— ? — Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m
V 1:500
0 6.25 12.5 17.5 25m
Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)	Design	ZL	12/04/23	Approved For Construction*
Reduced Scale (A3) 1:500	Drawn	ZL	12/04/23	
	Dsg Verifier		12/04/23	
	Dwg Check	JB	12/04/23	Date

* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: DESIGN SECTION CH3960 WESTERN END OF SLIP SCARP

Discipline: GEOTECHNICAL

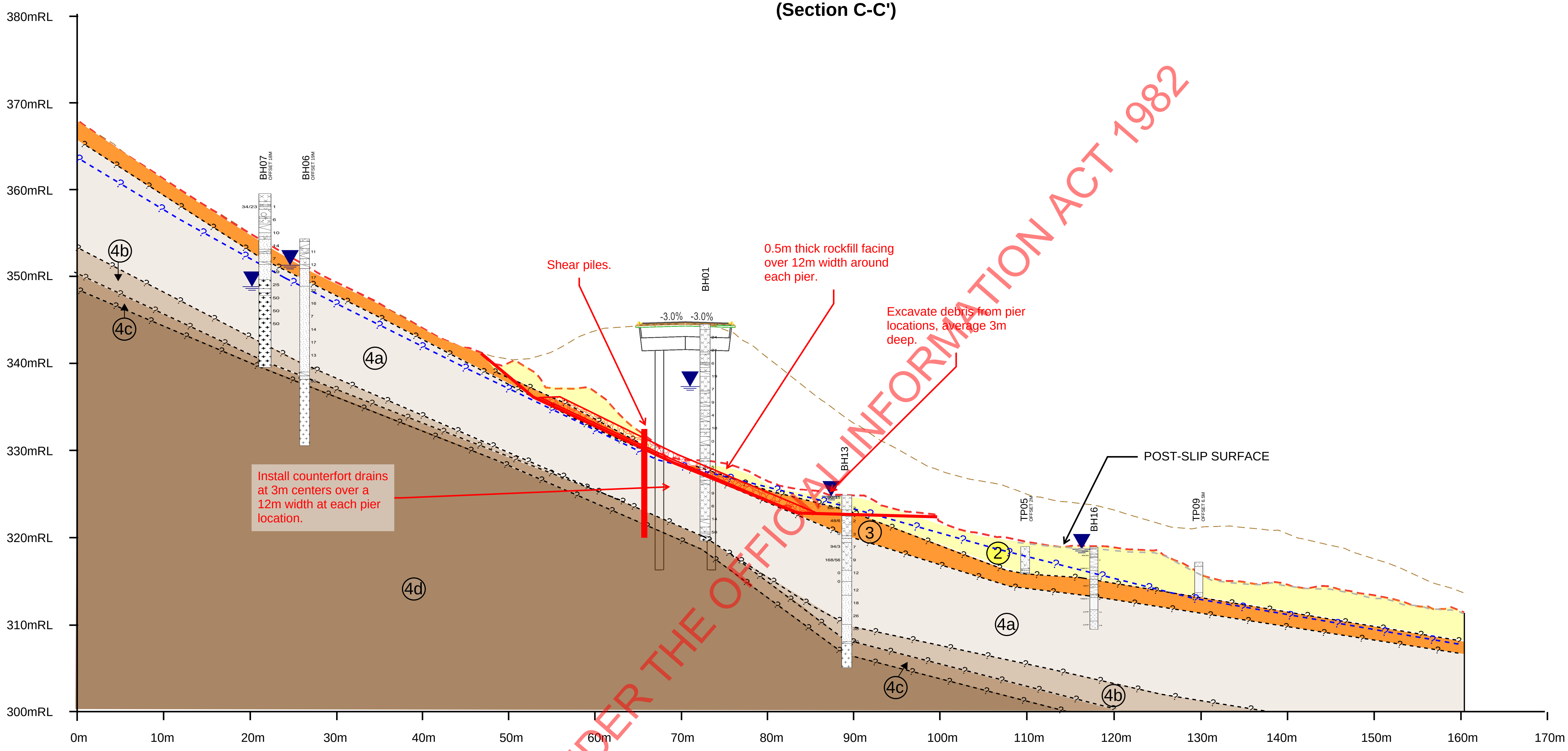
Drawing No. 3415236-GE-0002

Rev. A

DO NOT SCALE

IF IN DOUBT ASK.

DESIGN SECTION CH3990
Option 6
(Section C-C')



Legend

① [FILL]

② [RECENT SLIP DEBRIS]

③ [HISTORICAL SLIP DEBRIS]

(4a) [COMPLETELY WEATHERED ANDESITE]

(4b) [HIGHLY WEATHERED ANDESITE]

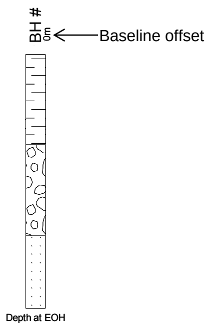
(4c) [MODERATELY WEATHERED ANDESITE]

(4d) [SLIGHTLY WEATHERED ANDESITE]

- - - Pre slip ground surface
- - - Post slip ground surface
—? — Interpreted geological boundary
▼ Measured/dipped groundwater
—? — Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m
V 1:500
0 6.25 12.5 17.5 25m
Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)
Reduced Scale (A3) 1:500

Design	ZL	12/04/23
Drawn	ZL	12/04/23
Dsg Verifier		12/04/23
Dwg Check	JB	12/04/23

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
DESIGN SECTION 3990
MIDDLE OF SLIP SCARP

Discipline
GEOTECHNICAL

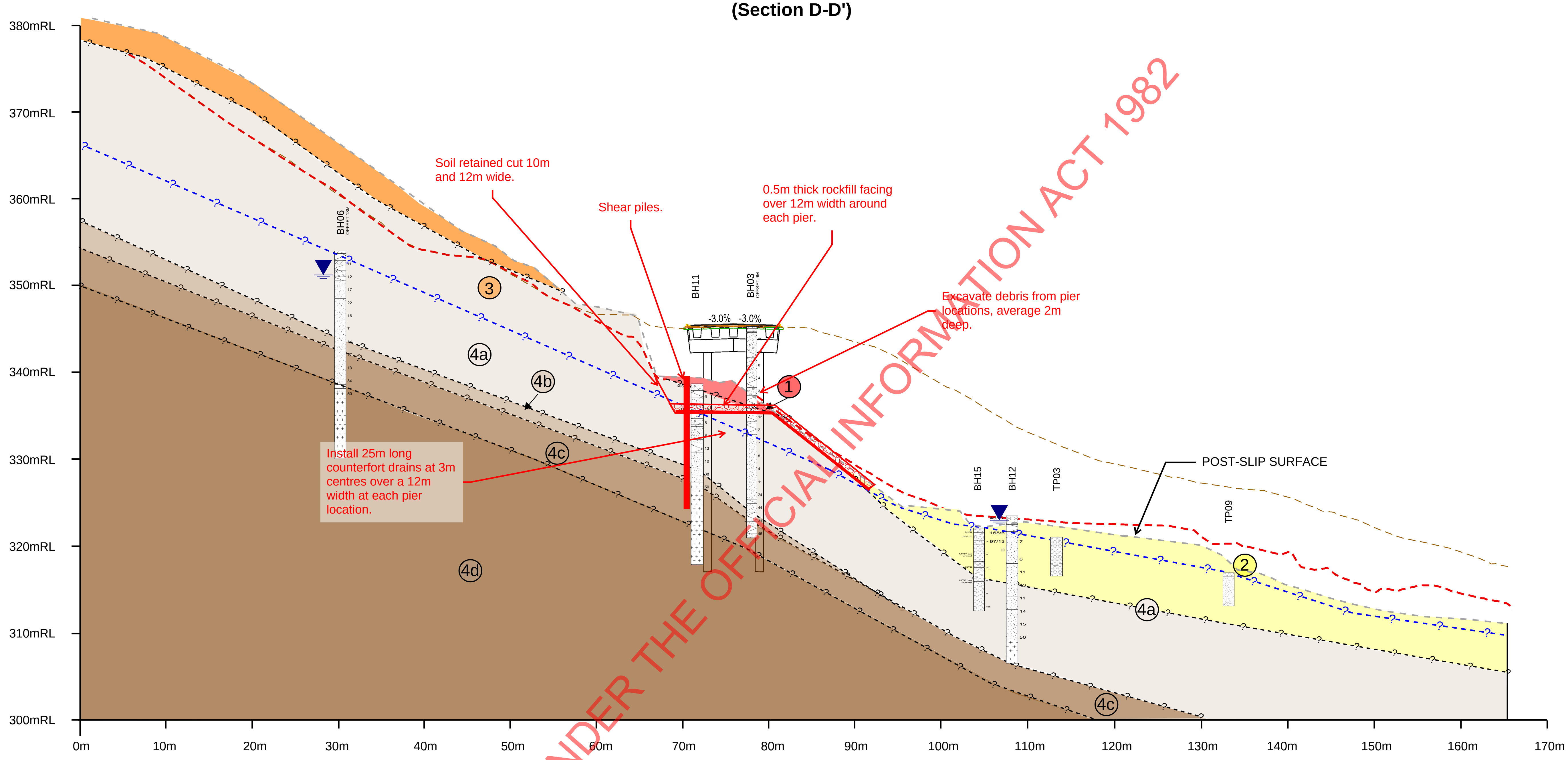
Drawing No.
3415236-GE-0003

Rev.
A

DO NOT SCALE

IF IN DOUBT ASK.

DESIGN SECTION CH4020
Option 6
(Section D-D')



Soil retained cut 10m and 12m wide.

Shear piles.

0.5m thick rockfill facing over 12m width around each pier.

Excavate debris from pier locations, average 2m deep.

Install 25m long counterfort drains at 3m centres over a 12m width at each pier location.

Legend

- ① [FILL]
- ② [RECENT SLIP DEPOSITS]
- ③ [HISTORICAL SLIP DEPOSITS]
- (4a) [COMPLETELY WEATHERED ANDESITE]
- (4b) [HIGHLY WEATHERED ANDESITE]
- (4c) [MODERATELY WEATHERED ANDESITE]
- (4d) [SLIGHTLY WEATHERED ANDESITE]

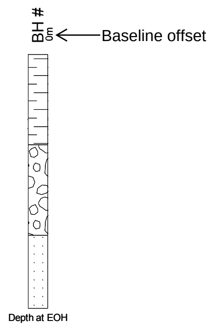
- Pre slip ground surface
- Post slip ground surface
- Interpreted geological boundary
- ▼ Measured/dipped groundwater
- Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m

V 1:500
0 6.25 12.5 17.5 25m

Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)
Reduced Scale (A3) 1:500

Design	ZL	12/04/23	Approved For Construction*
Drawn	ZL	12/04/23	
Dsg Verifier		12/04/23	
Dwg Check	JB	12/04/23	Date

* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: DESIGN SECTION CH4020
EASTERN END OF SLIP SCARP

Discipline: GEOTECHNICAL

Drawing No. 3415236-GE-0004
Rev. A

DO NOT SCALE

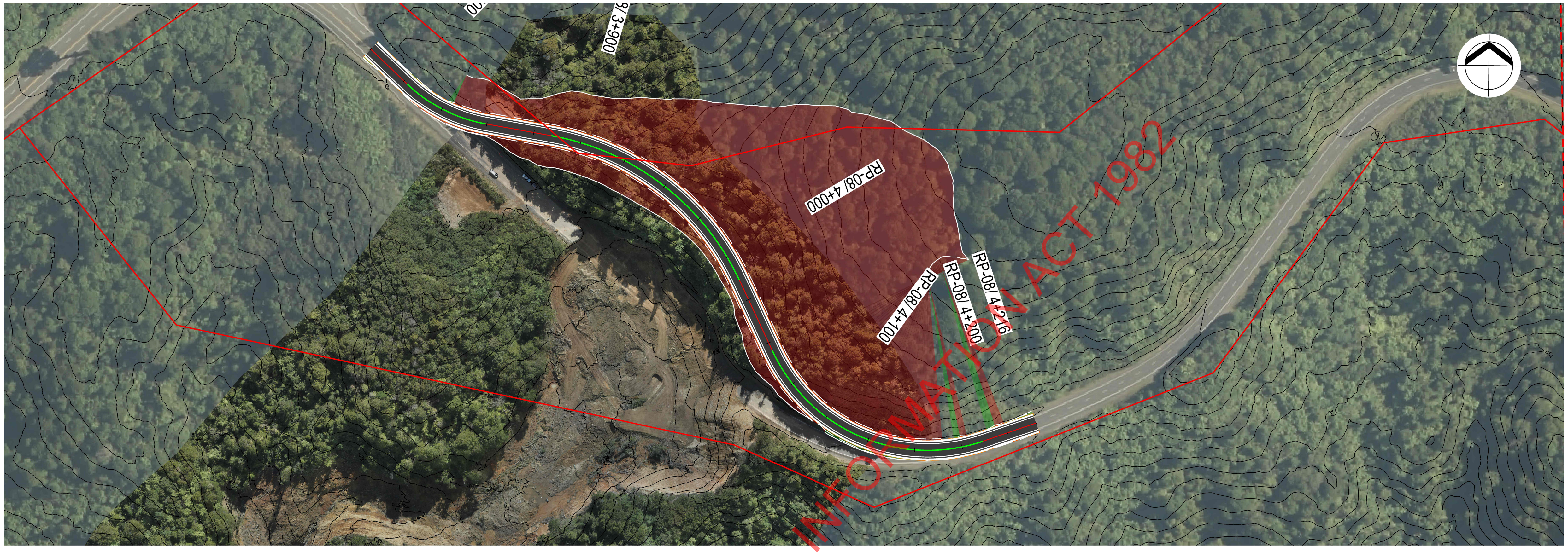
IF IN DOUBT ASK.

G

Appendix G – Option 7 Design Section, Sketches and Quantities

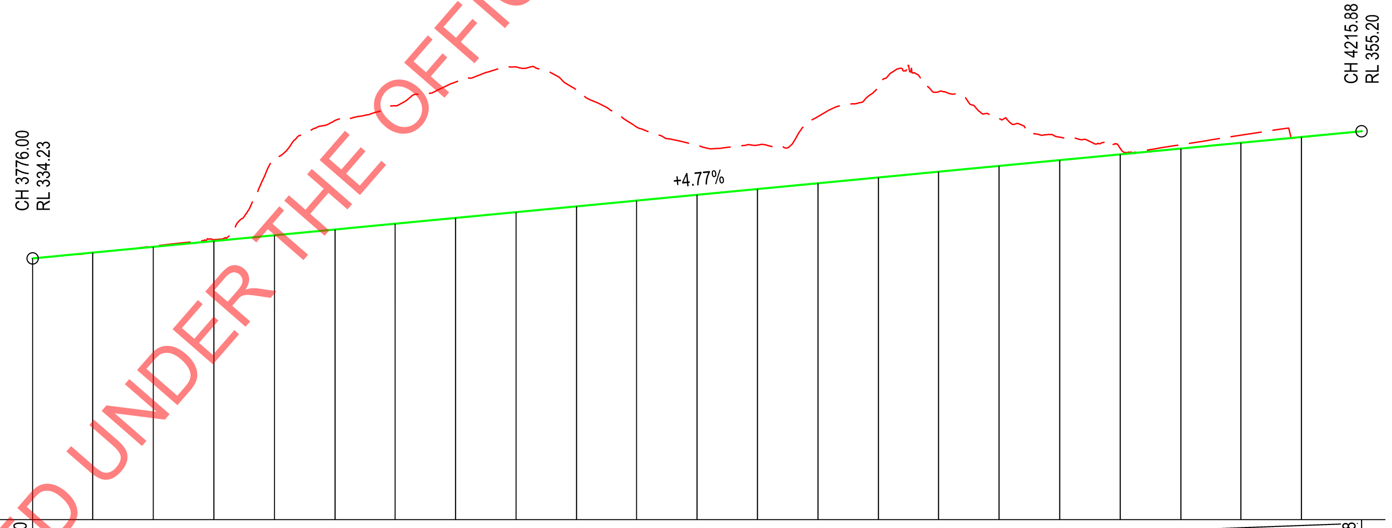
LEGEND

🟥 CUT
🟩 FILL



PLAN

A1 SCALE 1:1250



LEGEND
EXISTING GROUND LEVEL
DESIGN LEVEL

DATUM RL 291

VERTICAL ALIGNMENT: 3776.00 G=4.77% L = 439.88 4215.88

HORIZONTAL ALIGNMENT: 3776.00 L = 26.5 3802.51 R = 80.00 L = 46.76 3849.27 L = 35.38 3884.65 R = 135.00 L = 128.92 4013.58 L = 41.30 4054.87 R = 90.00 L = 131.56 4186.43 L = 29.4 4215.88

CUT / FILL	0.00	0.00	-0.04	0.12	0.23	12.69	17.98	19.46	22.41	23.95	19.17	12.14	8.16	7.25	11.00	15.02	13.18	7.84	3.79	0.98	0.64	1.25	-0.06
DESIGN LEVELS	0.00	334.23	335.18	336.14	337.09	338.04	339.00	339.95	340.90	341.86	342.81	343.76	344.72	345.67	346.62	347.58	348.53	349.48	350.44	351.39	352.34	353.30	354.25
EXISTING LEVELS	0.00	334.23	335.14	336.25	337.32	350.73	356.98	359.41	363.31	365.81	361.98	355.91	352.87	352.92	357.62	362.60	361.71	357.33	354.23	352.37	352.98	354.55	354.19
CHAINAGE	-50	3776	3796	3816	3836	3856	3876	3896	3916	3936	3956	3976	3996	4016	4036	4056	4076	4096	4116	4136	4156	4176	4196

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	CUT SLOPE REVISED	RJB			19.04.23
B	BOUNDARIES ADDED OPTION NAME CHANGED	RJB			20.2.23
A	UNDER REVISION				

Original Scale (A1) AS SHOWN
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

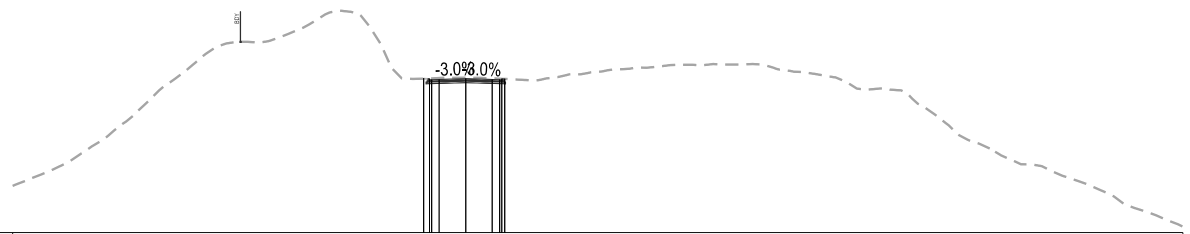
Title: PLAN & LONGITUDINAL SECTION
OPTION 7 NEW BYPASS

Discipline: CIVIL ENGINEERING

Drawing No. 3413292 - SK-07

Rev. C

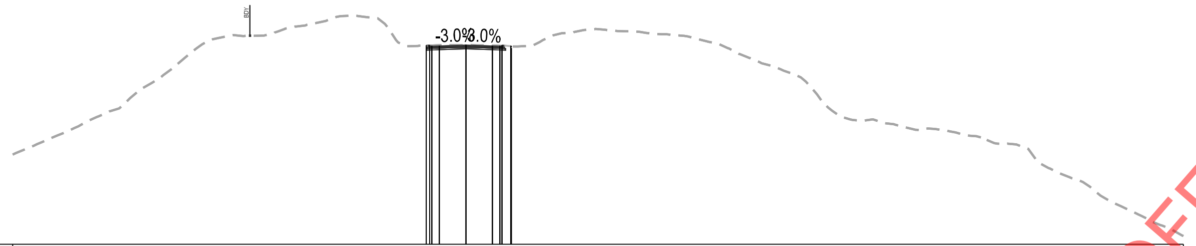
Drawing Plotted: 19/04/2023 10:57:13 AM



DATUM 315

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	335.40	335.34	335.24	335.27	335.37	335.27	335.24	335.34	335.36
EXISTING LEVELS	335.40	335.42	335.43	335.47	335.52	335.44	335.39	335.38	335.36
DESIGN OFFSETS	-5.56	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.18

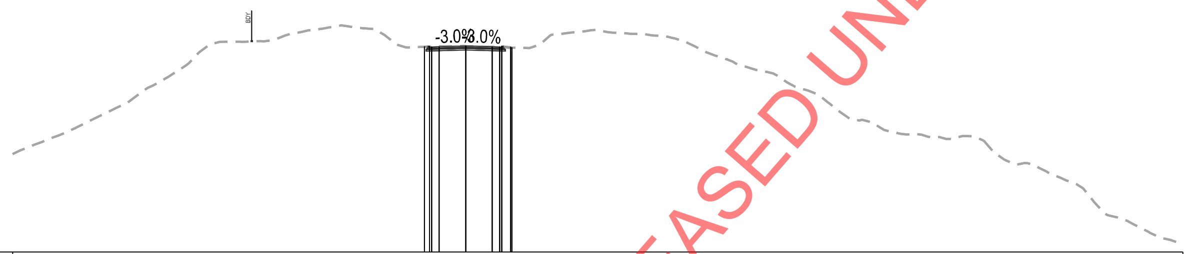
CHAINAGE RP-08/ 3800



DATUM 308

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	334.35	334.38	334.28	334.31	334.42	334.31	334.28	334.38	334.28	334.01
EXISTING LEVELS	334.35	334.37	334.38	334.41	334.43	334.35	334.32	334.31	334.25	334.24
DESIGN OFFSETS	-5.25	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.03

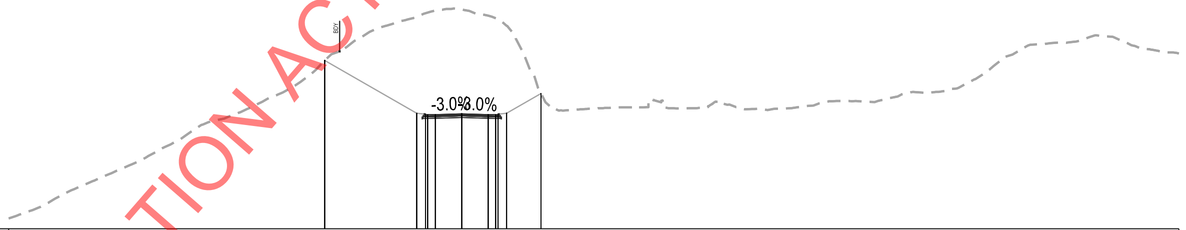
CHAINAGE RP-08/ 3780



DATUM 307

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	334.14	334.19	334.09	334.12	334.23	334.12	334.09	334.19	334.09	334.01
EXISTING LEVELS	334.14	334.15	334.16	334.20	334.23	334.12	334.07	334.07	334.01	334.01
DESIGN OFFSETS	-5.45	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.11

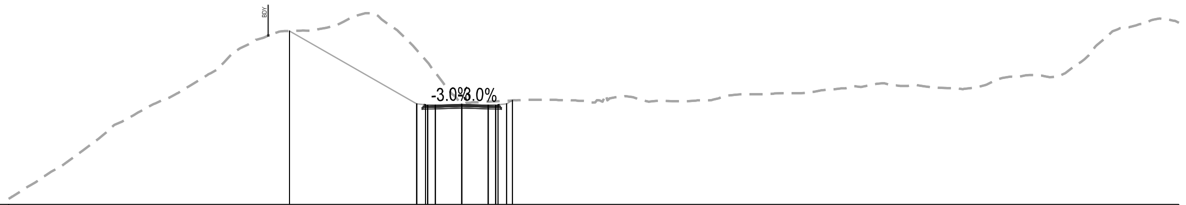
CHAINAGE RP-08/ 3776



DATUM 323

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	345.27	338.30	338.20	338.10	338.13	338.23	338.13	338.10	338.20	338.30	340.90
EXISTING LEVELS	345.27	351.05	351.54	351.63	351.90	352.01	351.23	350.88	350.78	349.88	340.90
DESIGN OFFSETS	-18.16	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	10.50

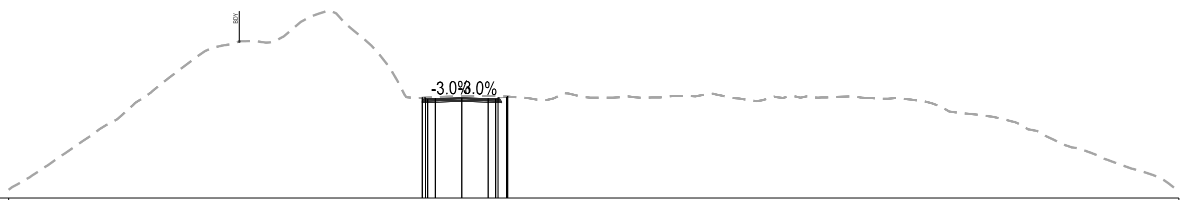
CHAINAGE RP-08/ 3860



DATUM 324

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	346.98	337.35	337.25	337.15	337.18	337.28	337.18	337.15	337.25	337.35	337.79
EXISTING LEVELS	346.98	344.45	343.14	342.79	341.48	337.51	337.62	337.67	337.69	337.75	337.79
DESIGN OFFSETS	-22.82	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	6.73

CHAINAGE RP-08/ 3840



DATUM 323

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	336.32	336.29	336.19	336.22	336.33	336.22	336.19	336.29	336.39	336.47
EXISTING LEVELS	336.32	336.34	336.35	336.39	336.52	336.55	336.53	336.53	336.48	336.47
DESIGN OFFSETS	-5.22	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.08

CHAINAGE RP-08/ 3820

FOR INFORMATION
NOT FOR CONSTRUCTION

A	ISSUED FOR REVIEW				
No.	Revision	By	Chk	Appd	Date

Original Scale (A1) 1:500	Design		Approved For Construction*
	Drawn		
Reduced Scale (A3)	Dsg Verifier		
	Dwg Check		Date
HALF SCALE	* Refer to Revision 1 for Original Signature		

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 7
RP-08/ 3776 TO RP-08/ 3860

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-300

Rev. A

DO NOT SCALE

IF IN DOUBT ASK.

Document No. ...\XSect-Mainline.dgn - OPTION 7 - 1 [Sheet]

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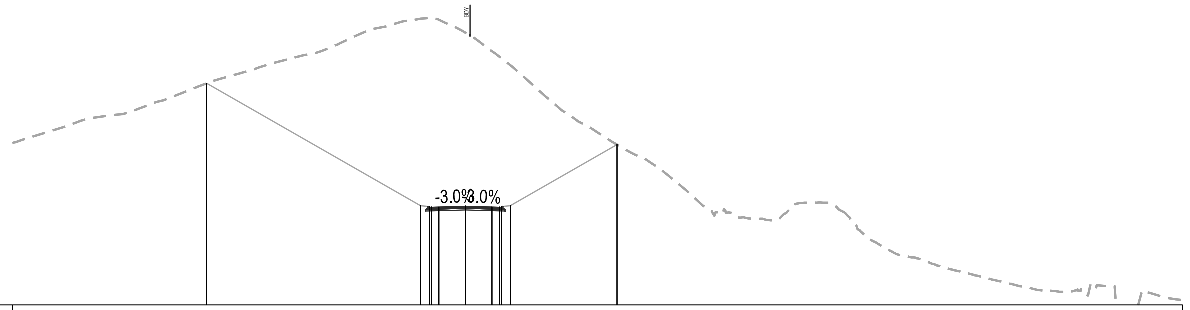
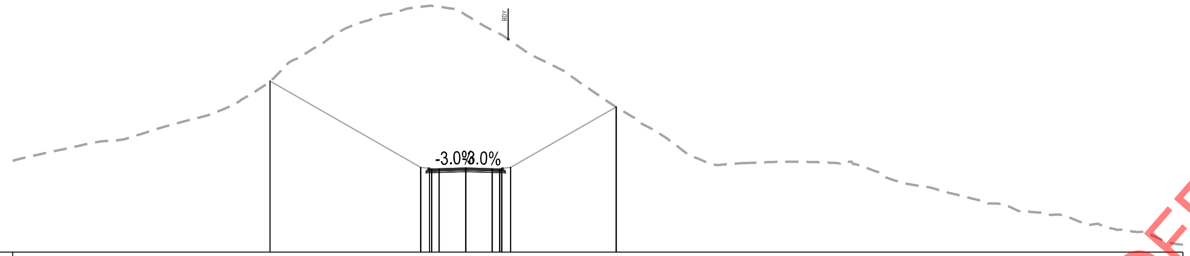


DATUM 328

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	357.36	341.16	341.06	340.96	340.99	341.09	340.99	340.96	341.06	341.16	349.24
EXISTING LEVELS	357.36	365.92	366.01	366.00	365.78	364.07	361.63	360.90	360.67	359.75	349.24
DESIGN OFFSETS	-34.30	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	20.09

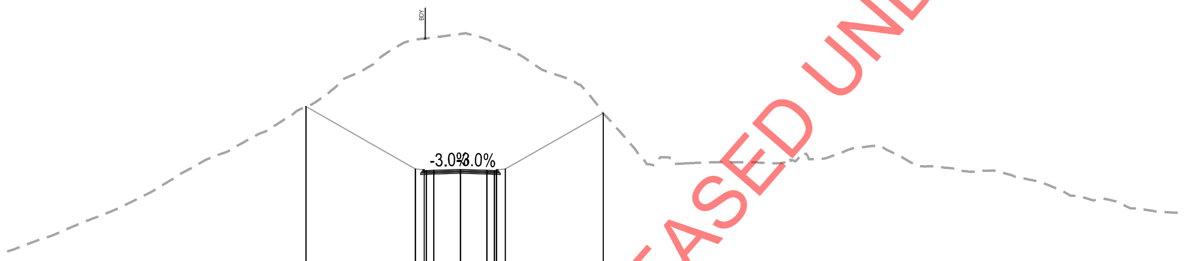
CHAINAGE RP-08/ 3920



DATUM 329

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	351.62	340.21	340.11	340.01	340.04	340.14	340.04	340.01	340.11	340.21	348.19
EXISTING LEVELS	351.62	361.43	361.55	361.55	361.45	360.38	358.35	357.86	357.70	356.96	348.19
DESIGN OFFSETS	-25.92	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	19.92

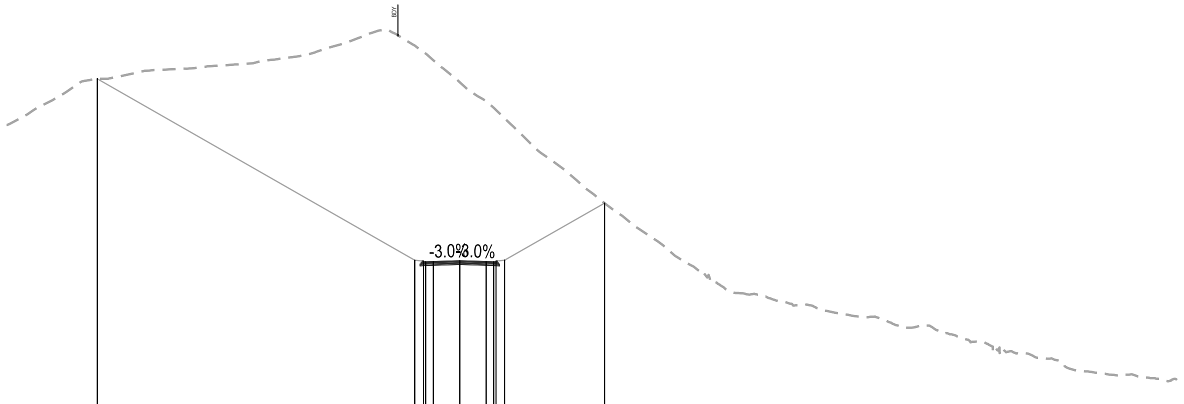
CHAINAGE RP-08/ 3900



DATUM 327

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	347.53	339.25	339.15	339.05	339.08	339.19	339.08	339.05	339.15	339.25	346.65
EXISTING LEVELS	347.53	356.40	356.54	356.57	356.69	357.15	356.45	355.95	355.79	355.33	346.65
DESIGN OFFSETS	-20.44	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	18.90

CHAINAGE RP-08/ 3880



DATUM 323

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	366.14	342.11	342.01	341.91	341.94	342.05	341.94	341.91	342.01	342.11	349.68
EXISTING LEVELS	366.14	370.53	369.73	369.47	368.61	365.70	363.17	362.30	362.02	360.92	349.68
DESIGN OFFSETS	-48.00	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	19.19

CHAINAGE RP-08/ 3940

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:500
Reduced Scale (A3) HALF SCALE

Design
Drawn
Dsg Verifier
Dwg Check

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 7
RP-08/ 3880 TO RP-08/ 3940

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-301

Rev. A

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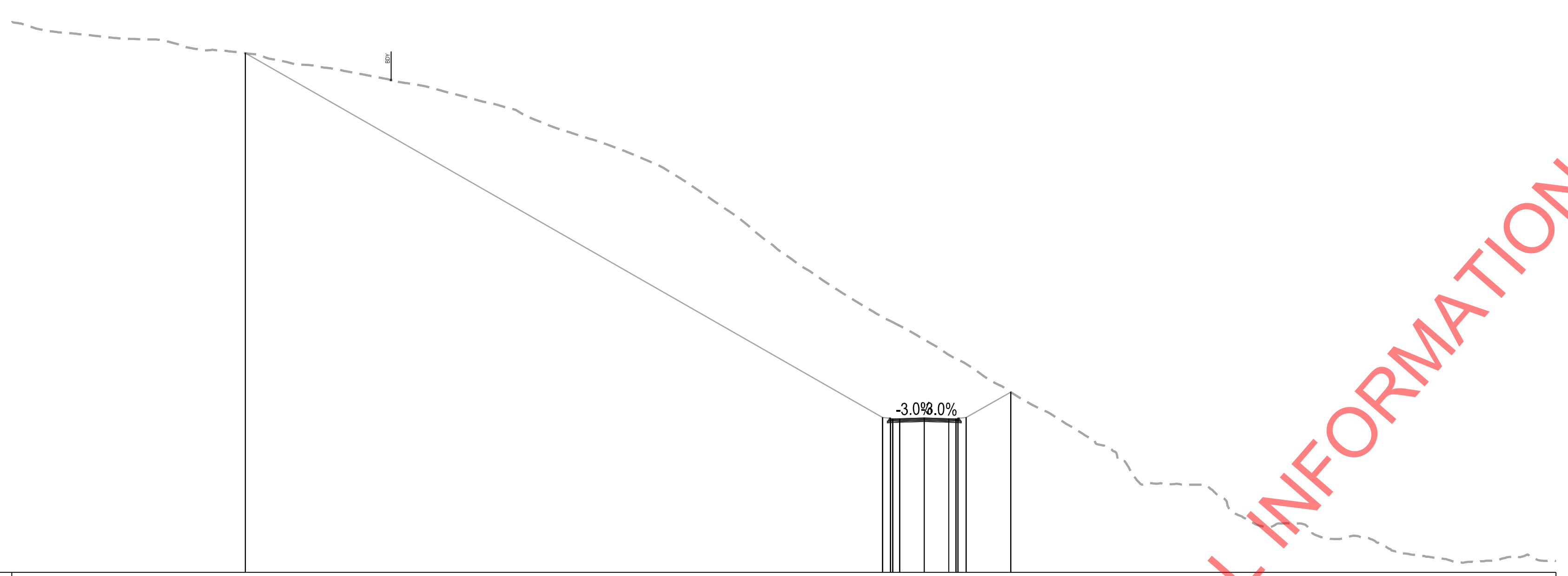
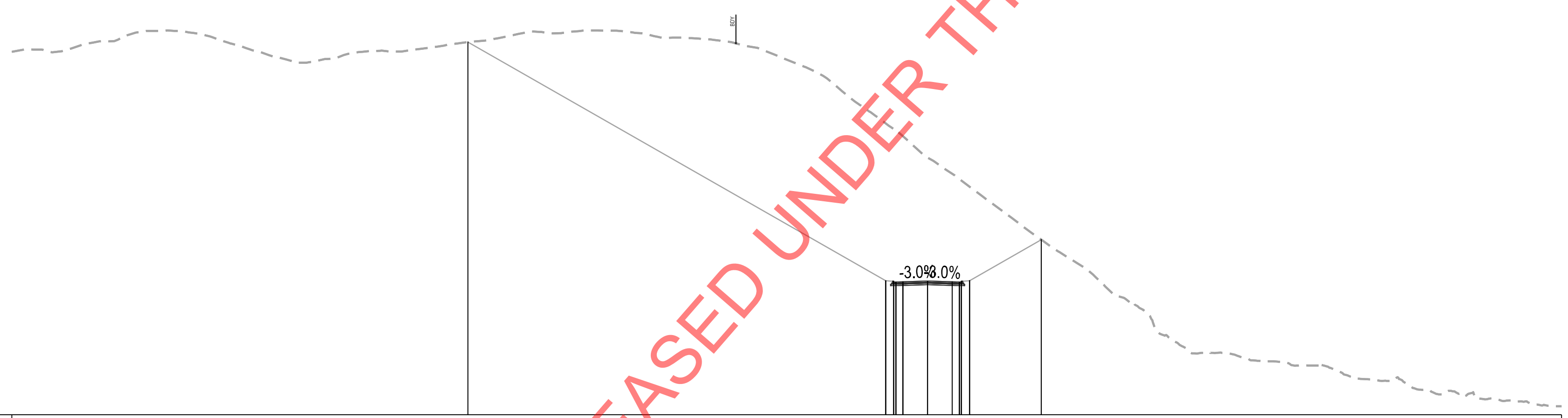


DATUM 322

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	395.89	344.02	343.92	343.82	343.85	343.95	343.85	343.82	343.92	344.02	347.65
EXISTING LEVELS	395.89	358.33	357.73	357.58	357.08	355.13	352.94	352.40	352.25	351.63	347.65
DESIGN OFFSETS	-96.73	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	12.30

CHAINAGE RP-08/ 3980



DATUM 324

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	376.95	343.07	342.97	342.87	342.90	343.00	342.90	342.87	342.97	343.07	348.89
EXISTING LEVELS	376.95	365.42	364.58	364.37	363.60	360.54	358.24	357.51	357.28	356.41	348.89
DESIGN OFFSETS	-65.25	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	16.14

CHAINAGE RP-08/ 3960

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:500
Reduced Scale (A3) HALF SCALE

Design			Approved For Construction*
Drawn			
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 7
RP-08/ 3960 TO RP-08/ 3980

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-302

Rev. A

DO NOT SCALE

IF IN DOUBT ASK.

Document No. ...\XSect-Mainline.dgn - OPTION 7 - 3 [Sheet]

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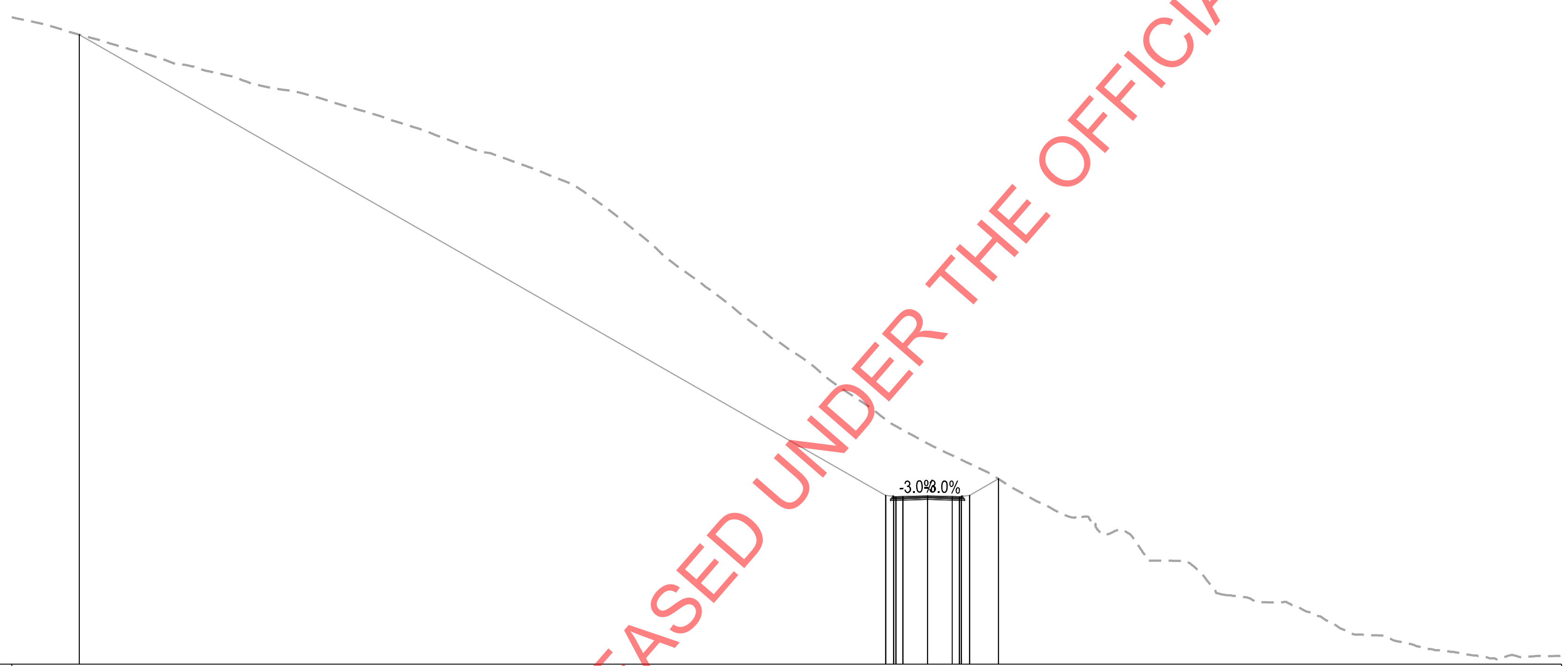


DATUM 321

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	410.38	344.97	344.87	344.77	344.80	344.91	344.80	344.77	344.87	344.97	347.32
EXISTING LEVELS	410.38	355.75	354.96	354.78	354.22	352.34	350.64	350.17	350.03	349.48	347.32
DESIGN OFFSETS	-120.42	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	10.06

CHAINAGE RP-08/ 4000

FOR INFORMATION
NOT FOR CONSTRUCTION

A	ISSUED FOR REVIEW				
No.	Revision	By	Chk	Appd	Date

Original Scale (A1) 1:500	Design			Approved For Construction*
	Drawn			
Reduced Scale (A3)	Dsg Verifier			
	Dwg Check			Date
HALF SCALE	* Refer to Revision 1 for Original Signature			

Client:

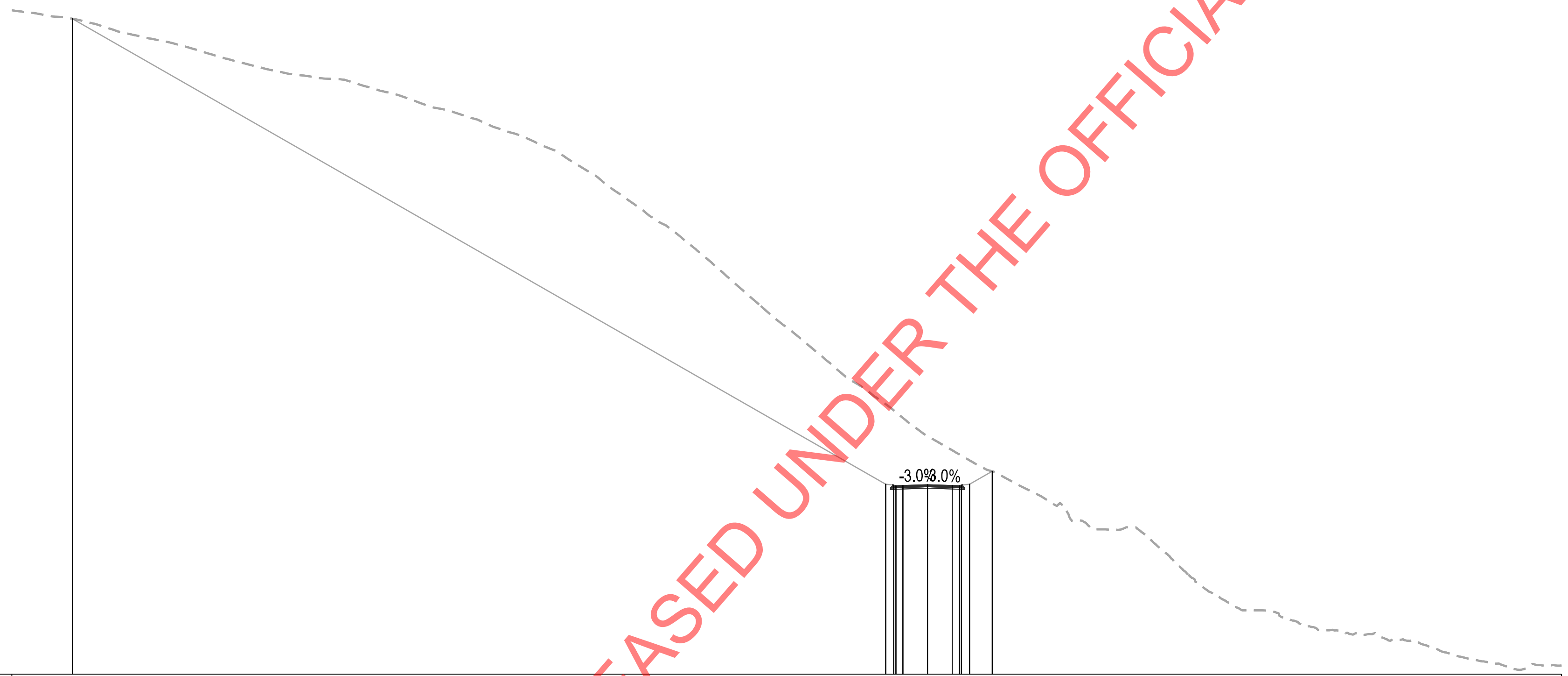
Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 7
RP-08/ 4000 TO RP-08/ 4000

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-303

Rev. A



DATUM 319

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	411.90	345.93	345.83	345.73	345.76	345.86	345.76	345.73	345.83	345.93	347.77
EXISTING LEVELS	411.90	357.28	356.38	356.14	355.31	352.75	350.73	350.15	349.98	349.31	347.77
DESIGN OFFSETS	-121.41	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	9.18

CHAINAGE RP-08/ 4020

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:500
Reduced Scale (A3) HALF SCALE

Design		
Drawn		
Dsg Verifier		
Dwg Check		

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

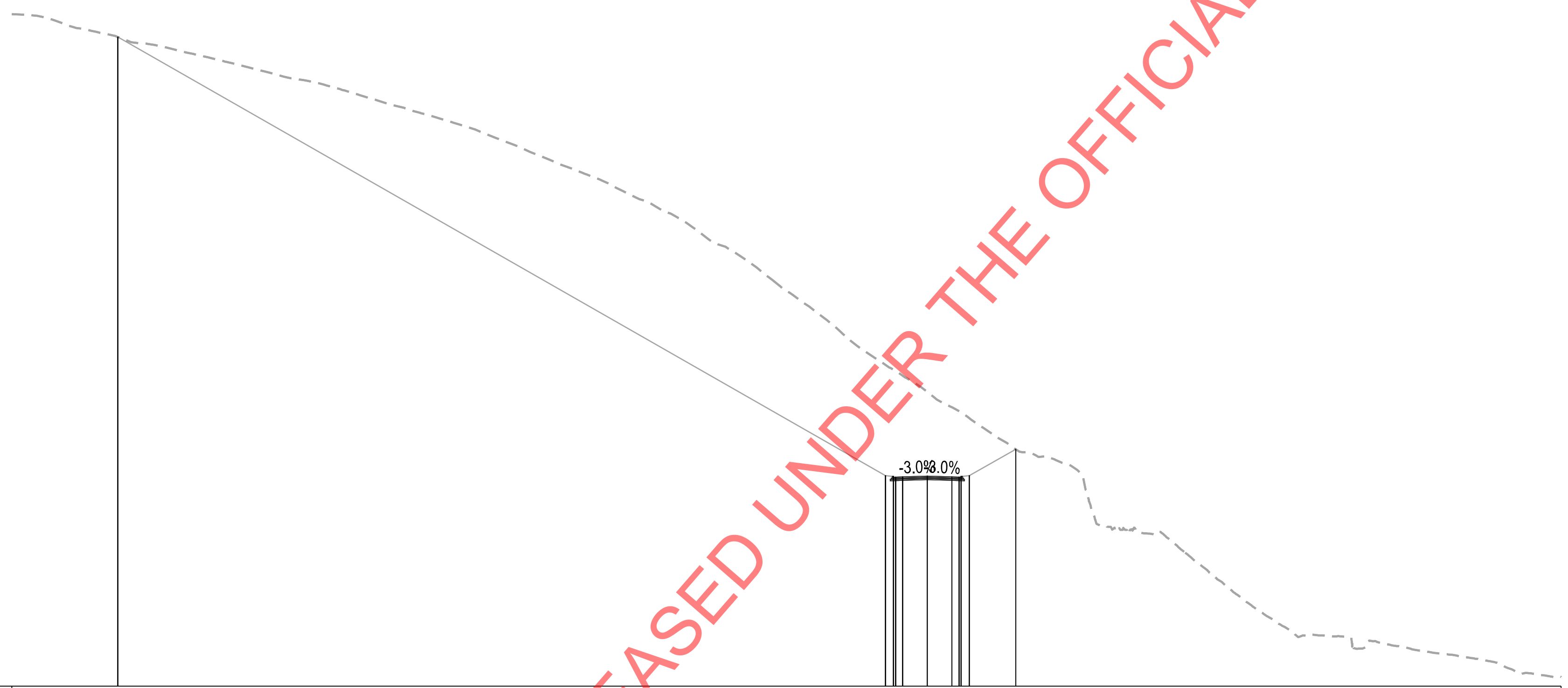
Title: DETAILED CROSS SECTIONS
OPTION 7
RP-08/ 4020 TO RP-08/ 4020

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-304

Rev. A

Drawing Plotted: 19/04/2023 10:57:16 AM



DATUM 317

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	409.15	346.88	346.78	346.68	346.71	346.81	346.71	346.68	346.78	346.88	350.65
EXISTING LEVELS	409.15	362.63	361.91	361.74	361.09	358.77	356.58	356.06	355.88	355.06	350.65
DESIGN OFFSETS	-114.93	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	12.54

CHAINAGE RP-08/ 4040

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:500	Design		Approved For Construction*
	Drawn		
Reduced Scale (A3)	Dsg Verifier		
HALF SCALE	Dwg Check		Date
	* Refer to Revision 1 for Original Signature		

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 7
RP-08/ 4040 TO RP-08/ 4040

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-305

Rev. A

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Document No. ...\XSect-Mainline.dgn - OPTION 7 - 6 [Sheet]

DO NOT SCALE

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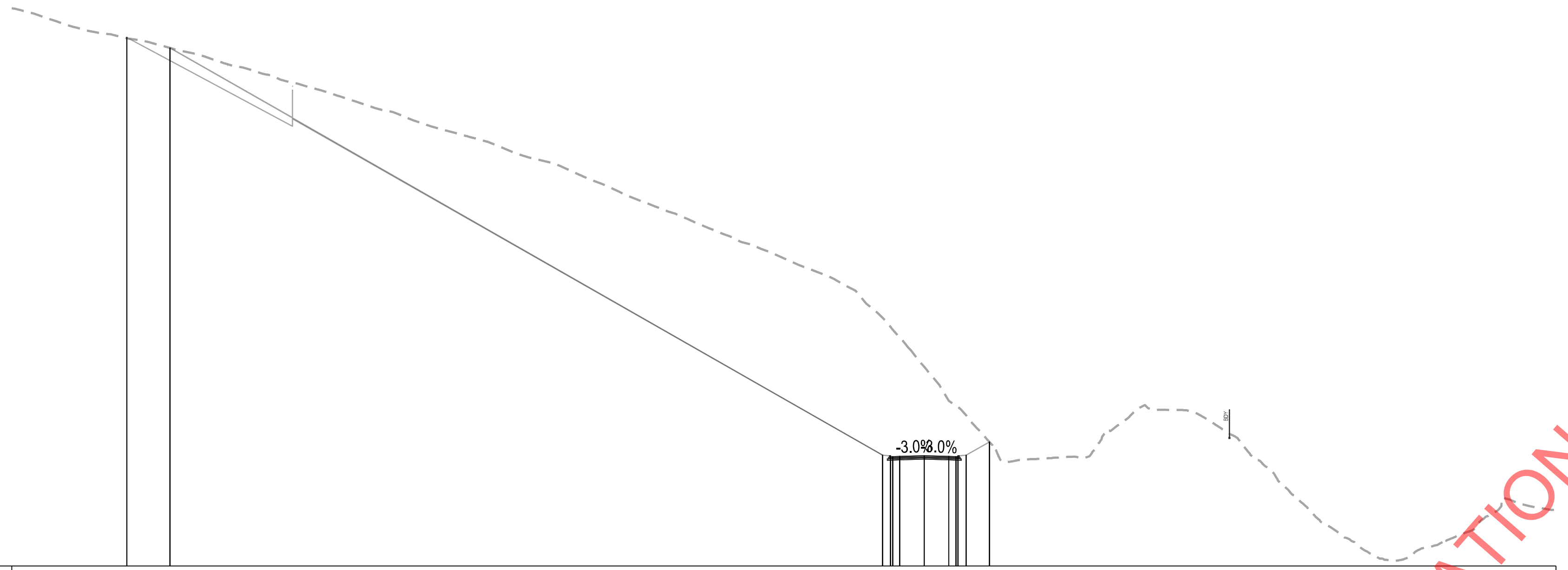
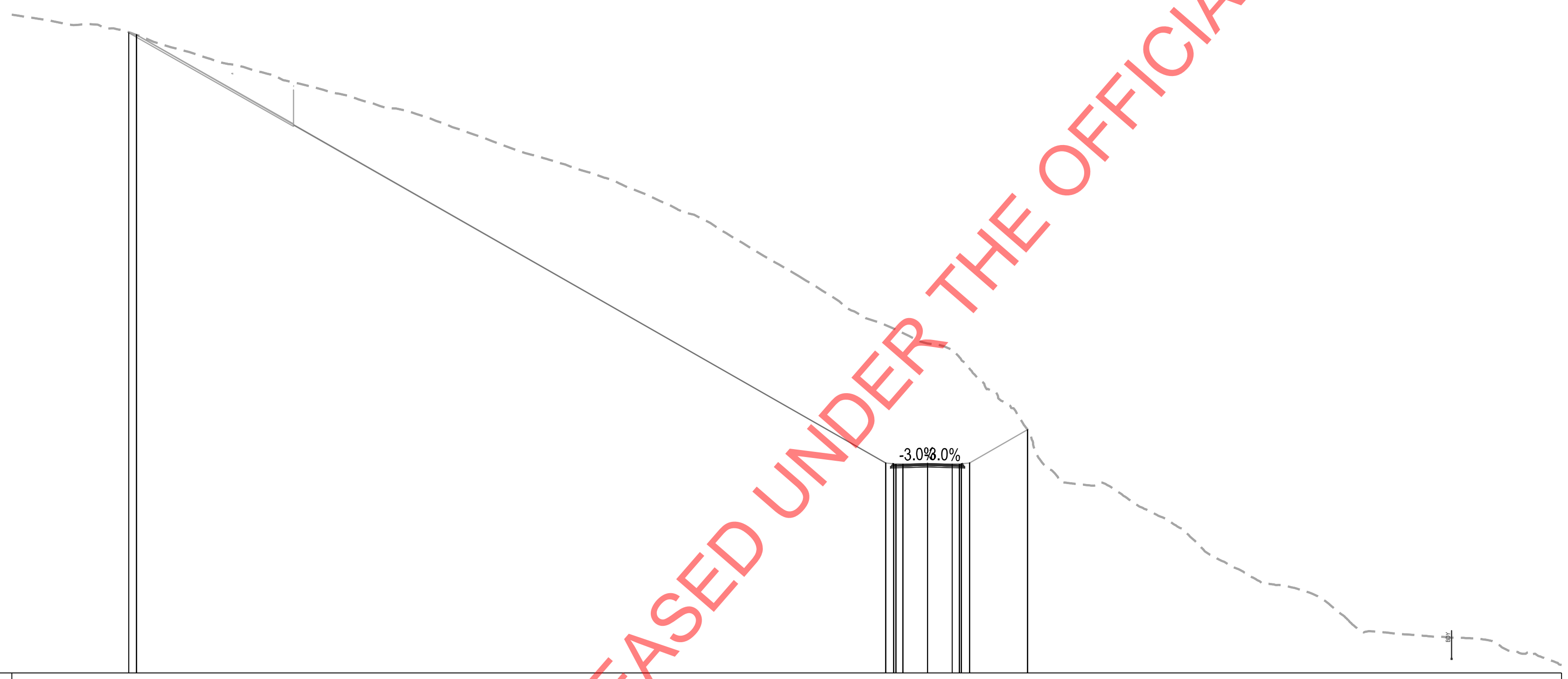


DATUM 333

DESIGN FEATURES	IA-L	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	408.28	406.79	348.79	348.69	348.59	348.62	348.72	348.62	348.59	348.69	348.79	350.68
EXISTING LEVELS	408.18	406.79	368.37	367.06	366.68	365.58	361.35	356.53	355.85	355.66	354.48	350.68
DESIGN OFFSETS	-113.61	-107.45	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	9.26

CHAINAGE RP-08/ 4080



DATUM 318

DESIGN FEATURES	IA-L	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	408.90	408.60	347.83	347.73	347.63	347.66	347.77	347.66	347.63	347.73	347.83	352.55
EXISTING LEVELS	408.97	408.60	367.40	366.89	366.74	366.27	364.78	363.86	362.85	362.44	361.21	352.55
DESIGN OFFSETS	-113.39	-112.30	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	14.20

CHAINAGE RP-08/ 4060

FOR INFORMATION
NOT FOR CONSTRUCTION

A	ISSUED FOR REVIEW				
No.	Revision	By	Chk	Appd	Date

Original Scale (A1) 1:500	Design		Approved For Construction*
	Drawn		
Reduced Scale (A3)	Dsg Verifier		
	Dwg Check		Date
HALF SCALE	* Refer to Revision 1 for Original Signature		

Beca

Client:

Project: SH 25A TAPARAHI SLIP

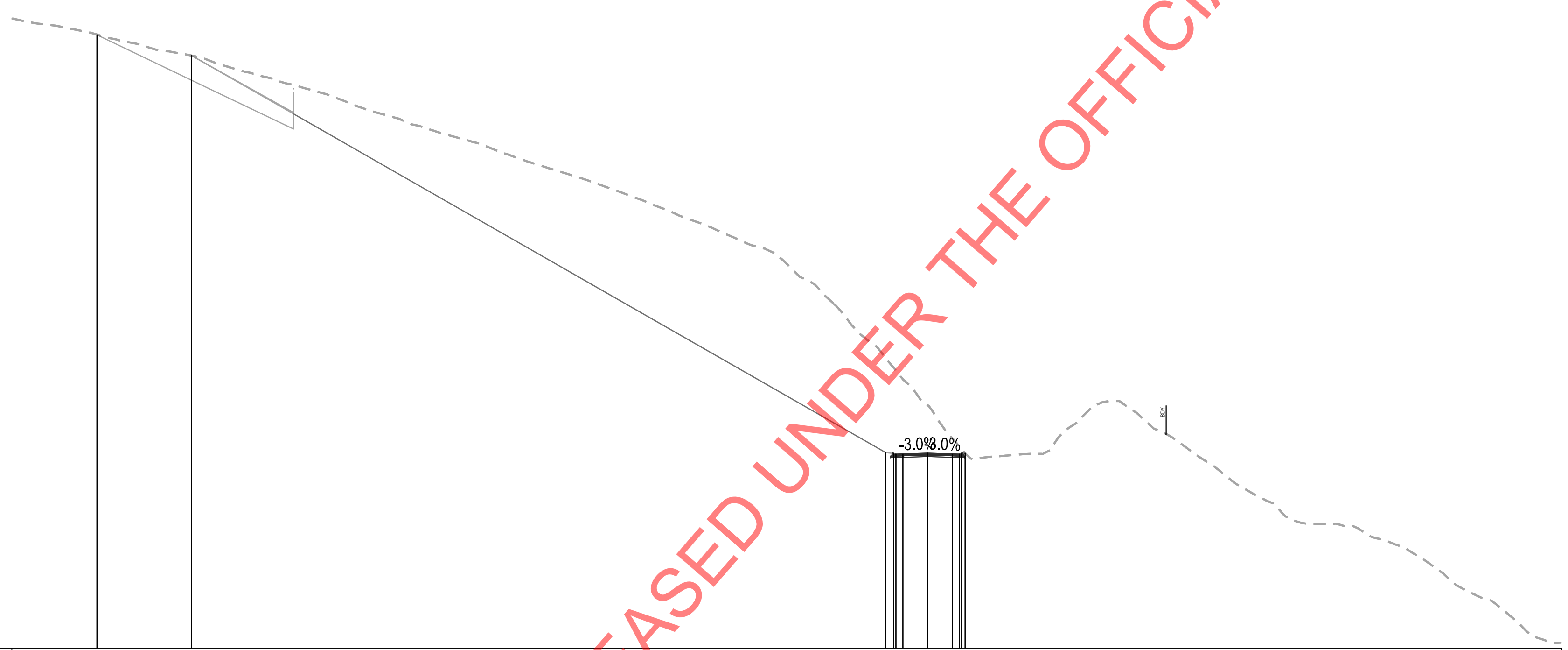
Title: DETAILED CROSS SECTIONS
OPTION 7
RP-08/ 4060 TO RP-08/ 4080

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-306

Rev. A

Drawing Plotted: 19/04/2023 10:57:18 AM



DATUM 322

DESIGN FEATURES	IA-L	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	408.97	406.06	349.74	349.64	349.54	349.57	349.68	349.57	349.54	349.64	349.68
EXISTING LEVELS	409.03	406.06	363.10	361.75	361.36	360.10	356.47	351.75	350.64	350.27	349.68
DESIGN OFFSETS	-117.92	-104.50	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.32

CHAINAGE RP-08/ 4100

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:500
Reduced Scale (A3) HALF SCALE

Design			Approved For Construction*
Drawn			
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 7
RP-08/ 4100 TO RP-08/ 4100

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-307

Rev. A

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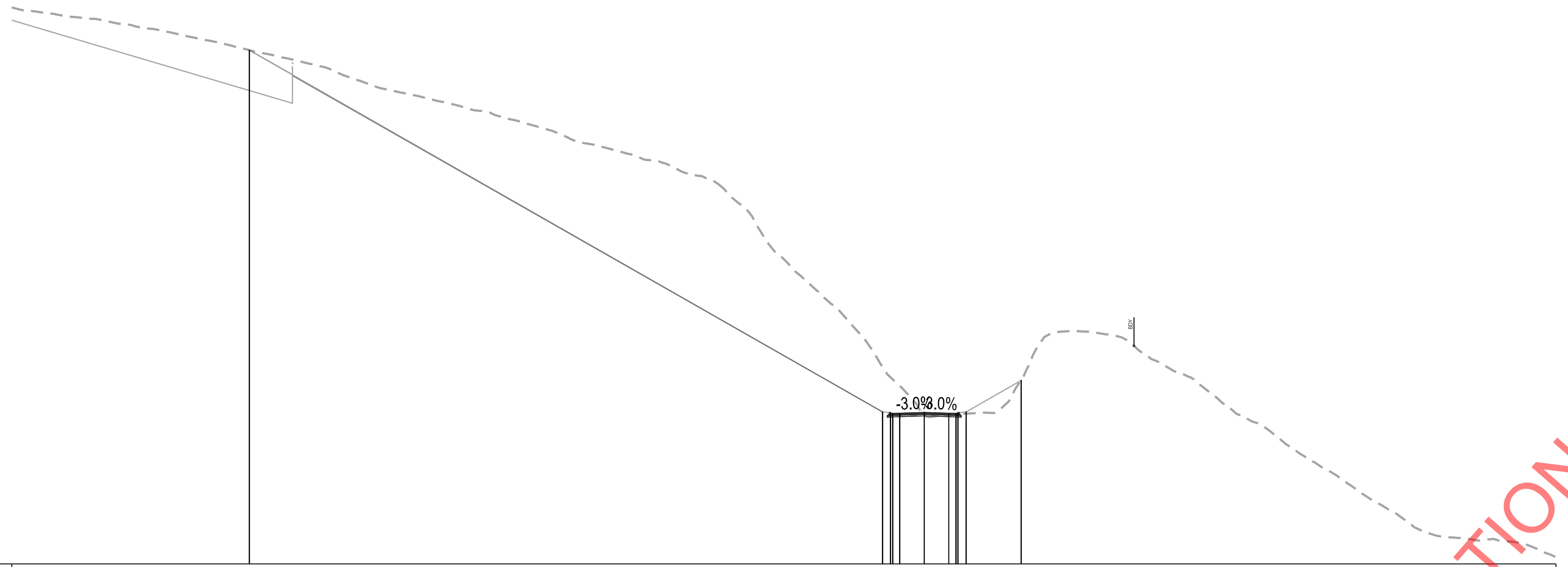
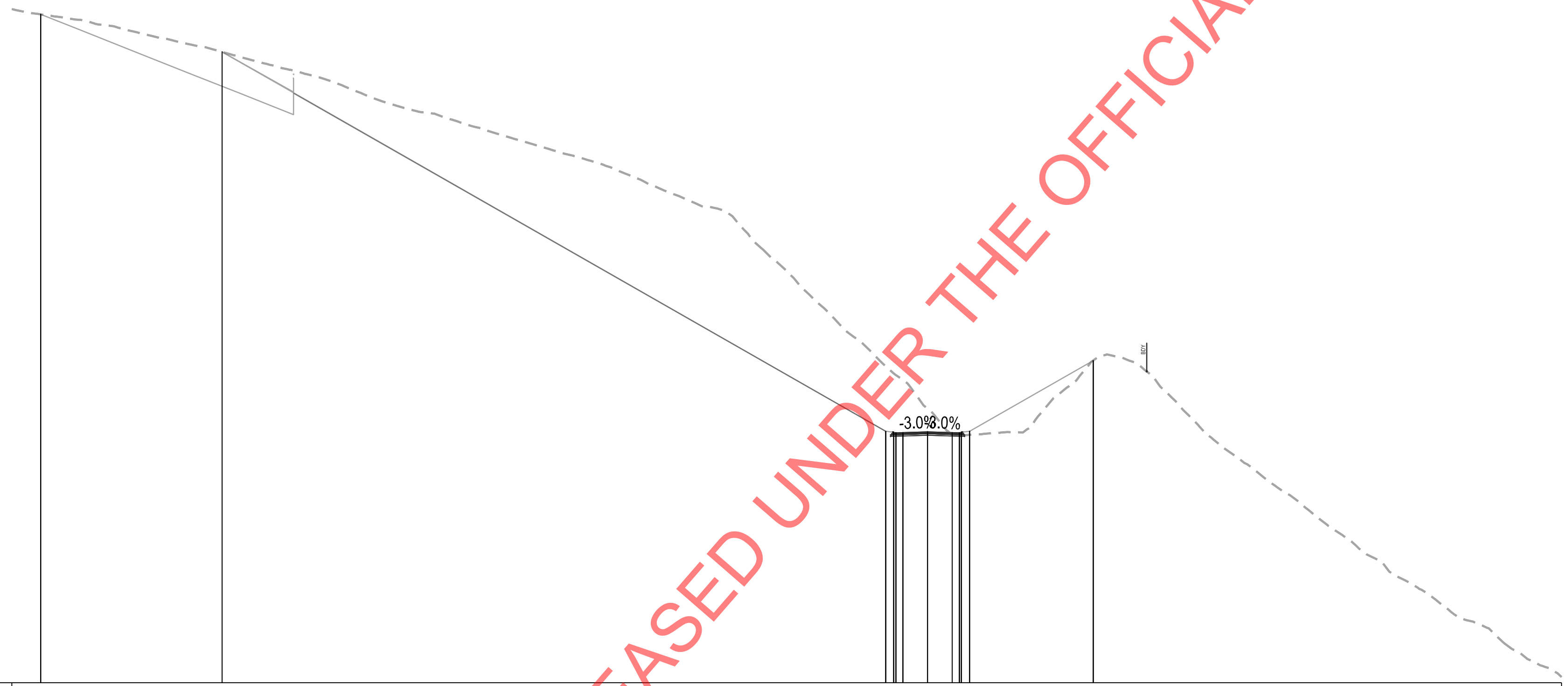
Drawing Plotted: 19/04/2023 10:57:18 AM



DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	403.19	351.65	351.55	351.45	351.48	351.58	351.48	351.45	351.55	351.65	356.13
EXISTING LEVELS	403.19	358.05	356.57	356.29	355.39	351.08	351.21	351.30	351.33	351.41	356.13
DESIGN OFFSETS	-96.15	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	13.79

CHAINAGE RP-08/ 4140



DESIGN FEATURES	IA-L	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	409.85	404.52	350.69	350.59	350.49	350.52	350.63	350.52	350.49	350.59	350.69	360.72
EXISTING LEVELS	409.85	404.52	359.91	358.89	358.65	357.94	353.91	350.09	349.99	350.06	350.19	360.72
DESIGN OFFSETS	-125.89	-100.15	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	23.49

CHAINAGE RP-08/ 4120

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:500
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 7
RP-08/ 4120 TO RP-08/ 4140

Discipline CIVIL ENGINEERING
Drawing No. 3413292 - CA-308
Rev. A

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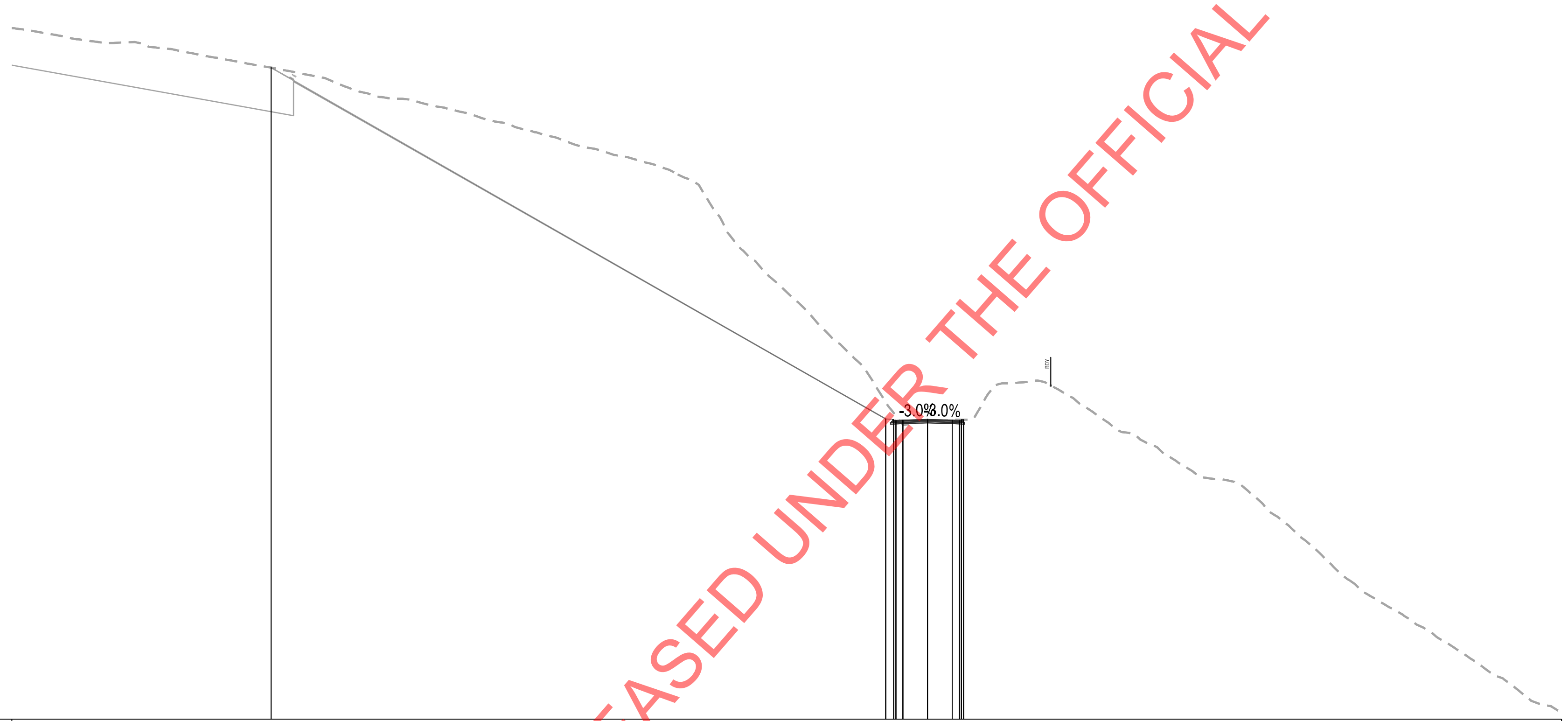
DO NOT SCALE

IF IN DOUBT ASK.



DATUM 310

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	402.45	352.60	352.50	352.40	352.43	352.54	352.43	352.40	352.50	352.52
EXISTING LEVELS	402.45	354.95	353.45	353.06	351.81	352.18	352.45	352.51	352.51	352.52
DESIGN OFFSETS	-93.19	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.10

CHAINAGE RP-08/ 4160

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:500
Reduced Scale (A3) HALF SCALE

Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 7
RP-08/ 4160 TO RP-08/ 4160

Discipline: CIVIL ENGINEERING

Drawing No. 3413292 - CA-309

Rev. A

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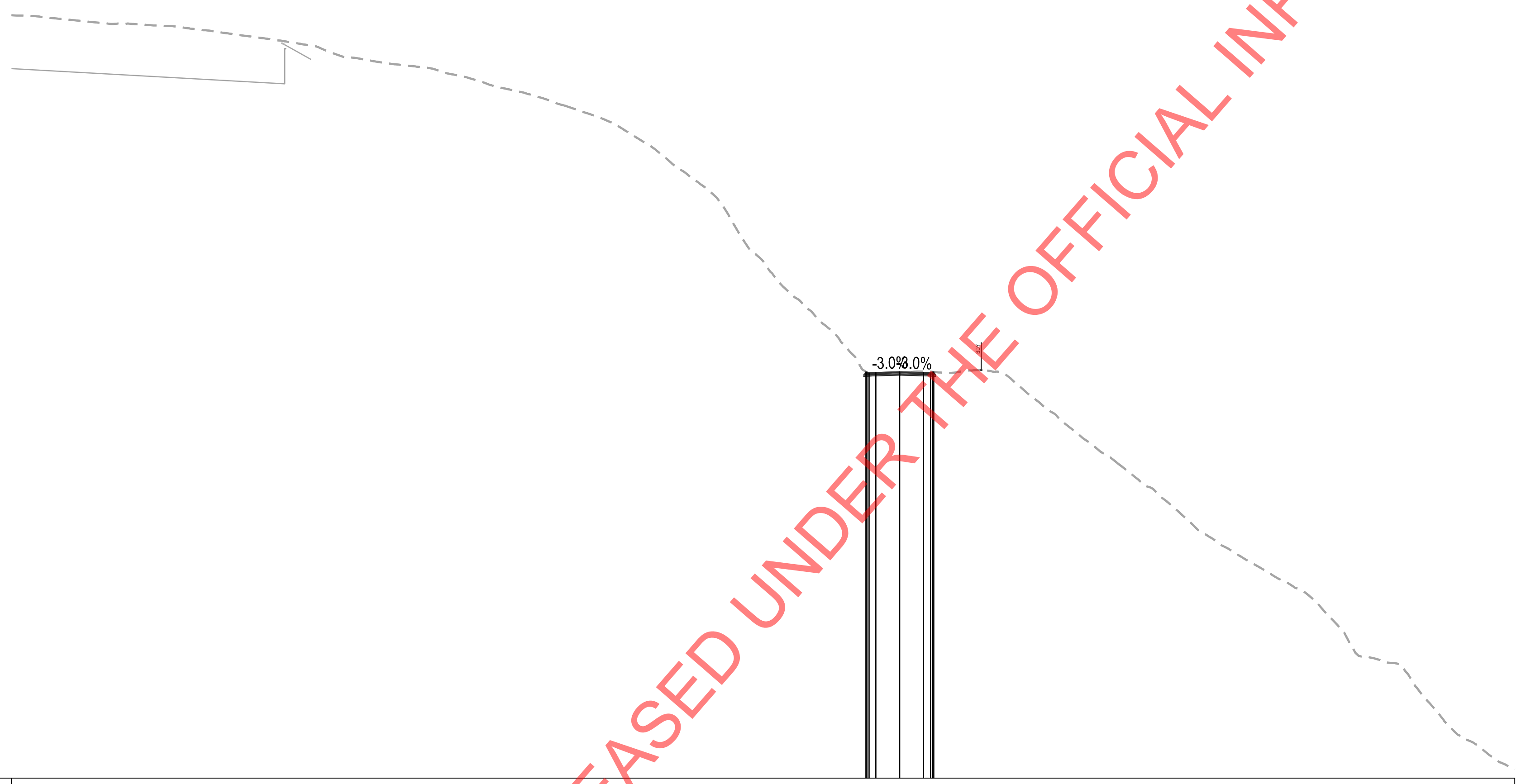
Document No. ...\XSect-Mainline.dgn - OPTION 7 - 10 [Sheet]



DATUM 294

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	353.45	353.45	353.35	353.38	353.49	353.38	353.35	353.45	353.46
EXISTING LEVELS	353.45	353.29	353.00	353.11	353.35	353.53	353.50	353.47	353.46
DESIGN OFFSETS	-4.97	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	4.98

CHAINAGE RP-08/ 4180

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:500	Design		Approved For Construction*
	Drawn		
Reduced Scale (A3) HALF SCALE	Dsg Verifier		
	Dwg Check		Date
	* Refer to Revision 1 for Original Signature		

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 7
RP-08/ 4180 TO RP-08/ 4180

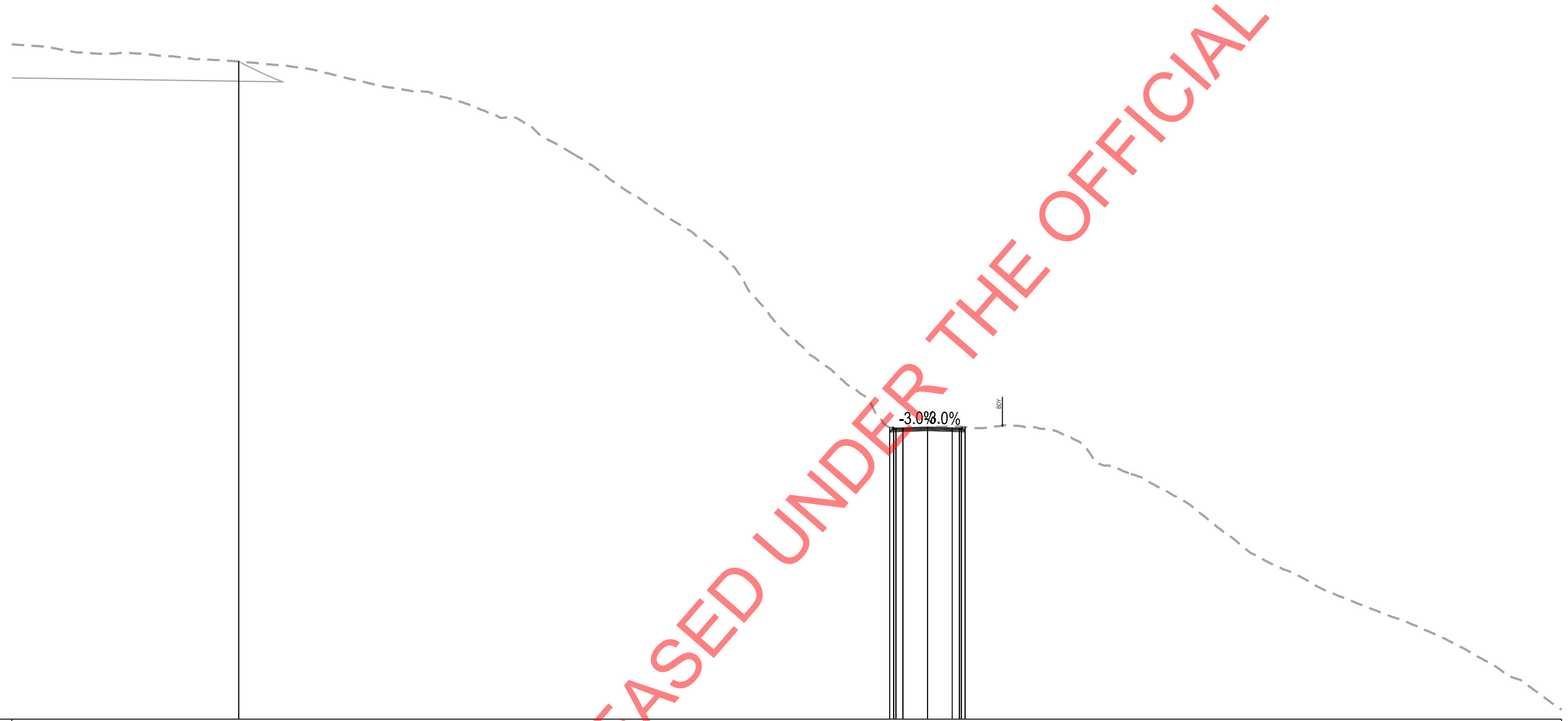
Discipline: CIVIL ENGINEERING

Drawing No.: 3413292 - CA-310

Rev.: A

DO NOT SCALE

IF IN DOUBT ASK.



DATUM 313

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	406.32	354.36	354.41	354.31	354.34	354.44	354.34	354.31	354.41	354.44
EXISTING LEVELS	406.32	354.36	354.17	354.13	354.21	354.40	354.54	354.54	354.50	354.44
DESIGN OFFSETS	-97.77	-5.38	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.32

CHAINAGE RP-08/ 4200

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:500
Reduced Scale (A3) HALF SCALE

Design			Approved For Construction*
Drawn			
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 7
RP-08/ 4200 TO RP-08/ 4200

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-311

Rev. A

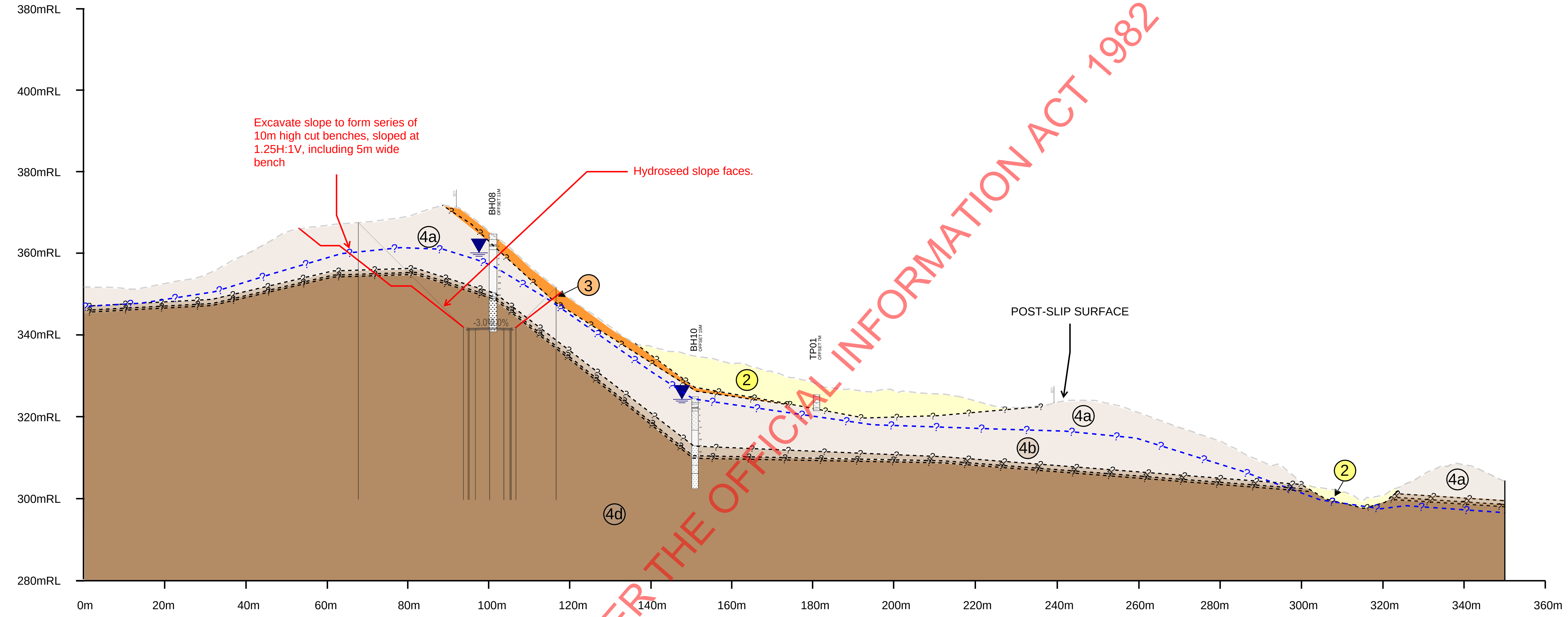
DO NOT SCALE

IF IN DOUBT ASK.

G

G'

DESIGN SECTION CH3940
Option 7
(Section G-G')



Legend

① [FILL]

② [RECENT SLIP DEBRIS]

③ [HISTORICAL SLIP DEBRIS]

(4a) [COMPLETELY WEATHERED ANDESITE]

(4b) [HIGHLY WEATHERED ANDESITE]

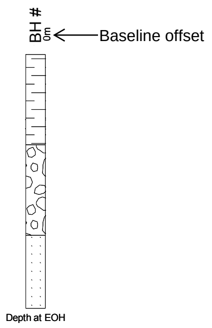
(4c) [MODERATELY WEATHERED ANDESITE]

(4d) [SLIGHTLY WEATHERED ANDESITE]

- - - Post slip ground surface
— ? — Interpreted geological boundary
▼ Measured/dipped groundwater
- ? - Interpreted groundwater level

H 1:1000
0 12.5 25.0 35.0 50m
V 1:1000
0 12.5 25.0 35.0 50m
Coord. System: NZTM Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)	Design	ZL	12/04/23
	Drawn	ZL	12/04/23
Reduced Scale (A3)	Dsg Verifier		12/04/23
1:1000	Dwg Check	JB	12/04/23

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
GEOLOGICAL SECTION H-H'
CH3940 OPTION 7

Discipline
GEOTECHNICAL

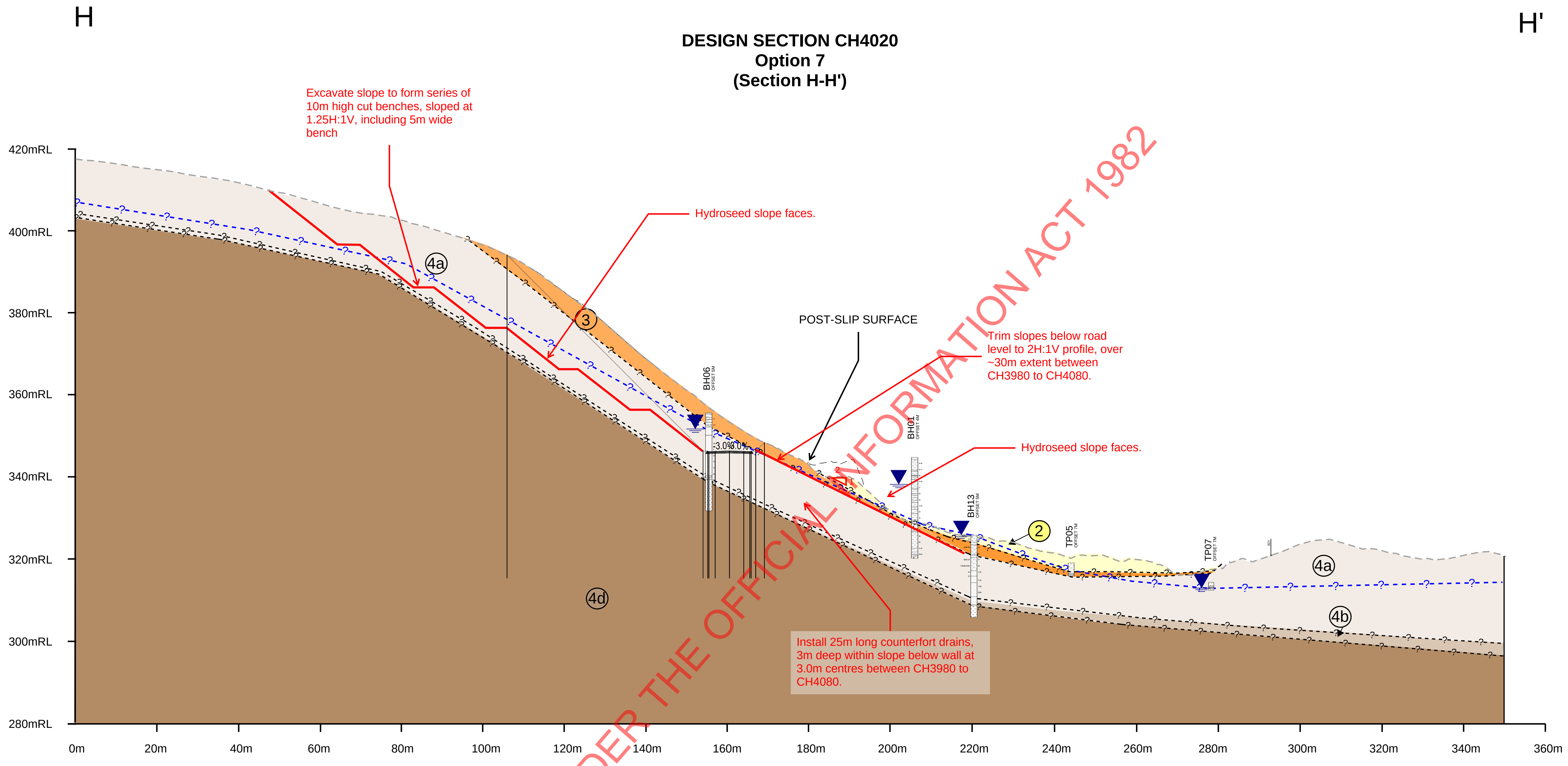
Drawing No.
3415236-GE-0007

Rev.
A

DO NOT SCALE

IF IN DOUBT ASK.

DESIGN SECTION CH4020
Option 7
(Section H-H')



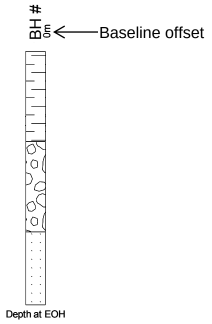
Legend

- ① [FILL]
- ② [RECENT SLIP DEBRIS]
- ③ [HISTORICAL SLIP DEBRIS]
- 4a [COMPLETELY WEATHERED ANDESITE]
- 4b [HIGHLY WEATHERED ANDESITE]
- 4c [MODERATELY WEATHERED ANDESITE]
- 4d [SLIGHTLY WEATHERED ANDESITE]

- - - - Post slip ground surface
- –? – Interpreted geological boundary
- ▼ Measured/dipped groundwater
- –? – Interpreted groundwater level

H 1:1000
0 12.5 25.0 35.0 50m
V 1:1000
0 12.5 25.0 35.0 50m
Coord. System: NZTM Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)	Design	ZL	12/04/23	Approved For Construction*
	Drawn	ZL	12/04/23	
Reduced Scale (A3)	Dsg Verifier		12/04/23	
1:1000	Dwg Check	JB	12/04/23	Date

* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: GEOLOGICAL SECTION H-H'
CH4020 OPTION 7

Discipline: GEOTECHNICAL

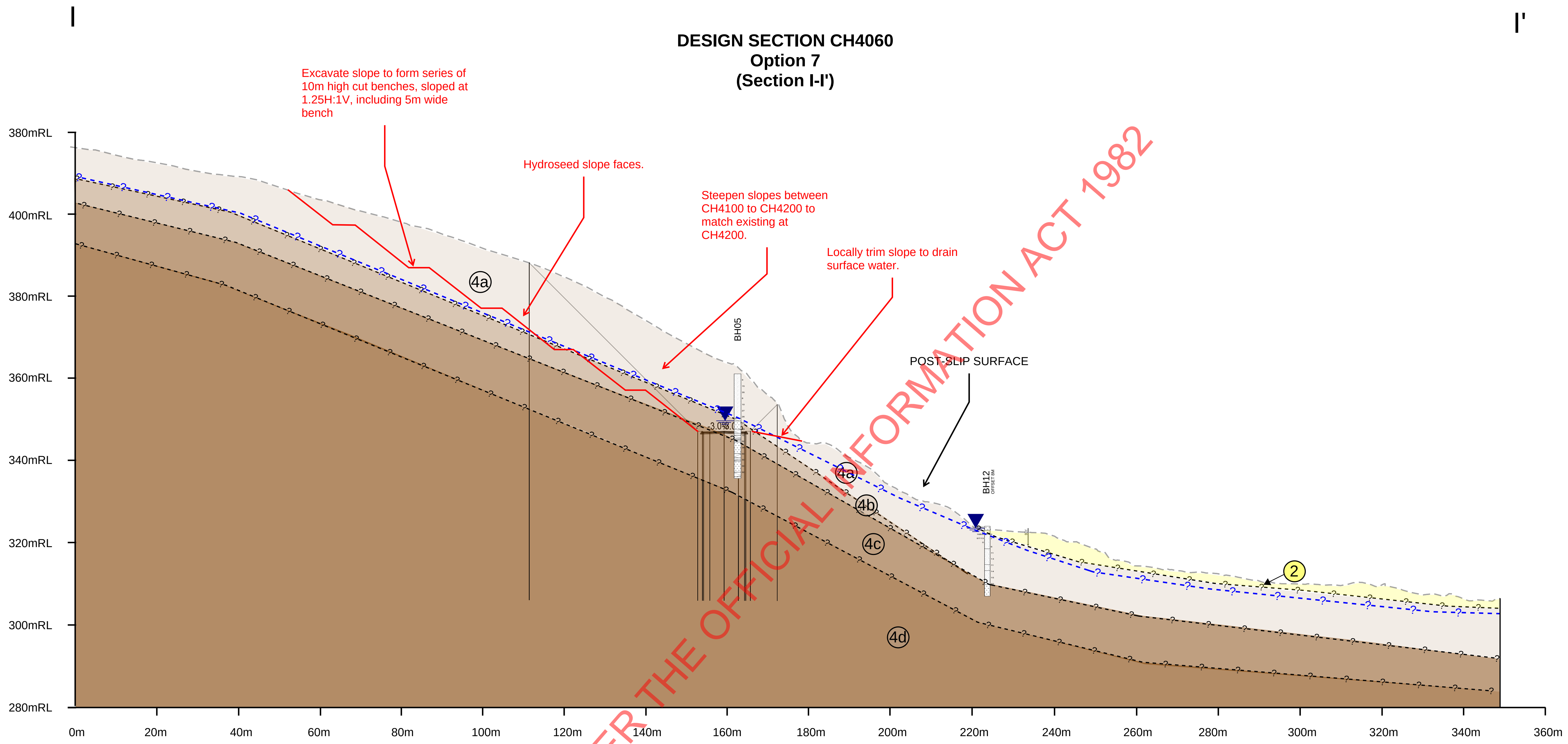
Drawing No.: 3415236-GE-0008

Rev.: A

DO NOT SCALE

IF IN DOUBT ASK.

DESIGN SECTION CH4060
Option 7
(Section I-I')



Legend

① [FILL]

② [RECENT SLIP DEBRIS]

③ [HISTORICAL SLIP DEBRIS]

(4a) [COMPLETELY WEATHERED ANDESITE]

(4b) [HIGHLY WEATHERED ANDESITE]

(4c) [MODERATELY WEATHERED ANDESITE]

(4d) [SLIGHTLY WEATHERED ANDESITE]

- - - Post-slip ground surface

—? — Interpreted geological boundary

▼ Measured/dipped groundwater

—? — Interpreted groundwater level

H 1:1000

0 12.5 25.0 35.0 50m

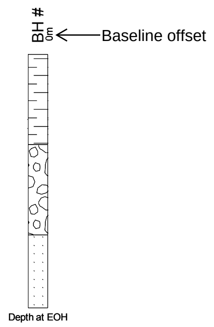
V 1:1000

0 12.5 25.0 35.0 50m

Coord. System: NZTM

Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)	Design	ZL	12/04/23	Approved For Construction*
Reduced Scale (A3)	Drawn	ZL	12/04/23	
1:1000	Dsg Verifier		12/04/23	
	Dwg Check	JB	12/04/23	Date

* Refer to Revision 1 for Original Signature 2

Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
GEOLOGICAL SECTION I-I'
CH4060 OPTION 7

Discipline
GEOTECHNICAL

Drawing No.
3415236-GE-0008

Rev.
A

DO NOT SCALE

IF IN DOUBT ASK.

Option 7 - Bypass Box Cut

Date	30-Apr-23		

Extent

Fill Start Chainage	3775		
End Chainage	4220		
Bypass Extent	445	m	

Cut Slope Profile

Cut profile adopted	1.25:1 (hor:ver) slopes 10m high with 5m wide benches (accessible)
Overall cut profile	1.75:1 (hor:ver)
Cut slope surfacing	Hydroseed

Footprint

Footprint	28,300	m2	

Excavation Estimate

Bulk Excavation of the cut	382,000	m3	
Additional excavation of slip scarp	14400	m3	Ch3940 to CH4060
Overall excavation to waste	396,400	m3	
Rock Excavation	32,000	m3	Unit 4c and 4d, western end
Soil and EW Rock excavation	364,400	m3	Unit 4a and 4b

Pavement

New pavement length	445	m	New pavement, also needs swales both sides to carry stormwater to culvert

Counterfort drains in lower slope

Extent	120	m	Ch3940 to CH4060
Spacing	3	m	
Number of counterfort drains	40		

Length of each drain	25	m
depth	3	m
width	0.4	m
Excavation volume	1200	m3
Backfill volume	1200	m3

Inclined bored drains

Not designed. Some allowance needed to pick up seegae area in the box cut.

Consider further if Option 7 is being seriously considered relative to the other options.

Cut Slope Bench Swales

Not designed. Some allowance needed to pick up seepage along each bench in the cuts.

Consider further if Option 7 is being seriously considered relative to the other options.

Culvert (allowance only)

Not designed. New stormwater discharge needed for the new pavement plus slopes.

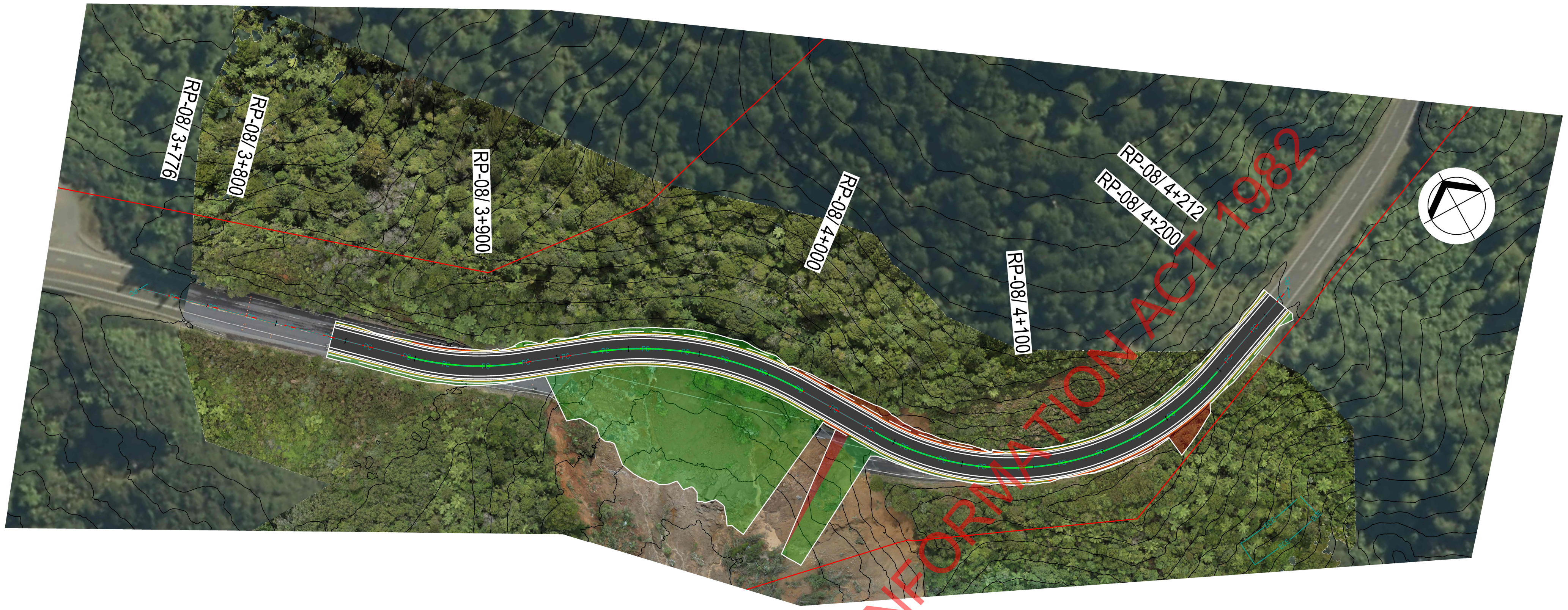
Consider further if Option 7 is being seriously considered relative to the other options.

H

Appendix H – Option 10a Design Section, Sketches and Quantities

LEGEND

🟥 ROAD BOUNDARY
🟥 CUT
🟩 FILL



LEGEND
— — EXISTING GROUND LEVEL
—— DESIGN LEVEL

DATUM RL 319

VERTICAL ALIGNMENT: G=5.74% L = 37.24 | 3813.24 | K = -30 L = 38.08 | 3851.32 | G=4.47% L = 149.90 | 4001.23 | K = 64 L = 50.00 | 4051.23 | G=5.24% L = 26.84 | 4078.07 | K = -83 L = 50.00 | 4128.07 | G=4.64% L = 84.12 | 4212.20

HORIZONTAL ALIGNMENT: L = 96.65 | 3872.65 | R = 100.00 L = 40.15 | 3912.80 | L = 24.4 | 3937.22 | R = 115.00 L = 76.40 | 4013.62 | L = 29.23 | 4042.85 | R = 95.00 L = 131.21 | 4174.06 | L = 38.13 | 4212.20

CHAINAGE	CUT / FILL	DESIGN LEVELS	EXISTING LEVELS
3776	0.00	334.23	334.23
3780	-0.02	334.46	334.43
3800	-0.09	335.60	335.52
3820	-0.20	336.74	336.54
3840	-0.05	337.78	337.73
3860	0.01	338.69	338.70
3880	0.00	339.59	339.59
3900	0.07	340.48	340.55
3920	-1.65	341.37	339.73
3940	-4.65	342.27	337.62
3960	-8.84	343.16	334.32
3980	-4.83	344.05	339.22
4000	-4.25	344.95	340.69
4020	1.65	345.87	347.52
4040	5.11	346.85	351.96
4060	-0.32	347.89	347.57
4080	-0.12	348.94	348.82
4100	-0.12	349.96	349.84
4120	-0.16	350.93	350.77
4140	-0.12	351.86	351.74
4160	-0.11	352.79	352.68
4180	-0.10	353.72	353.62
4200	-0.05	354.65	354.60
4216	0.00	0.00	0.00

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR INFORMATION	RJB			12.04.23

Original Scale (A1) AS SHOWN
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

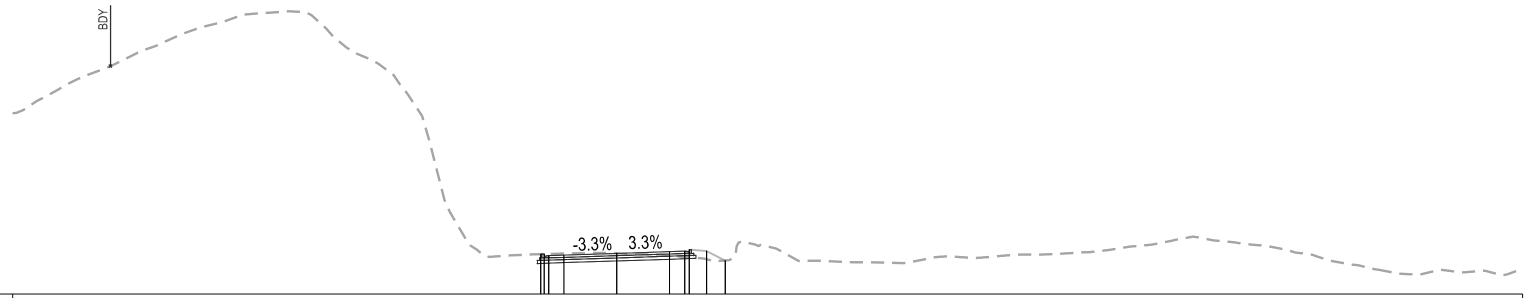
Project: SH 25A TAPARAHI SLIP

Title: PLAN & LONGITUDINAL SECTION
OPTION 10 NEW BYPASS

Discipline: CIVIL ENGINEERING

Drawing No.: 3413292 - SK10A

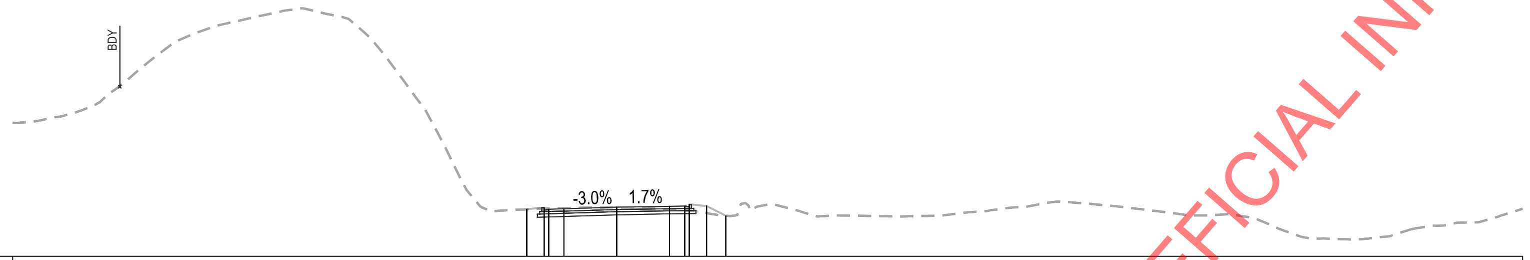
Rev.: A



DATUM 336

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	338.64	338.65	338.55	338.58	338.69	338.81	338.84	338.94	338.84	338.22
EXISTING LEVELS	338.64	338.65	338.66	338.69	338.70	338.58	338.45	338.43	338.30	338.22
DESIGN OFFSETS	-5.03	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	7.19

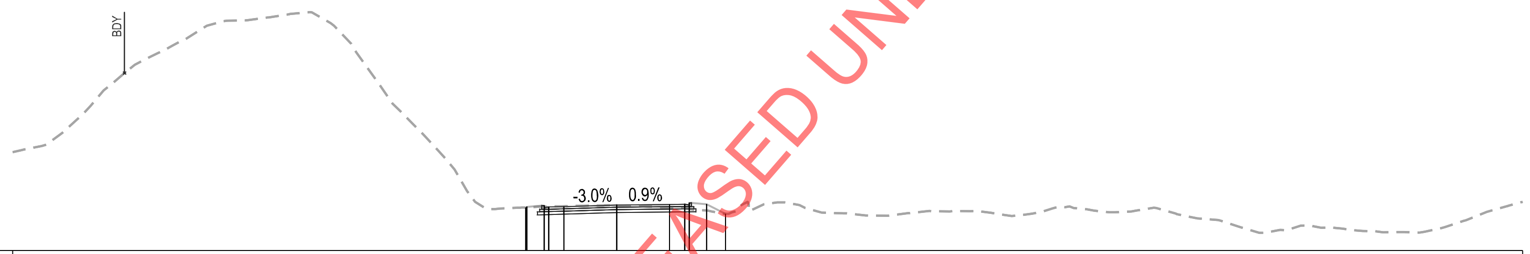
CHAINAGE RP-08/ 3860



DATUM 335

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	338.11	338.11	338.21	338.11	338.14	338.25	338.30	338.32	338.42	338.32	337.68
EXISTING LEVELS	338.11	338.11	338.16	338.16	338.18	338.23	338.10	338.04	338.01	337.87	337.68
DESIGN OFFSETS	-5.96	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	7.23

CHAINAGE RP-08/ 3850



DATUM 335

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	337.85	337.88	337.98	337.88	337.91	338.02	338.05	338.05	338.15	338.05	337.43
EXISTING LEVELS	337.85	337.85	337.90	337.91	337.93	337.98	337.85	337.79	337.75	337.65	337.43
DESIGN OFFSETS	-6.01	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	7.21

CHAINAGE RP-08/ 3845

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design		
Drawn		
Dsg Verifier		
Dwg Check		

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 3845 TO RP-08/ 3860

Discipline: CIVIL ENGINEERING

Drawing No. 3413292 - CA-325

Rev. A

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Document No. ...\XSect-Mainline.dgn - OPTION 10 - 1 [Sheet]

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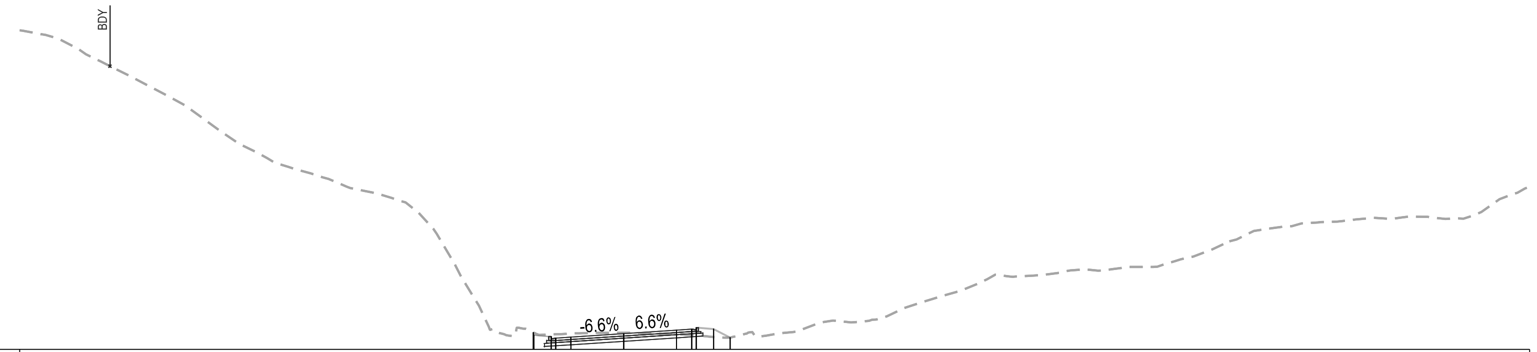
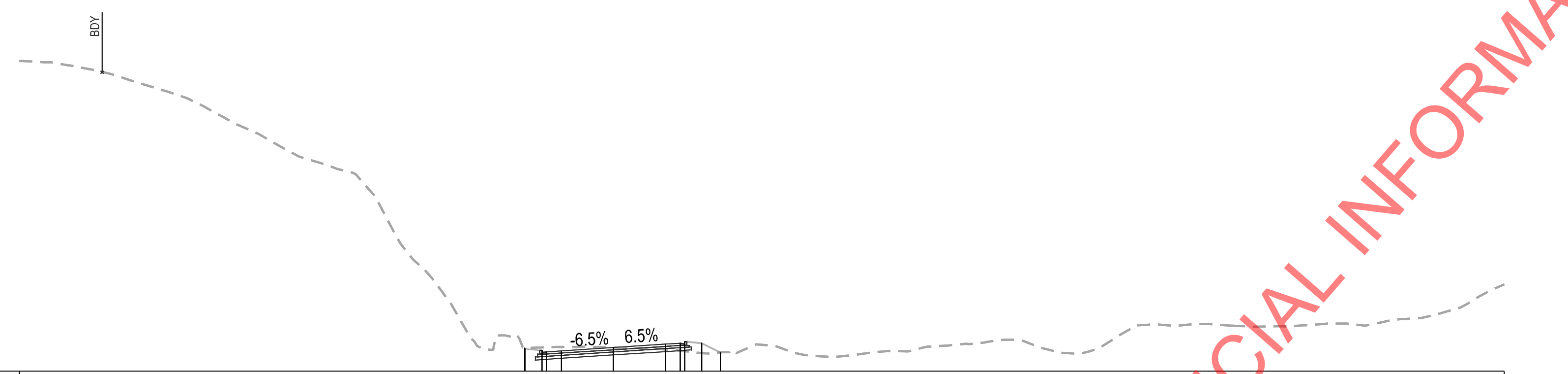


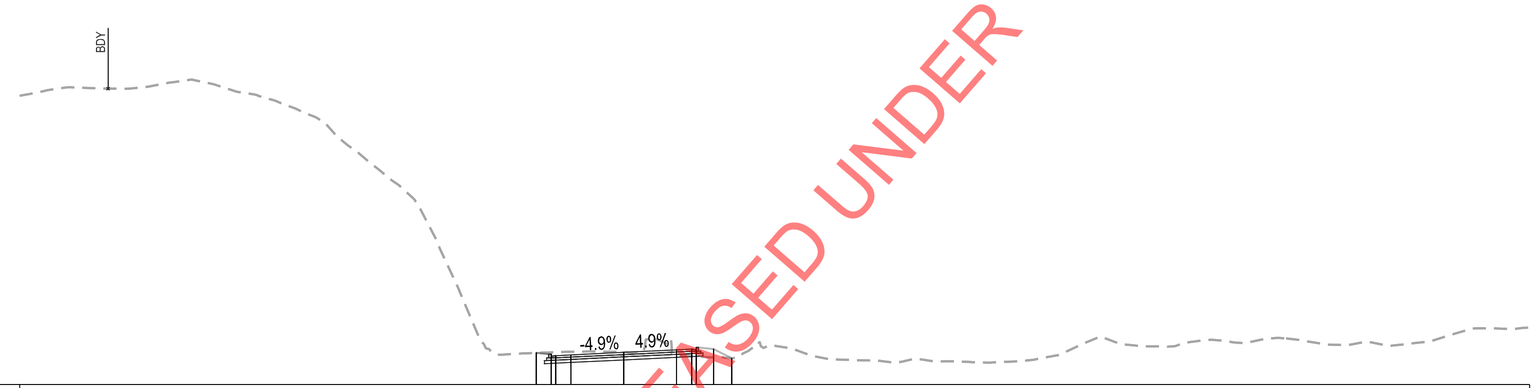
DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	340.12	339.94	339.84	339.74	339.80	340.03	340.26	340.33	340.43	340.33	339.78
EXISTING LEVELS	340.12	340.10	339.99	340.00	340.04	340.09	340.00	339.93	339.92	339.81	339.78
DESIGN OFFSETS	-5.98	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	7.05

CHAINAGE RP-08/ 3890



DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	339.56	339.50	339.40	339.30	339.36	339.59	339.81	339.88	339.98	339.88	339.25
EXISTING LEVELS	339.56	339.56	339.59	339.60	339.63	339.59	339.44	339.37	339.34	339.22	339.25
DESIGN OFFSETS	-5.96	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	7.21

CHAINAGE RP-08/ 3880



DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	339.10	339.02	338.92	338.97	339.14	339.31	339.36	339.46	339.36	338.75
EXISTING LEVELS	339.10	339.14	339.15	339.18	339.15	339.00	338.88	338.85	338.82	338.75
DESIGN OFFSETS	-5.79	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	7.16

CHAINAGE RP-08/ 3870

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design			Approved For Construction*
Drawn			
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 3870 TO RP-08/ 3890

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-326

Rev. A

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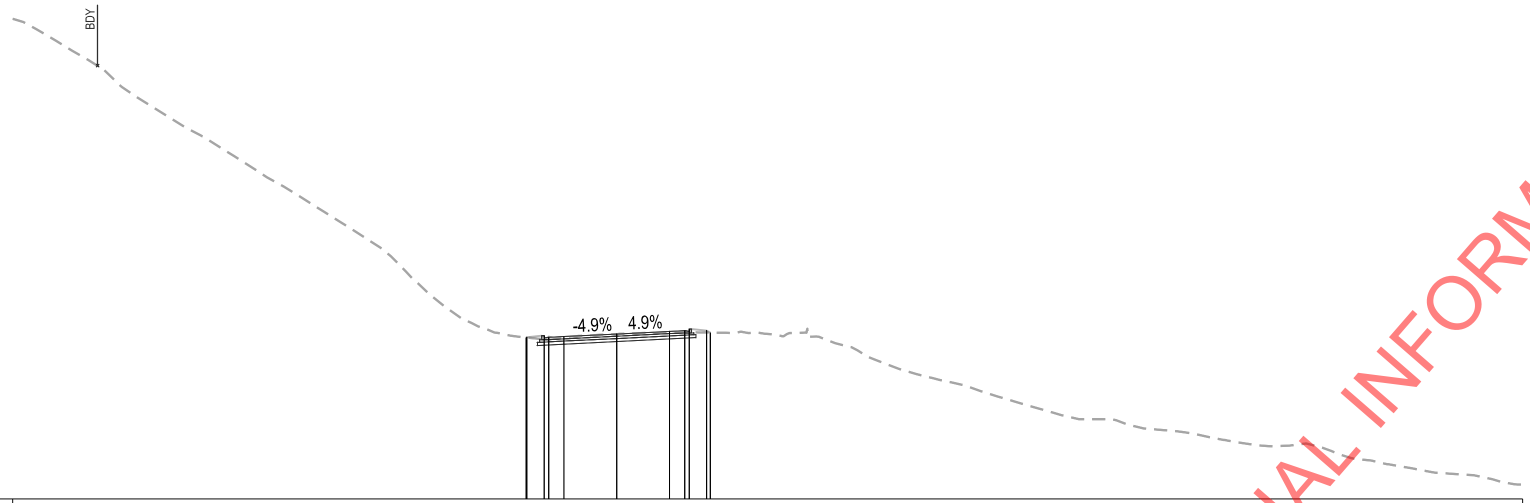
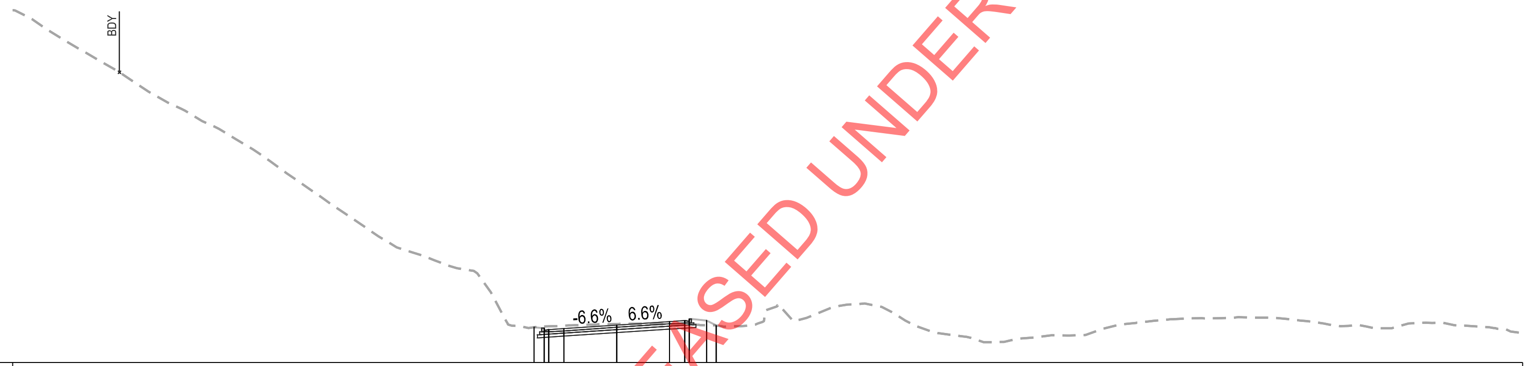


DATUM 330

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	340.68	340.71	340.81	340.71	340.75	340.93	341.10	341.15	341.25	341.15	341.02
EXISTING LEVELS	340.68	340.68	340.61	340.73	340.72	340.92	341.04	341.04	341.04	341.02	341.02
DESIGN OFFSETS	-6.00	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.20

CHAINAGE RP-08/ 3910



DATUM 338

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	340.33	340.28	340.18	340.25	340.48	340.71	340.78	340.88	340.78	340.46
EXISTING LEVELS	340.33	340.39	340.40	340.45	340.55	340.53	340.51	340.50	340.46	340.46
DESIGN OFFSETS	-5.47	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	6.59

CHAINAGE RP-08/ 3900

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 3900 TO RP-08/ 3910

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-327

Rev. A

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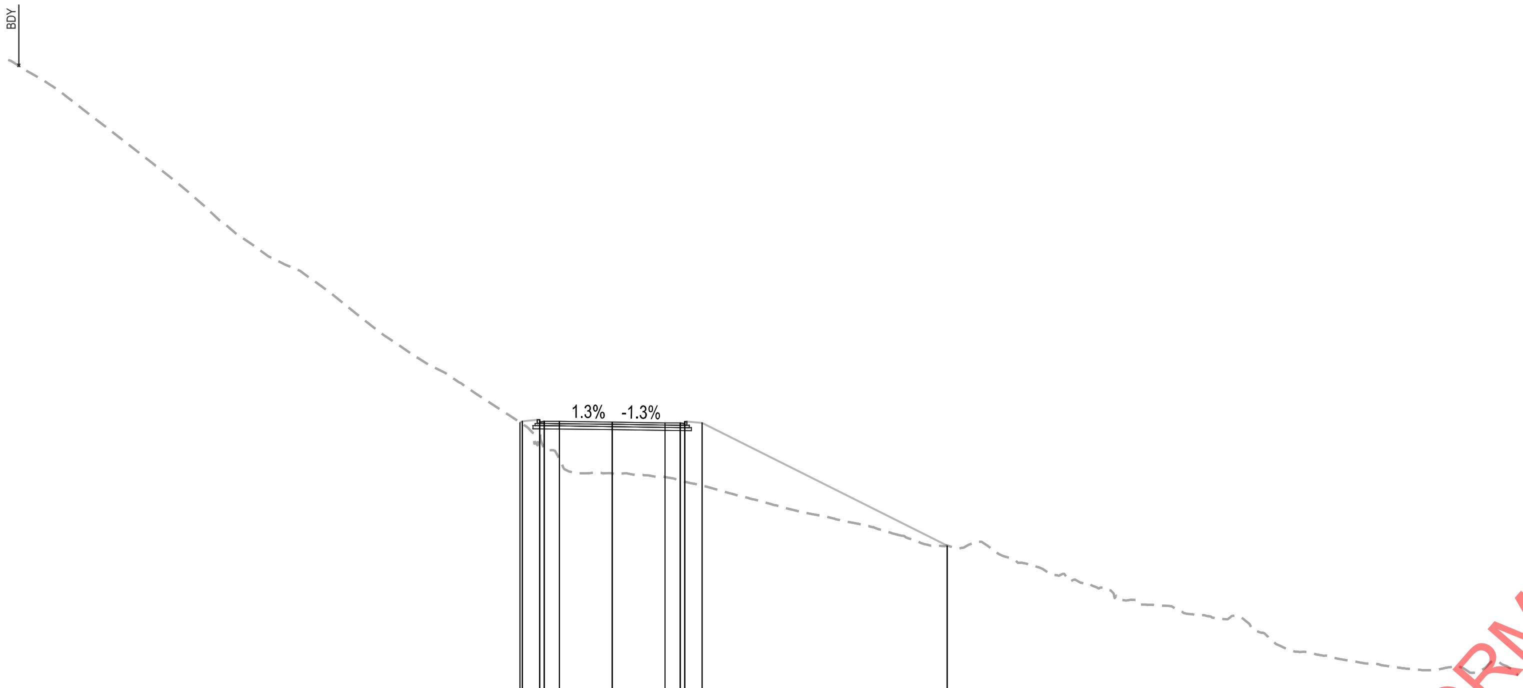
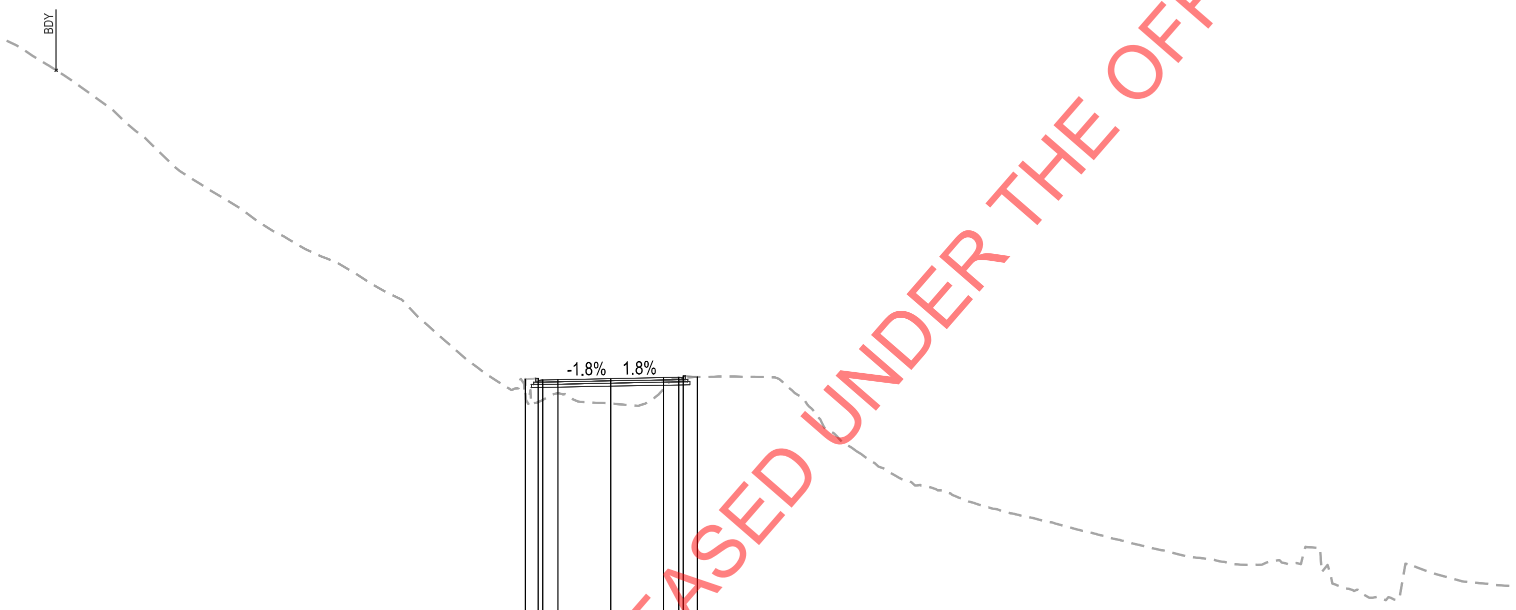
Document No. ...\XSect-Mainline.dgn - OPTION 10 - 3 [Sheet]



DATUM 324

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	341.80	341.88	341.98	341.88	341.86	341.82	341.78	341.76	341.86	341.76	333.64
EXISTING LEVELS	341.80	341.70	340.99	340.01	339.38	338.42	338.18	337.95	337.88	337.61	333.64
DESIGN OFFSETS	-6.10	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	22.19

CHAINAGE RP-08/ 3930



DATUM 326

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	341.32	341.39	341.29	341.31	341.37	341.44	341.46	341.56	341.48
EXISTING LEVELS	341.32	339.82	339.96	340.42	339.73	340.71	341.43	341.45	341.48
DESIGN OFFSETS	-5.65	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.74

CHAINAGE RP-08/ 3920

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

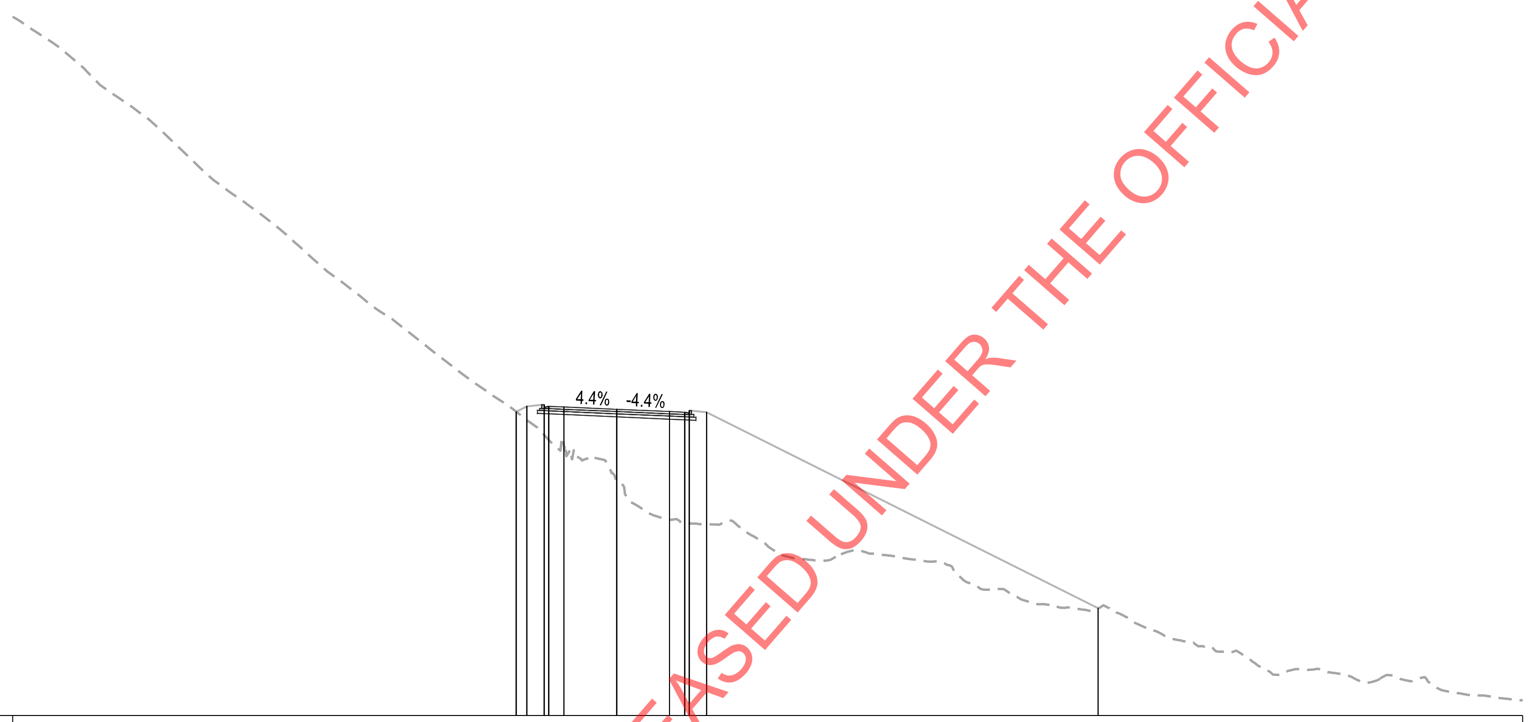
Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 3920 TO RP-08/ 3930

Discipline: CIVIL ENGINEERING

Drawing No. 3413292 - CA-328

Rev. A



DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	342.11	342.46	342.56	342.46	342.42	342.27	342.11	342.07	342.17	342.07	329.11
EXISTING LEVELS	342.11	341.55	340.56	340.24	339.94	337.63	334.97	334.72	334.72	334.64	329.11
DESIGN OFFSETS	-6.66	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	31.88

CHAINAGE RP-08/ 3940

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 3940 TO RP-08/ 3940

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-329

Rev. A

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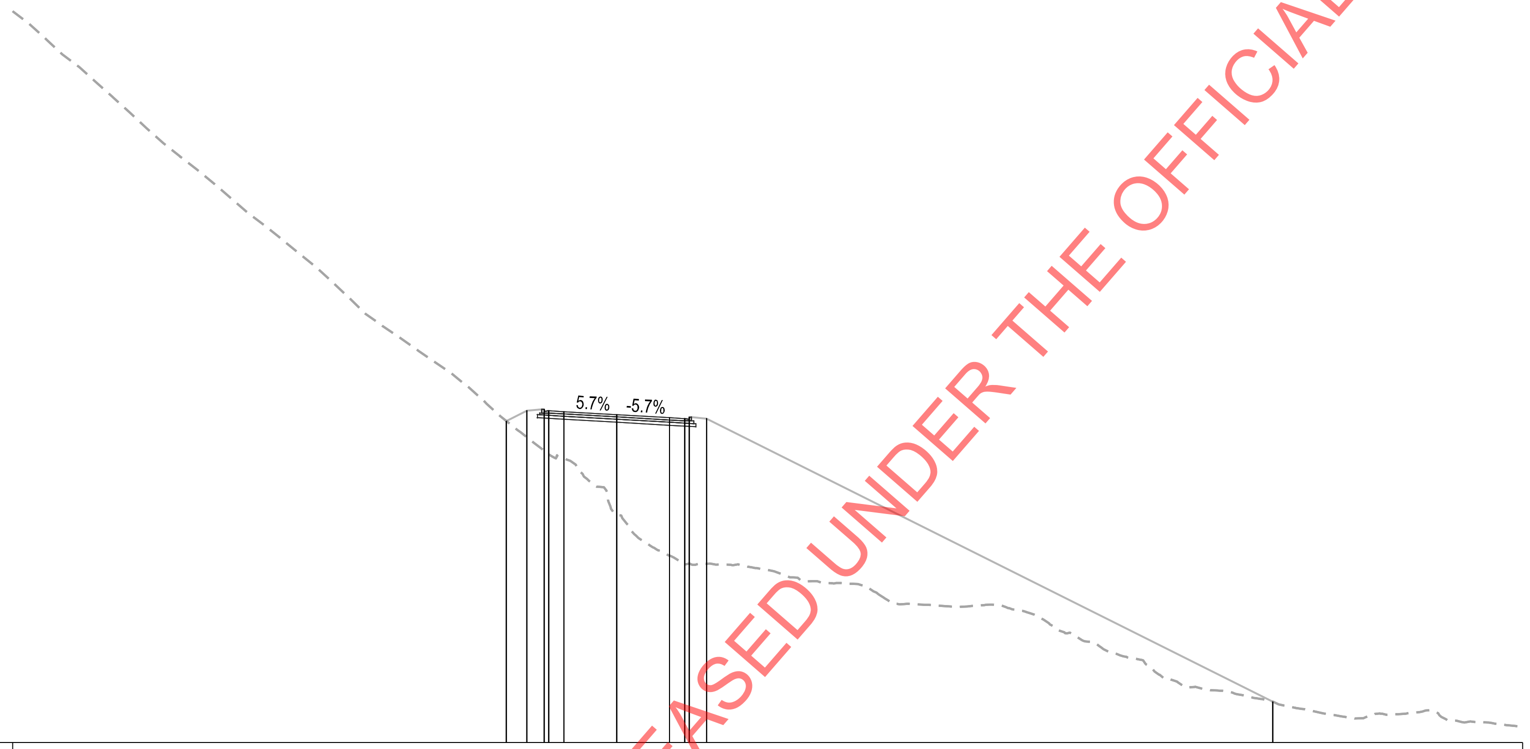

DATUM 321

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	342.29	342.97	343.07	342.97	342.91	342.71	342.51	342.45	342.55	342.45	323.71
EXISTING LEVELS	342.29	341.23	340.34	340.11	339.81	336.08	333.37	332.80	332.85	332.84	323.71
DESIGN OFFSETS	-7.31	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	43.44

CHAINAGE RP-08/ 3950

FOR INFORMATION
NOT FOR CONSTRUCTION

A	ISSUED FOR REVIEW				
No.	Revision	By	Chk	Appd	Date

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design			Approved For Construction*
Drawn			
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 3950 TO RP-08/ 3950

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-330

Rev. A

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Document No. ...\XSect-Mainline.dgn - OPTION 10 - 6 [Sheet]

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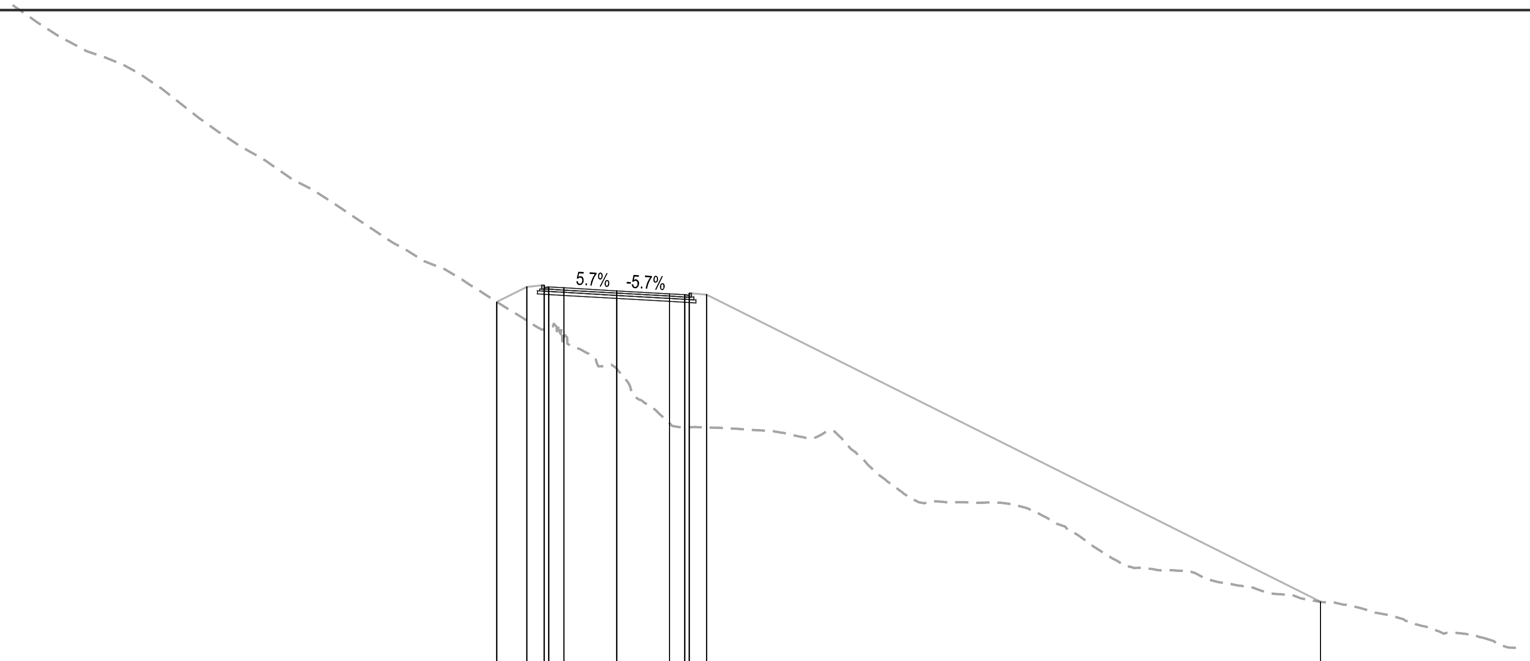
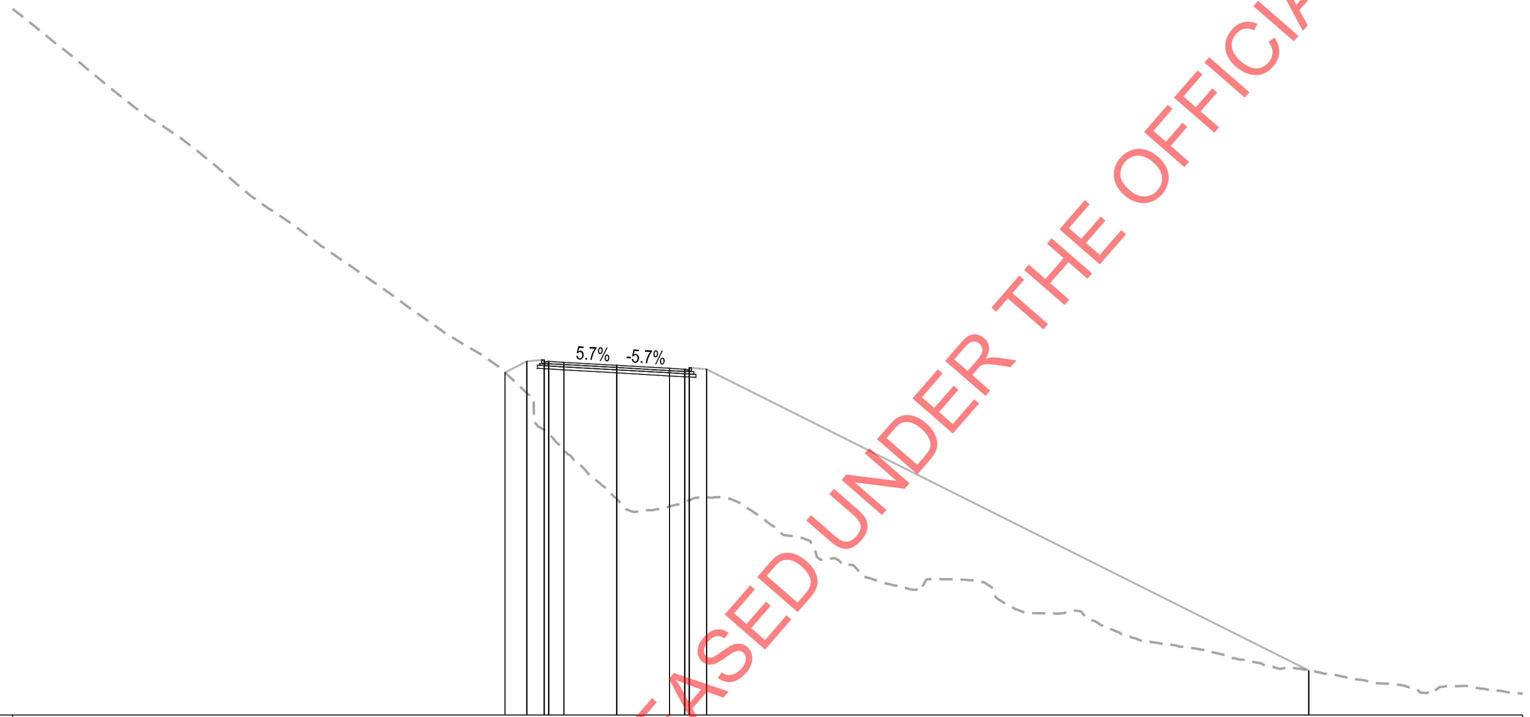


DATUM 319

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	342.87	343.87	343.97	343.87	343.81	343.61	343.41	343.35	343.45	343.35	323.02
EXISTING LEVELS	342.87	341.64	341.06	341.14	340.60	338.45	334.83	334.57	334.58	334.55	323.02
DESIGN OFFSETS	-7.94	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	46.61

CHAINAGE RP-08/ 3970



DATUM 320

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	342.69	343.42	343.52	343.42	343.36	343.16	342.96	342.90	343.00	342.90	322.96
EXISTING LEVELS	342.69	341.33	338.87	338.60	337.55	334.34	333.81	334.13	334.22	334.42	322.96
DESIGN OFFSETS	-7.40	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	45.84

CHAINAGE RP-08/ 3960

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 3960 TO RP-08/ 3970

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-331

Rev. A

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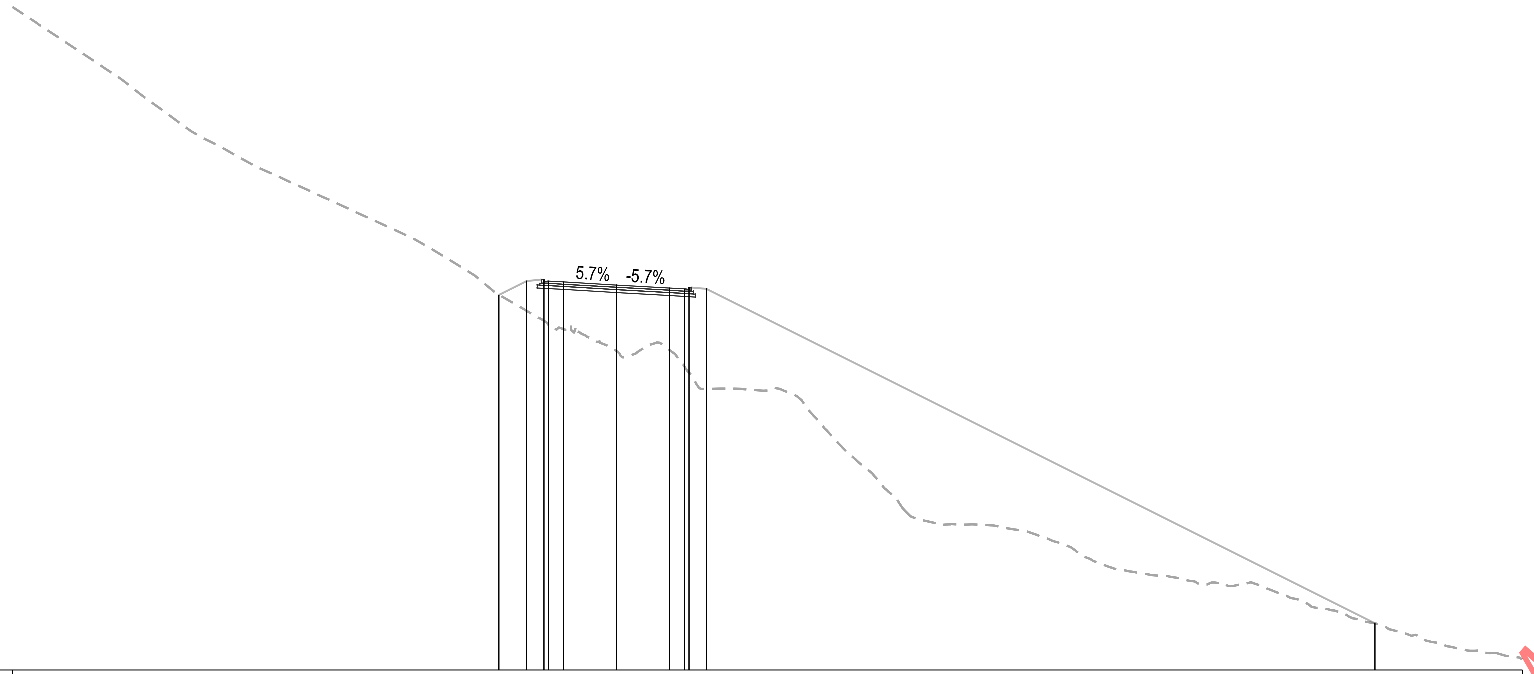
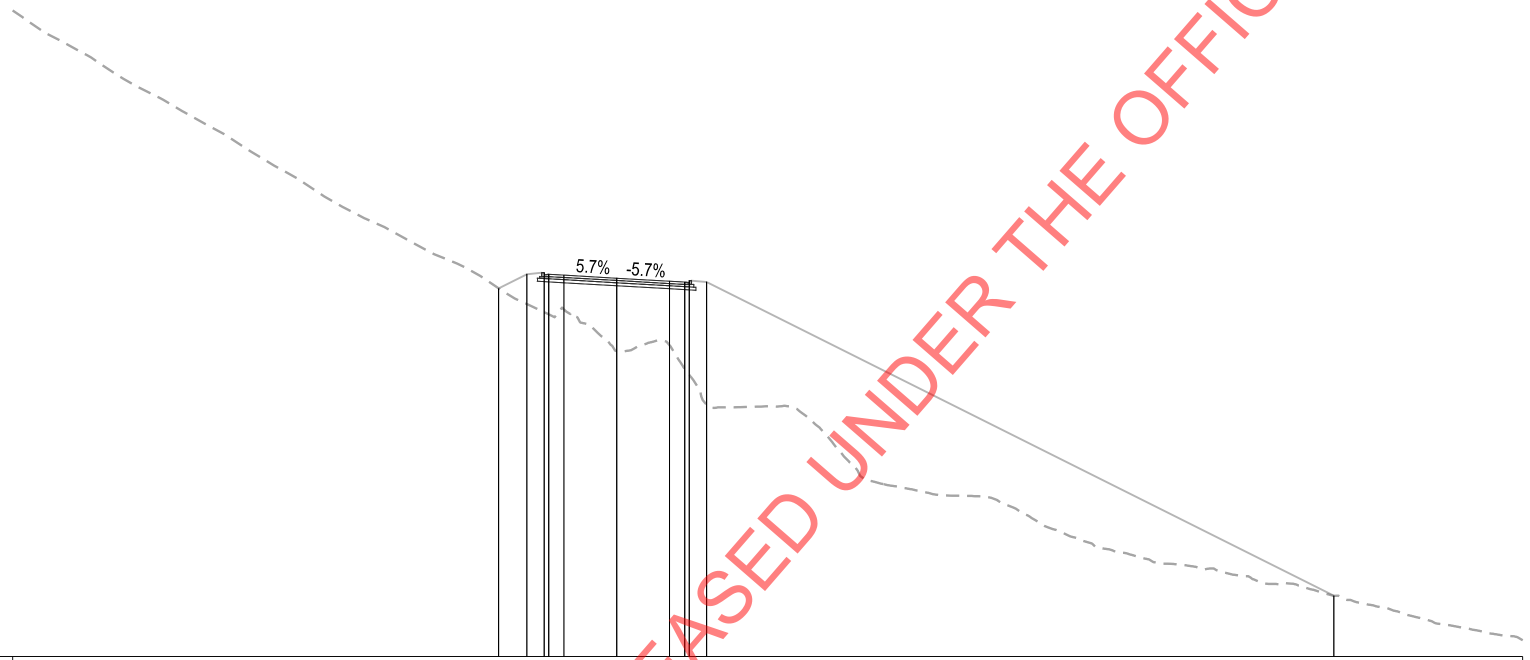


DATUM 319

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	343.84	344.76	344.86	344.76	344.70	344.50	344.30	344.24	344.34	344.24	322.10
EXISTING LEVELS	343.84	342.79	342.13	341.86	341.58	340.14	340.21	339.10	338.71	337.62	322.10
DESIGN OFFSETS	-7.78	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	50.24

CHAINAGE RP-08/ 3990



DATUM 319

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	343.38	344.31	344.41	344.31	344.25	344.05	343.85	343.80	343.90	343.80	323.02
EXISTING LEVELS	343.38	342.34	341.81	341.67	342.00	339.23	339.62	338.06	337.68	335.67	323.02
DESIGN OFFSETS	-7.81	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	47.49

CHAINAGE RP-08/ 3980

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design
Drawn
Dsg Verifier
Dwg Check
* Refer to Revision 1 for Original Signature

Approved For Construction*
Date

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 3980 TO RP-08/ 3990

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-332

Rev. A

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Document No. ...\XSect-Mainline.dgn - OPTION 10 - 8 [Sheet]

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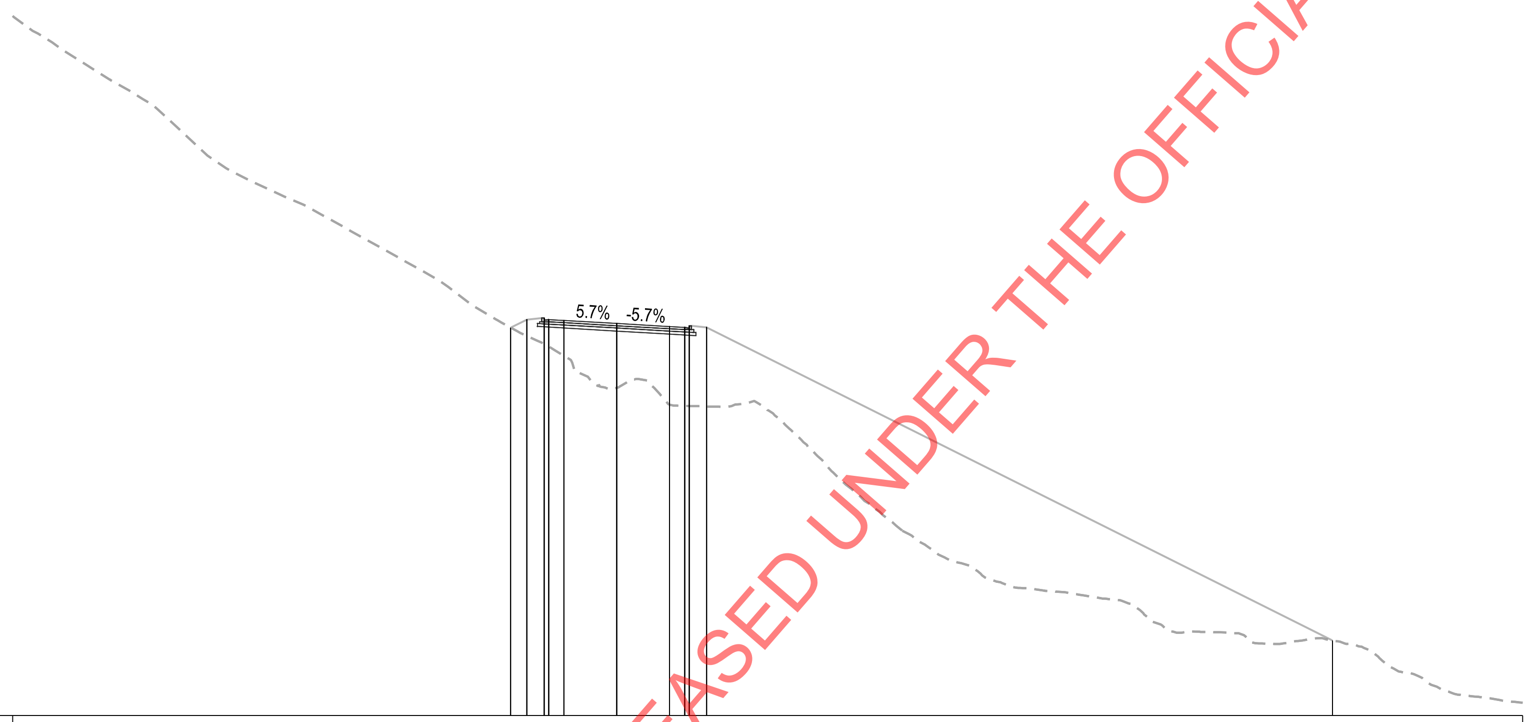

DATUM 319

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	344.67	345.21	345.31	345.21	345.15	344.95	344.75	344.69	344.79	344.69	323.96
EXISTING LEVELS	344.67	344.12	343.61	343.43	342.82	340.69	339.59	339.50	339.48	339.45	323.96
DESIGN OFFSETS	-7.02	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	47.40

CHAINAGE RP-08/ 4000

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4000 TO RP-08/ 4000

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-333

Rev. A

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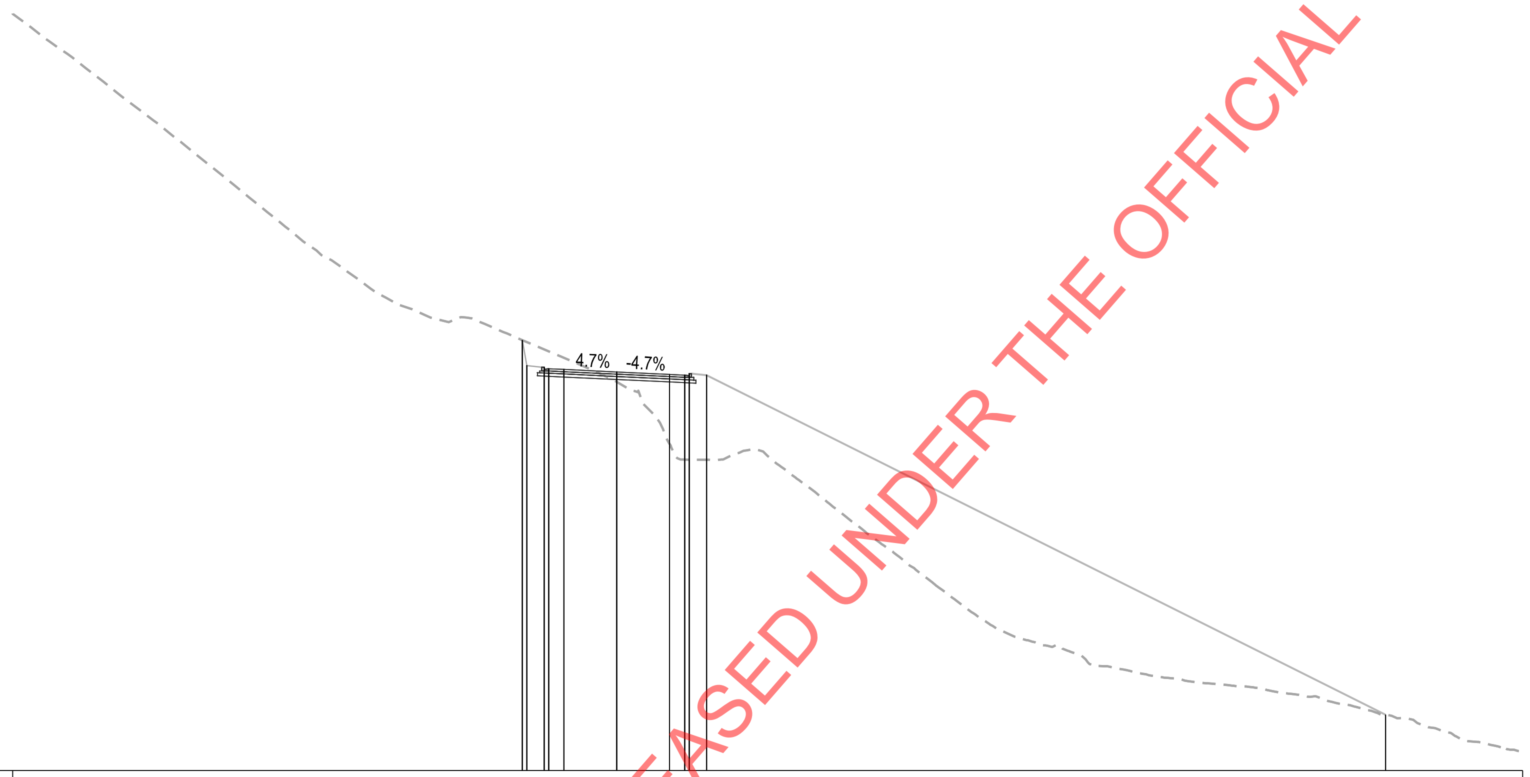

DATUM 319

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	347.51	345.81	345.71	345.61	345.56	345.40	345.23	345.19	345.29	345.19	322.70
EXISTING LEVELS	347.51	347.38	346.89	346.77	346.34	344.74	340.64	339.59	339.59	339.59	322.70
DESIGN OFFSETS	-6.25	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	50.92

CHAINAGE RP-08/ 4010

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design			Approved For Construction*
Drawn			
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

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Client:

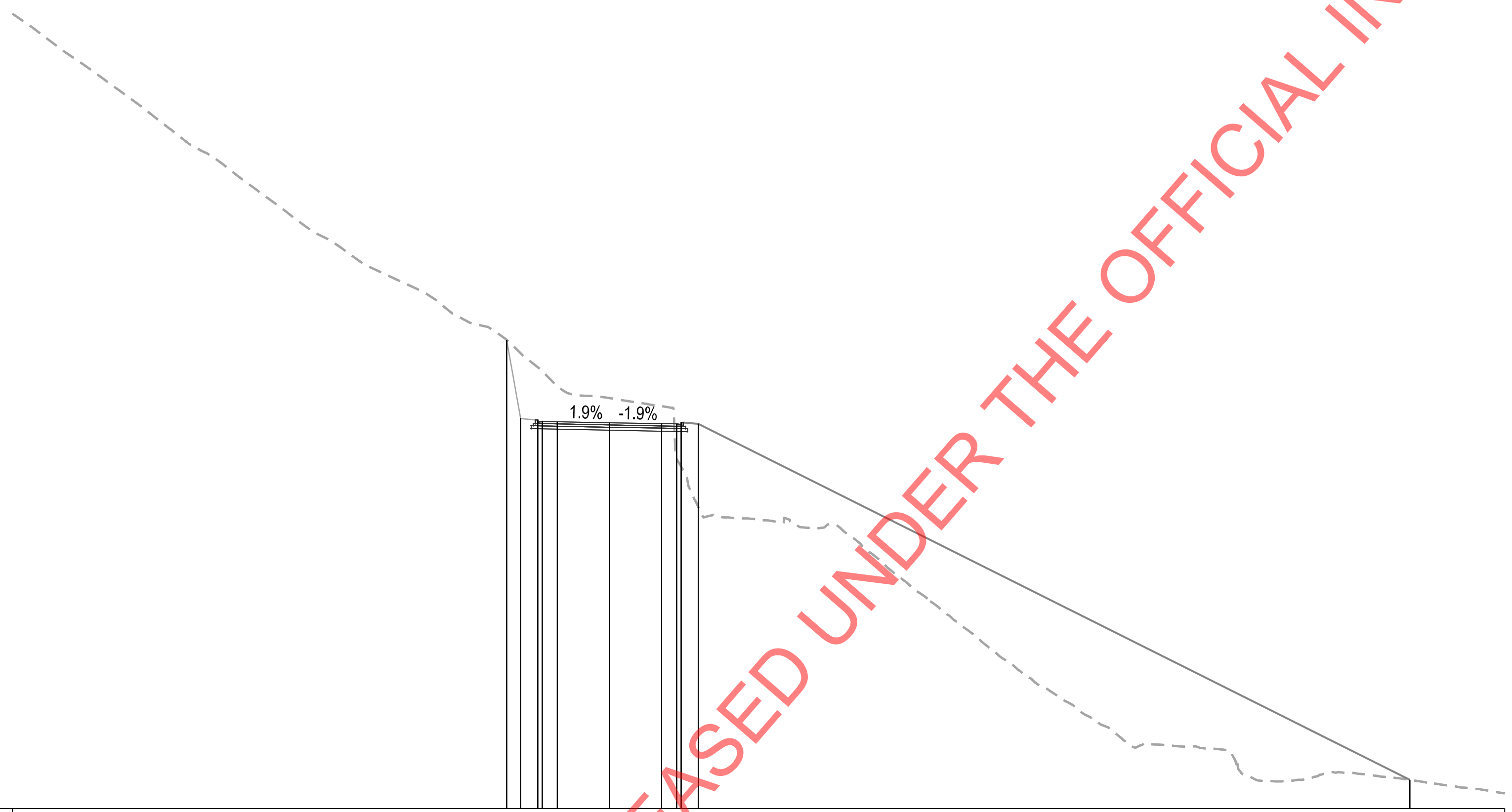
Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4010 TO RP-08/ 4010

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-334

Rev. A



DATUM 320

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	351.42	346.15	346.05	345.95	345.93	345.87	345.80	345.78	345.88	345.78	321.93
EXISTING LEVELS	351.42	350.53	349.59	349.33	348.31	347.52	346.98	343.47	342.94	340.23	321.93
DESIGN OFFSETS	-6.88	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	53.65

CHAINAGE RP-08/ 4020

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4020 TO RP-08/ 4020

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-335

Rev. A

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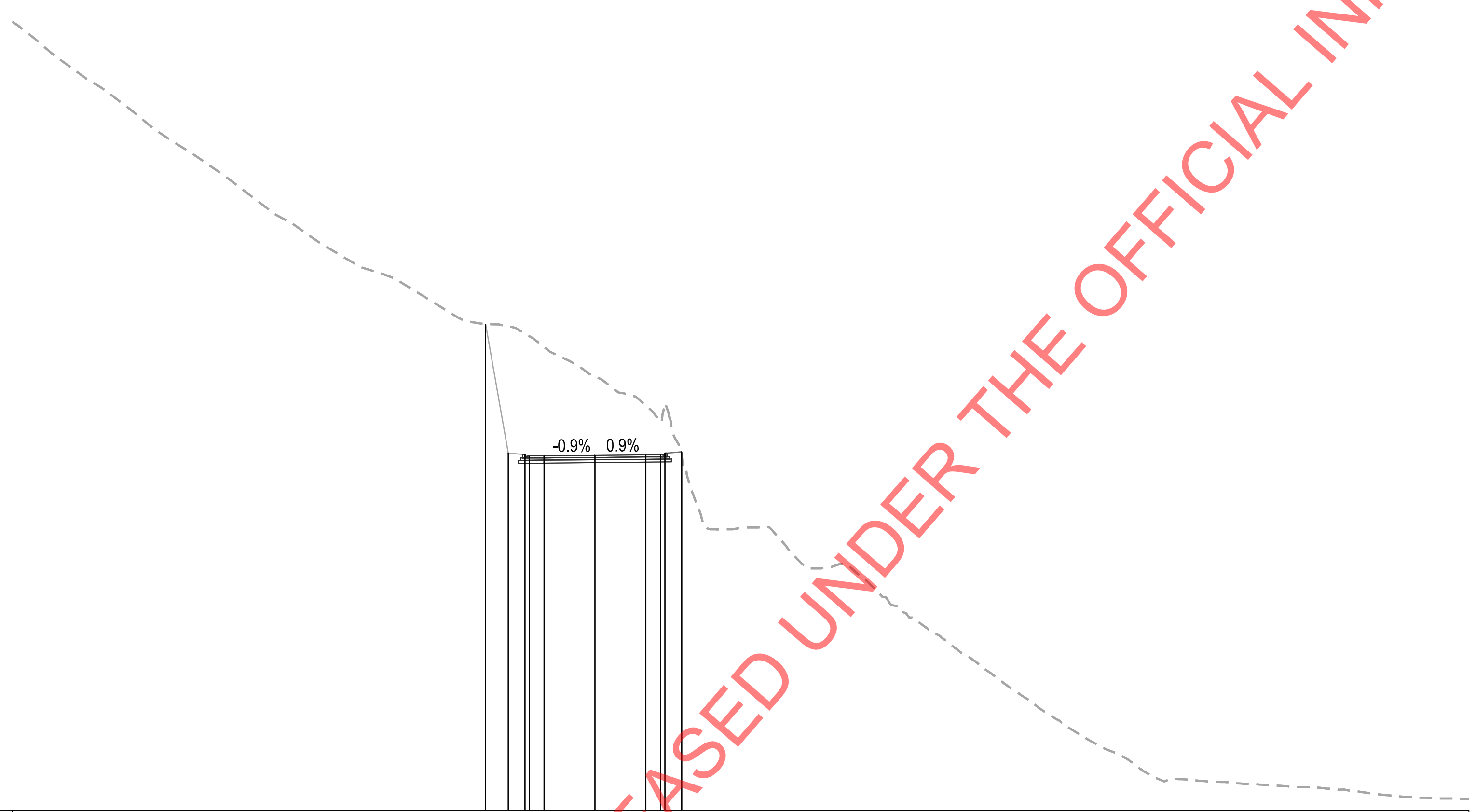
Document No. ...\XSect-Mainline.dgn - OPTION 10 - 11 [Sheet]



DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	355.34	346.51	346.41	346.31	346.32	346.35	346.38	346.39	346.49	346.59	346.60
EXISTING LEVELS	355.34	355.20	354.69	354.52	353.80	351.77	349.76	348.70	349.84	346.60	346.60
DESIGN OFFSETS	-7.51	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	5.95

CHAINAGE RP-08/ 4030

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

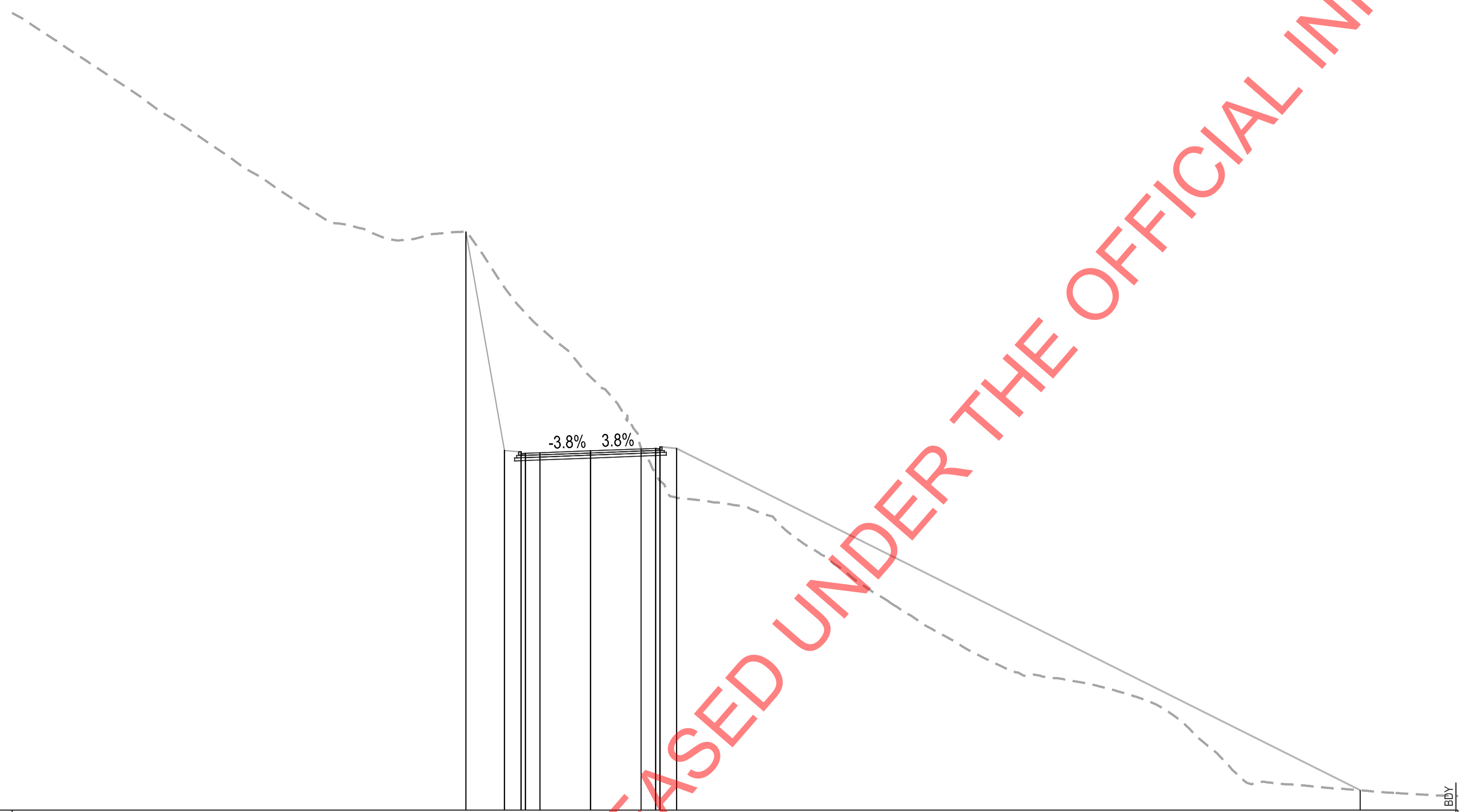
Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4030 TO RP-08/ 4030

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-336

Rev. A



DATUM 322

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	362.01	346.88	346.78	346.68	346.72	346.85	346.98	347.02	347.12	347.02	323.38
EXISTING LEVELS	362.01	358.15	356.70	356.38	355.39	351.96	347.06	345.25	344.79	343.60	323.38
DESIGN OFFSETS	-8.62	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	53.23

CHAINAGE RP-08/ 4040

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4040 TO RP-08/ 4040

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-337

Rev. A

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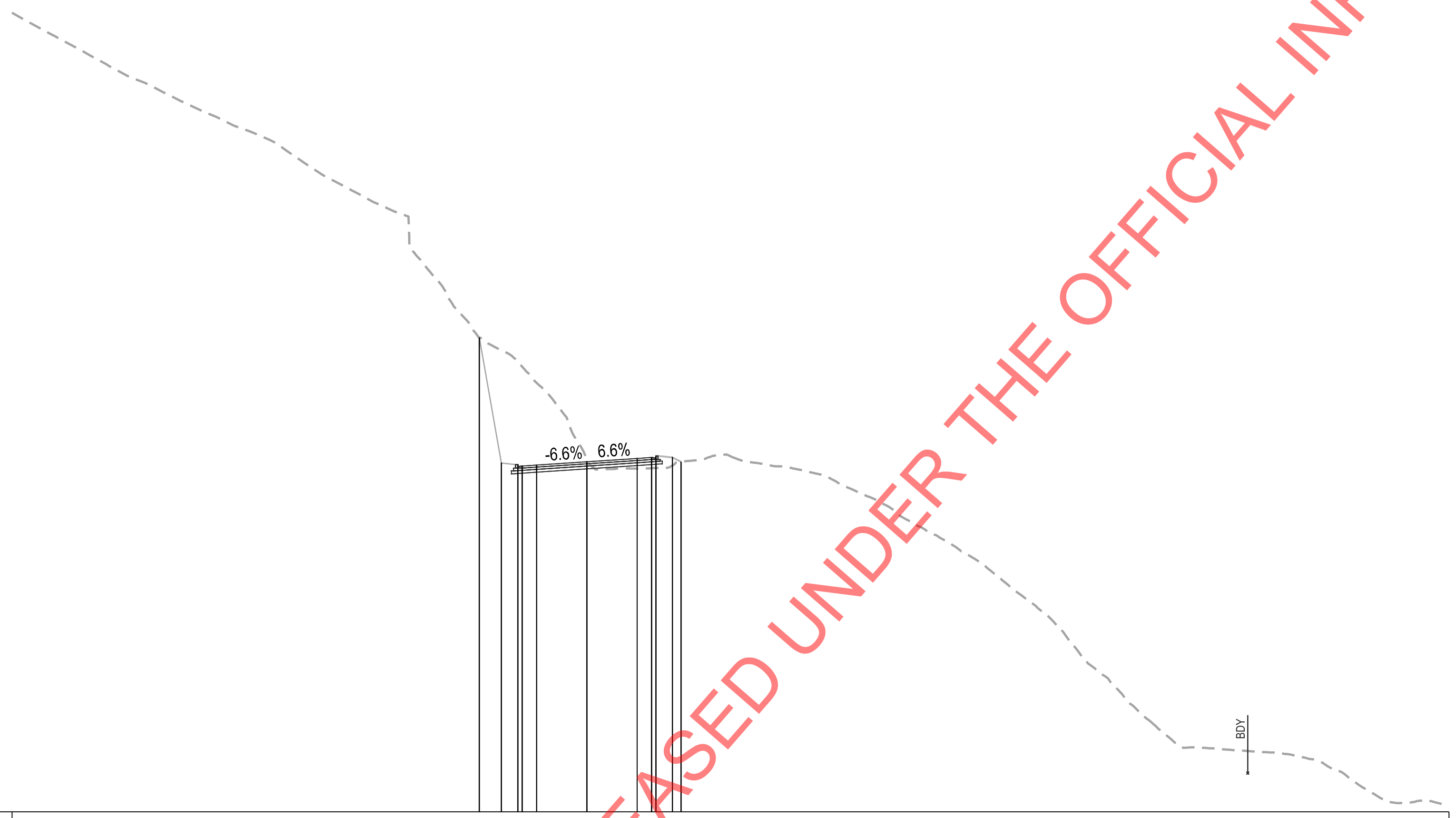
Document No. ...\XSect-Mainline.dgn - OPTION 10 - 13 [Sheet]

Drawing Plotted: 1/05/2023 9:59:06 AM



DATUM 323

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	356.01	347.27	347.17	347.07	347.13	347.37	347.60	347.66	347.76	347.66	347.36
EXISTING LEVELS	356.01	355.10	354.27	353.97	352.86	347.54	346.89	346.92	346.93	347.10	347.36
DESIGN OFFSETS	-7.49	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.55

CHAINAGE RP-08/ 4050

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design
Drawn
Dsg Verifier
Dwg Check

Approved For Construction*
Date

* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4050 TO RP-08/ 4050

Discipline: CIVIL ENGINEERING

Drawing No. 3413292 - CA-338

Rev. A

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Document No. ...\XSect-Mainline.dgn - OPTION 10 - 14 [Sheet]

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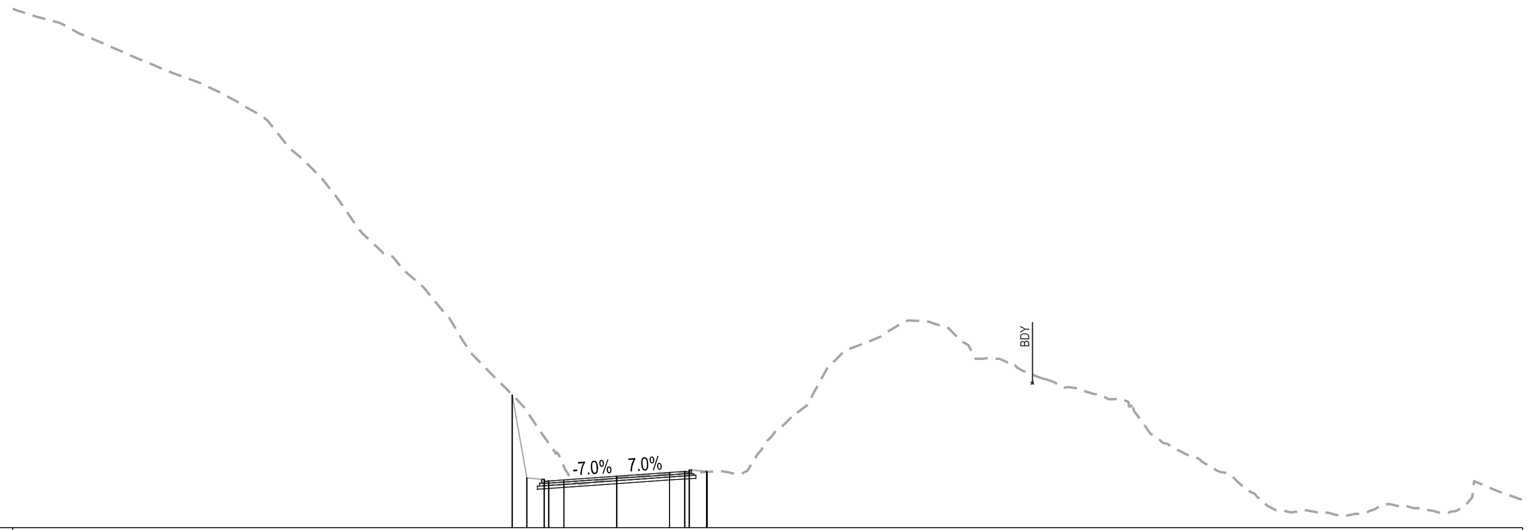
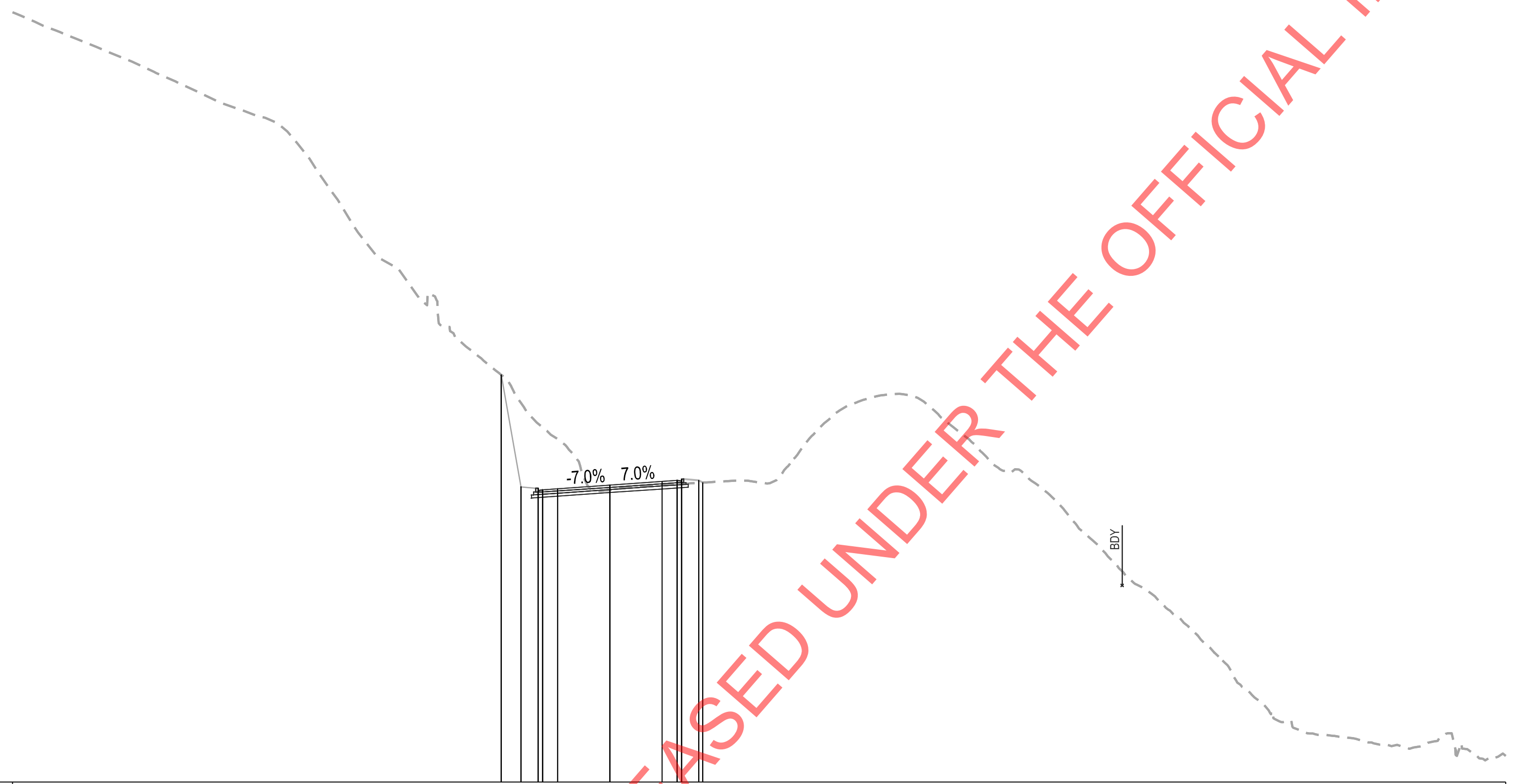


DATUM 345

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	353.81	348.30	348.20	348.10	348.17	348.41	348.66	348.73	348.83	348.73	348.70
EXISTING LEVELS	353.81	352.71	351.03	350.60	349.07	348.29	348.54	348.61	348.63	348.70	348.70
DESIGN OFFSETS	-6.92	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.00

CHAINAGE RP-08/ 4070



DATUM 328

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	355.29	347.78	347.68	347.58	347.65	347.89	348.13	348.20	348.30	348.20	348.06
EXISTING LEVELS	355.29	353.39	352.01	351.76	350.98	347.58	347.90	347.95	347.97	348.05	348.06
DESIGN OFFSETS	-7.27	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.23

CHAINAGE RP-08/ 4060

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design		
Drawn		
Dsg Verifier		
Dwg Check		

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4060 TO RP-08/ 4070

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-339
Rev. A

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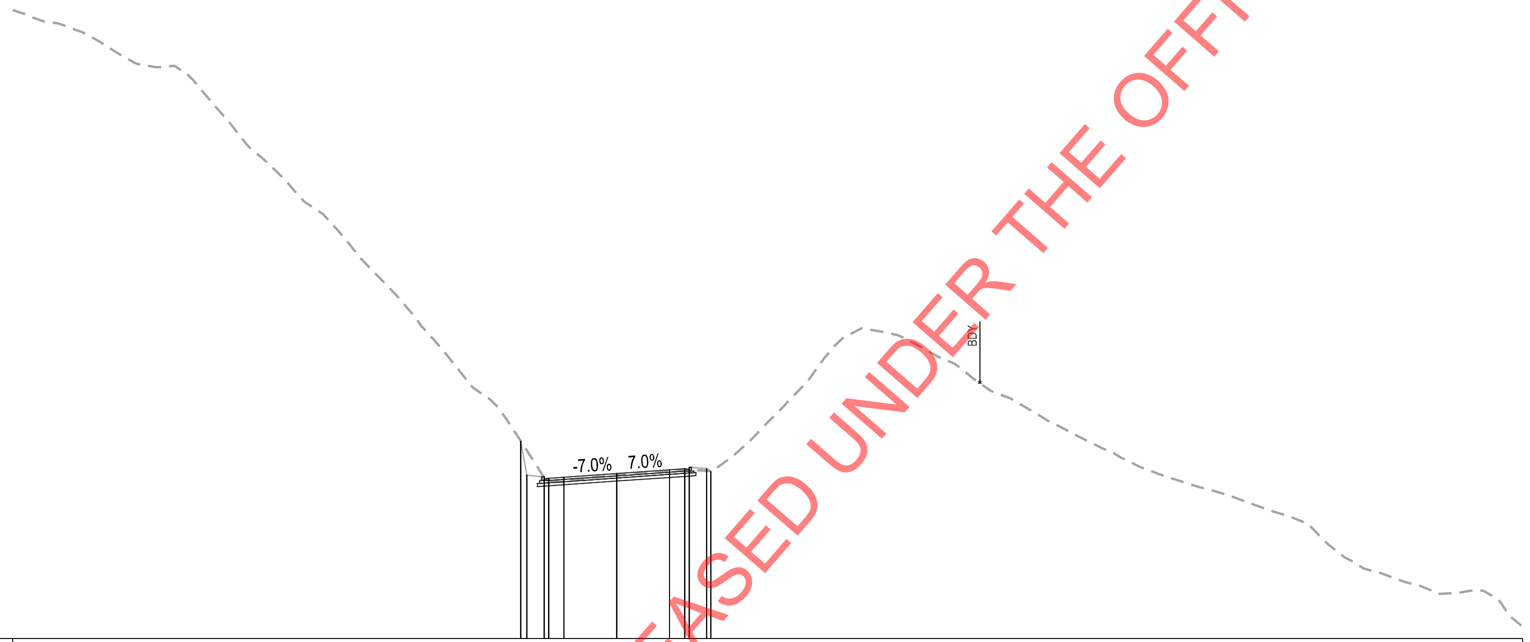
Document No. ...\XSect-Mainline.dgn - OPTION 10 - 15 [Sheet]



DATUM 338

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	351.10	348.83	348.73	348.63	348.69	348.94	349.18	349.25	349.35	349.25	349.10
EXISTING LEVELS	351.10	350.47	348.66	348.42	348.40	348.82	349.09	349.13	349.15	349.11	349.10
DESIGN OFFSETS	-6.35	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.25

CHAINAGE RP-08/ 4080

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design		
Drawn		
Dsg Verifier		
Dwg Check		

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

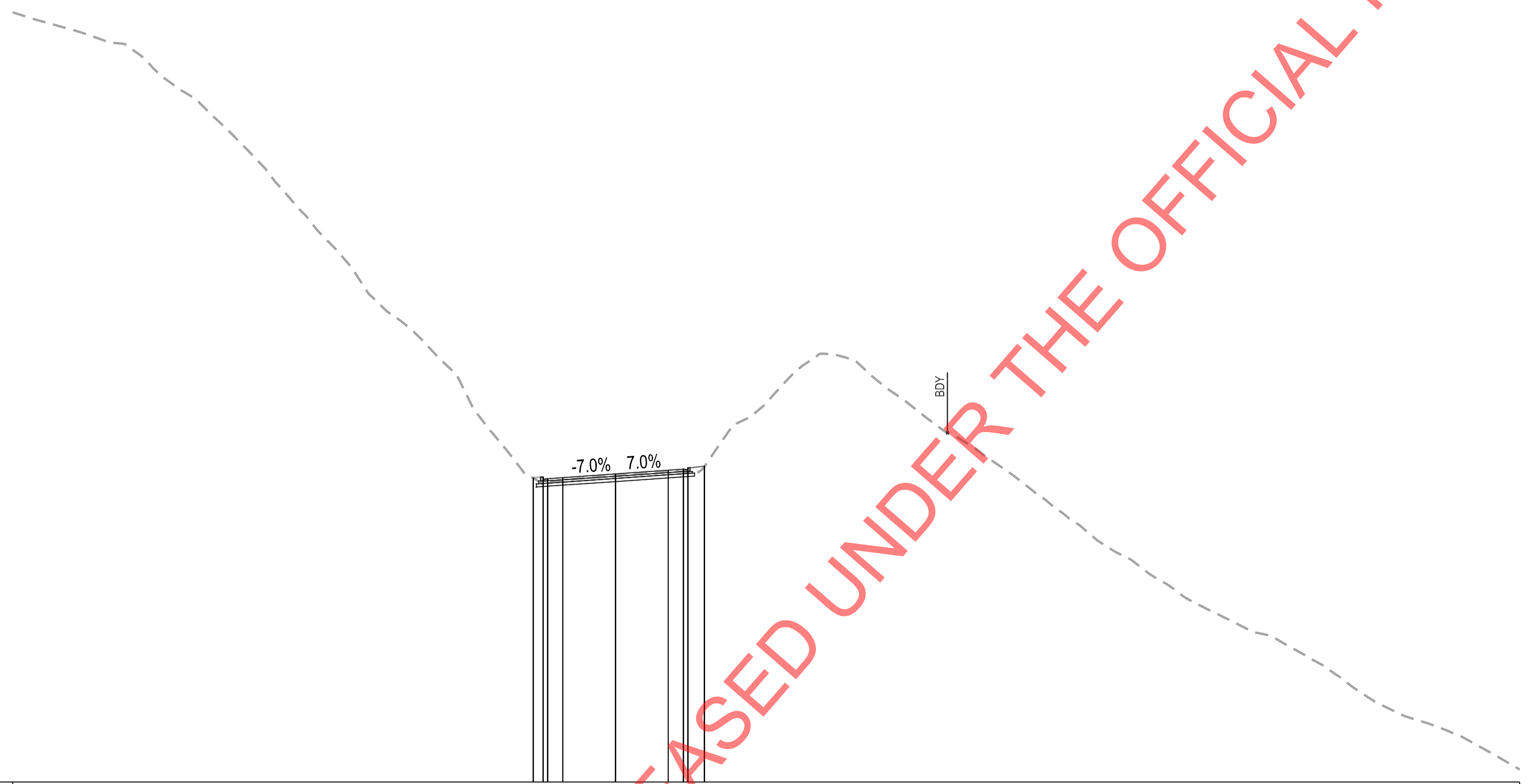
Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4080 TO RP-08/ 4080

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-340

Rev. A

Drawing Plotted: 1/05/2023 9:59:08 AM



DATUM 329

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	349.19	349.24	349.14	349.21	349.45	349.70	349.77	349.87	349.96
EXISTING LEVELS	349.19	348.78	348.84	349.03	349.35	349.60	349.61	349.61	349.96
DESIGN OFFSETS	-5.46	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.91

CHAINAGE RP-08/ 4090

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4090 TO RP-08/ 4090

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-341
Rev. A

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Document No. ...\XSect-Mainline.dgn - OPTION 10 - 17 [Sheet]

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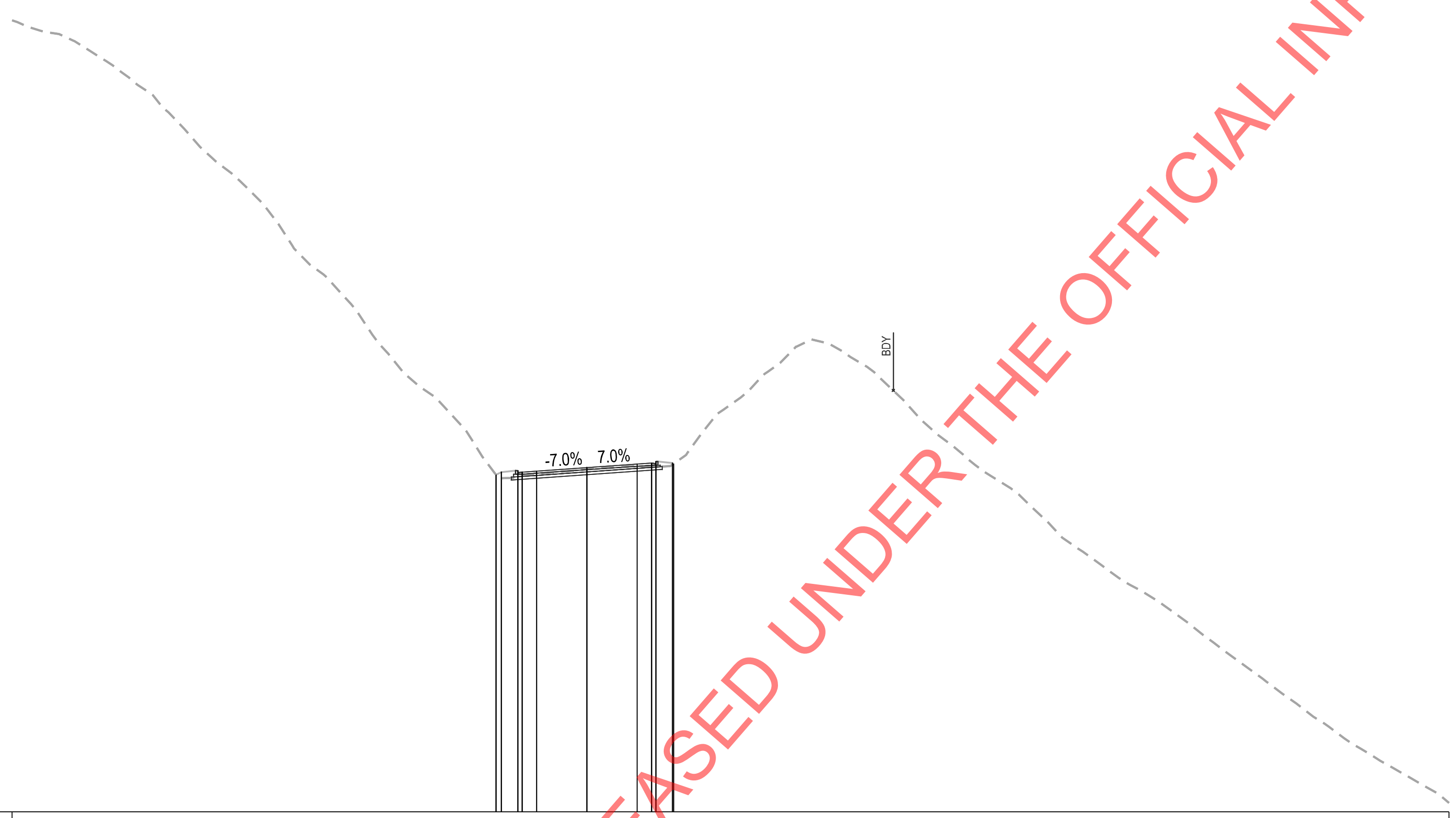

DATUM 326

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	349.46	349.65	349.75	349.65	349.71	349.96	350.20	350.27	350.37	350.27	350.22
EXISTING LEVELS	349.46	349.22	349.31	349.37	349.52	349.84	350.06	350.00	349.99	350.16	350.22
DESIGN OFFSETS	-6.32	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.04

CHAINAGE RP-08/ 4100

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4100 TO RP-08/ 4100

Discipline: CIVIL ENGINEERING

Drawing No. 3413292 - CA-342

Rev. A

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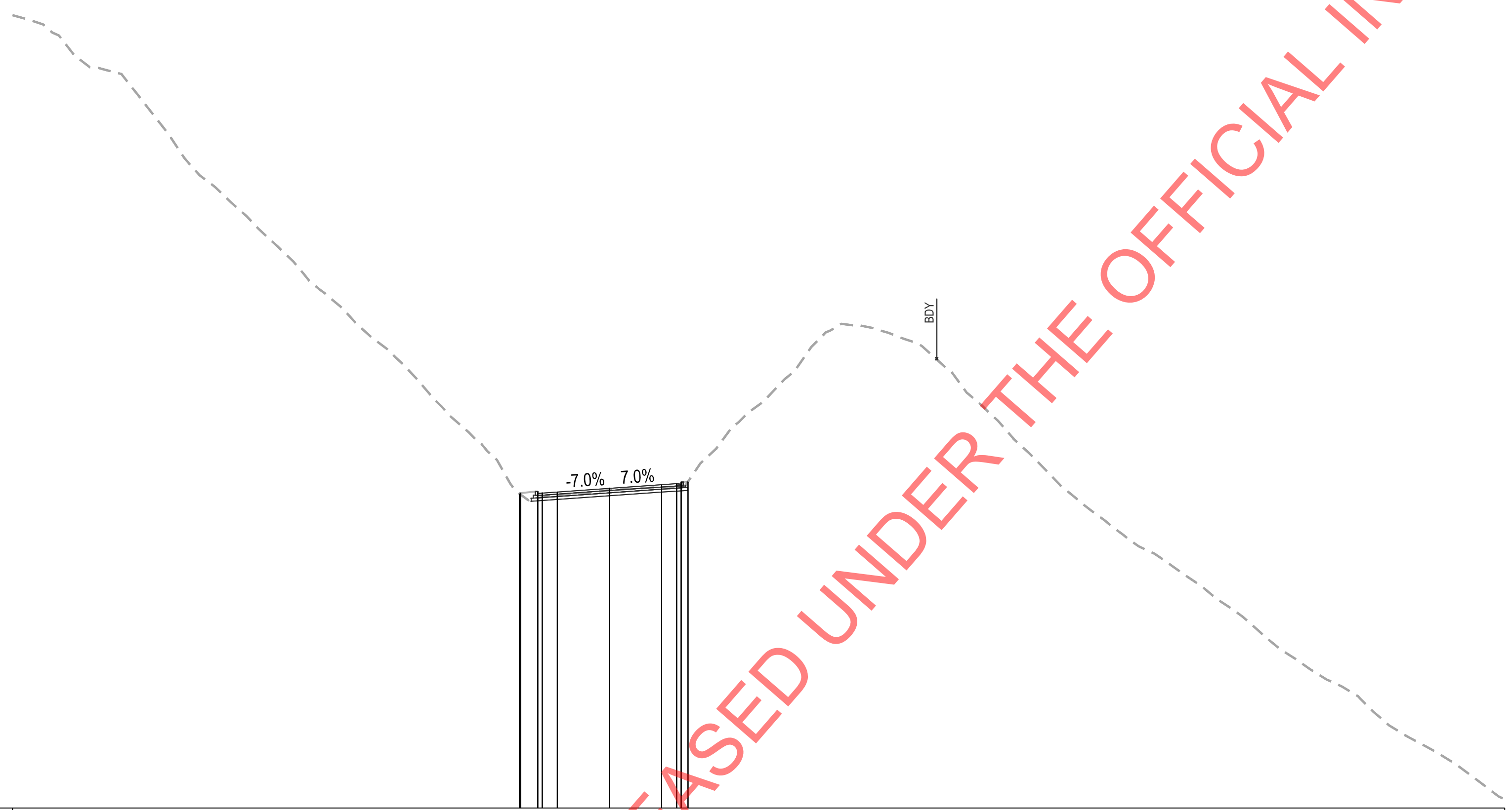
- OPTION 10 - 18 [Sheet]

Document No. ...\XSect-Mainline.dgn



DATUM 329

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	350.09	350.14	350.24	350.14	350.21	350.45	350.69	350.76	350.86	350.89
EXISTING LEVELS	350.09	350.03	349.80	349.86	349.99	350.31	350.47	350.51	350.55	350.89
DESIGN OFFSETS	-6.04	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.26

CHAINAGE RP-08/ 4110

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design
Drawn
Dsg Verifier
Dwg Check

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

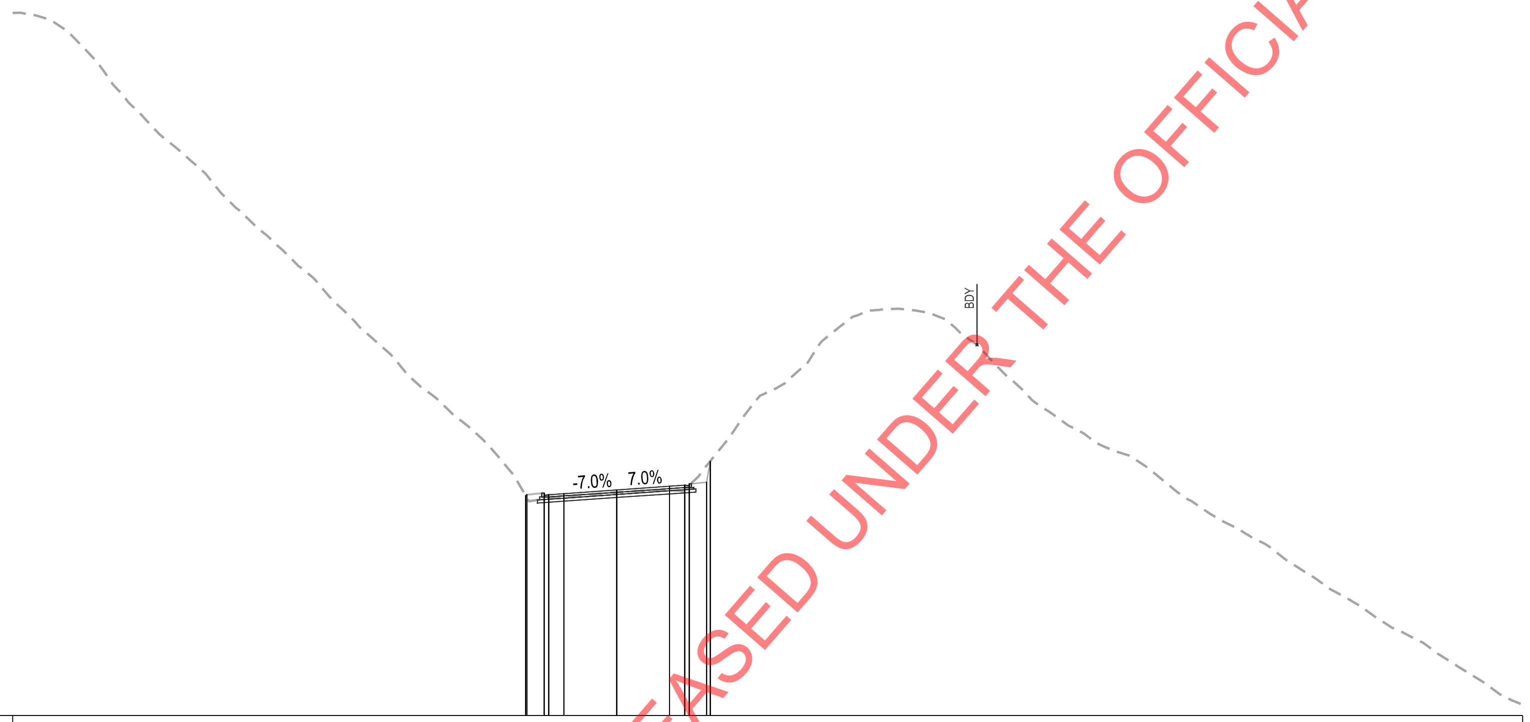
Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4110 TO RP-08/ 4110

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-343
Rev. A

DO NOT SCALE

IF IN DOUBT ASK.



DATUM 336

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	350.57	350.62	350.72	350.62	350.69	350.93	351.17	351.24	351.34	351.44	352.84
EXISTING LEVELS	350.57	350.43	350.32	350.35	350.46	350.77	350.92	350.95	351.24	352.53	352.84
DESIGN OFFSETS	-6.04	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	6.20

CHAINAGE RP-08/ 4120

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250	Design			Approved For Construction*
	Drawn			
Reduced Scale (A3)	Dsg Verifier			
	Dwg Check			Date
HALF SCALE	* Refer to Revision 1 for Original Signature			

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4120 TO RP-08/ 4120

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-344

Rev. A

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Document No. ...\XSect-Mainline.dgn - OPTION 10 - 20 [Sheet]

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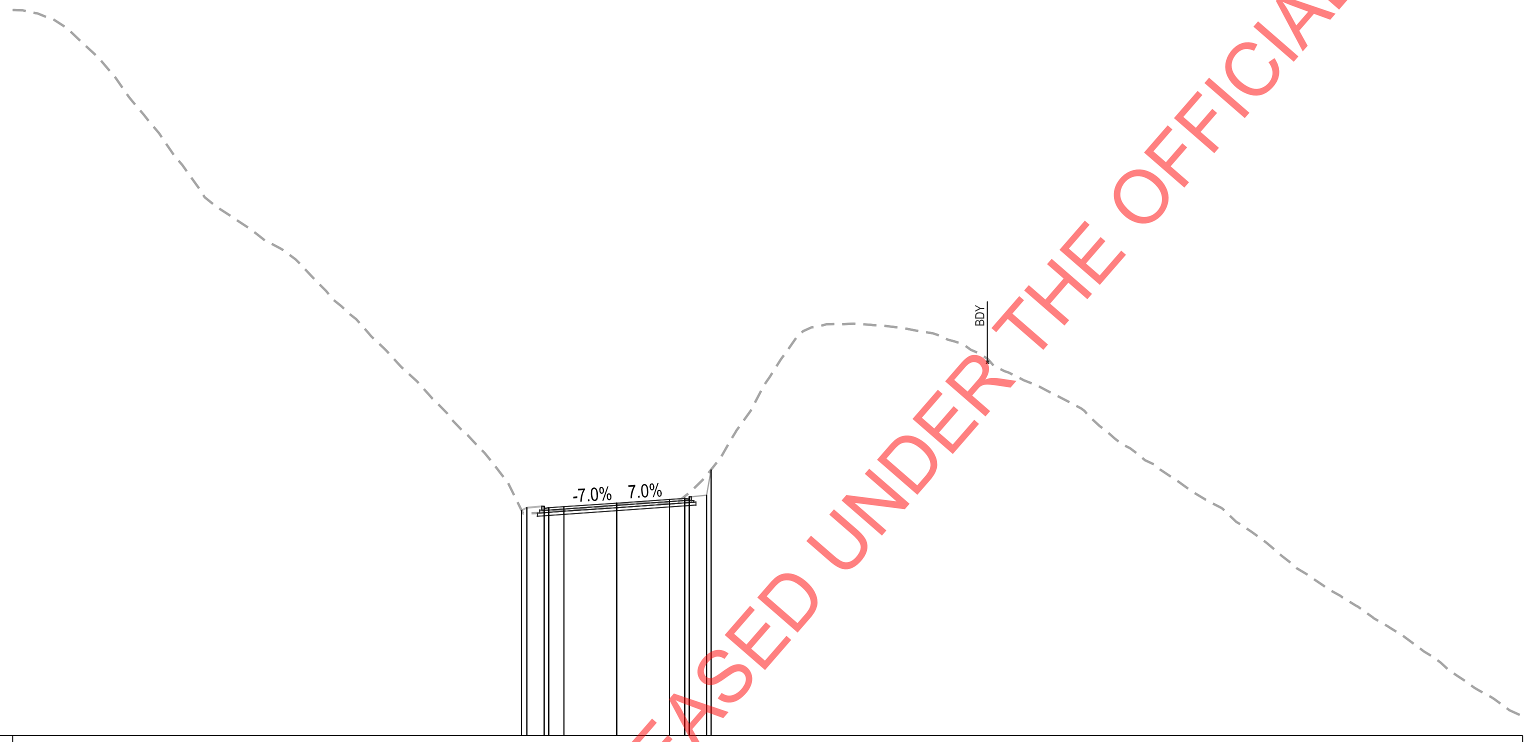

DATUM 336

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	350.91	351.08	351.18	351.08	351.15	351.40	351.64	351.71	351.81	351.91	353.61
EXISTING LEVELS	350.91	350.71	350.80	350.84	350.92	351.26	351.33	351.84	352.07	353.23	353.61
DESIGN OFFSETS	-6.30	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.25

CHAINAGE RP-08/ 4130

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4130 TO RP-08/ 4130

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-345

Rev. A

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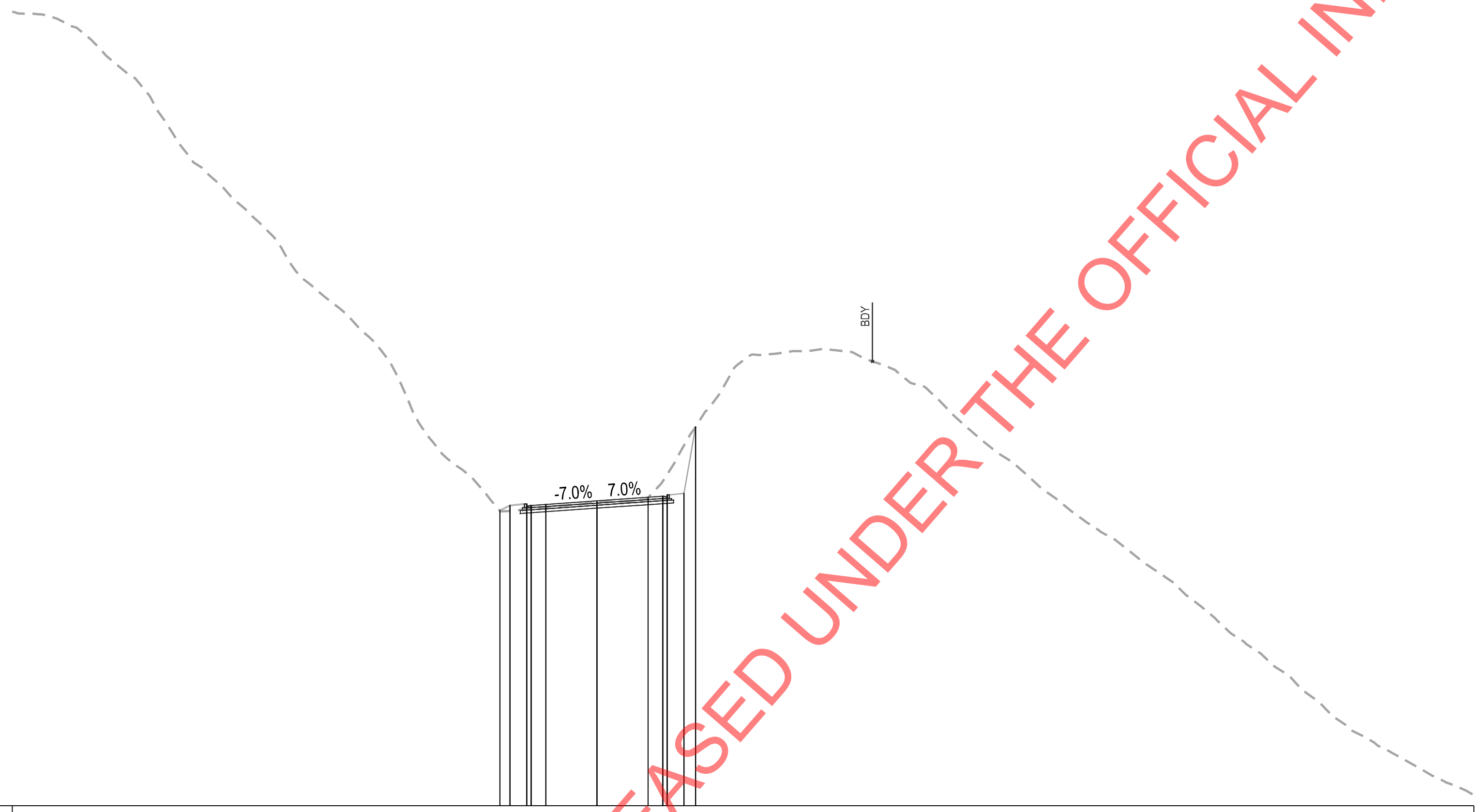
Drawing Plotted: 1/05/2023 9:59:11 AM



DATUM 331

DESIGN FEATURES	DESIGN LEVELS	EXISTING LEVELS	DESIGN OFFSETS
IA-L	351.20	351.20	-6.64
EV-L	351.55	351.17	-5.95
KF-L	351.65	351.32	-4.80
ES-L	351.55	351.36	-4.50
LE-L	351.62	351.43	-3.50
L1	351.86	351.74	-0.00
LE-R	352.10	352.07	3.50
ES-R	352.17	353.19	4.50
KF-R	352.27	353.64	4.80
EV-R	352.37	355.64	5.95
IA-R	356.94	356.94	6.76

CHAINAGE RP-08/ 4140

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design			Approved For Construction*
Drawn			
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4140 TO RP-08/ 4140

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-346

Rev. A

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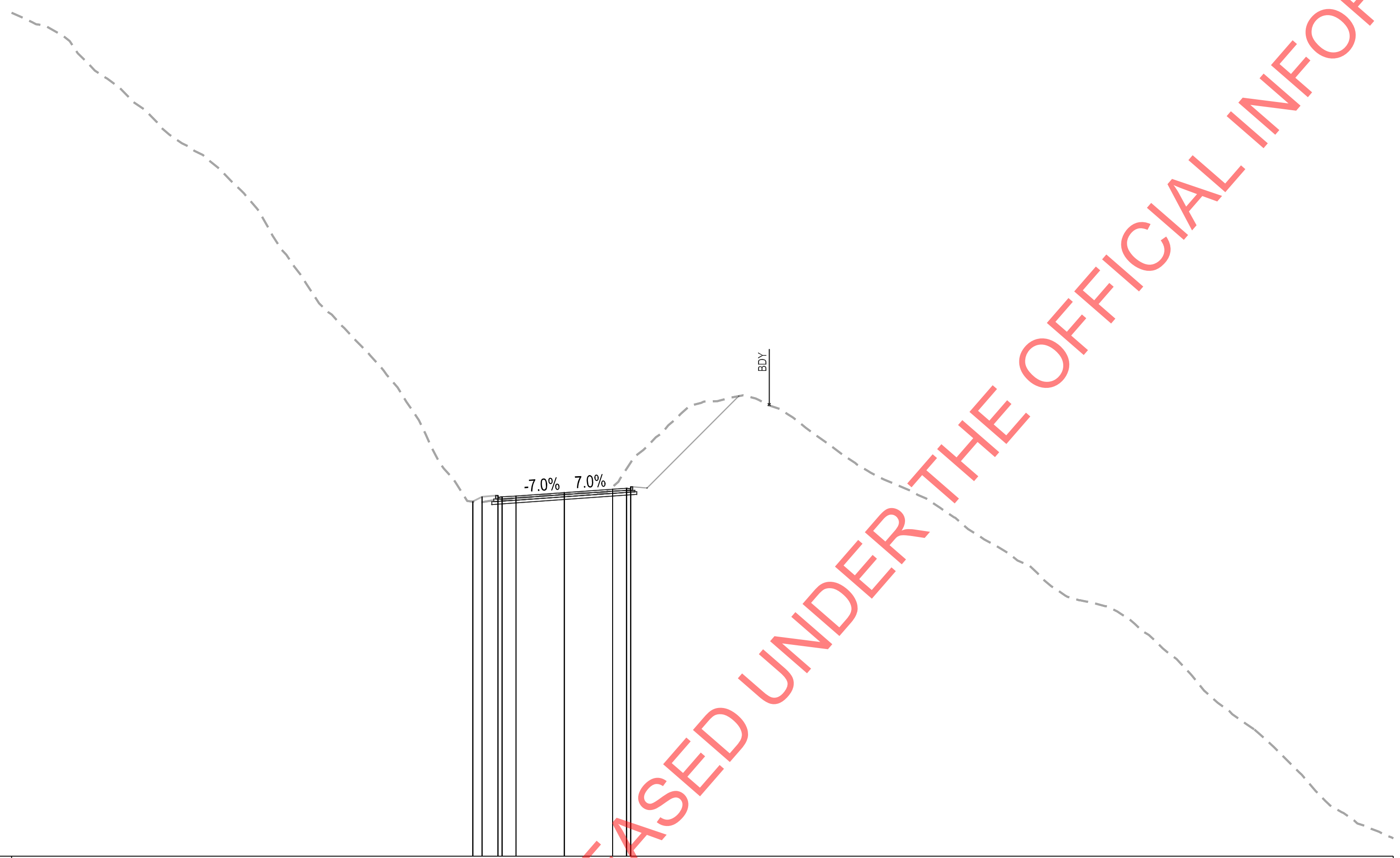
Document No. ...\XSect-Mainline.dgn - OPTION 10 - 22 [Sheet] www.beca.com



DATUM 326

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R
DESIGN LEVELS	351.68	352.01	352.11	352.01	352.08	352.33	352.57	352.64	352.74
EXISTING LEVELS	351.68	351.63	351.80	351.82	351.93	352.20	352.74	354.03	354.49
DESIGN OFFSETS	-6.61	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80

CHAINAGE RP-08/ 4150

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250	Design			Approved For Construction*
	Drawn			
Reduced Scale (A3)	Dsg Verifier			
	Dwg Check			Date
HALF SCALE	* Refer to Revision 1 for Original Signature			

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4150 TO RP-08/ 4150

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-347

Rev. A

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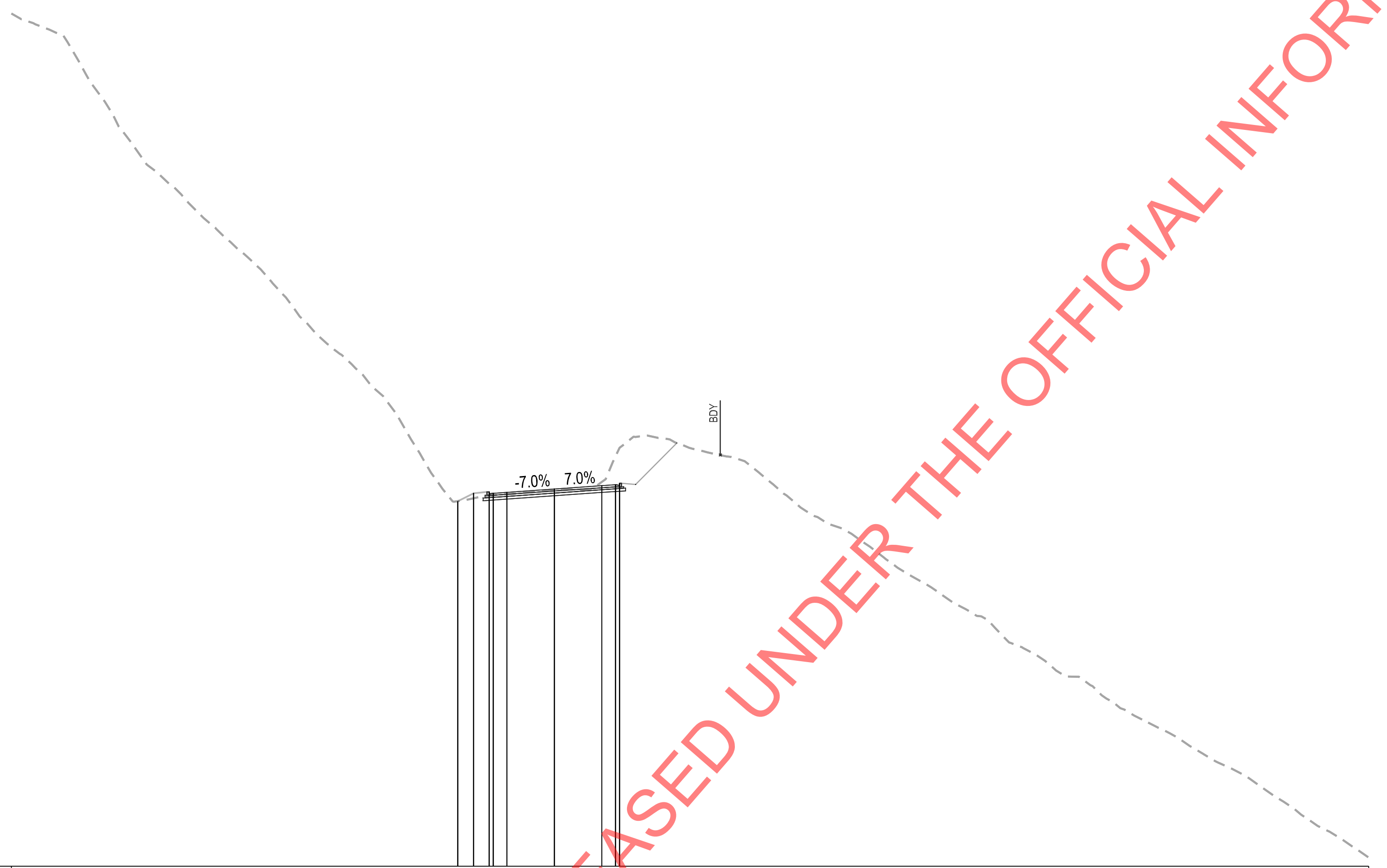
Document No. ...\XSect-Mainline.dgn - OPTION 10 - 23 [Sheet]



DATUM 325

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R
DESIGN LEVELS	351.89	352.48	352.58	352.48	352.55	352.79	353.03	353.10	353.20
EXISTING LEVELS	351.89	352.10	352.29	352.32	352.40	352.68	353.31	355.17	355.80
DESIGN OFFSETS	-7.12	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80

CHAINAGE RP-08/ 4160

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4160 TO RP-08/ 4160

Discipline CIVIL ENGINEERING
Drawing No. 3413292 - CA-348
Rev. A

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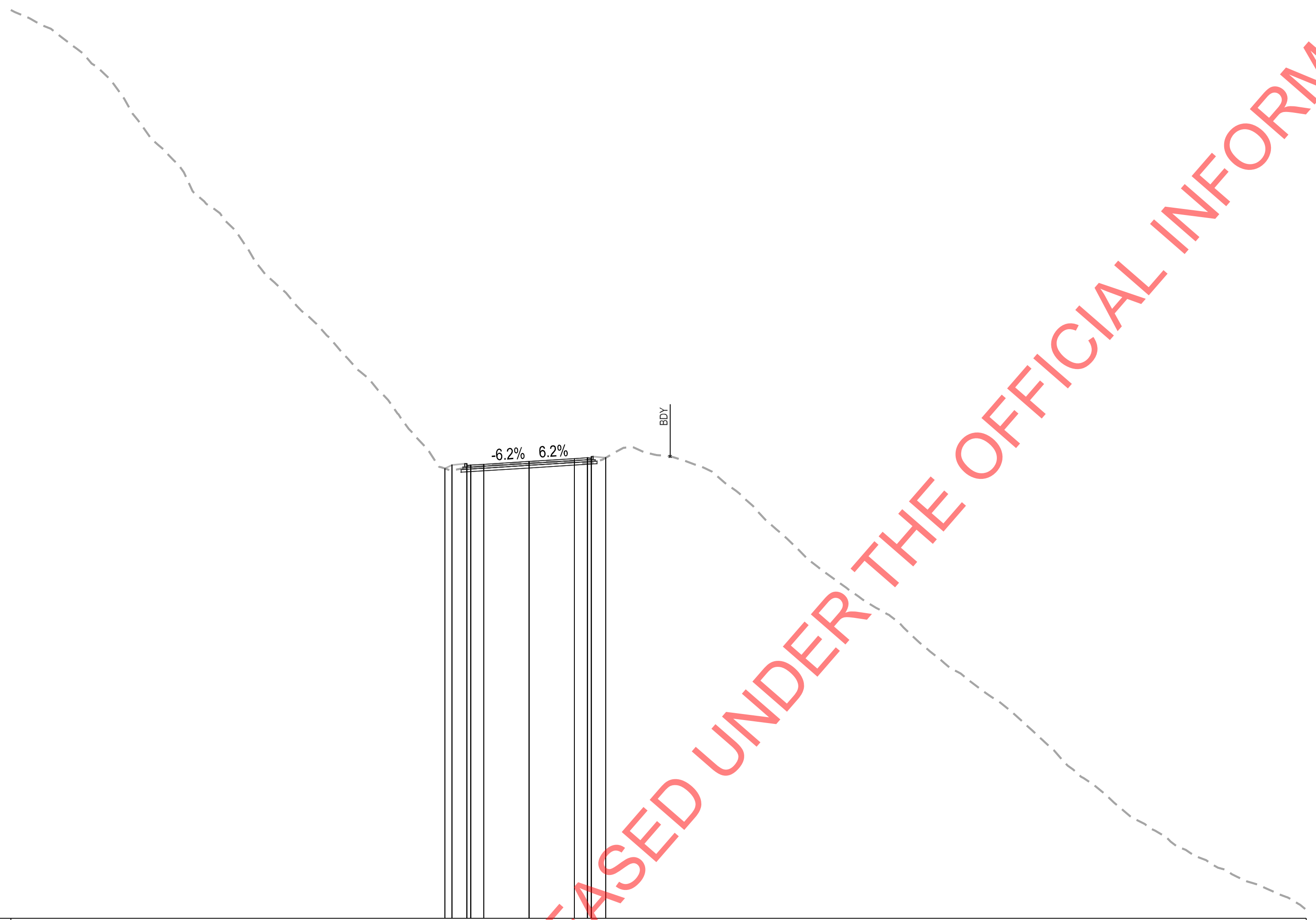
Document No. ...\XSect-Mainline.dgn - OPTION 10 - 24 [Sheet]



DATUM 318

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	352.70	352.97	353.07	352.97	353.04	353.25	353.47	353.53	353.63	353.54
EXISTING LEVELS	352.70	352.58	352.79	352.82	352.89	353.12	353.19	353.11	353.14	353.54
DESIGN OFFSETS	-6.49	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.92

CHAINAGE RP-08/ 4170

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

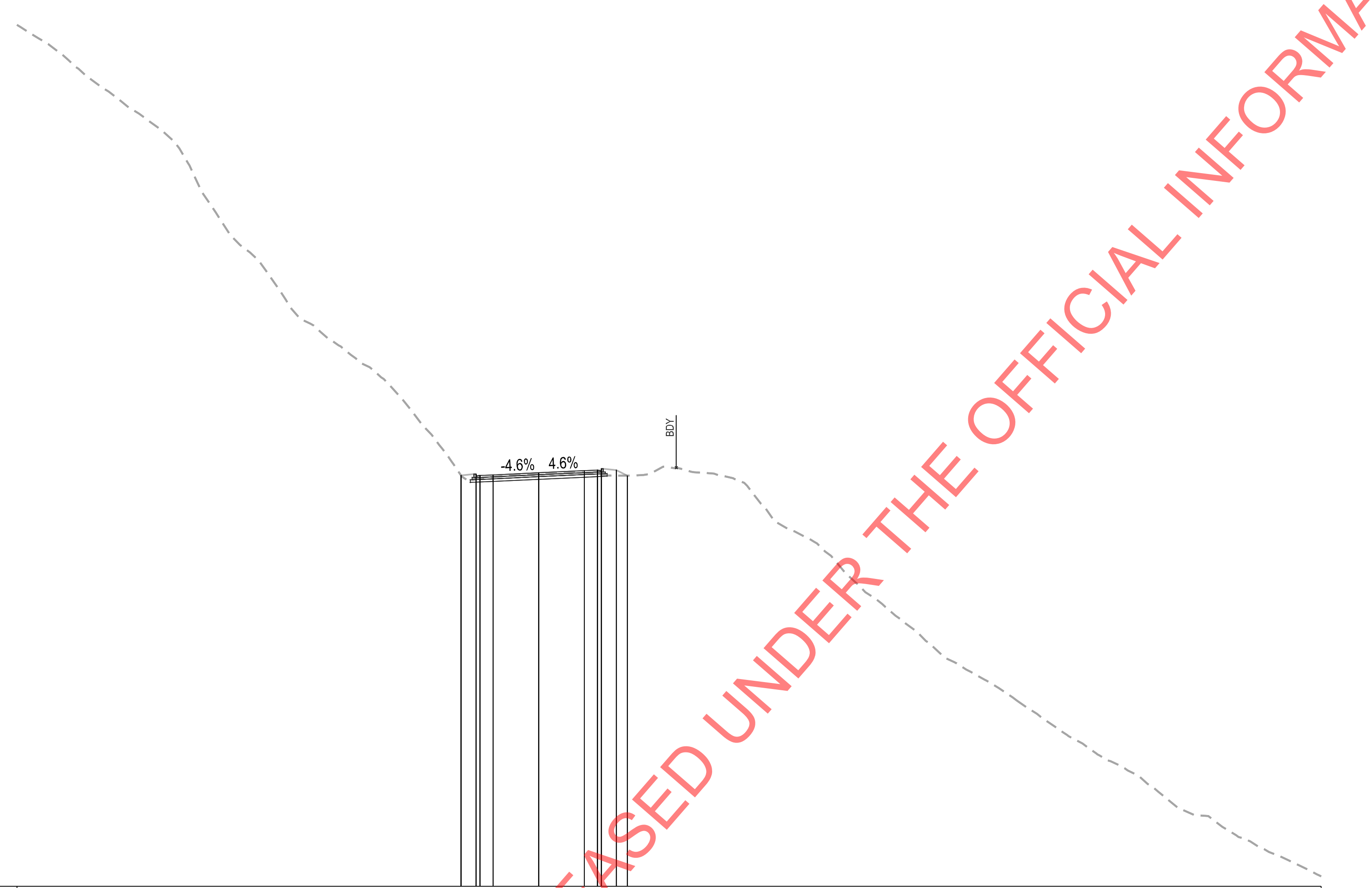
Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4170 TO RP-08/ 4170

Discipline CIVIL ENGINEERING
Drawing No. 3413292 - CA-349
Rev. A



DATUM 322

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	353.51	353.51	353.61	353.51	353.56	353.72	353.88	353.92	354.02	353.92	353.50
EXISTING LEVELS	353.51	353.51	353.25	353.30	353.40	353.62	353.72	353.59	353.56	353.50	353.50
DESIGN OFFSETS	-5.95	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	6.80

CHAINAGE RP-08/ 4180

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4180 TO RP-08/ 4180

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-350

Rev. A

Document No. ...\XSect-Mainline.dgn - OPTION 10 - 26 [Sheet]

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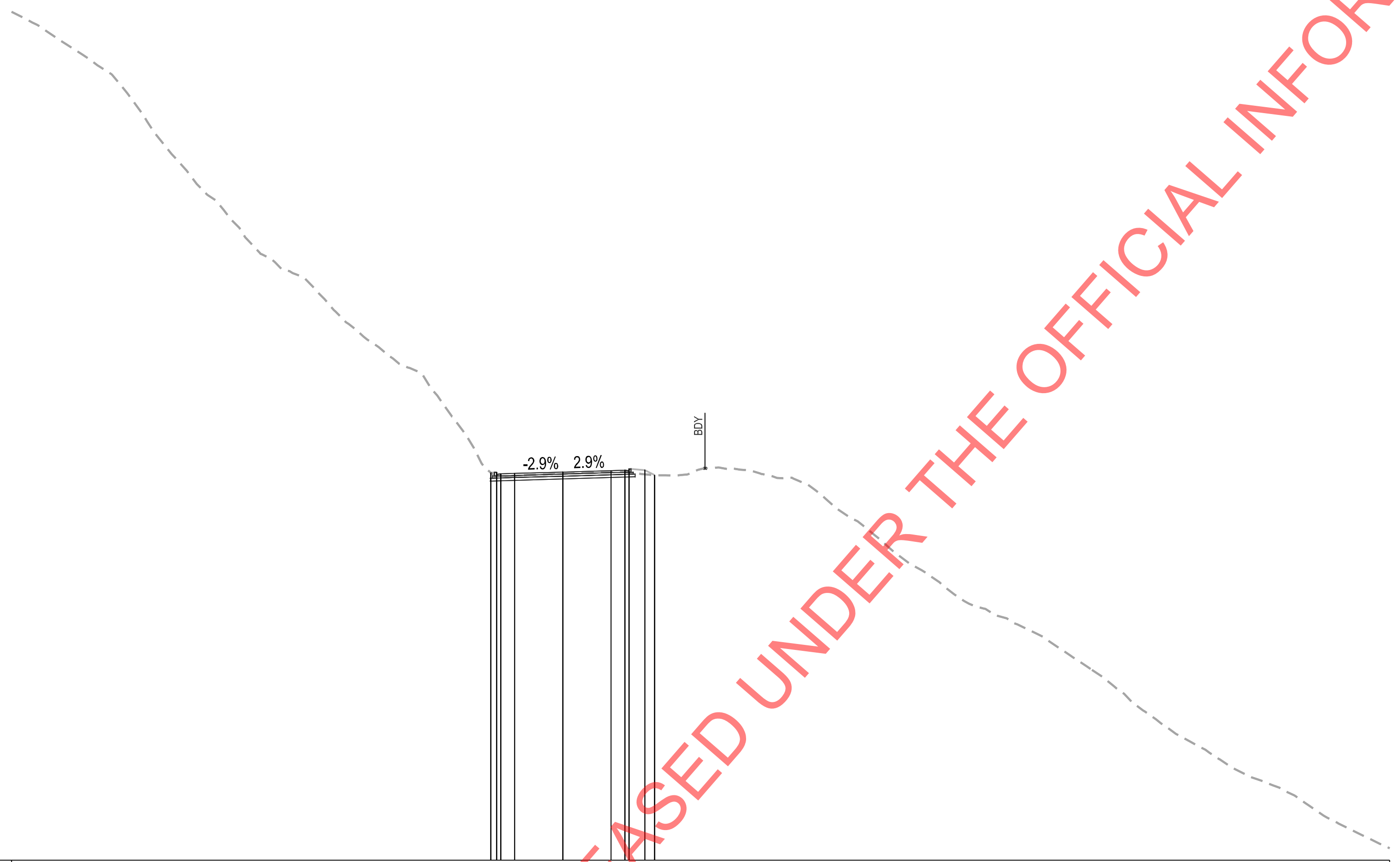


DATUM 326

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	354.12	354.15	354.05	354.08	354.18	354.28	354.31	354.41	354.31	353.96
EXISTING LEVELS	354.12	353.79	353.81	353.90	354.09	354.23	354.19	354.16	354.02	353.96
DESIGN OFFSETS	-5.22	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	6.66

CHAINAGE RP-08/ 4190

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

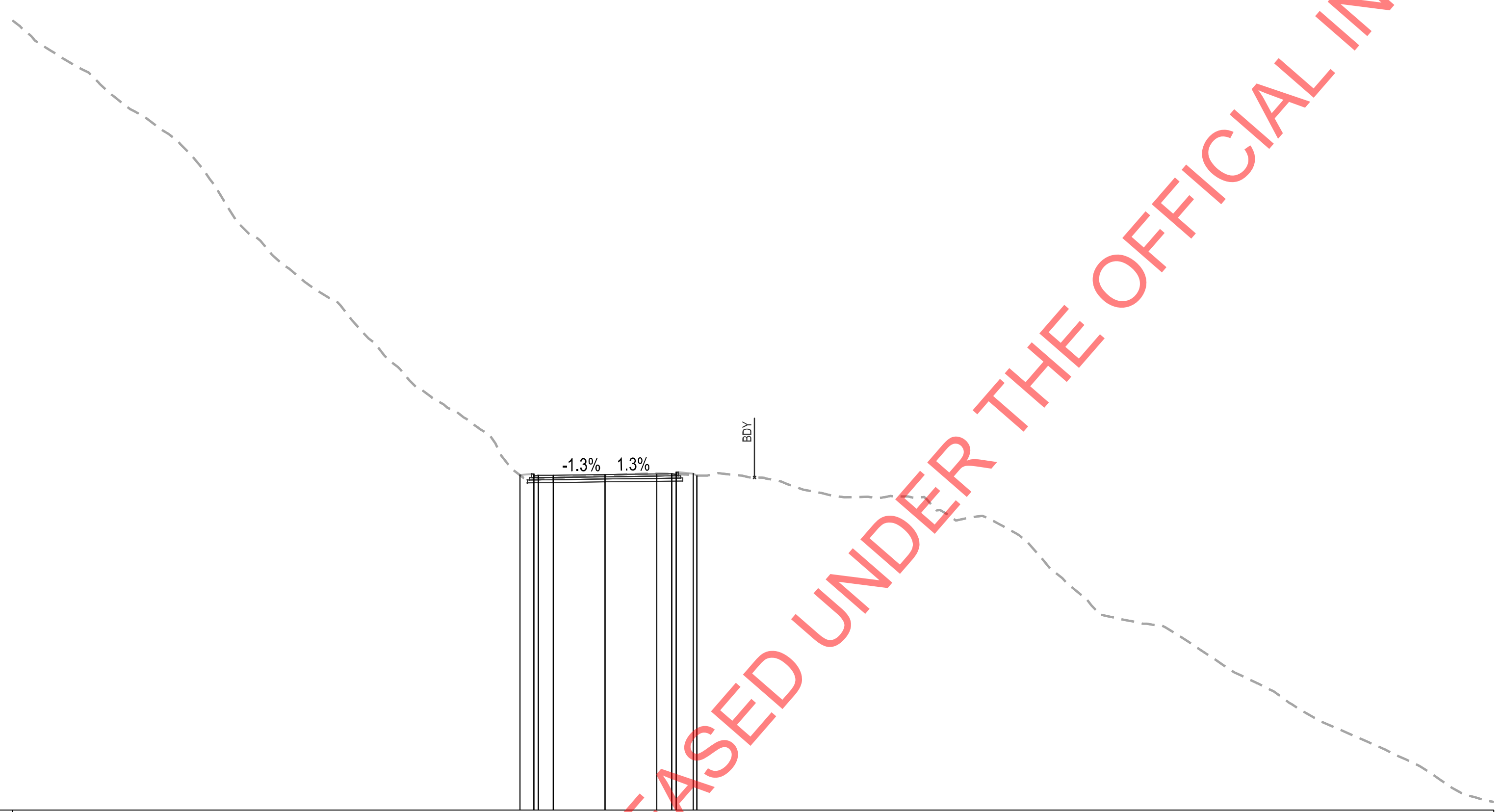
Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4190 TO RP-08/ 4190

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-351

Rev. A



DATUM 332

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	354.61	354.69	354.59	354.60	354.65	354.69	354.70	354.80	354.70	354.58
EXISTING LEVELS	354.61	354.29	354.31	354.40	354.60	354.71	354.68	354.67	354.59	354.58
DESIGN OFFSETS	-5.74	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.20

CHAINAGE RP-08/ 4200

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design
Drawn
Dsg Verifier
Dwg Check

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10A 2:1 FILL
RP-08/ 4200 TO RP-08/ 4200

Discipline CIVIL ENGINEERING

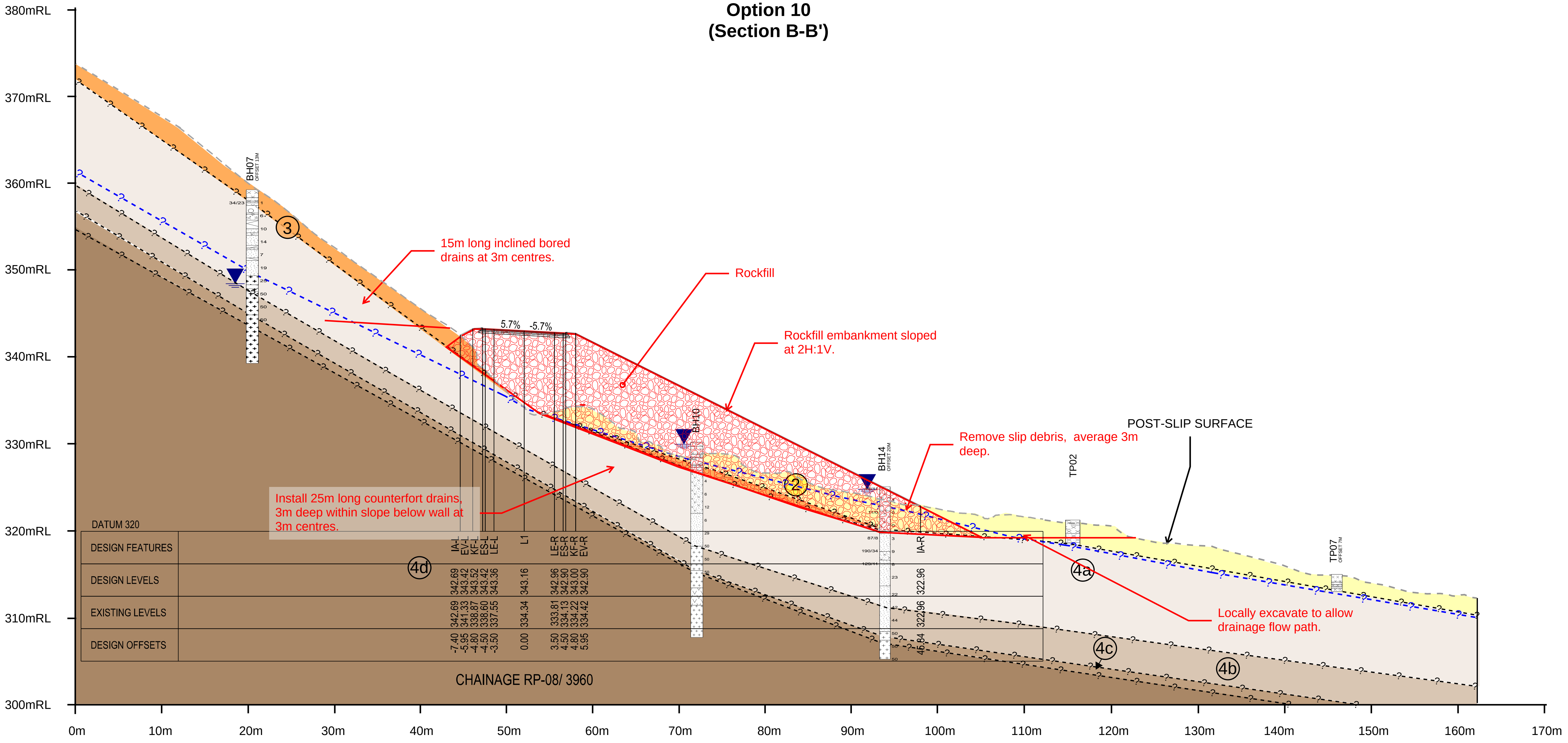
Drawing No. 3413292 - CA-352

Rev. A

DO NOT SCALE

IF IN DOUBT ASK.

DESIGN SECTION CH3960
Option 10
(Section B-B')



DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	342.69	343.42	343.52	343.42	343.36	343.16	342.96	342.90	343.00	342.90	322.96
EXISTING LEVELS	342.69	341.33	338.87	338.60	337.55	334.34	333.81	334.13	334.22	334.42	322.96
DESIGN OFFSETS	-7.40	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	45.84

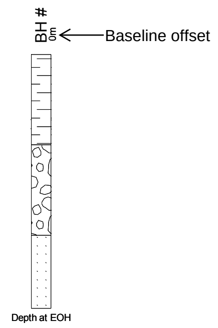
Legend

- ① [FILL]
- ② [RECENT SLIP DEBRIS]
- ③ [HISTORICAL SLIP DEBRIS]
- (4a) [COMPLETELY WEATHERED ANDESITE]
- (4b) [HIGHLY WEATHERED ANDESITE]
- (4c) [MODERATELY WEATHERED ANDESITE]
- (4d) [SLIGHTLY WEATHERED ANDESITE]

- - - - Pre slip ground surface
- - - - Post slip ground surface
— ? — Interpreted geological boundary
▼ Measured/dipped groundwater
— ? — Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m
V 1:500
0 6.25 12.5 17.5 25m
Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)	Design	ZL	12/04/23
	Drawn	ZL	12/04/23
Reduced Scale (A3)	Dsg Verifier		12/04/23
1:500	Dwg Check	JB	12/04/23

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
DESIGN SECTION CH3960
WESTERN END OF SLIP SCARP

Discipline
GEOTECHNICAL

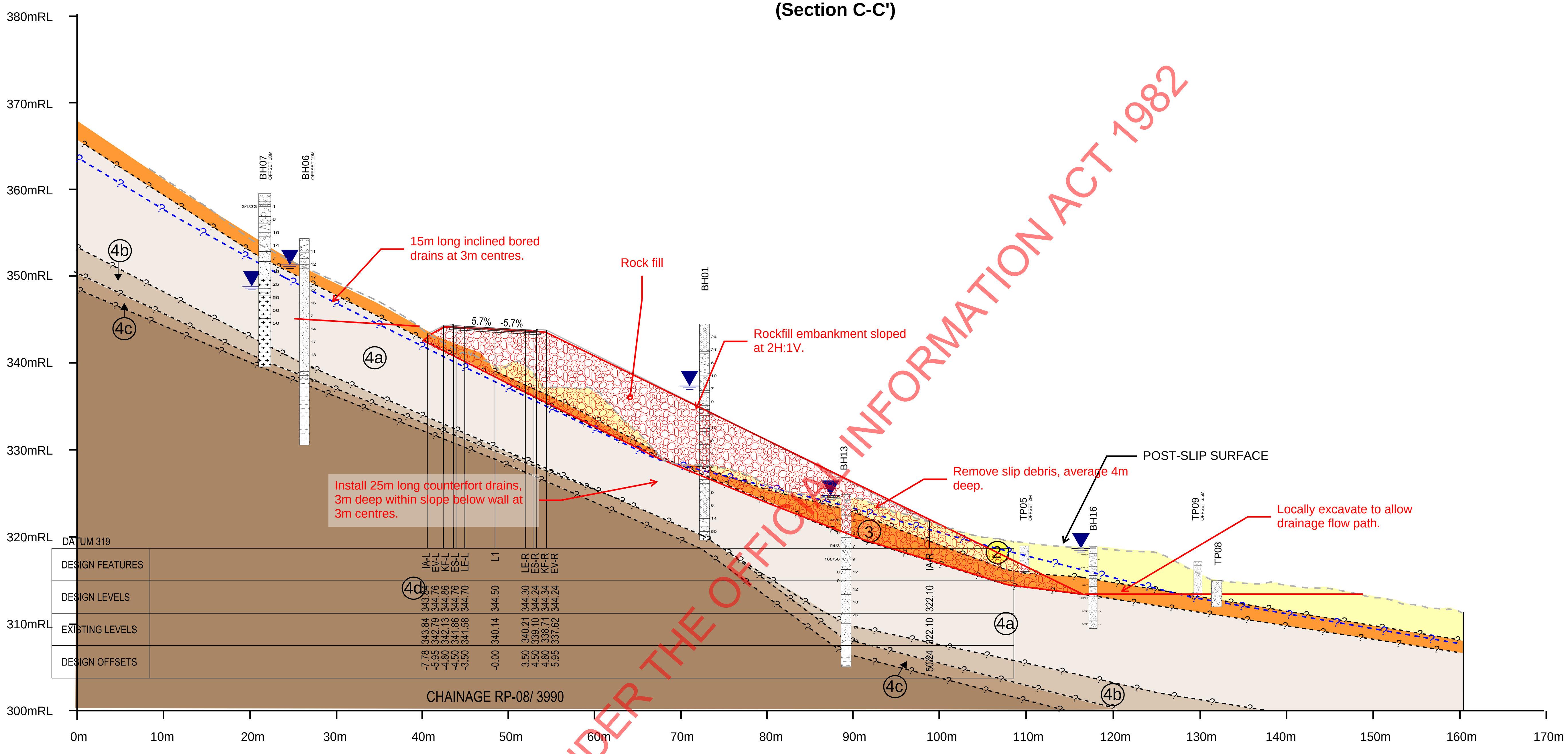
Drawing No.
3415236-GE-0002

Rev.
A

DO NOT SCALE

IF IN DOUBT ASK.

DESIGN SECTION CH3990
Option 10
(Section C-C')



	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	343.84	344.76	344.86	344.76	344.70	344.50	344.30	344.24	344.34	344.24
EXISTING LEVELS	343.84	342.79	342.13	341.86	341.58	340.14	340.21	339.10	338.71	337.62
DESIGN OFFSETS	-7.78	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95

Legend

1 [FILL]

2 [RECENT SLIP DEBRIS]

3 [HISTORICAL SLIP DEBRIS]

4a [COMPLETELY WEATHERED ANDESITE]

4b [HIGHLY WEATHERED ANDESITE]

4c [MODERATELY WEATHERED ANDESITE]

4d [SLIGHTLY WEATHERED ANDESITE]

- - - - Pre slip ground surface

- - - - Post slip ground surface

—?— Interpreted geological boundary

▼ Measured/dipped groundwater

—?— Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m

V 1:500
0 6.25 12.5 17.5 25m

Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND

BH #
Baseline offset
Depth at EOH

No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)	Design	ZL	12/04/23
	Drawn	ZL	12/04/23
Reduced Scale (A3)	Dsg Verifier		12/04/23
1:500	Dwg Check	JB	12/04/23

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
DESIGN SECTION 3990
MIDDLE OF SLIP SCARP

Discipline
GEOTECHNICAL

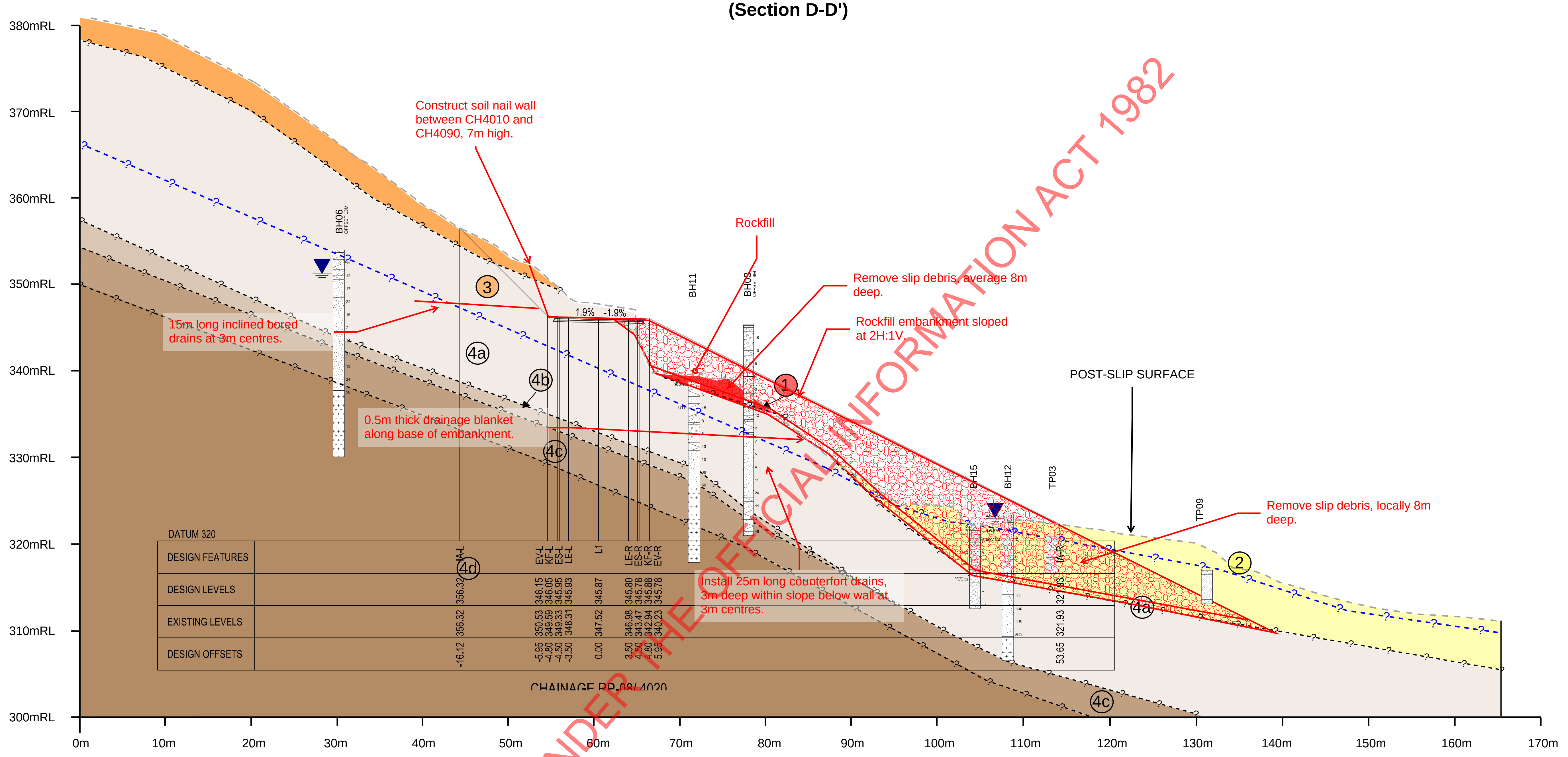
Drawing No.
3415236-GE-0003

Rev.
A

DO NOT SCALE

IF IN DOUBT ASK.

DESIGN SECTION CH4020
Option 10
(Section D-D')



DESIGN FEATURES	TA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	TA-R
DESIGN LEVELS	356.32	346.15	346.05	345.95	345.93	345.87	345.80	345.78	345.88	345.78	321.93
EXISTING LEVELS	356.32	350.53	349.59	349.33	348.31	347.52	346.98	343.47	342.94	340.23	321.93
DESIGN OFFSETS	-16.12	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	53.65

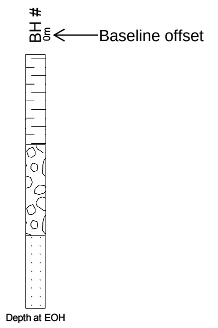
Legend

- ① [FILL]
- ② [RECENT SLIP DEPOSITS]
- ③ [HISTORICAL SLIP DEPOSITS]
- (4a) [COMPLETELY WEATHERED ANDESITE]
- (4b) [HIGHLY WEATHERED ANDESITE]
- (4c) [MODERATELY WEATHERED ANDESITE]
- (4d) [SLIGHTLY WEATHERED ANDESITE]

- - - - Pre slip ground surface
- - - - Post slip ground surface
— ? — Interpreted geological boundary
▼ Measured/dipped groundwater
— ? — Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m
V 1:500
0 6.25 12.5 17.5 25m
Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND



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No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)	Design	ZL	12/04/23	Approved For Construction*
	Drawn	ZL	12/04/23	
Reduced Scale (A3) 1:500	Dsg Verifier		12/04/23	
	Dwg Check	JB	12/04/23	Date
	* Refer to Revision 1 for Original Signature			

Client:
WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project:
SH25A TARAPAHI SLIP

Title:
DESIGN SECTION CH4020
EASTERN END OF SLIP SCARP

Discipline
GEOTECHNICAL

Drawing No.
3415236-GE-0004

Rev.
A

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IF IN DOUBT ASK.

Option 10a - Rockfill Slope

Date 30-Apr-23

Extent

Fill Start Chainage	3915		
Fill end Chainage	4045		
Rockfill Slope Extent	130	m	

Footprint

Footprint of rockfill	10,000	m2	
Allowance for toe below debris (10m wide)	1300	m2	
Total footprint	11,300	m2	

Excavation Estimate

Average Excavation Depth (m)	3	m	
Allowance for Benching	1	m	
Excavation Depth	4	m	
Estimated excavation cut to waste volume	45200	m3	
Adopted Excation to Waste	**46,000**	**m3**	

Rock Fill and Excavation Check using typial sections

	Extent m	Rockfill m2/m	Excavation m2/m		
Section B	40	470	230		Areas estimated from typical sections
Section C	40	490	400		
Section D	50	510	430		
Volumes		63900	46700	m3	

Rock Fill

Geotextile on base	11,300	m2	
Rock Fill (100mm to 400mm dia rock)			
Backfill excavated material	40680	m3	backfill the excavated materials
Rock fill Above existing ground	22290	m3	
Estimated Rock Fill	62970	m3	includes drainage layer
Estimated Rockfill from Typical Sections	63900	m3	
Adopted Value of Rock Fill	**64000**	**m3**	Adopt for costing

Pavement

New pavement length - wall	130	m	New pavement, also needs swale to carry stormwater to culvert
New pavement length - east	50	m	New pavement/realignment
New pavement West	50	m	New pavement/realignment

Cut Earthworks at Eastern Abutment

Extent	80	m	CH4010 to CH4090
Cut Volume	12000	m3	Trim back existing cut, tie into existing cut.

https://becagroup.sharepoint.com/sites/project-74652/Shared Documents/Job Delivery/Technical - Working Files/Geotech Design/Option 10a/Option 10 a Quantities.xlsx

Allowance for soil nailing face area	560	m2	CH4010 to CH4090, 7m high, 200mm thick reinforced shotcrete facing needed
Number of Class 1 soil nails	280		One 8m long nail per 2m2

Allow for inclined bored drains in slope base. This is covered in the inclined bored drain quantities

<u>Counterfort drains in lower slope</u>

Extent	42	m	Region of Section DD (40m extent)
Spacing	3	m	
Number of counterfort drains	14		
Length of each drain	25	m	
depth	3	m	
width	0.4	m	
Excavation volume	420	m3	
Backfill volume	420	m3	

<u>Inclined bored drains</u>

			in slope above the wall
extent	180	m	130m wall plus 50m east
spacing	3	m	
number	60		
length per inclined drain	18	m	pick up unit 4a thickness
total length of drains installed	1080	m	

<u>Culvert (allowance only)</u>

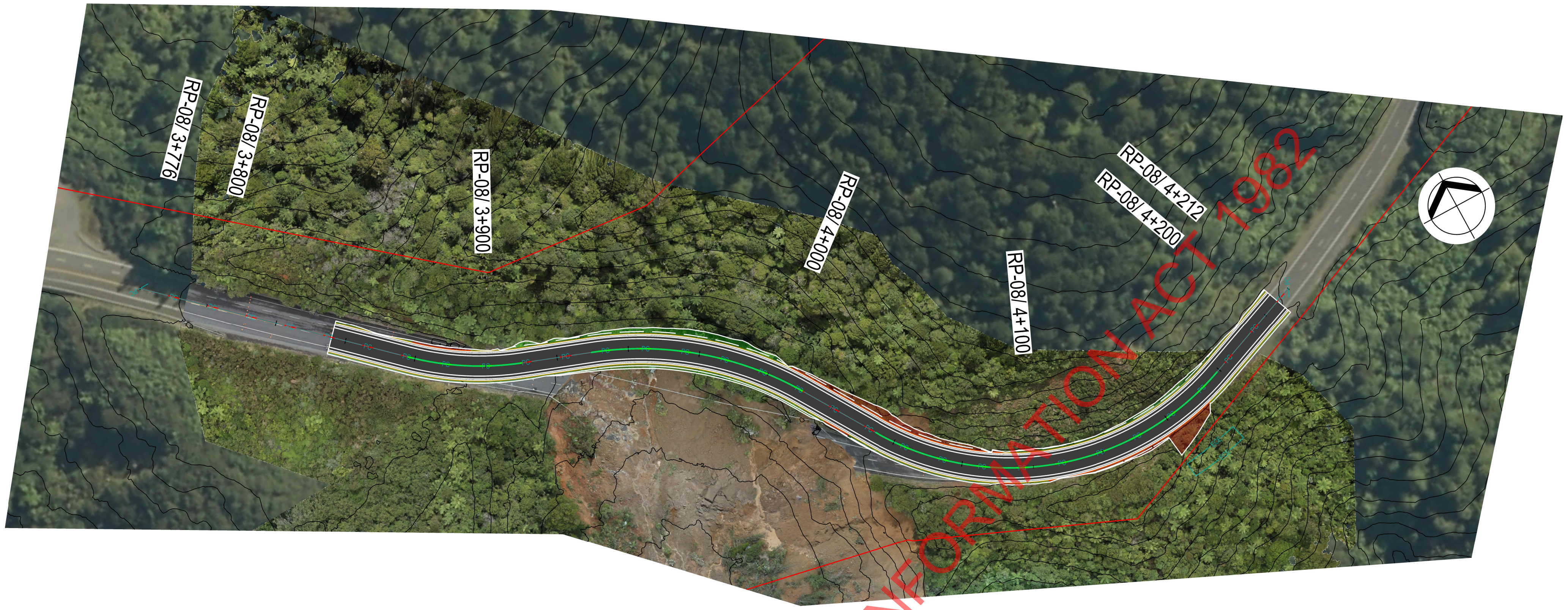
new culvert inlet	1	no.	
New 750mm diameter culvert	30	m	No design completed diameter bigger that the existing culvert
Discharge headwall	1	no.	
rock lined channel	60	m	carry stormwater in channel to property boundary
			Culvert location and depth not designed.

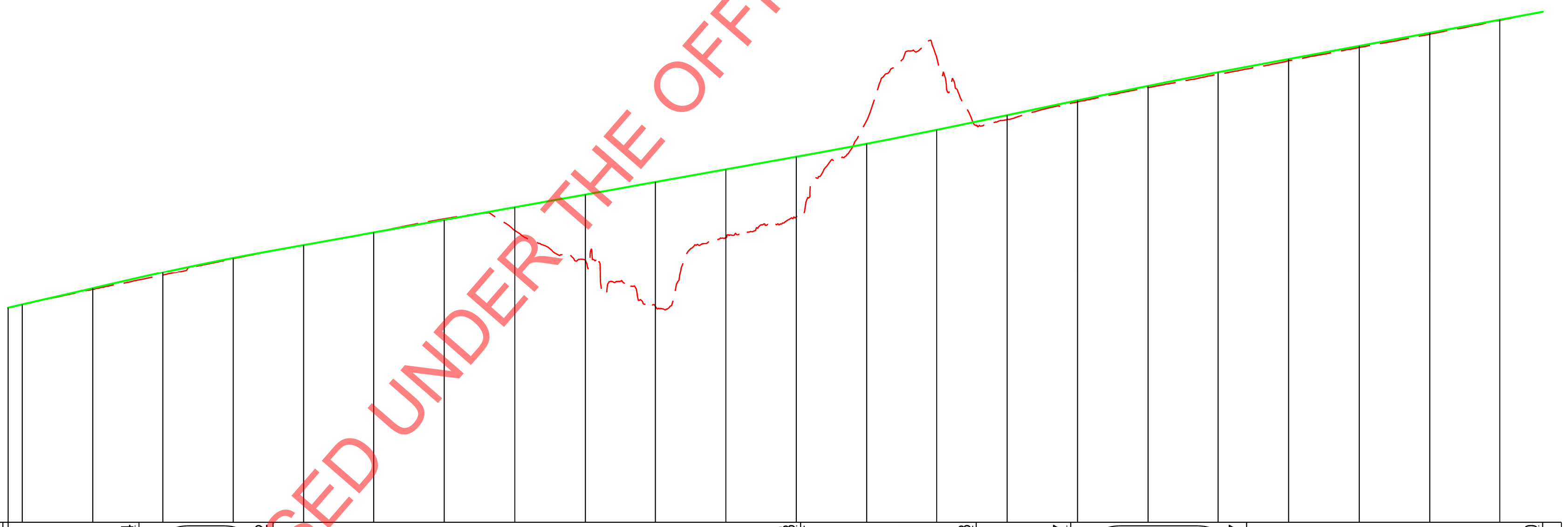
I

Appendix I – Option 10c Design Section, Sketches and Quantities

LEGEND

🟥	ROAD BOUNDARY
🟥	CUT
🟩	FILL





LEGEND

— —	EXISTING GROUND LEVEL
——	DESIGN LEVEL

DATUM RL 319

VERTICAL ALIGNMENT
G=5.74% L = 37.24 — 3813.24
K = -30 L = 38.08 — 3851.32
G=4.47% L = 149.90 — 4001.23
K = 64 L = 50.00 — 4051.23
G=5.24% L = 26.84 — 4078.07
K = -83 L = 50.00 — 4128.07
G=4.64% L = 84.12 — 4212.20

HORIZONTAL ALIGNMENT
L = 96.65 — 3872.65
R = 100.00 L = 40.15 — 3912.80
L = 24.4 — 3937.22
R = 115.00 L = 76.40 — 4013.62
L = 29.23 — 4042.85
R = 95.00 L = 131.21 — 4174.06
L = 38.13 — 4212.20

CHAINAGE	CUT / FILL	DESIGN LEVELS	EXISTING LEVELS
3776	0.00	334.23	334.23
3780	-0.02	334.46	334.43
3800	-0.09	335.60	335.52
3820	-0.20	336.74	336.54
3840	-0.05	337.78	337.73
3860	0.01	338.69	338.70
3880	0.00	339.59	339.59
3900	0.07	340.48	340.55
3920	-1.65	341.37	339.73
3940	-4.65	342.27	337.62
3960	-8.84	343.16	334.32
3980	-4.83	344.05	339.22
4000	-4.25	344.95	340.69
4020	1.65	345.87	347.52
4040	5.11	346.85	351.96
4060	-0.32	347.89	347.57
4080	-0.12	348.94	348.82
4100	-0.12	349.96	349.84
4120	-0.16	350.93	350.77
4140	-0.12	351.86	351.74
4160	-0.11	352.79	352.68
4180	-0.10	353.72	353.62
4200	-0.05	354.65	354.60
4216	0.00	0.00	0.00

FOR INFORMATION
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No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR INFORMATION	RJB			12.04.23

Original Scale (A1) AS SHOWN
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

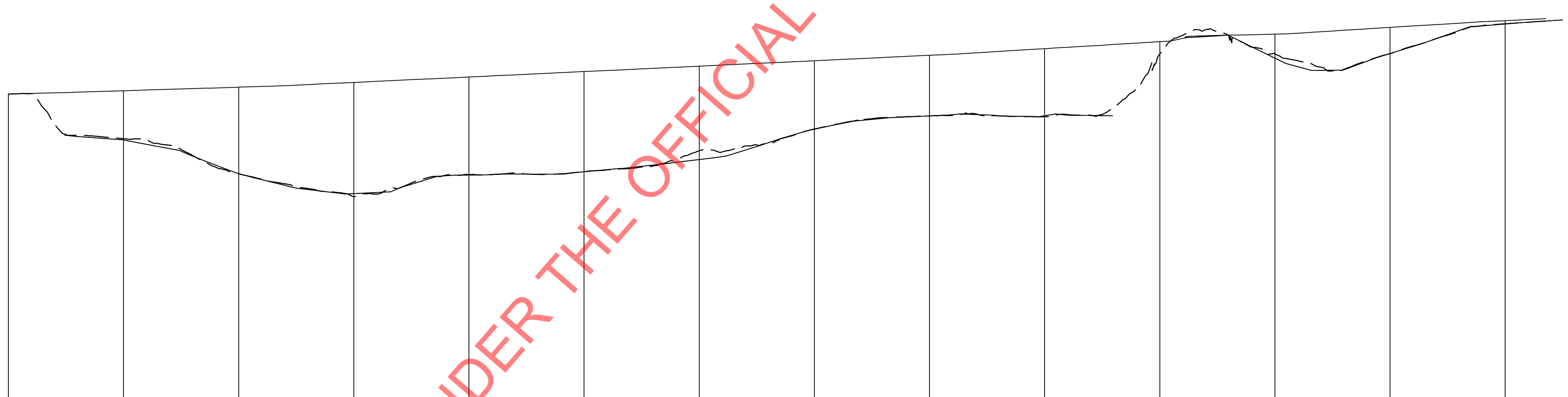
Title: PLAN & LONGITUDINAL SECTION
OPTION 10C NEW BYPASS

Discipline: CIVIL ENGINEERING

Drawing No.: 3413292 - SK10C

Rev.: A

Drawing Plotted: 14/04/2023 4:29:03 PM



DATUM RL 315

TOP OF WALL	341.48	341.77	342.08	342.49	342.96	343.43	343.91	344.38	344.85	345.43	346.03	346.68	347.28	347.86
BASE OF WALL	337.91	337.48	334.57	332.83	334.44	334.72	335.79	338.42	339.59	339.59	346.43	344.60	345.01	347.58
HEIGHT OF WALL	3.57	4.28	7.51	9.66	8.52	8.71	8.11	5.95	5.26	5.83	-0.39	2.09	2.27	0.28
EXISTING LEVELS	341.48	337.61	334.56	332.56	334.49	334.74	336.56	338.44	339.57	339.52	344.96	344.97	345.00	347.59
CHAINAGE	3920	3930	3940	3950	3960	3970	3980	3990	4000	4010	4020	4030	4040	4050

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date

Original Scale (A1)
Reduced Scale (A3)
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: PLAN & LONGITUDINAL SECTION

SHEET 1 OF 1

Discipline

Drawing No. 3413292 - PROFILE 1

Rev.

Document No. ...\Plan and Profile\PP-Seed.dgn - WTop - Profile 1 [Sheet]

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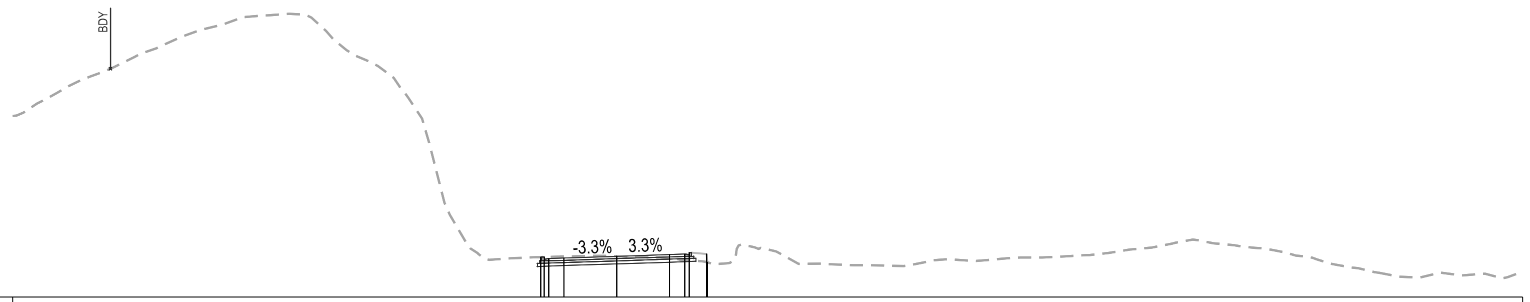
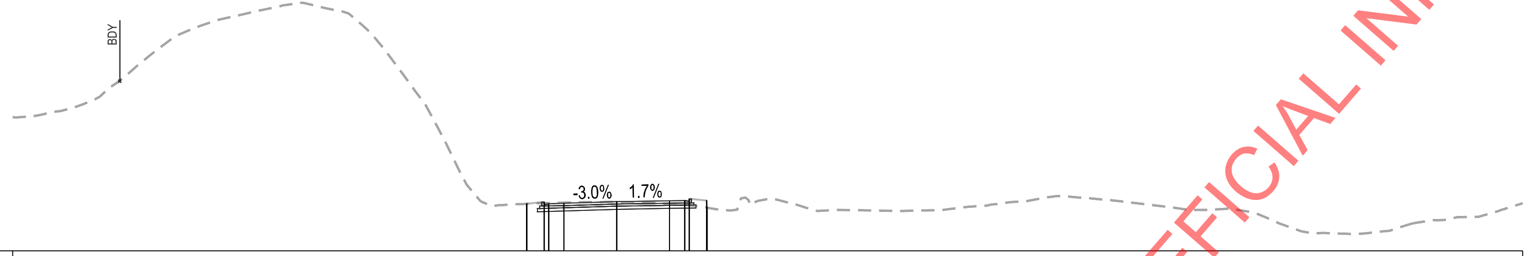


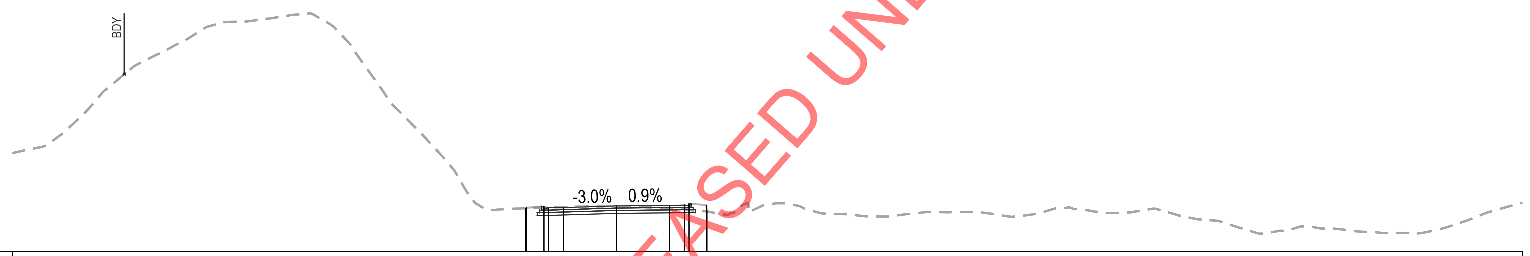
DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	338.64	338.65	338.55	338.58	338.69	338.81	338.84	338.94	338.84	338.29
EXISTING LEVELS	338.64	338.65	338.66	338.69	338.70	338.58	338.45	338.43	338.30	338.29
DESIGN OFFSETS	-5.03	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.01

CHAINAGE RP-08/ 3860



DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	338.11	338.11	338.21	338.11	338.14	338.25	338.30	338.32	338.42	338.32	337.86
EXISTING LEVELS	338.11	338.11	338.16	338.16	338.18	338.23	338.10	338.04	338.01	337.87	337.86
DESIGN OFFSETS	-5.96	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.00

CHAINAGE RP-08/ 3850



DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	337.85	337.88	337.98	337.88	337.91	338.02	338.05	338.05	338.15	338.05	337.65
EXISTING LEVELS	337.85	337.85	337.90	337.91	337.93	337.98	337.85	337.79	337.75	337.65	337.65
DESIGN OFFSETS	-6.01	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	5.99

CHAINAGE RP-08/ 3845

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

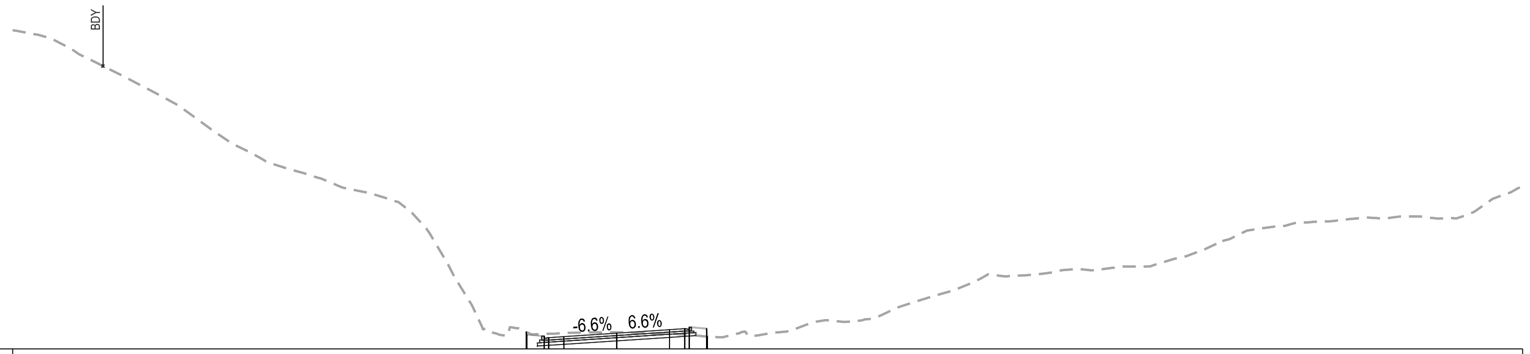
Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 3845 TO RP-08/ 3860

Discipline CIVIL ENGINEERING
Drawing No. 3413292 - CA-370
Rev. A

FOR INFORMATION
NOT FOR CONSTRUCTION

DO NOT SCALE

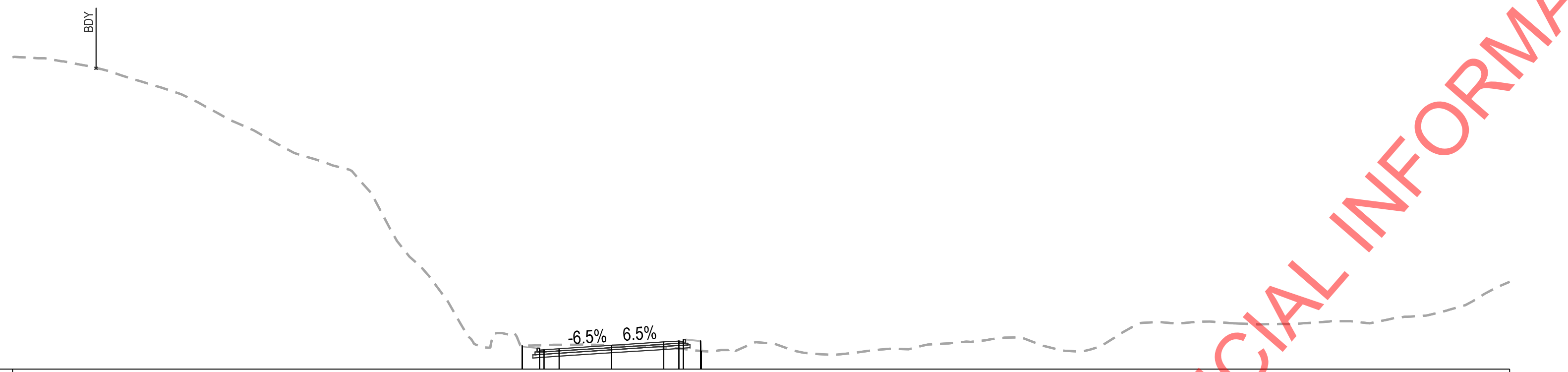
IF IN DOUBT ASK.



DATUM 339

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	340.12	339.94	339.84	339.74	339.80	340.03	340.26	340.33	340.43	340.33	339.80
EXISTING LEVELS	340.12	340.10	339.99	340.00	340.04	340.09	340.00	339.93	339.92	339.81	339.80
DESIGN OFFSETS	-5.98	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.00

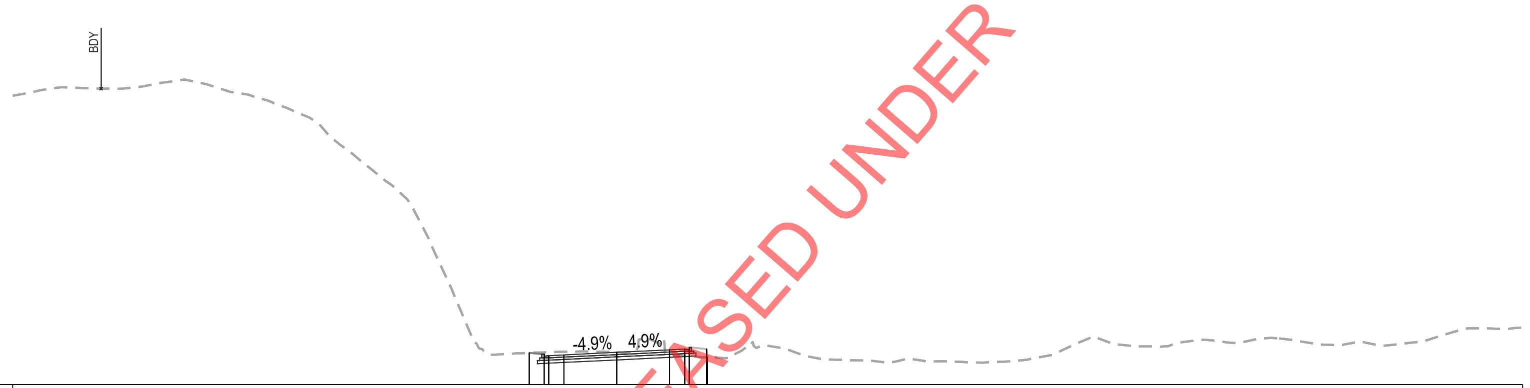
CHAINAGE RP-08/ 3890



DATUM 338

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	339.56	339.50	339.40	339.30	339.36	339.59	339.81	339.88	339.98	339.88	339.21
EXISTING LEVELS	339.56	339.56	339.59	339.60	339.63	339.59	339.44	339.37	339.34	339.22	339.21
DESIGN OFFSETS	-5.96	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.02

CHAINAGE RP-08/ 3880



DATUM 337

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	339.10	339.02	338.92	338.97	339.14	339.31	339.36	339.46	339.36	338.83
EXISTING LEVELS	339.10	339.14	339.15	339.18	339.15	339.00	338.88	338.85	338.82	338.83
DESIGN OFFSETS	-5.79	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.00

CHAINAGE RP-08/ 3870

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250	Design			Approved For Construction*
	Drawn			
Reduced Scale (A3)	Dsg Verifier			
	Dwg Check			Date
HALF SCALE	* Refer to Revision 1 for Original Signature			

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 3870 TO RP-08/ 3890

FOR INFORMATION
NOT FOR CONSTRUCTION

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-371

Rev. A

DO NOT SCALE

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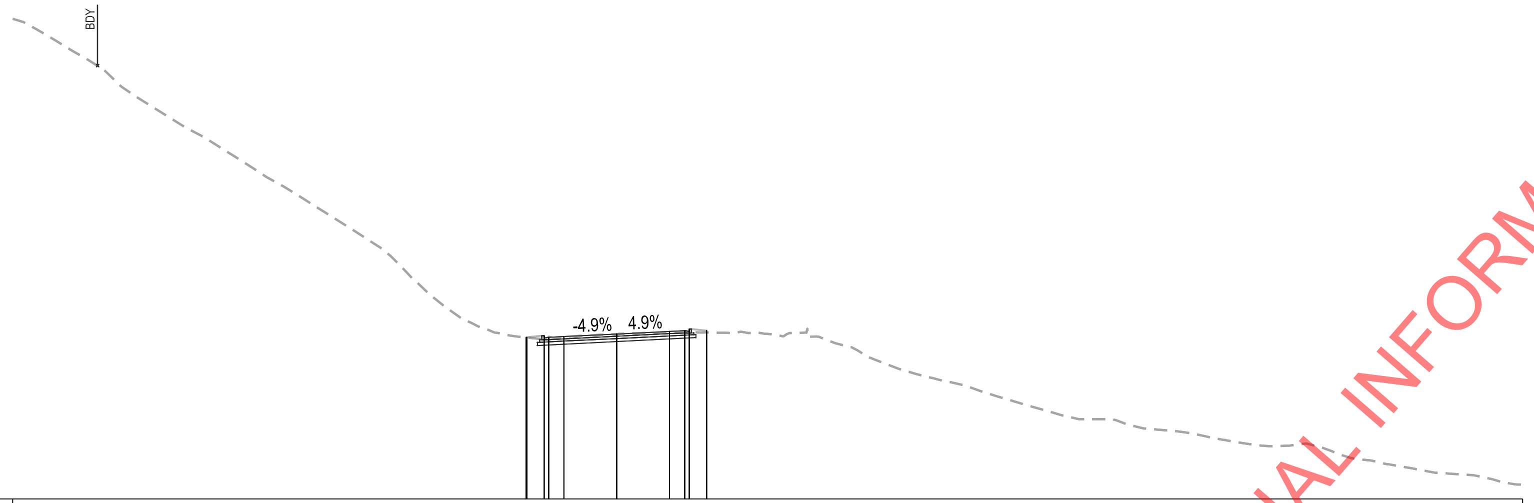
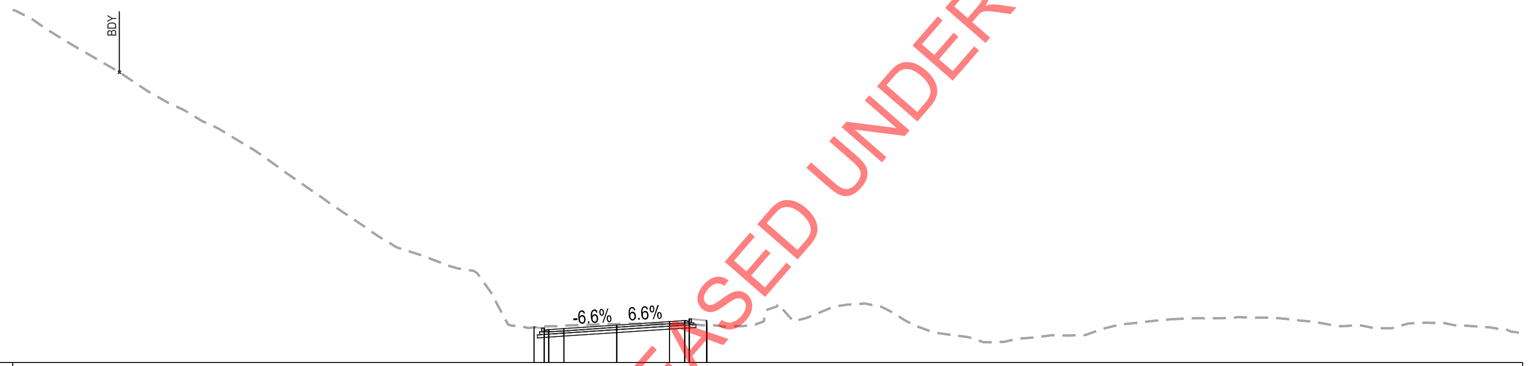


DATUM 330

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	340.68	340.71	340.81	340.71	340.75	340.93	341.10	341.15	341.25	341.15	341.02
EXISTING LEVELS	340.68	340.68	340.61	340.73	340.72	340.92	341.04	341.04	341.04	341.02	341.02
DESIGN OFFSETS	-6.00	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	5.96

CHAINAGE RP-08/ 3910



DATUM 338

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	340.33	340.28	340.18	340.25	340.48	340.71	340.78	340.88	340.78	340.46
EXISTING LEVELS	340.33	340.39	340.40	340.45	340.55	340.53	340.51	340.50	340.46	340.46
DESIGN OFFSETS	-5.47	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	5.98

CHAINAGE RP-08/ 3900

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design		
Drawn		
Dsg Verifier		
Dwg Check		

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 3900 TO RP-08/ 3910

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-372

Rev. A

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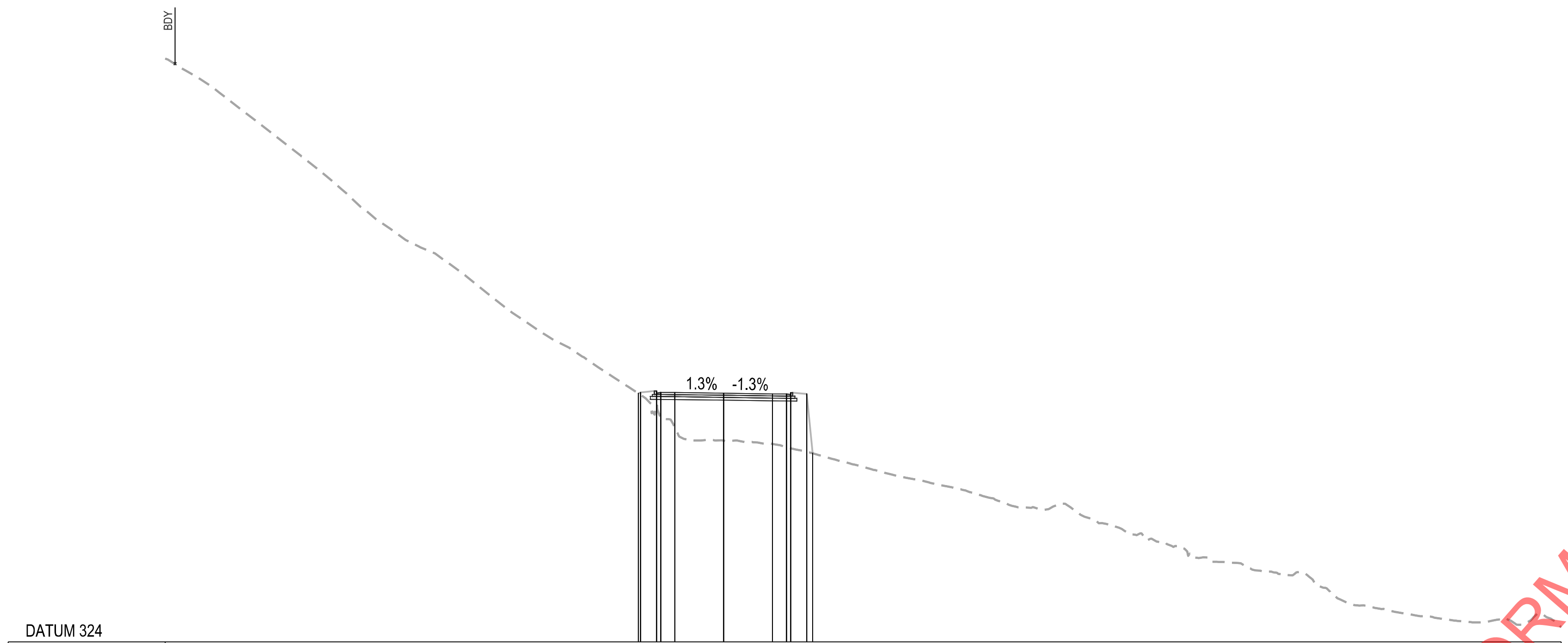
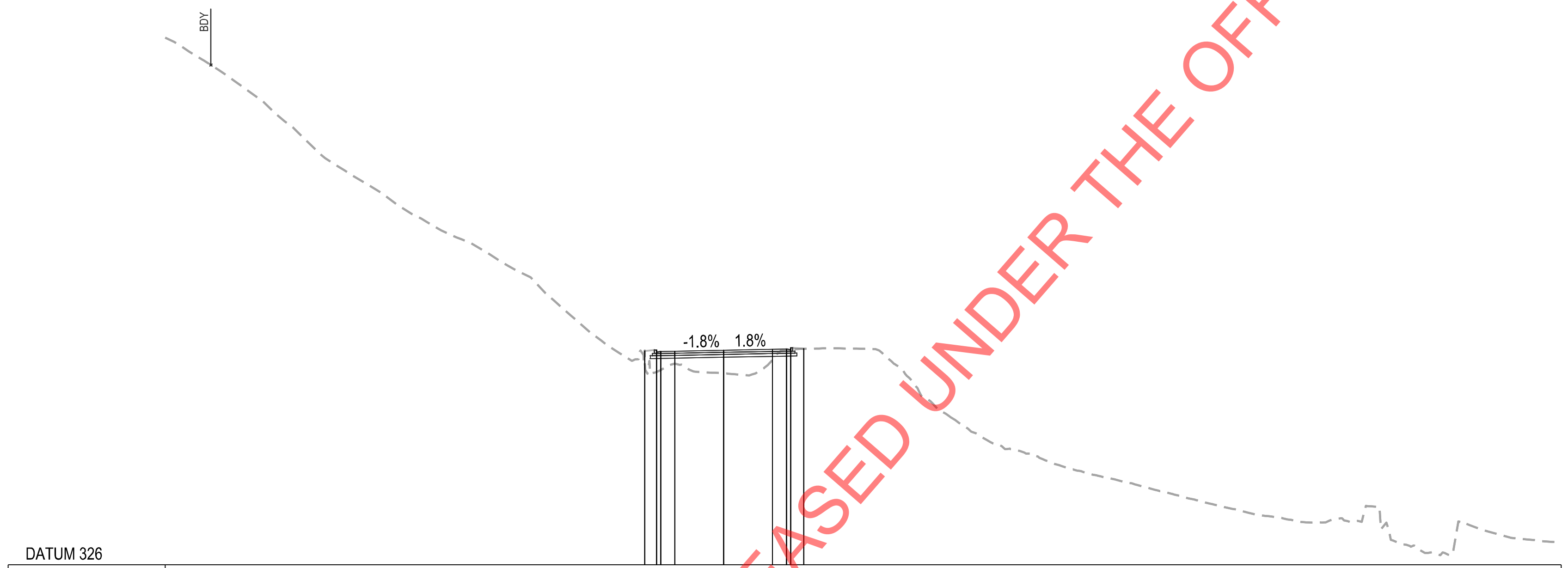


DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	341.80	341.88	341.98	341.88	341.86	341.82	341.78	341.76	341.86	341.76	337.51
EXISTING LEVELS	341.80	341.70	340.99	340.01	339.38	338.42	338.18	337.95	337.88	337.61	337.51
DESIGN OFFSETS	-6.10	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.38

CHAINAGE RP-08/ 3930



DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	341.32	341.39	341.29	341.31	341.37	341.44	341.46	341.56	341.48
EXISTING LEVELS	341.32	339.82	339.96	340.42	339.73	340.71	341.43	341.45	341.48
DESIGN OFFSETS	-5.65	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.74

CHAINAGE RP-08/ 3920

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

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Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 3920 TO RP-08/ 3930

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-373

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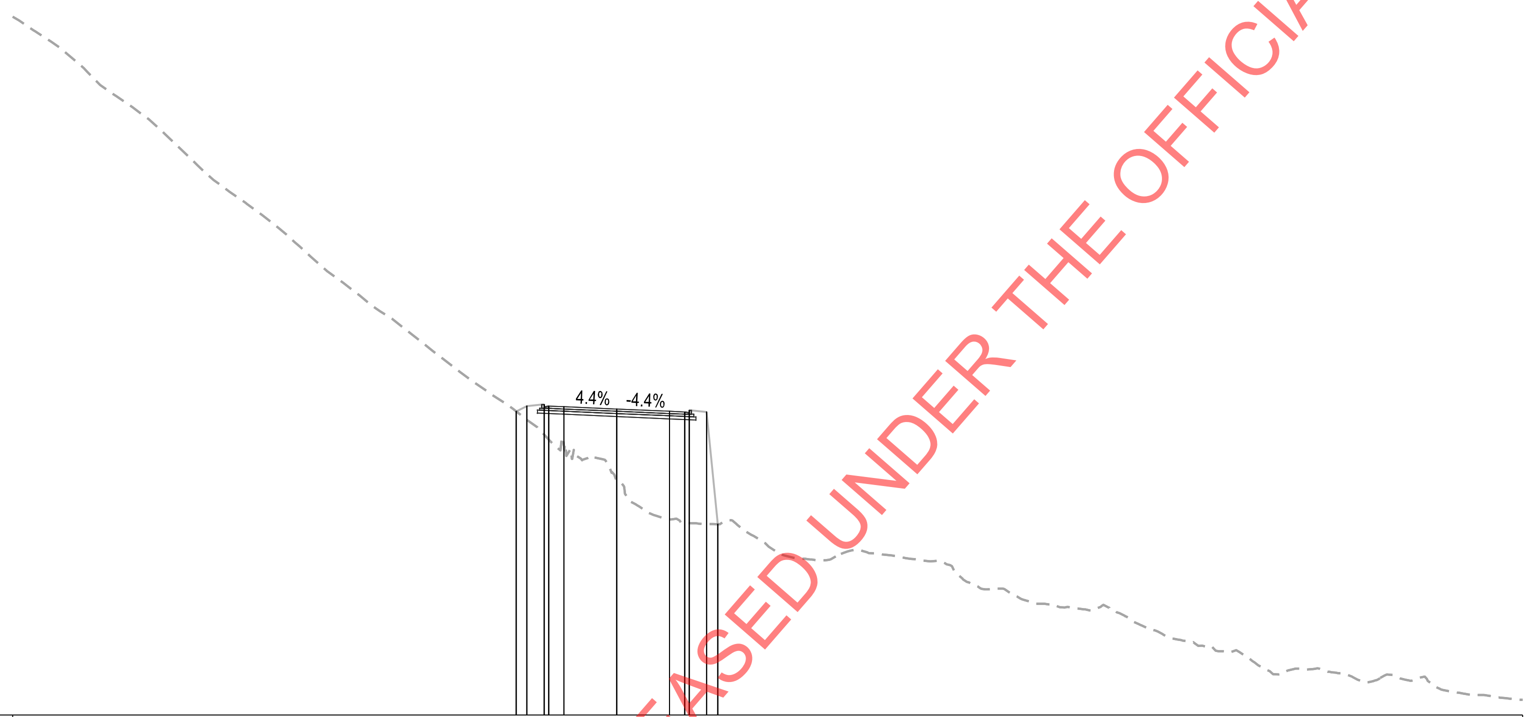


DATUM 322

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	342.11	342.46	342.56	342.46	342.42	342.27	342.11	342.07	342.17	342.07	334.64
EXISTING LEVELS	342.11	341.55	340.56	340.24	339.94	337.63	334.97	334.72	334.72	334.64	334.64
DESIGN OFFSETS	-6.66	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.69

CHAINAGE RP-08/ 3940

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

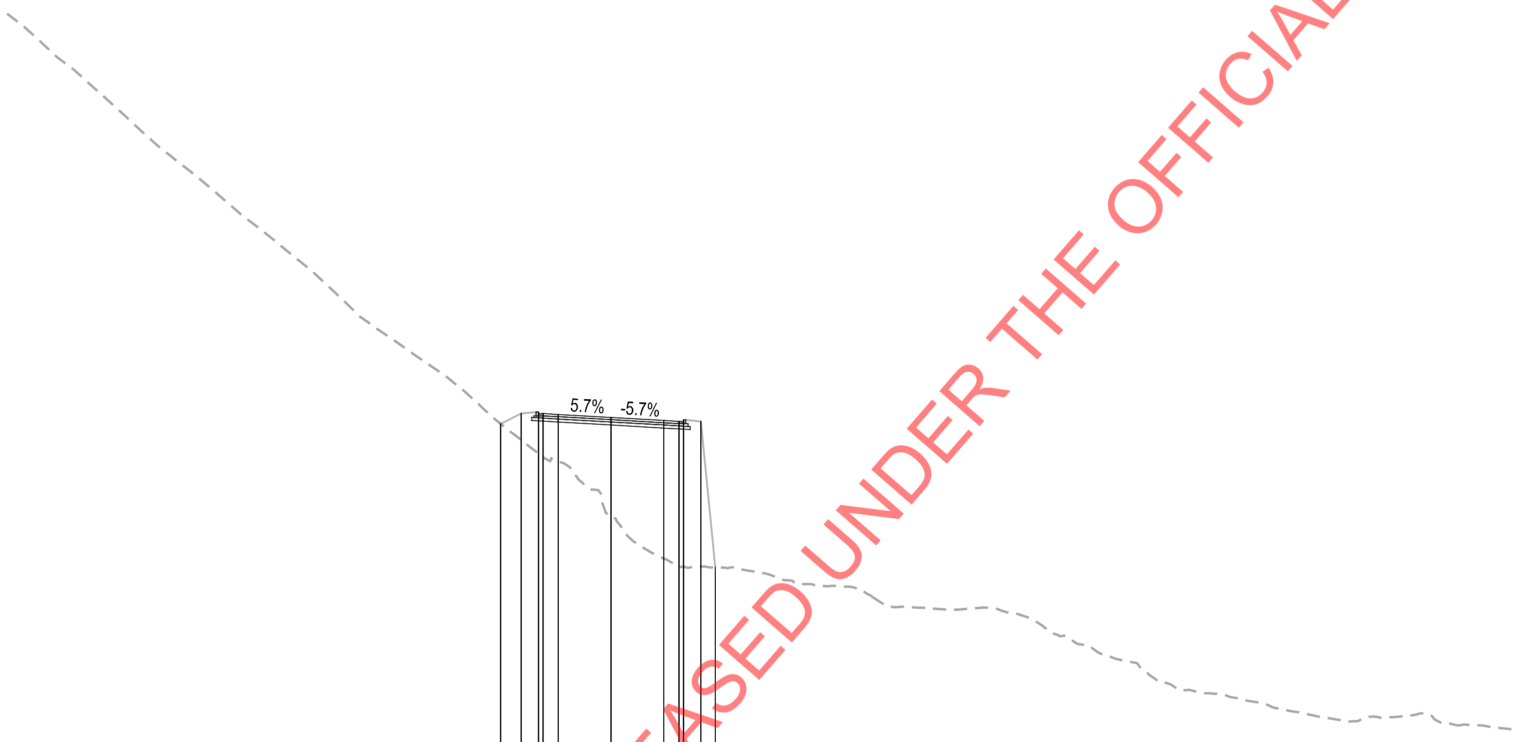
Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 3940 TO RP-08/ 3940

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-374

Rev. A



DATUM 321

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	342.29	342.97	343.07	342.97	342.91	342.71	342.51	342.45	342.55	342.45	332.80
EXISTING LEVELS	342.29	341.23	340.34	340.11	339.81	336.08	333.37	332.80	332.85	332.84	332.80
DESIGN OFFSETS	-7.31	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	6.92

CHAINAGE RP-08/ 3950

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 3950 TO RP-08/ 3950

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-375

Rev. A

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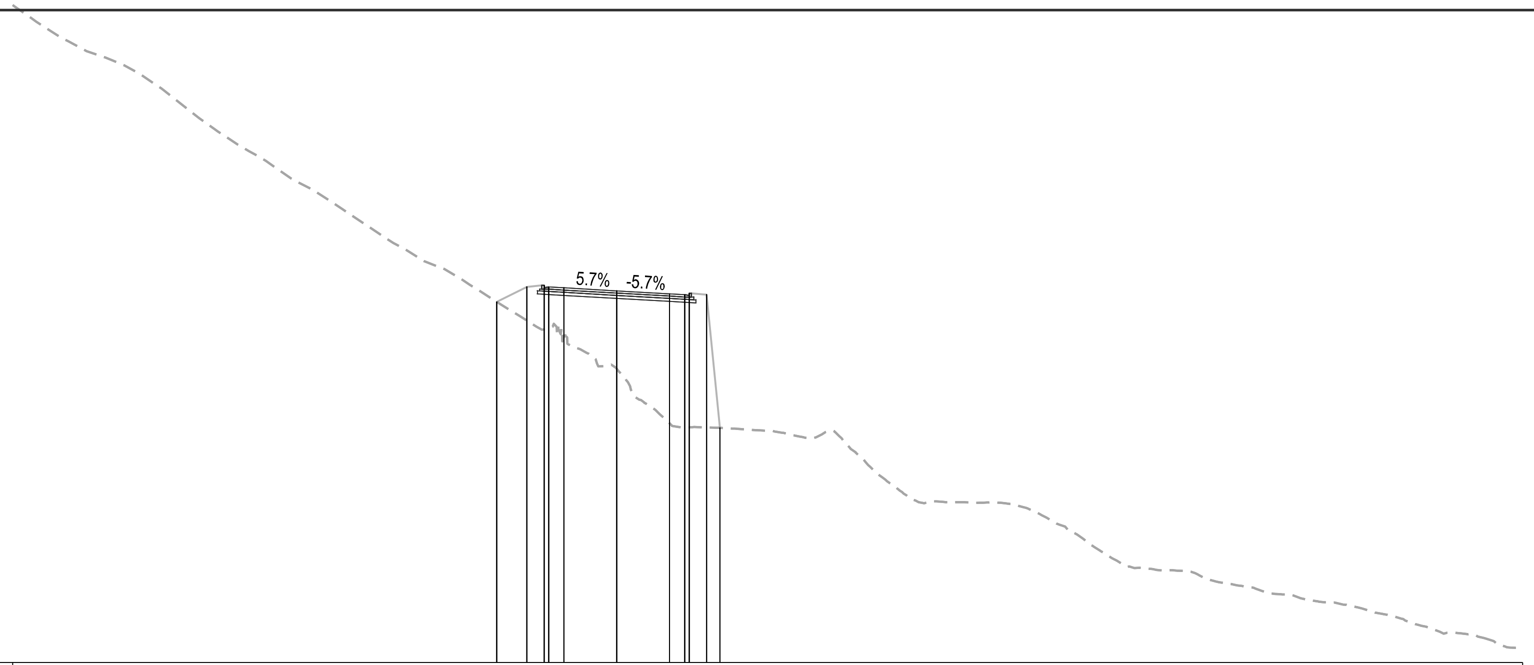
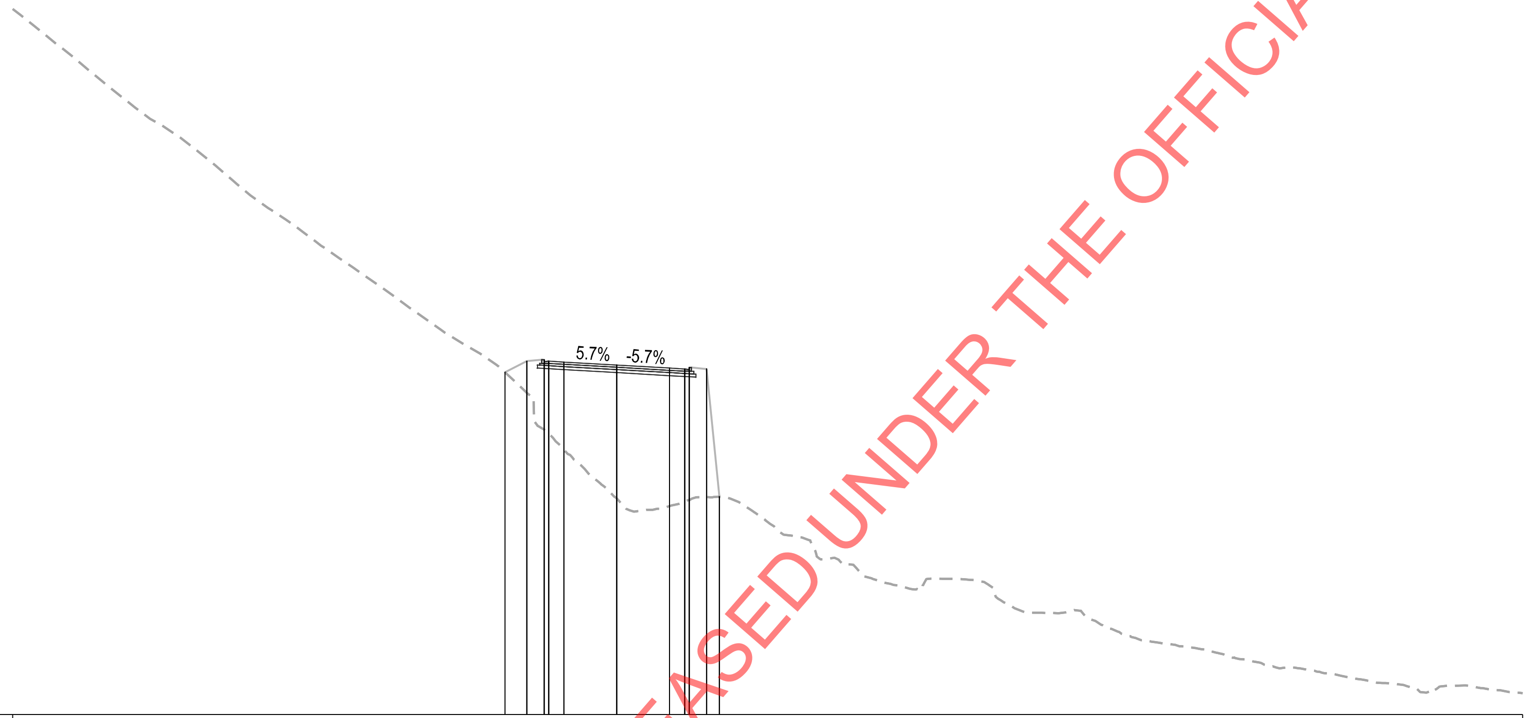


DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	342.87	343.87	343.97	343.87	343.81	343.61	343.41	343.35	343.45	343.35	334.53
EXISTING LEVELS	342.87	341.64	341.06	341.14	340.60	338.45	334.83	334.57	334.58	334.55	334.53
DESIGN OFFSETS	-7.94	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.83

CHAINAGE RP-08/ 3970



DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	342.69	343.42	343.52	343.42	343.36	343.16	342.96	342.90	343.00	342.90	334.43
EXISTING LEVELS	342.69	341.33	338.87	338.60	337.55	334.34	333.81	334.13	334.22	334.42	334.43
DESIGN OFFSETS	-7.40	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.80

CHAINAGE RP-08/ 3960

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 3960 TO RP-08/ 3970

Discipline CIVIL ENGINEERING
Drawing No. 3413292 - CA-376
Rev. A

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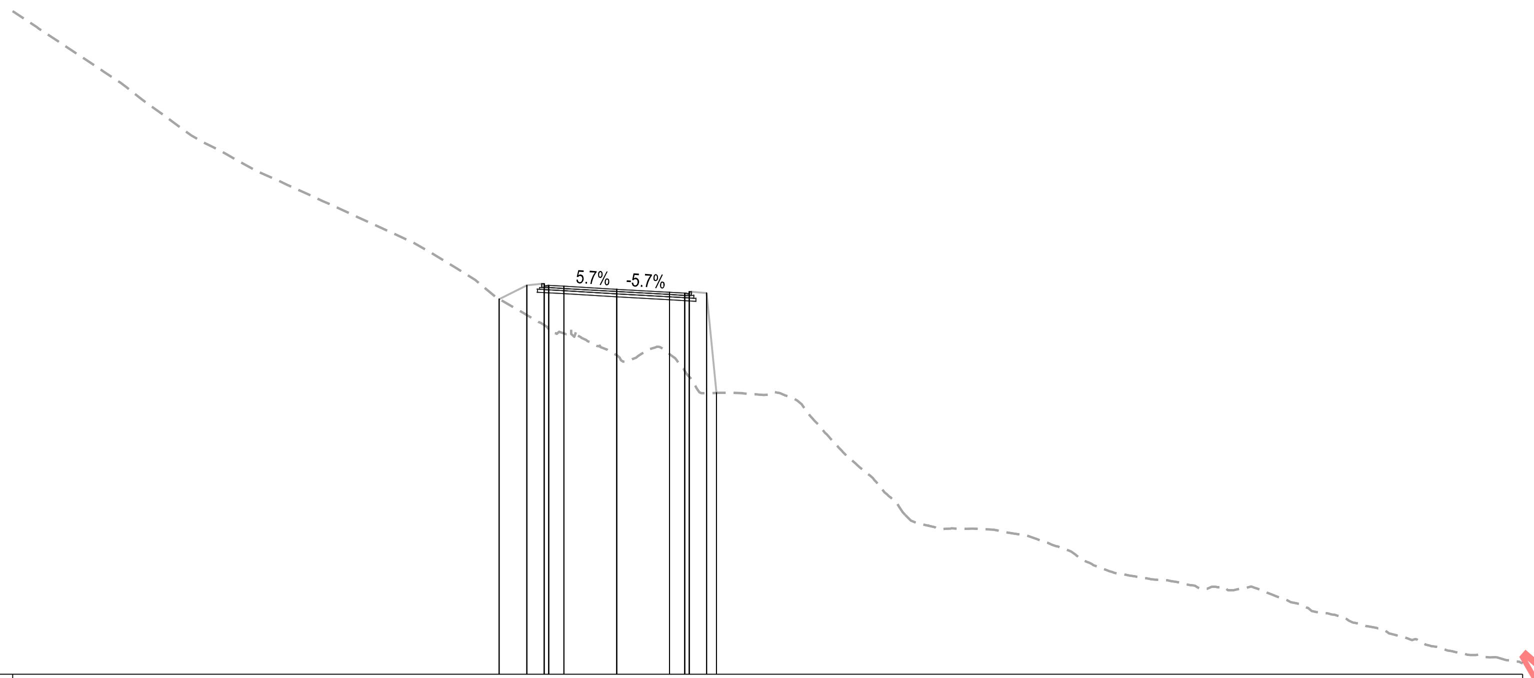
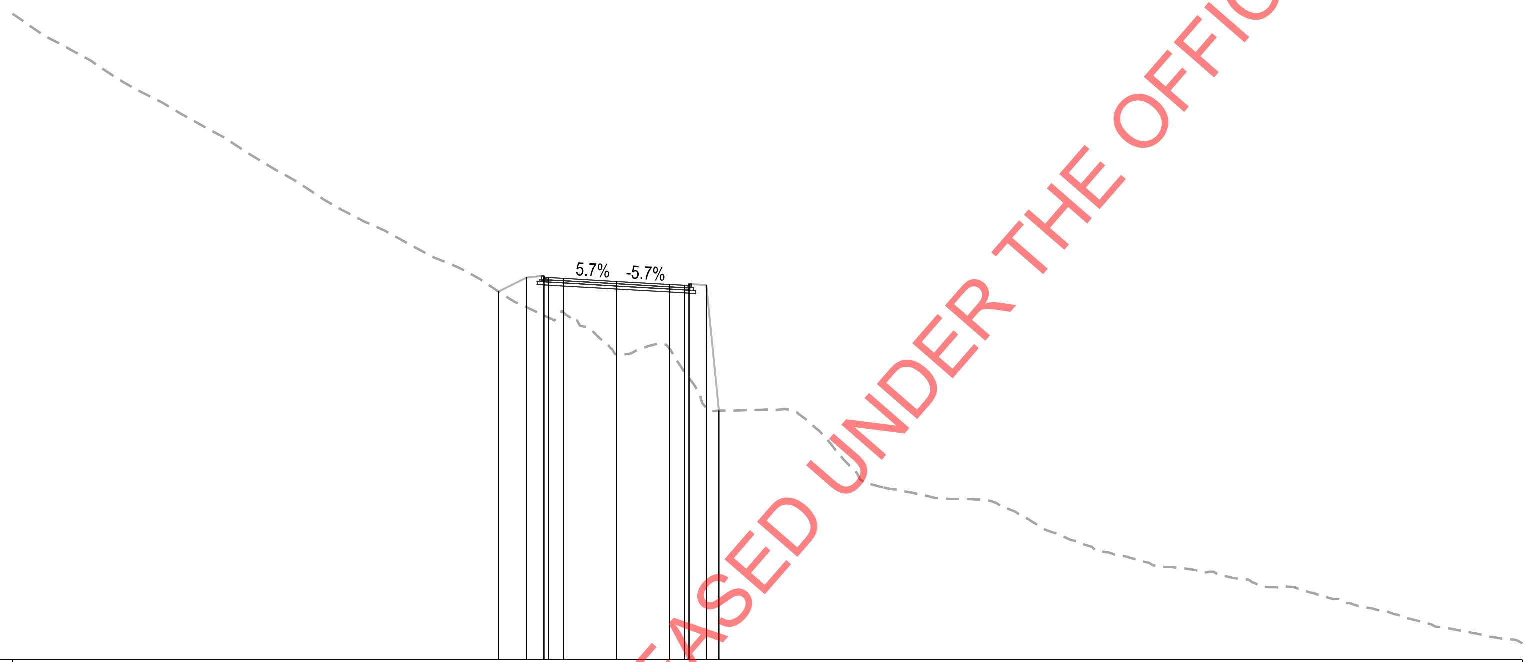


DATUM 319

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	343.84	344.76	344.86	344.76	344.70	344.50	344.30	344.24	344.34	344.24	337.64
EXISTING LEVELS	343.84	342.79	342.13	341.86	341.58	340.14	340.21	339.10	338.71	337.62	337.64
DESIGN OFFSETS	-7.78	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	6.61

CHAINAGE RP-08/ 3990



DATUM 319

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	343.38	344.31	344.41	344.31	344.25	344.05	343.85	343.80	343.90	343.80	335.50
EXISTING LEVELS	343.38	342.34	341.81	341.67	342.00	339.23	339.62	338.06	337.68	335.67	335.50
DESIGN OFFSETS	-7.81	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.78

CHAINAGE RP-08/ 3980

FOR INFORMATION
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No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design			Approved For Construction*
Drawn			
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

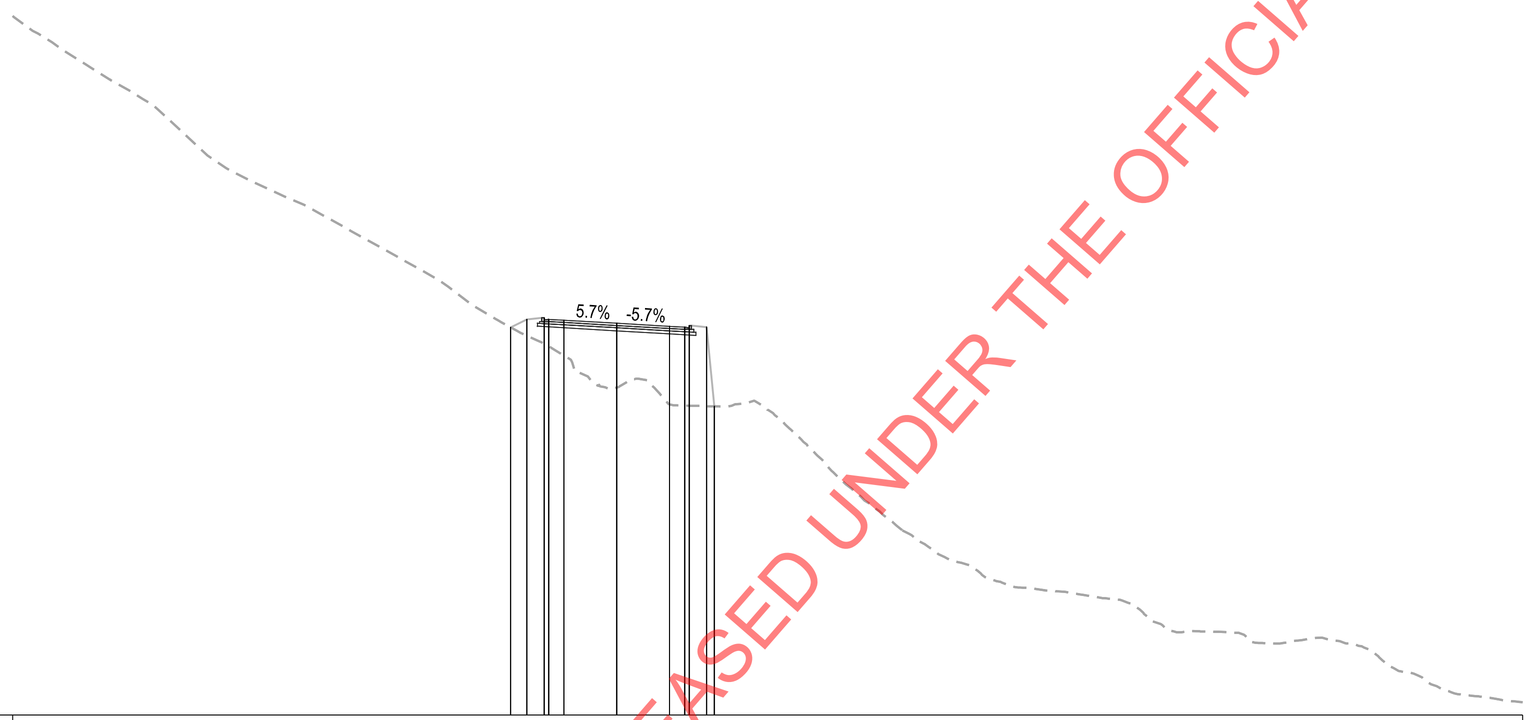
Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 3980 TO RP-08/ 3990

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-377

Rev. A

Drawing Plotted: 1/05/2023 10:19:59 AM



DATUM 319

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	344.67	345.21	345.31	345.21	345.15	344.95	344.75	344.69	344.79	344.69	339.44
EXISTING LEVELS	344.67	344.12	343.61	343.43	342.82	340.69	339.59	339.50	339.48	339.45	339.44
DESIGN OFFSETS	-7.02	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	6.47

CHAINAGE RP-08/ 4000

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

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Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4000 TO RP-08/ 4000

Discipline CIVIL ENGINEERING

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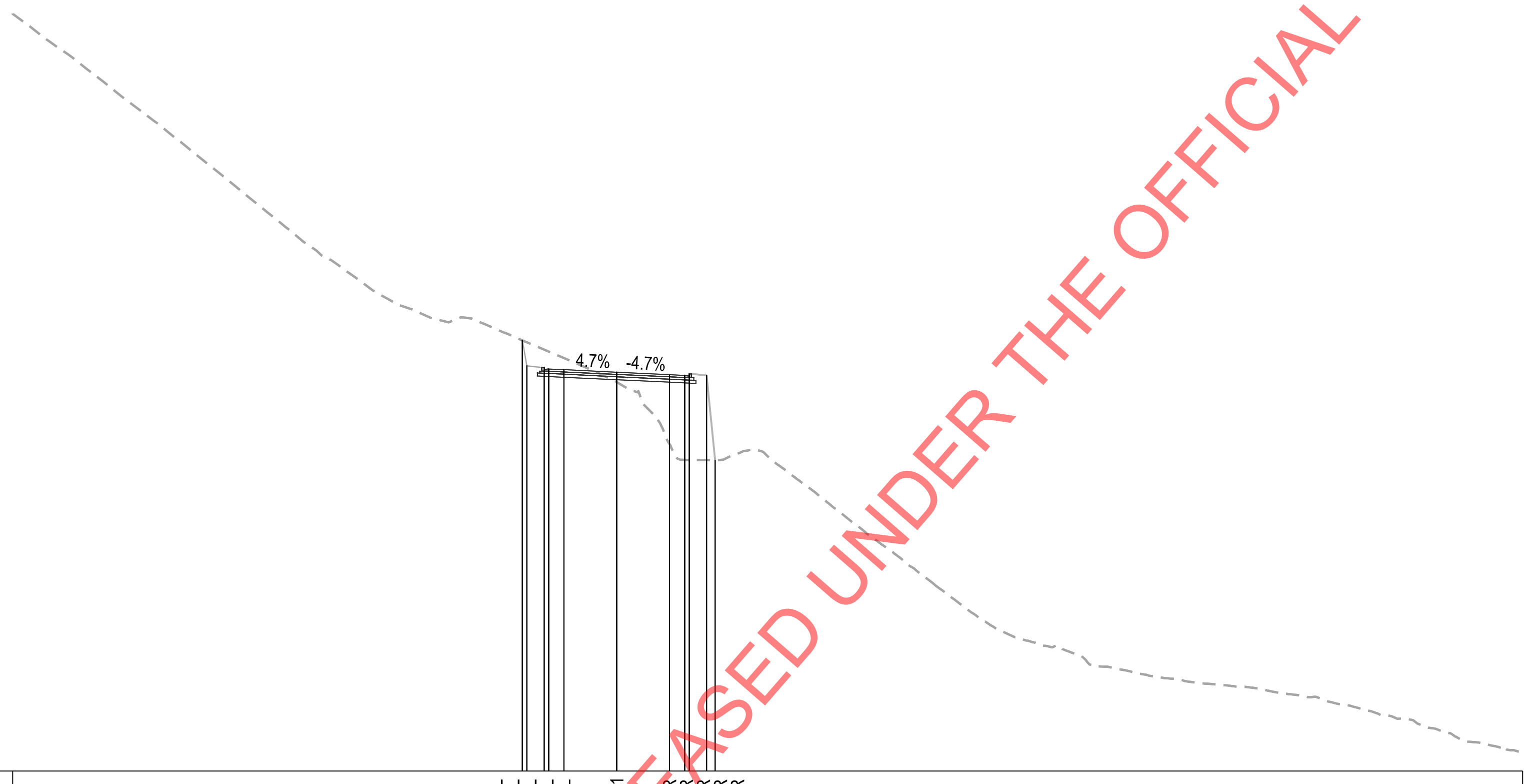

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	347.51	345.81	345.71	345.61	345.56	345.40	345.23	345.19	345.29	345.19	339.57
EXISTING LEVELS	347.51	347.38	346.89	346.77	346.34	344.74	340.64	339.59	339.59	339.59	339.57
DESIGN OFFSETS	-6.25	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	6.51

CHAINAGE RP-08/ 4010

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design
Drawn
Dsg Verifier
Dwg Check

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4010 TO RP-08/ 4010

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-379

Rev. A

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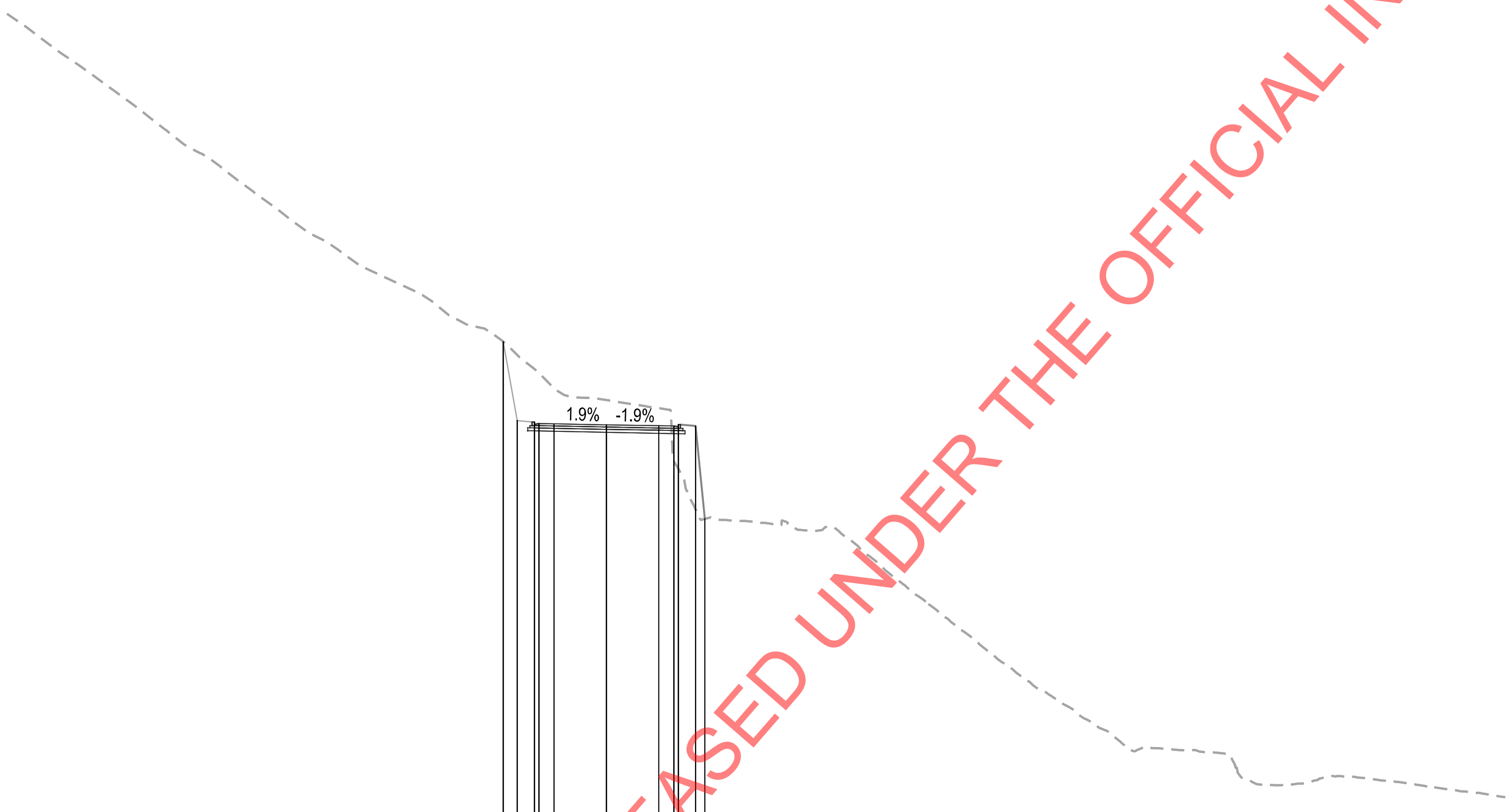

DATUM 320

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	351.42	346.15	346.05	345.95	345.93	345.87	345.80	345.78	345.88	345.78	339.60
EXISTING LEVELS	351.42	350.53	349.59	349.33	348.31	347.52	346.98	343.47	342.94	340.23	339.60
DESIGN OFFSETS	-6.88	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.57

CHAINAGE RP-08/ 4020

FOR INFORMATION
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No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250	Design			Approved For Construction*
	Drawn			
Reduced Scale (A3)	Dsg Verifier			
	Dwg Check			Date
HALF SCALE	* Refer to Revision 1 for Original Signature			

Client:

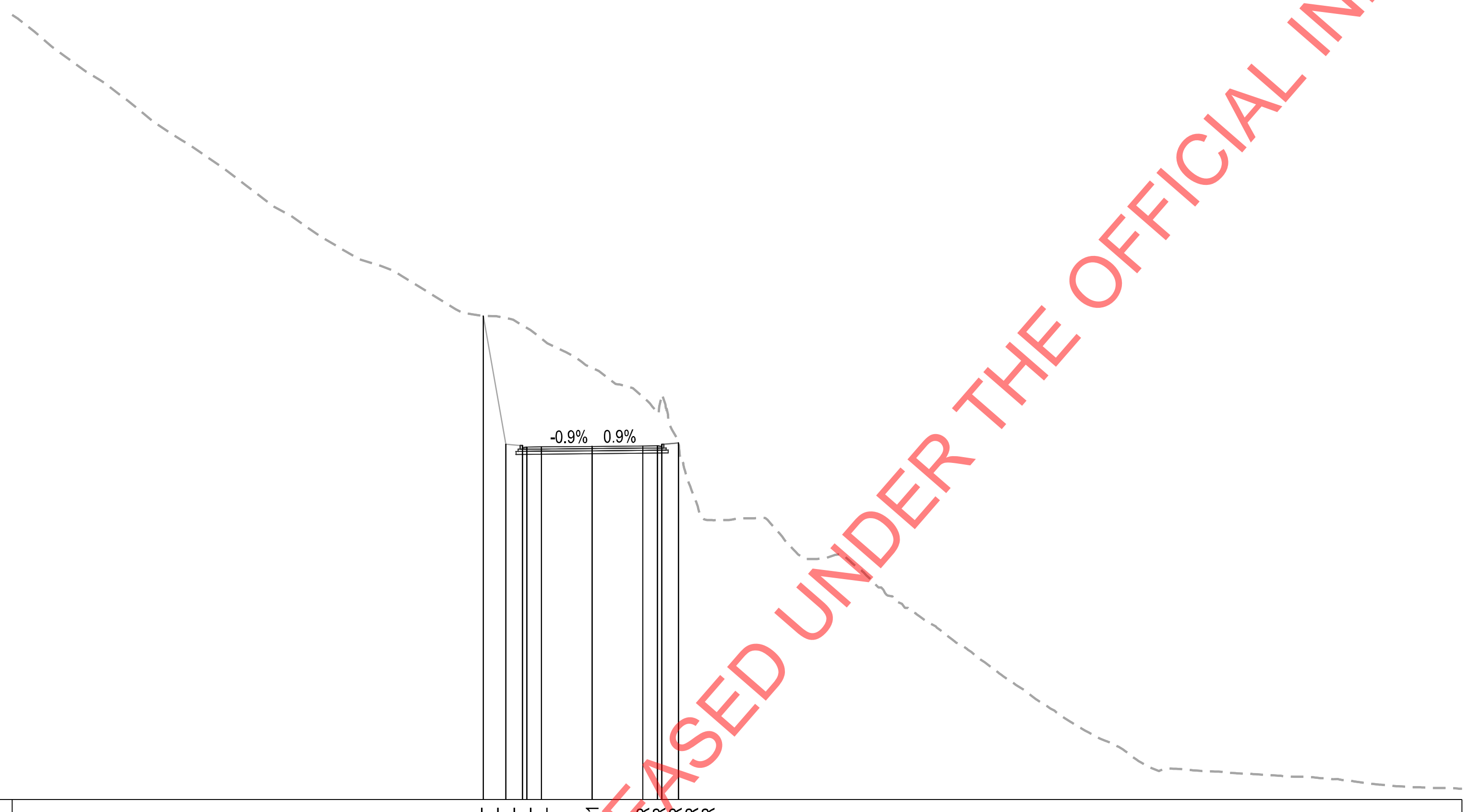
Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4020 TO RP-08/ 4020

Discipline: CIVIL ENGINEERING

Drawing No. 3413292 - CA-380

Rev. A



DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R	
DESIGN LEVELS	355.34	346.51	346.41	346.31	346.32	346.35	346.38	346.39	346.49	346.59	346.60	
EXISTING LEVELS	355.34	355.20	354.69	354.52	353.80	351.77	349.76	348.70	349.84	346.60	346.60	
DESIGN OFFSETS	-7.51	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	5.95	

CHAINAGE RP-08/ 4030

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4030 TO RP-08/ 4030

Discipline CIVIL ENGINEERING
Drawing No. 3413292 - CA-381
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DO NOT SCALE

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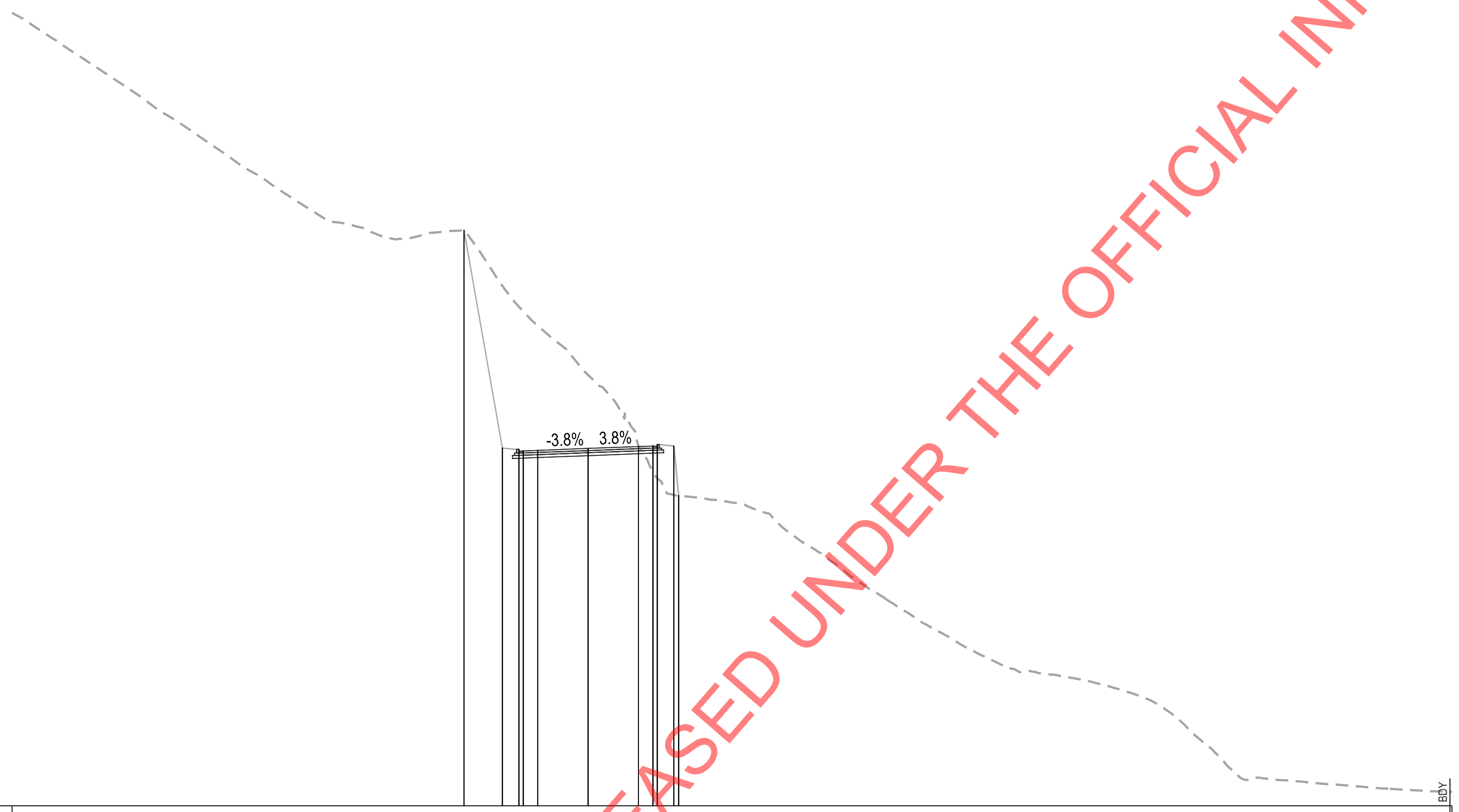

DATUM 322

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	362.01	346.88	346.78	346.68	346.72	346.85	346.98	347.02	347.12	347.02	343.57
EXISTING LEVELS	362.01	358.15	356.70	356.38	355.39	351.96	347.06	345.25	344.79	343.60	343.57
DESIGN OFFSETS	-8.62	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.29

CHAINAGE RP-08/ 4040

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4040 TO RP-08/ 4040

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-382

Rev. A

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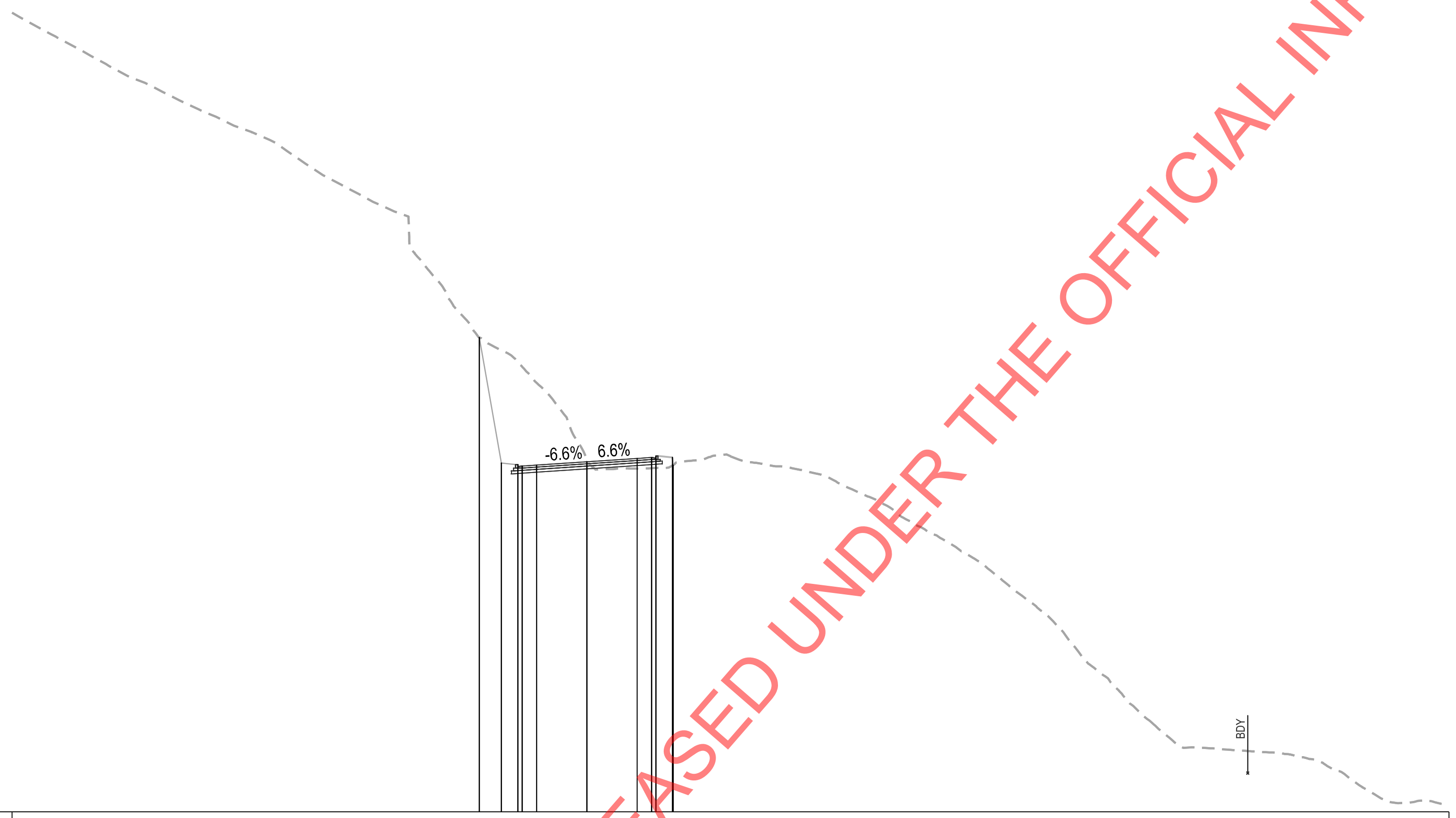


DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	356.01	347.27	347.17	347.07	347.13	347.37	347.60	347.66	347.76	347.66	347.14
EXISTING LEVELS	356.01	355.10	354.27	353.97	352.86	347.54	346.89	346.92	346.93	347.10	347.14
DESIGN OFFSETS	-7.49	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.00

CHAINAGE RP-08/ 4050

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250	Design			Approved For Construction*
	Drawn			
Reduced Scale (A3)	Dsg Verifier			
HALF SCALE	Dwg Check			Date
	* Refer to Revision 1 for Original Signature			

Beca

Client:

Project: SH 25A TAPARAHI SLIP

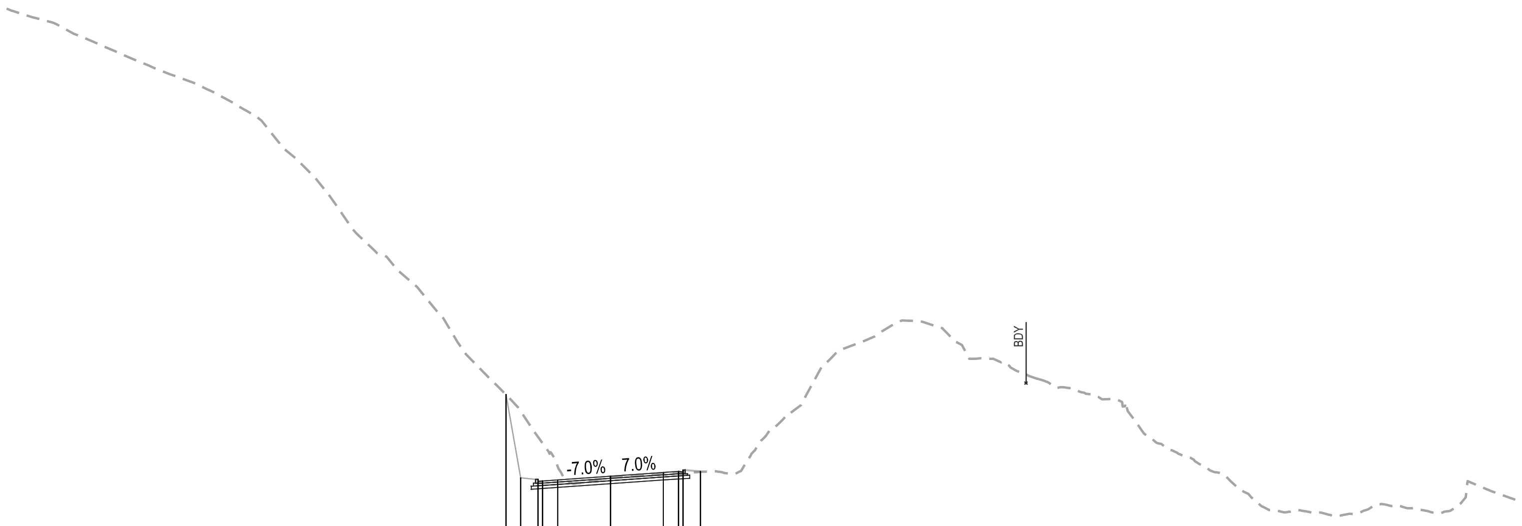
Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4050 TO RP-08/ 4050

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-383

Rev. A

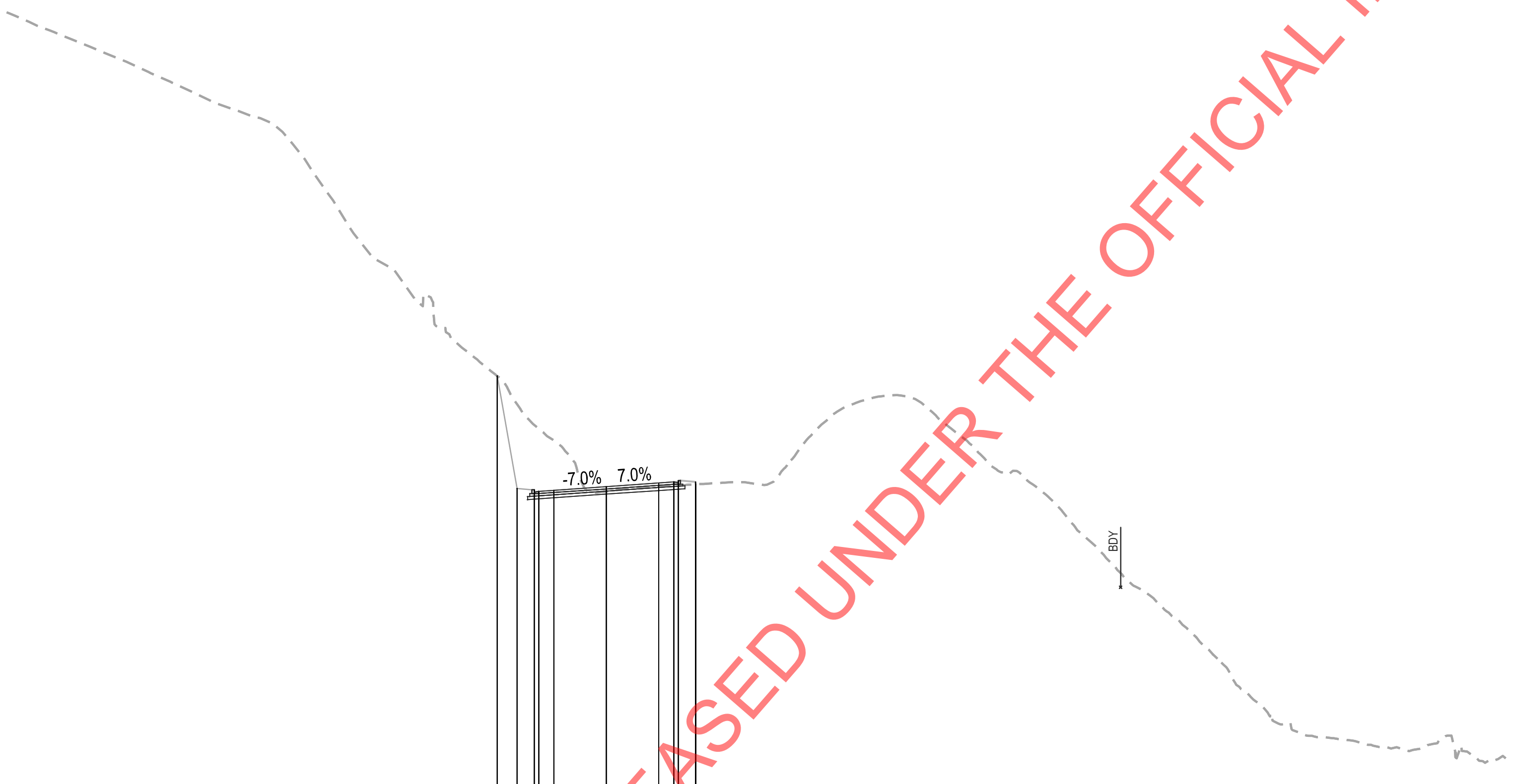
Drawing Plotted: 1/05/2023 10:20:04 AM



DATUM 345

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	353.81	348.30	348.20	348.10	348.17	348.41	348.66	348.73	348.83	348.73	348.70
EXISTING LEVELS	353.81	352.71	351.03	350.60	349.07	348.29	348.54	348.61	348.63	348.70	348.70
DESIGN OFFSETS	-6.92	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	5.95

CHAINAGE RP-08/ 4070



DATUM 328

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	355.29	347.78	347.68	347.58	347.65	347.89	348.13	348.20	348.30	348.20	348.05
EXISTING LEVELS	355.29	353.39	352.01	351.76	350.98	347.58	347.90	347.95	347.97	348.05	348.05
DESIGN OFFSETS	-7.27	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	5.97

CHAINAGE RP-08/ 4060

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design		
Drawn		
Dsg Verifier		
Dwg Check		

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4060 TO RP-08/ 4070

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-384

Rev. A

DO NOT SCALE

IF IN DOUBT ASK.

Document No. ...\XSect-Mainline.dgn - OPTION 10C WALL - 15 [Sheet]

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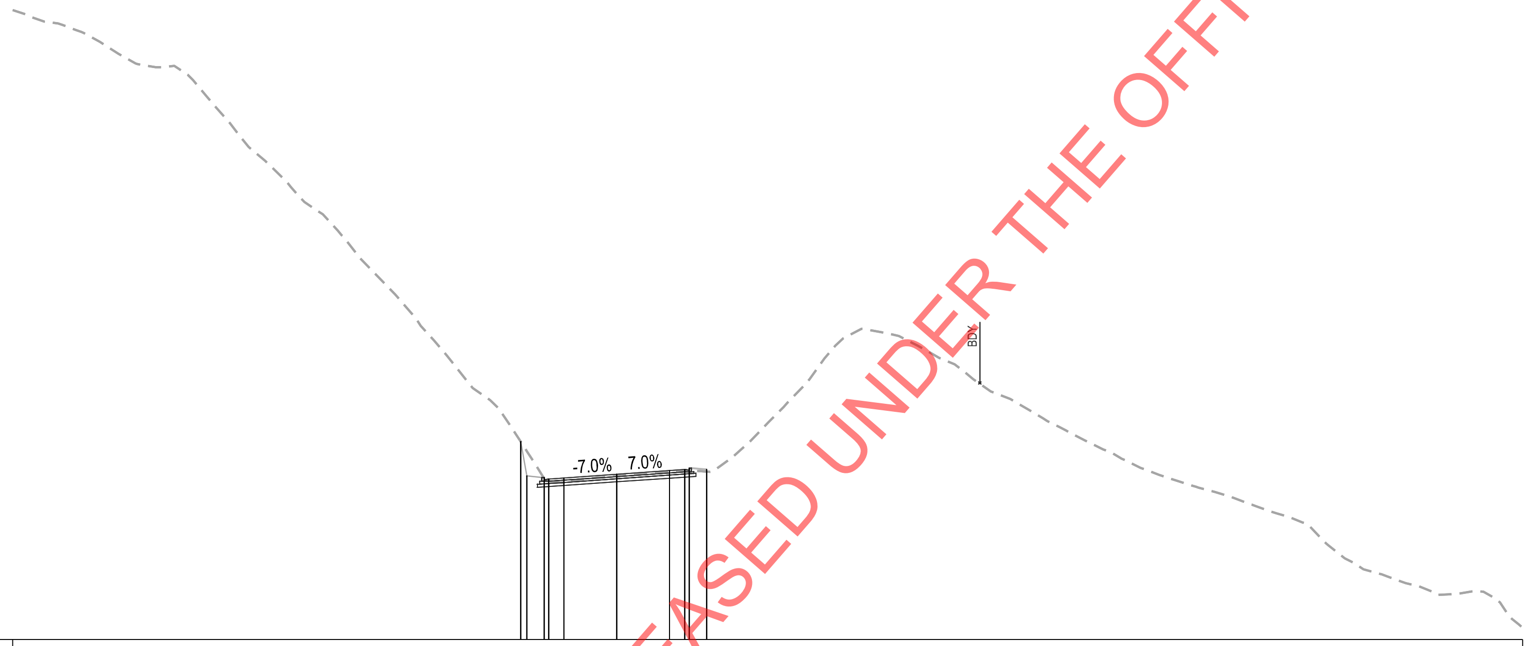

DATUM 338

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	351.10	348.83	348.73	348.63	348.69	348.94	349.18	349.25	349.35	349.25	349.11
EXISTING LEVELS	351.10	350.47	348.66	348.42	348.40	348.82	349.09	349.13	349.15	349.11	349.11
DESIGN OFFSETS	-6.35	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	5.96

CHAINAGE RP-08/ 4080

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4080 TO RP-08/ 4080

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-385

Rev. A

DO NOT SCALE

IF IN DOUBT ASK.

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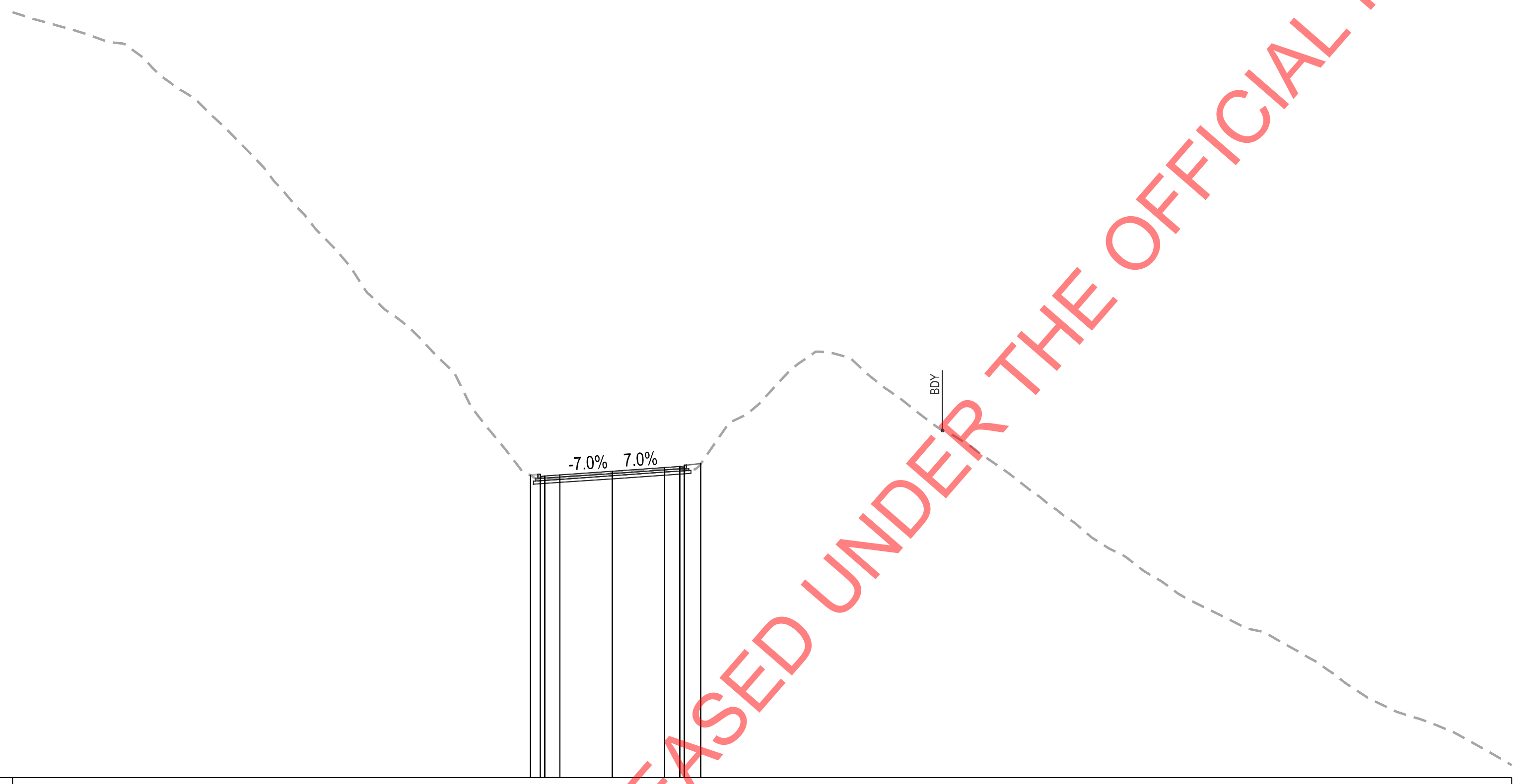


DATUM 329

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	349.19	349.24	349.14	349.21	349.45	349.70	349.77	349.87	349.96
EXISTING LEVELS	349.19	348.78	348.84	349.03	349.35	349.60	349.61	349.61	349.96
DESIGN OFFSETS	-5.46	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.91

CHAINAGE RP-08/ 4090

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design		
Drawn		
Dsg Verifier		
Dwg Check		

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

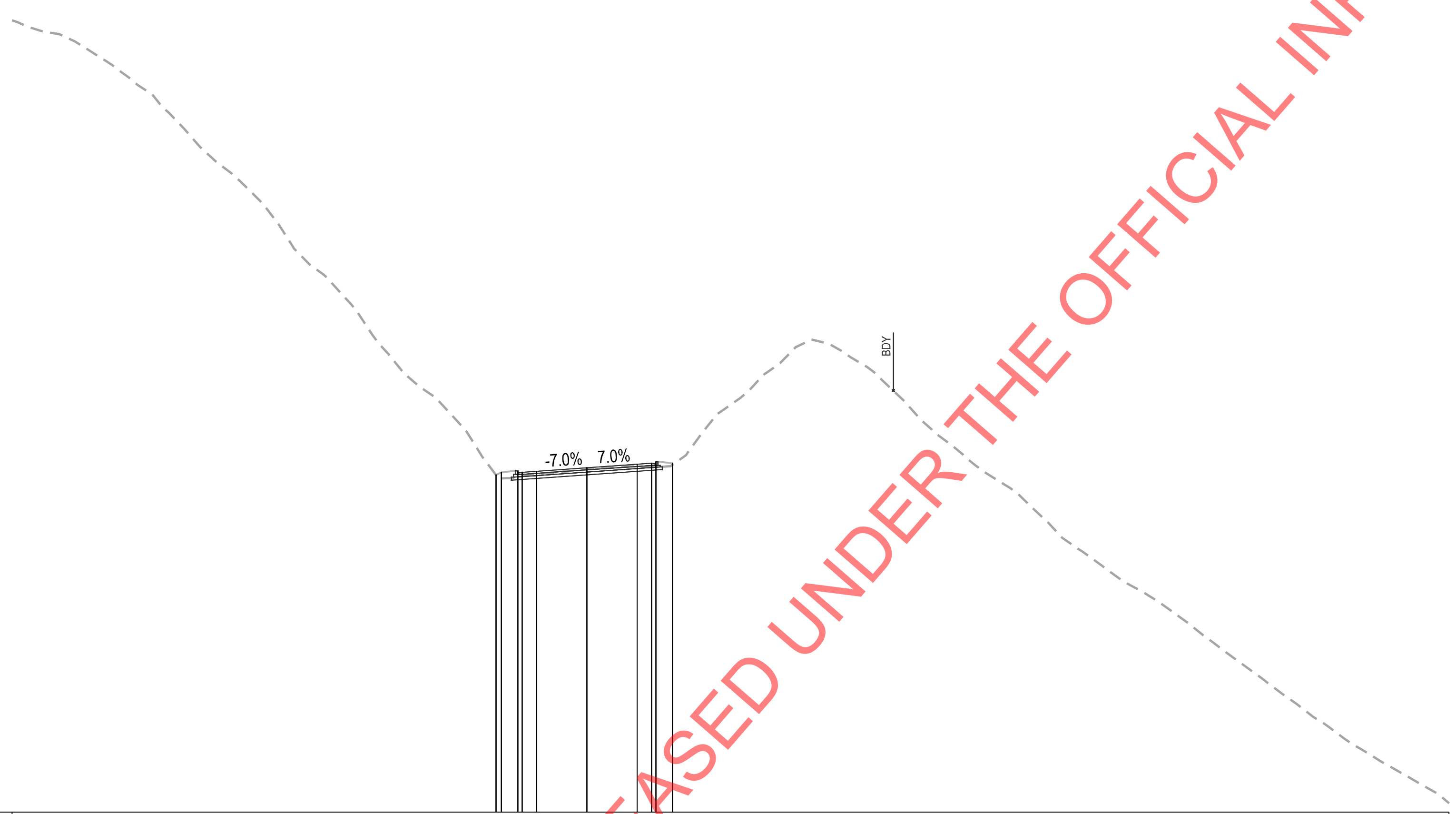
Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4090 TO RP-08/ 4090

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-386

Rev. A



DATUM 326

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	349.46	349.65	349.75	349.65	349.71	349.96	350.20	350.27	350.37	350.27	350.16
EXISTING LEVELS	349.46	349.22	349.31	349.37	349.52	349.84	350.06	350.00	349.99	350.16	350.16
DESIGN OFFSETS	-6.32	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	5.96

CHAINAGE RP-08/ 4100

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

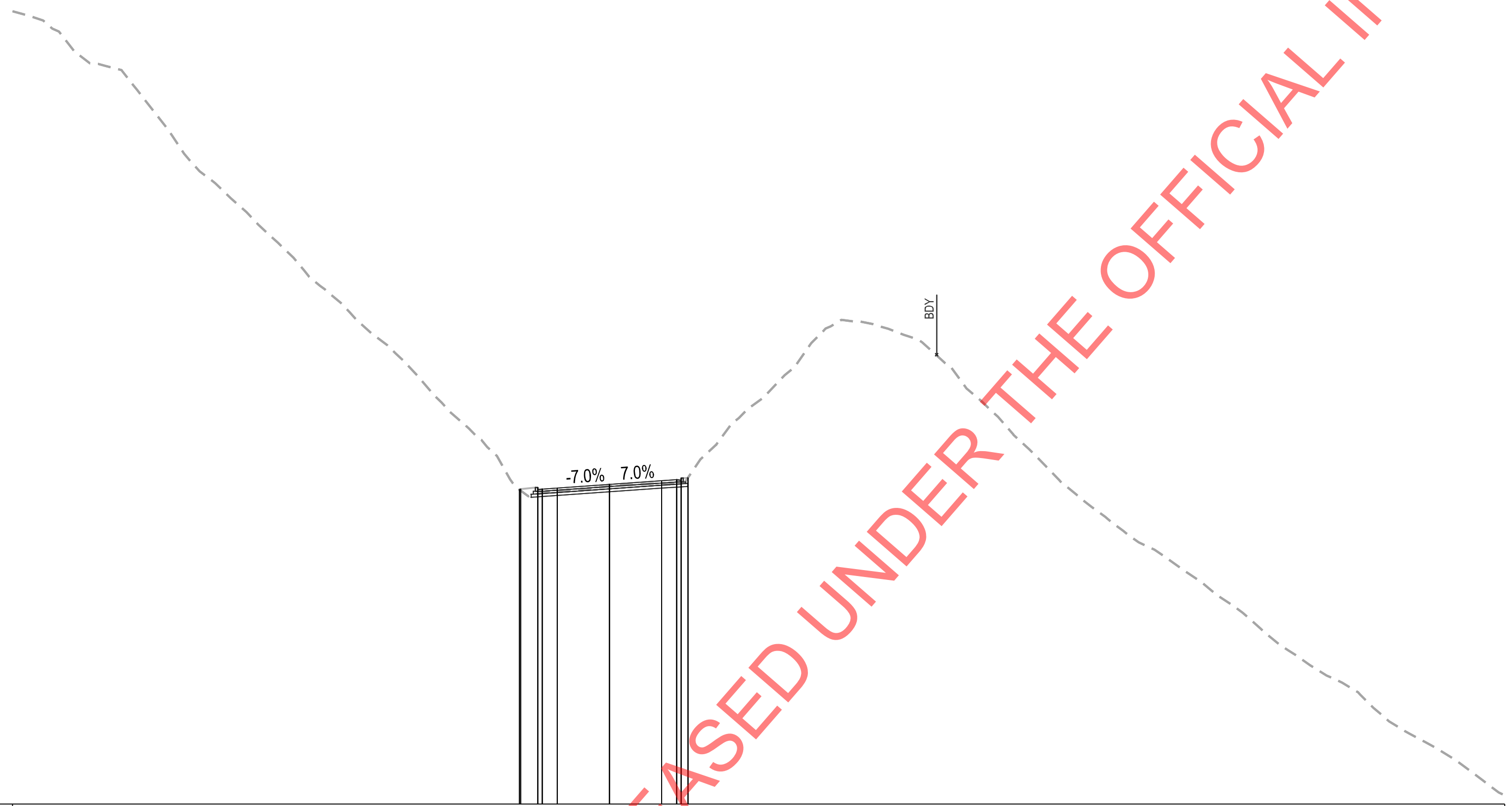
Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4100 TO RP-08/ 4100

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-387

Rev. A



DATUM 329

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	350.09	350.14	350.24	350.14	350.21	350.45	350.69	350.76	350.86	350.89
EXISTING LEVELS	350.09	350.03	349.80	349.86	349.99	350.31	350.47	350.51	350.55	350.89
DESIGN OFFSETS	-6.04	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.26

CHAINAGE RP-08/ 4110

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design			Approved For Construction*
Drawn			
Dsg Verifier			
Dwg Check			Date
* Refer to Revision 1 for Original Signature			

Beca

Client:

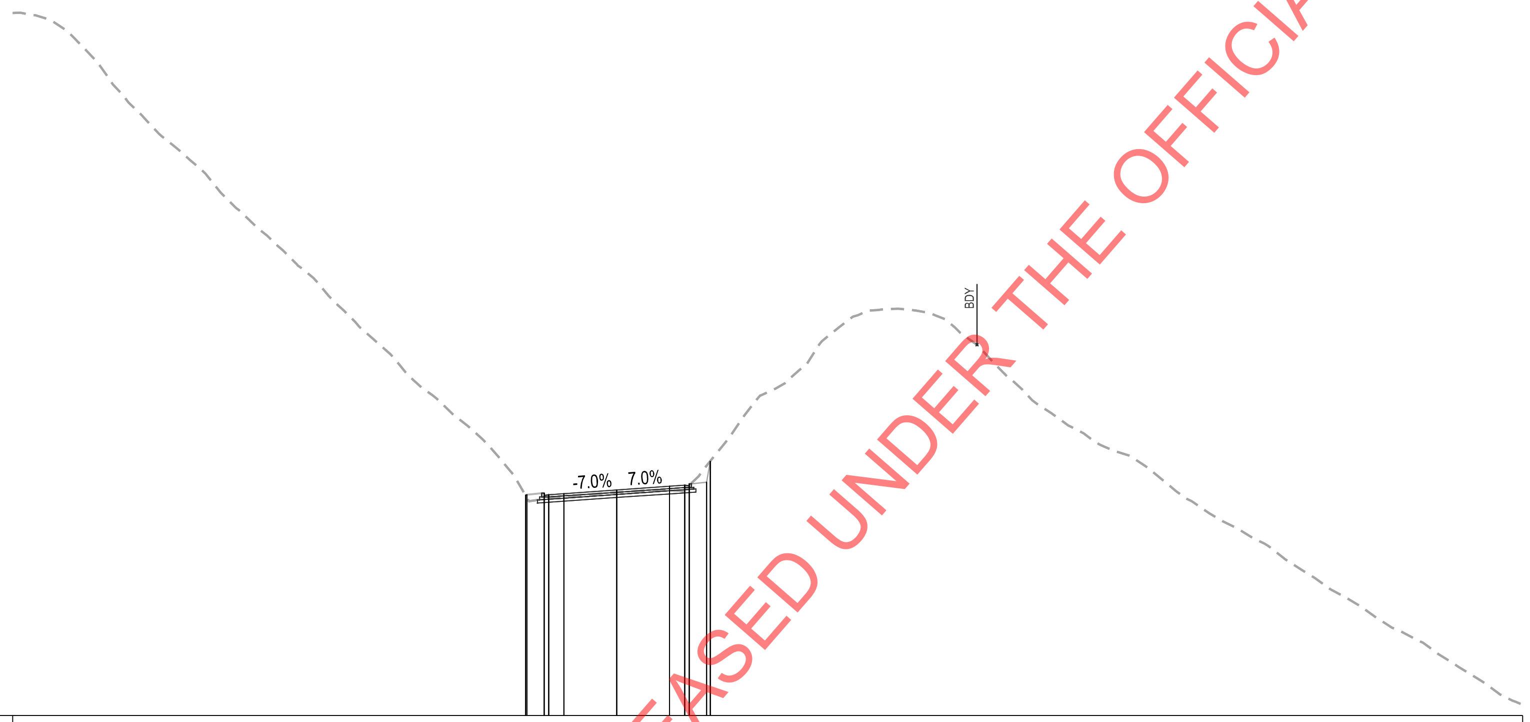
Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4110 TO RP-08/ 4110

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-388

Rev. A



DATUM 336

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	350.57	350.62	350.72	350.62	350.69	350.93	351.17	351.24	351.34	351.44	352.84
EXISTING LEVELS	350.57	350.43	350.32	350.35	350.46	350.77	350.92	350.95	351.24	352.53	352.84
DESIGN OFFSETS	-6.04	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	6.20

CHAINAGE RP-08/ 4120

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

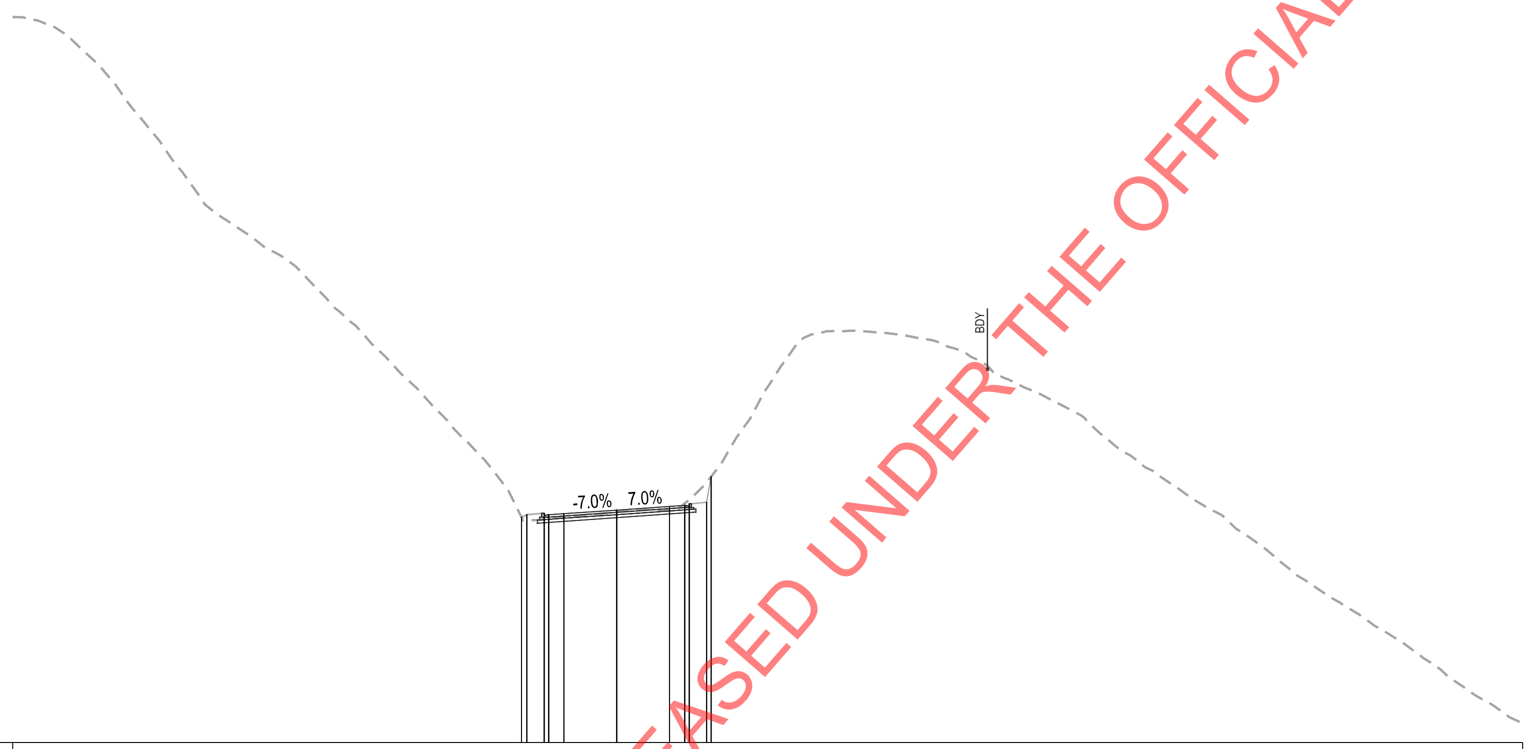
Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4120 TO RP-08/ 4120

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-389

Rev. A



DATUM 336

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	350.91	351.08	351.18	351.08	351.15	351.40	351.64	351.71	351.81	351.91	353.61
EXISTING LEVELS	350.91	350.71	350.80	350.84	350.92	351.26	351.33	351.84	352.07	353.23	353.61
DESIGN OFFSETS	-6.30	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.25

CHAINAGE RP-08/ 4130

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4130 TO RP-08/ 4130

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-390

Rev. A

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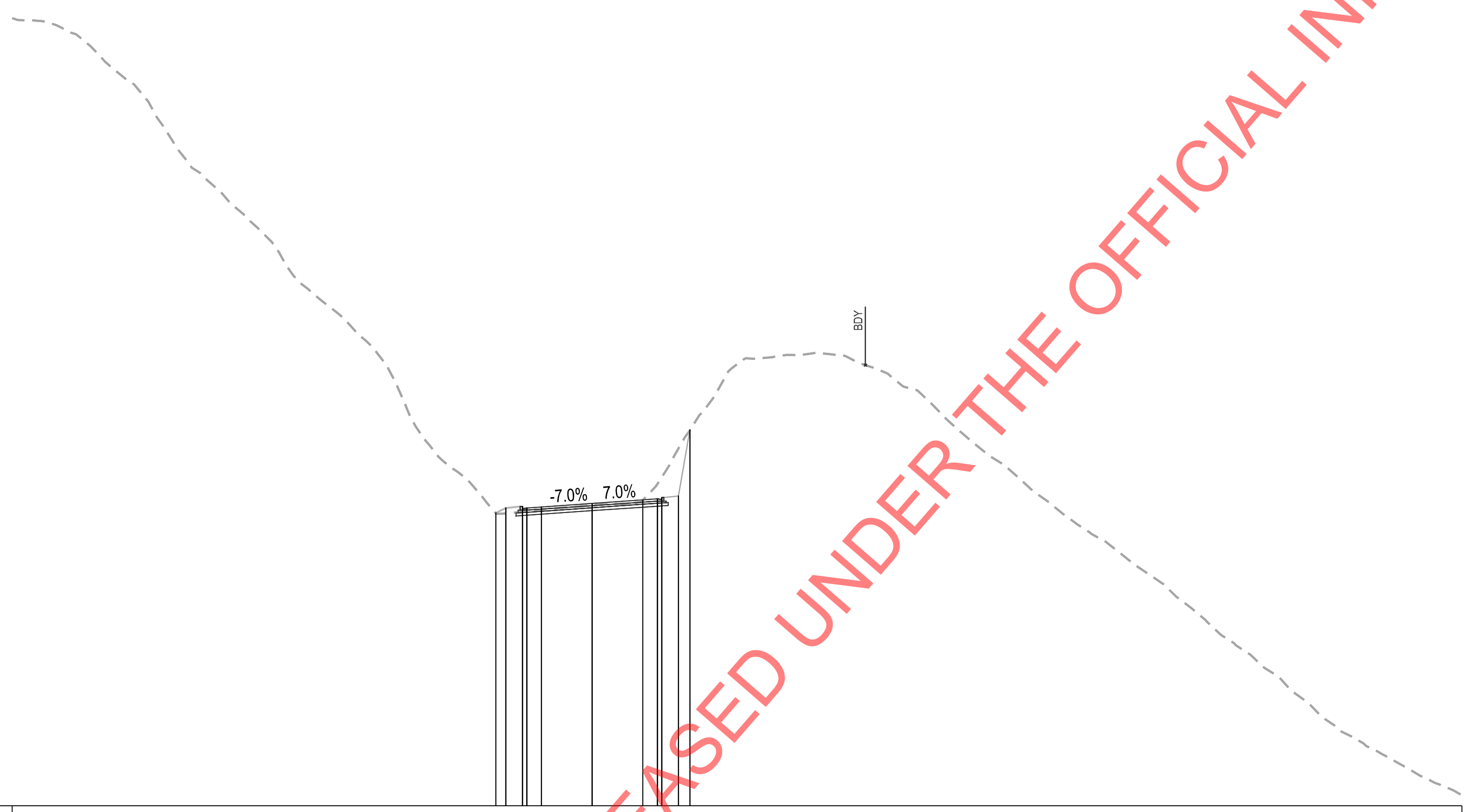


DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	351.20	351.55	351.65	351.55	351.62	351.86	352.10	352.17	352.27	352.37	356.94
EXISTING LEVELS	351.20	351.17	351.32	351.36	351.43	351.74	352.07	353.19	353.64	355.64	356.94
DESIGN OFFSETS	-6.64	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	6.76

CHAINAGE RP-08/ 4140

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE
Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

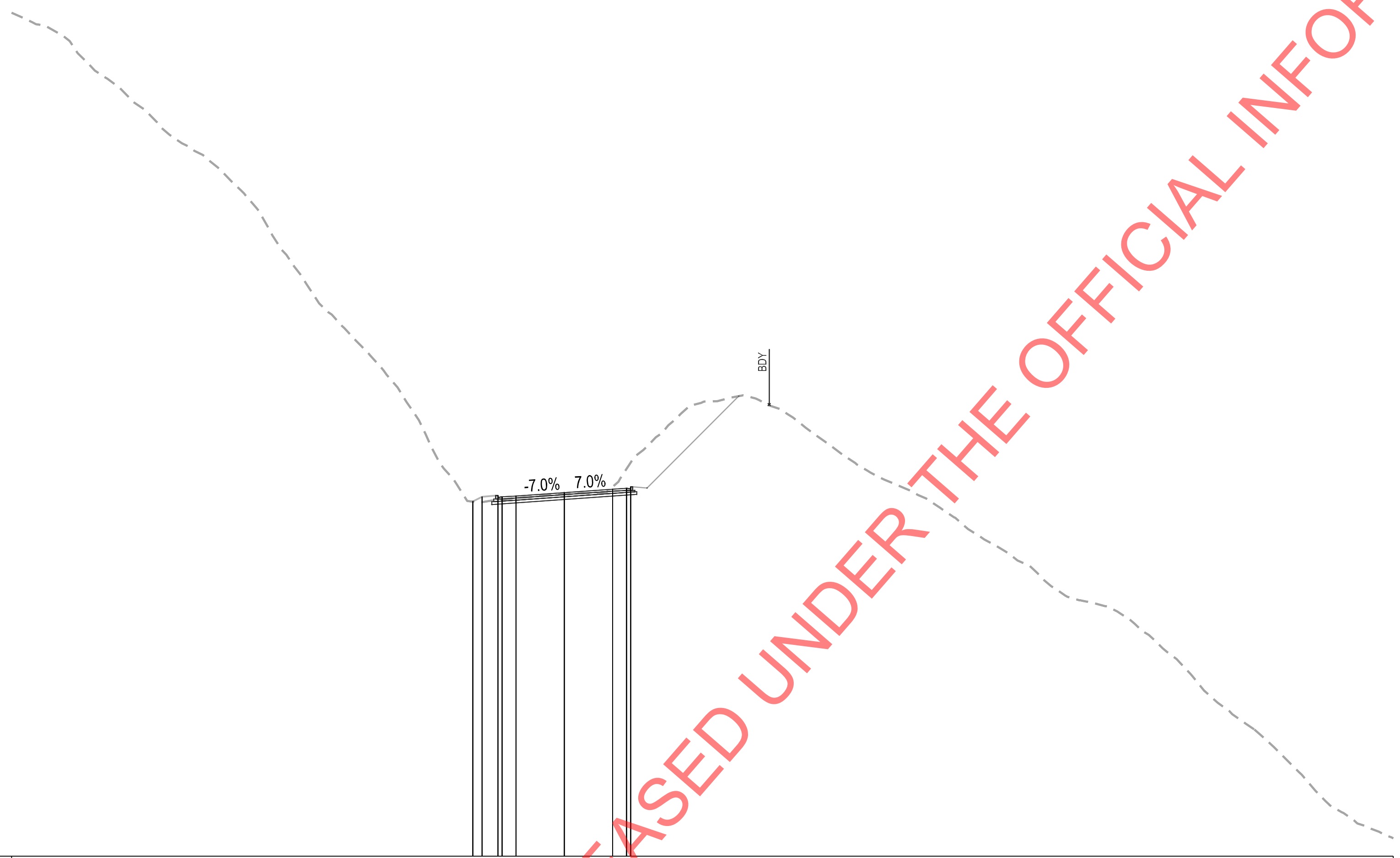
Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4140 TO RP-08/ 4140

Discipline: CIVIL ENGINEERING

Drawing No. 3413292 - CA-391

Rev. A



DATUM 326

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R
DESIGN LEVELS	351.68	352.01	352.11	352.01	352.08	352.33	352.57	352.64	352.74
EXISTING LEVELS	351.68	351.63	351.80	351.82	351.93	352.20	352.74	354.03	354.49
DESIGN OFFSETS	-6.61	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80

CHAINAGE RP-08/ 4150

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design
Drawn
Dsg Verifier
Dwg Check
Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4150 TO RP-08/ 4150

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-392

Rev. A

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Document No. ...\XSect-Mainline.dgn - OPTION 10C WALL - 23 [Sheet]

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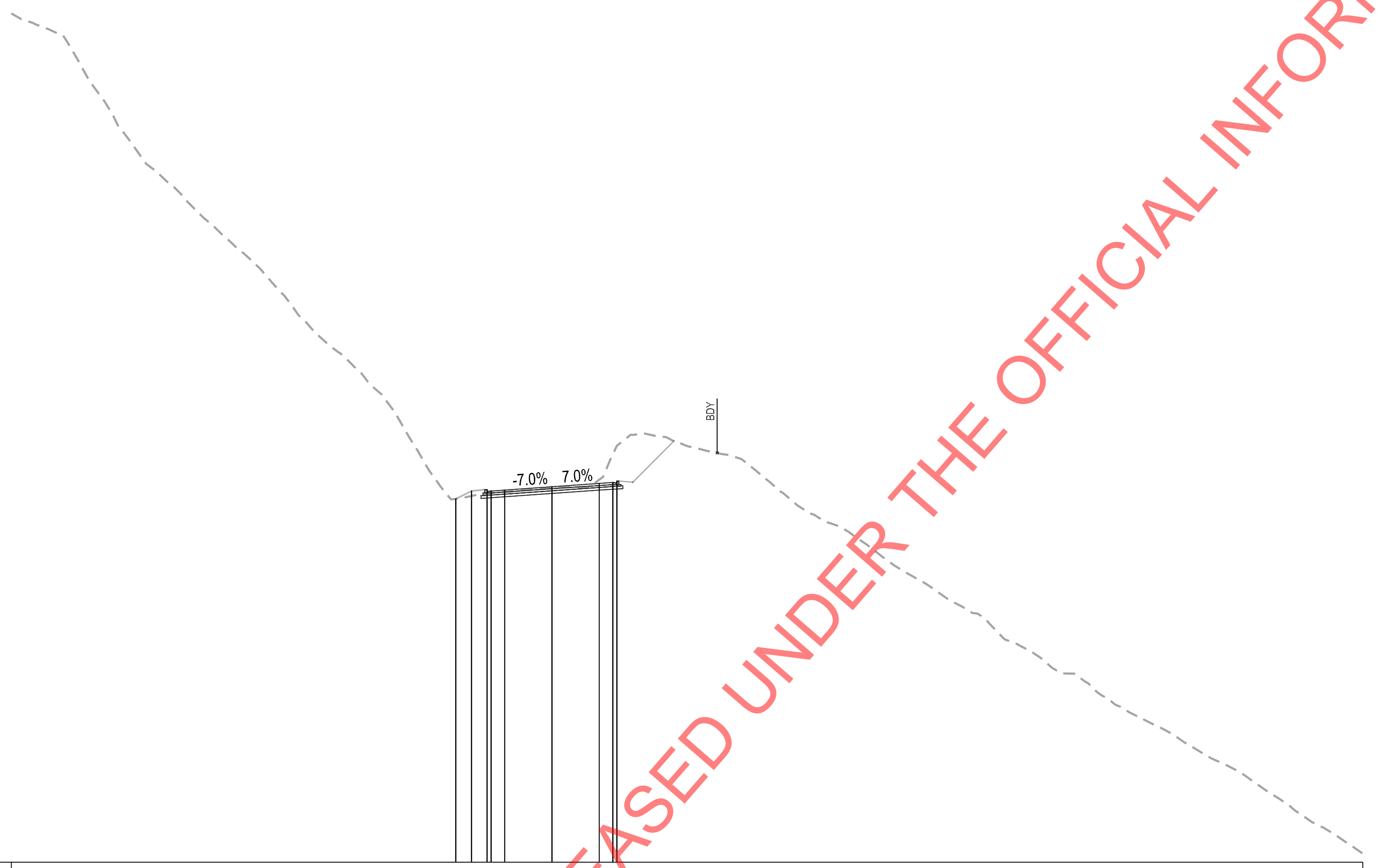


DATUM 325

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R
DESIGN LEVELS	351.89	352.48	352.58	352.48	352.55	352.79	353.03	353.10	353.20
EXISTING LEVELS	351.89	352.10	352.29	352.32	352.40	352.68	353.31	355.17	355.80
DESIGN OFFSETS	-7.12	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80

CHAINAGE RP-08/ 4160

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design			Approved For Construction*
Drawn			
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4160 TO RP-08/ 4160

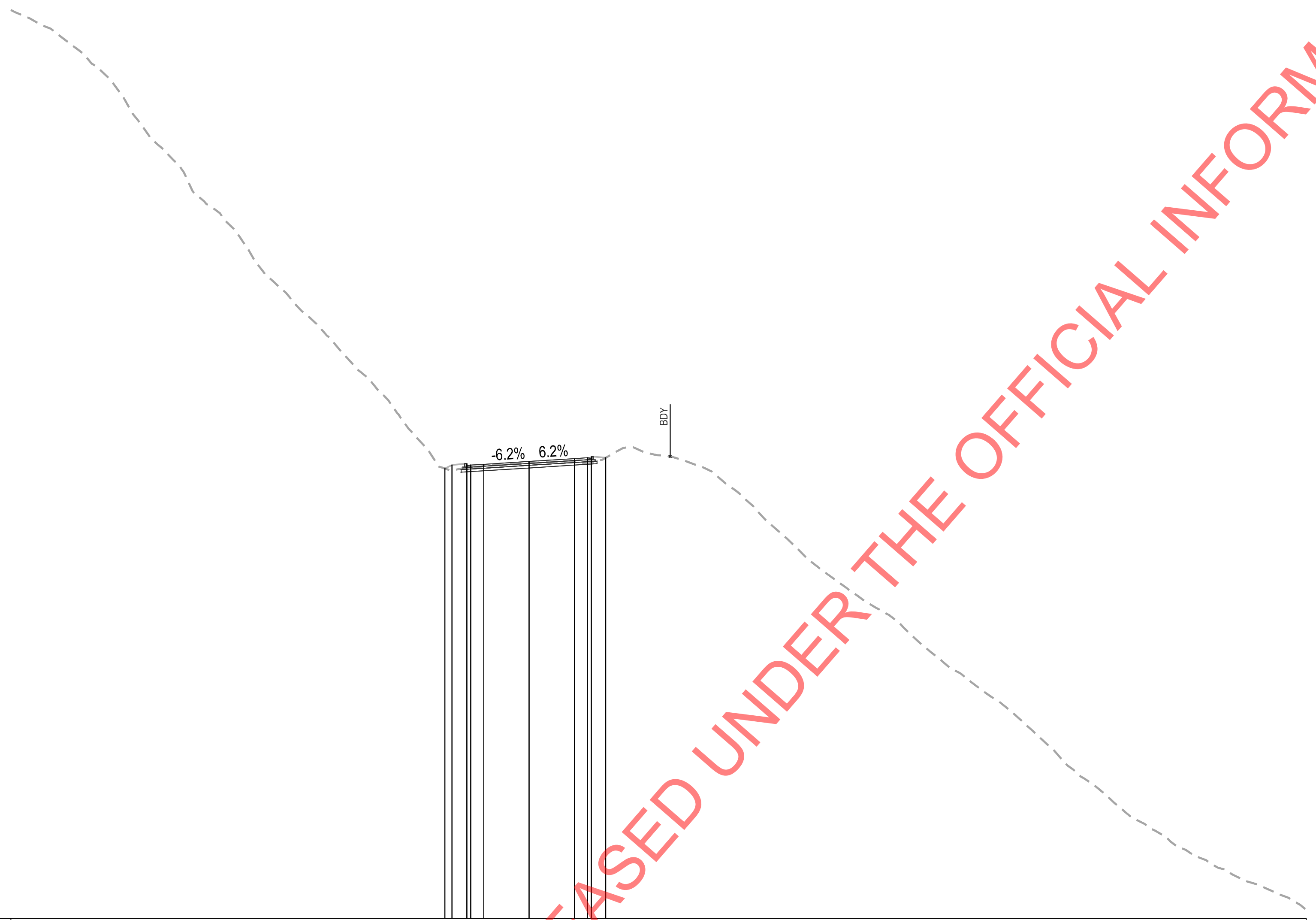
Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-393

Rev. A

DO NOT SCALE

IF IN DOUBT ASK.



DATUM 318

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R
DESIGN LEVELS	352.70	352.97	353.07	352.97	353.04	353.25	353.47	353.53	353.63	353.54
EXISTING LEVELS	352.70	352.58	352.79	352.82	352.89	353.12	353.19	353.11	353.14	353.54
DESIGN OFFSETS	-6.49	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.92

CHAINAGE RP-08/ 4170

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design
Drawn
Dsg Verifier
Dwg Check

Approved For Construction*
Date

* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4170 TO RP-08/ 4170

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-394

Rev. A

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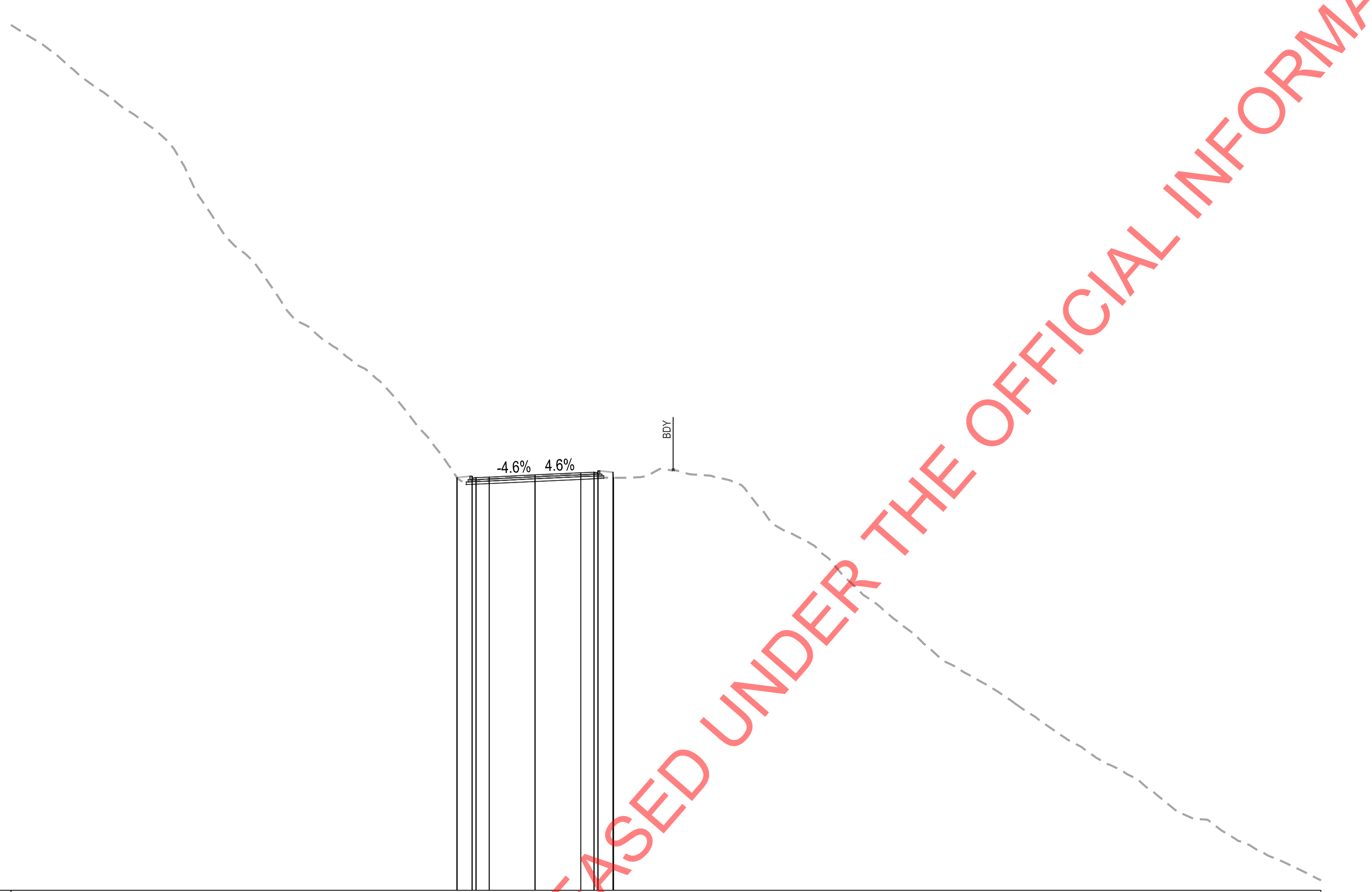

DATUM 322

DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	353.51	353.51	353.61	353.51	353.56	353.72	353.88	353.92	354.02	353.92	353.49
EXISTING LEVELS	353.51	353.51	353.25	353.30	353.40	353.62	353.72	353.59	353.56	353.50	353.49
DESIGN OFFSETS	-5.95	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	5.99

CHAINAGE RP-08/ 4180

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design		
Drawn		
Dsg Verifier		
Dwg Check		

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4180 TO RP-08/ 4180

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-395

Rev. A

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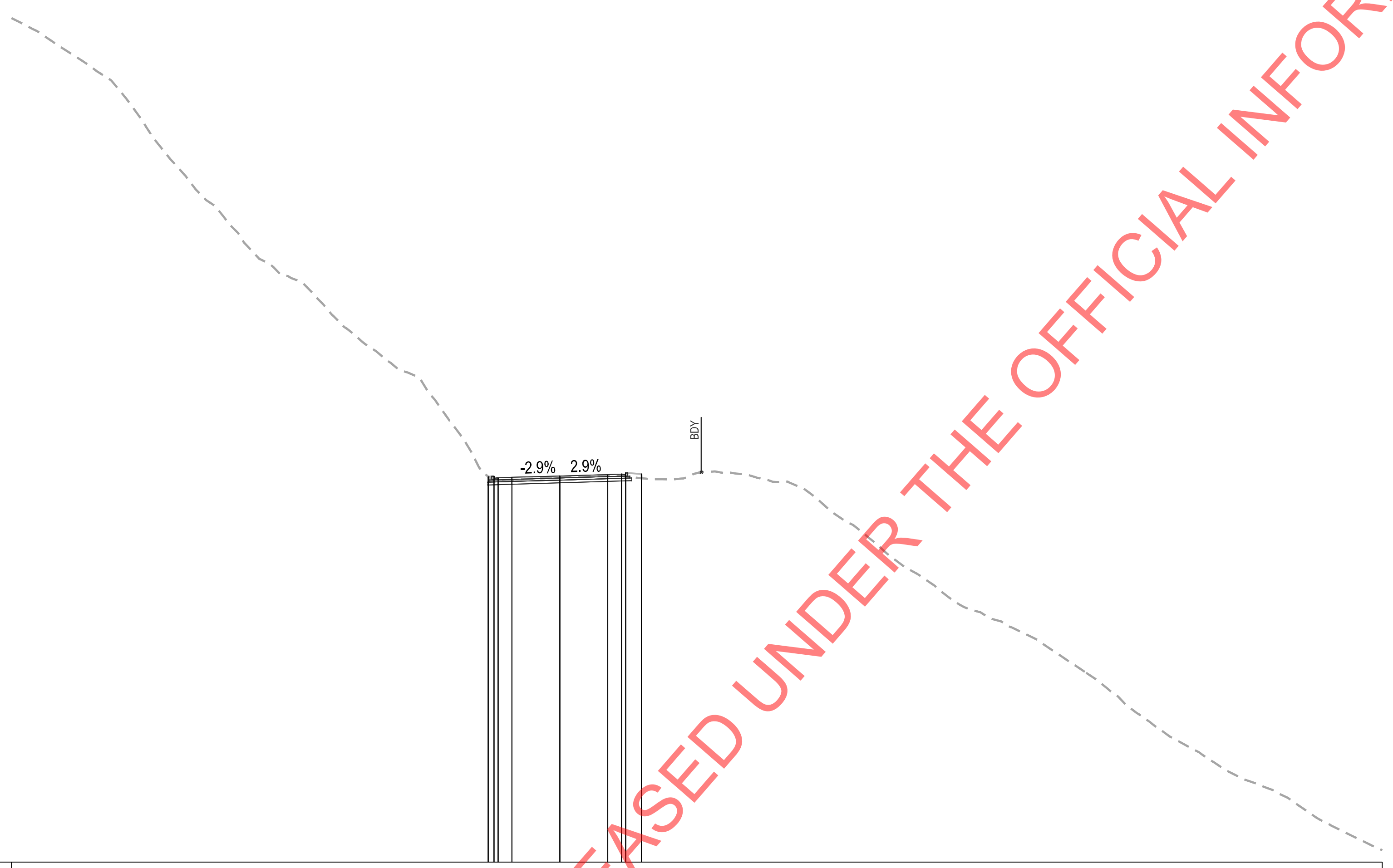
Document No. ...\XSect-Mainline.dgn - OPTION 10C WALL - 26 [Sheet]

DO NOT SCALE

IF IN DOUBT ASK.



DATUM 326

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	354.12	354.15	354.05	354.08	354.18	354.28	354.31	354.41	354.31	354.01
EXISTING LEVELS	354.12	353.79	353.81	353.90	354.09	354.23	354.19	354.16	354.02	354.01
DESIGN OFFSETS	-5.22	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	5.98

CHAINAGE RP-08/ 4190

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250	Design			Approved For Construction*
	Drawn			
Reduced Scale (A3)	Dsg Verifier			
	Dwg Check			Date
HALF SCALE	* Refer to Revision 1 for Original Signature			

Beca

Client:

Project: SH 25A TAPARAHI SLIP

Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4190 TO RP-08/ 4190

FOR INFORMATION
NOT FOR CONSTRUCTION

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-396

Rev. A

DO NOT SCALE

IF IN DOUBT ASK.

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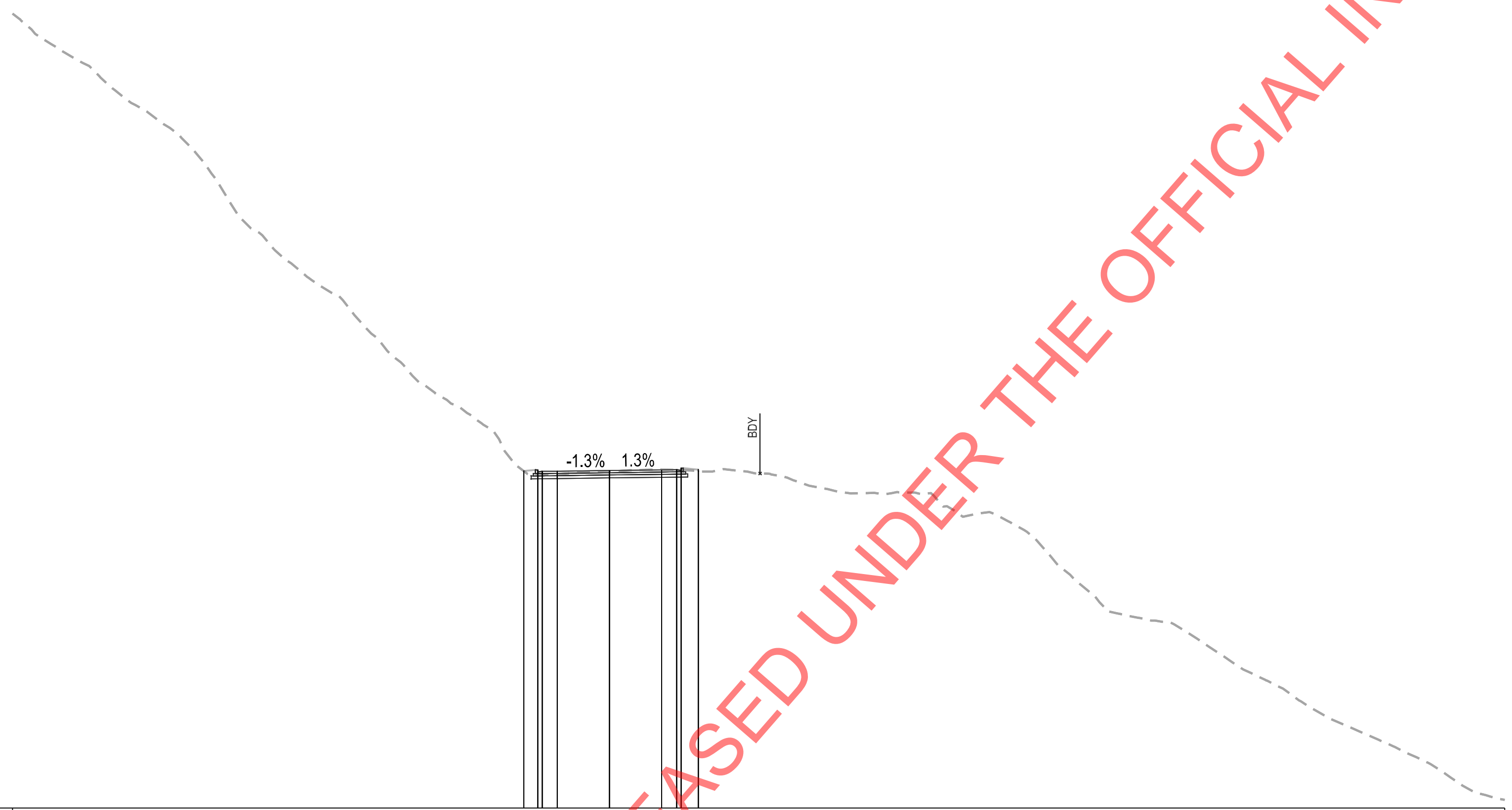
Document No. ...\XSect-Mainline.dgn - OPTION 10C WALL - 27 [Sheet]



DATUM 332

DESIGN FEATURES	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	354.61	354.69	354.59	354.60	354.65	354.69	354.70	354.80	354.70	354.59
EXISTING LEVELS	354.61	354.29	354.31	354.40	354.60	354.71	354.68	354.67	354.59	354.59
DESIGN OFFSETS	-5.74	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	5.96

CHAINAGE RP-08/ 4200

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	ISSUED FOR REVIEW				

Original Scale (A1) 1:250
Reduced Scale (A3) HALF SCALE

Design			Approved For Construction*
Drawn			
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client:

Project: SH 25A TAPARAHI SLIP

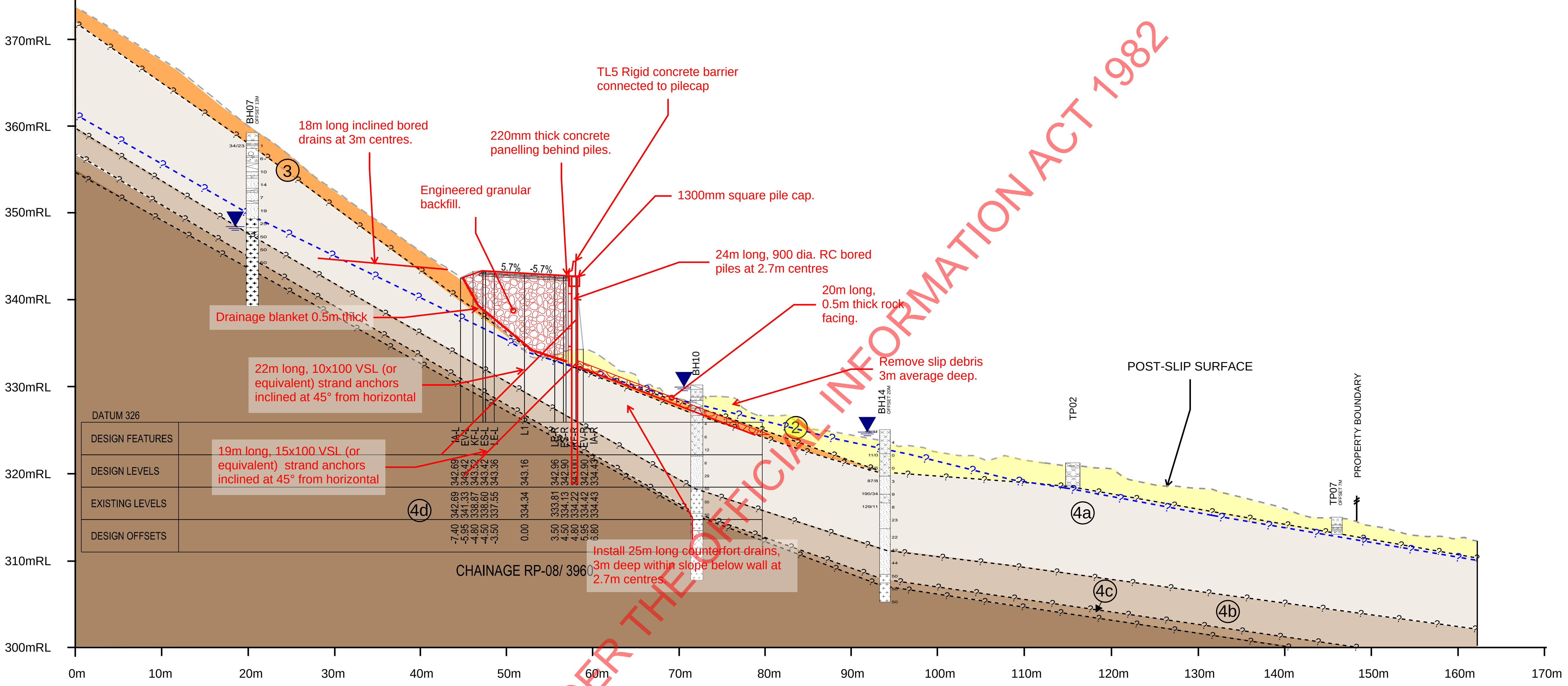
Title: DETAILED CROSS SECTIONS
OPTION 10C WALL
RP-08/ 4200 TO RP-08/ 4200

Discipline CIVIL ENGINEERING

Drawing No. 3413292 - CA-397

Rev. A

DESIGN SECTION CH3960
Option 10
(Section B-B')



	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	342.69	343.42	343.52	343.42	343.36	343.16	342.96	342.90	343.00	342.90	334.43
EXISTING LEVELS	342.69	341.33	338.87	338.60	337.55	334.34	333.81	334.13	334.22	334.42	334.43
DESIGN OFFSETS	-7.40	-5.95	-4.80	-4.50	-3.50	0.00	3.50	4.50	4.80	5.95	6.80

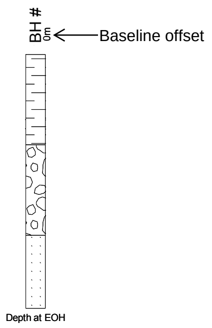
Legend

- ① [FILL]
- ② [RECENT SLIP DEBRIS]
- ③ [HISTORICAL SLIP DEBRIS]
- (4a) [COMPLETELY WEATHERED ANDESITE]
- (4b) [HIGHLY WEATHERED ANDESITE]
- (4c) [MODERATELY WEATHERED ANDESITE]
- (4d) [SLIGHTLY WEATHERED ANDESITE]

- - - - Pre slip ground surface
- - - - Post slip ground surface
—?— Interpreted geological boundary
▼ Measured/dipped groundwater
—?— Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m
V 1:500
0 6.25 12.5 17.5 25m
Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)
Reduced Scale (A3) 1:500

Design	ZL	12/04/23
Drawn	ZL	12/04/23
Dsg Verifier		12/04/23
Dwg Check	JB	12/04/23

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: DESIGN SECTION CH3960
WESTERN END OF SLIP SCARP

Discipline: GEOTECHNICAL

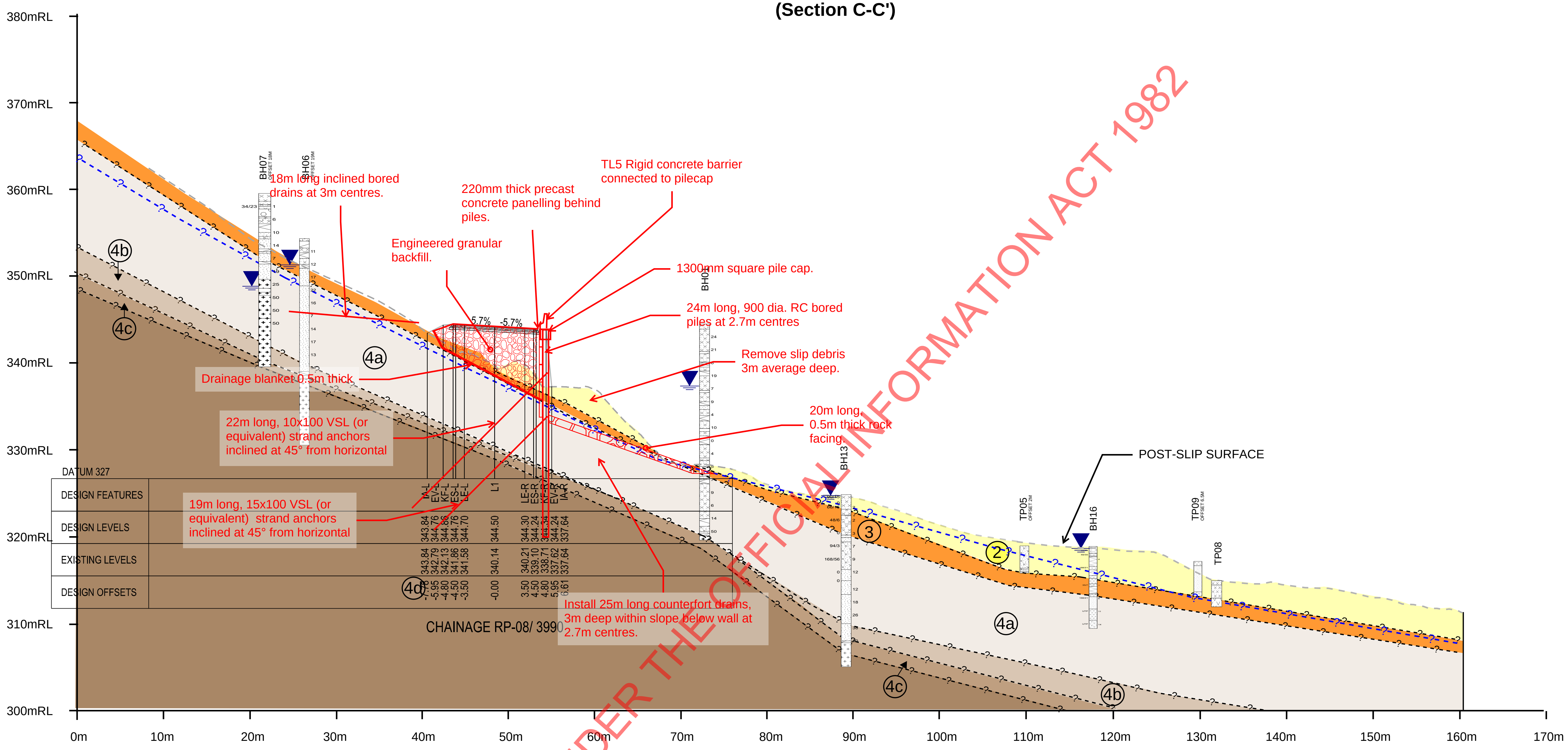
Drawing No. 3415236-GE-0002

Rev. A

DO NOT SCALE

IF IN DOUBT ASK.

DESIGN SECTION CH3990
Option 10
(Section C-C')



DESIGN FEATURES	IA-L	EV-L	KF-L	ES-L	LE-L	L1	LE-R	ES-R	KF-R	EV-R	IA-R
DESIGN LEVELS	343.84	344.76	344.86	344.76	344.70	344.50	344.30	344.24	344.34	344.24	337.64
EXISTING LEVELS	343.84	342.79	342.13	341.86	341.58	340.14	340.21	339.10	338.71	337.62	337.64
DESIGN OFFSETS	-7.[illegible]8	-5.95	-4.80	-4.50	-3.50	-0.00	3.50	4.50	4.80	5.95	6.61

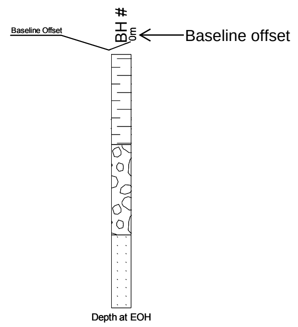
Legend

- ① [FILL]
- ② [RECENT SLIP DEBRIS]
- ③ [HISTORICAL SLIP DEBRIS]
- (4a) [COMPLETELY WEATHERED ANDESITE]
- (4b) [HIGHLY WEATHERED ANDESITE]
- (4c) [MODERATELY WEATHERED ANDESITE]
- (4d) [SLIGHTLY WEATHERED ANDESITE]

- - - - Pre slip ground surface
- - - - Post slip ground surface
—?— Interpreted geological boundary
▼ Measured/dipped groundwater
—?— Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m
V 1:500
0 6.25 12.5 17.5 25m
Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)
Reduced Scale (A3) 1:500

Design	ZL	12/04/23
Drawn	ZL	12/04/23
Dsg Verifier		12/04/23
Dwg Check	JB	12/04/23

Approved For Construction*
Date
* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: DESIGN SECTION 3990
MIDDLE OF SLIP SCARP

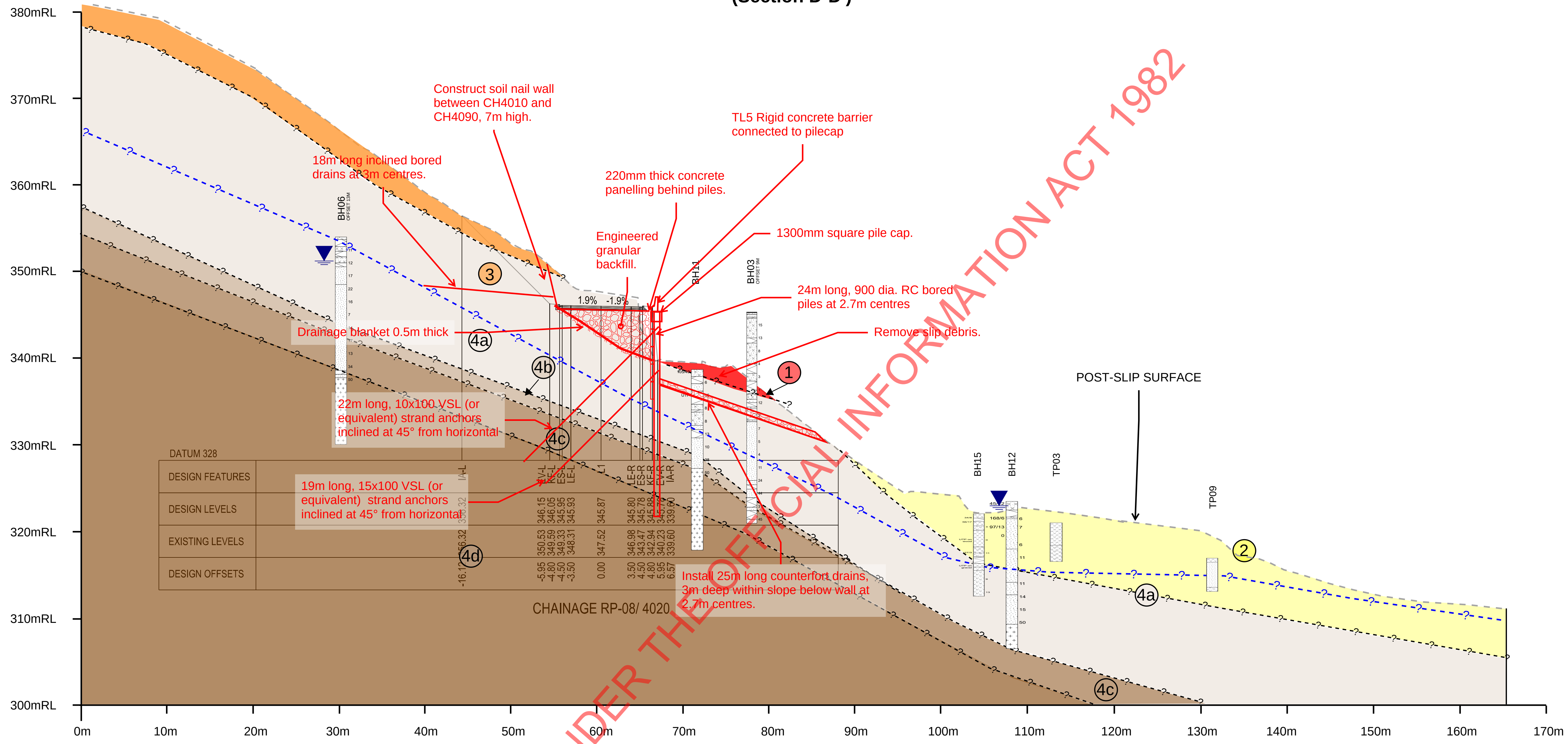
Discipline: GEOTECHNICAL

Drawing No. 3415236-GE-0003
Rev. A

DO NOT SCALE

IF IN DOUBT ASK.

DESIGN SECTION CH4020
Option 10
(Section D-D')



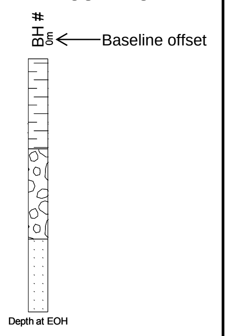
Legend

- ① [FILL]
- ② [RECENT SLIP DEPOSITS]
- ③ [HISTORICAL SLIP DEPOSITS]
- 4a [COMPLETELY WEATHERED ANDESITE]
- 4b [HIGHLY WEATHERED ANDESITE]
- 4c [MODERATELY WEATHERED ANDESITE]
- 4d [SLIGHTLY WEATHERED ANDESITE]

- Pre slip ground surface
- Post slip ground surface
- Interpreted geological boundary
- Measured/dipped groundwater
- Interpreted groundwater level

H 1:500
0 6.25 12.5 17.5 25m
V 1:500
0 6.25 12.5 17.5 25m
Coord. System: NZTM
Height Datum: NZVD2016

POST LEGEND



No.	Revision	By	Chk	Appd	Date
A	FOR ISSUE	ZL	JB		12/04/23

Drawing Originator: Beca

Original Scale (A1)
Reduced Scale (A3) 1:500

Design	ZL	12/04/23	Approved For Construction*
Drawn	ZL	12/04/23	
Dsg Verifier		12/04/23	
Dwg Check	JB	12/04/23	Date

* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI
NEW ZEALAND TRANSPORT AGENCY

Project: SH25A TARAPAHI SLIP

Title: DESIGN SECTION CH4020
EASTERN END OF SLIP SCARP

Discipline: GEOTECHNICAL

Drawing No. 3415236-GE-0004

Rev. A

DO NOT SCALE

IF IN DOUBT ASK.

Retaining Wall Option 10c - Tied back Pile Retaining Wall

Date 30-Apr-23

Extent

Wall Start Chainage	3910		
Wall end Chainage	4050		
Wall Length	140	m	

Wall Piles

Pile spacing	2.7	m	
Pile diameter	0.9	m	
Pile length	24	m	Socket 3m to 5m into SW Andesite bedrock
Number of Piles	51.85185		
Number of Piles	52	round up to nearest whole number	

Cap Beam

Cap Beam Length	140	Also needs a TL5 barrier	

Anchors

Top Anchor	VSL 10 x 100, 22m long (socketed into strong rock)		
Bottom Anchor	VSL 15 x 100, 19m long (socketed into strong rock)		
Number of Top Anchors	52	one per each pile	
Number of Bottom Anchors	52	one per each pile	

Concrete Panel Facing

extent	140	m	extent of wall
depth	10	m	typical depth though main slip area
facing area	1400	m2	probably high, though the sections do not show the final ground levels allowing for excavation.

Slope and debris Excavation

Lateral Extent Slope clearance	120	m	CH3925-CH4045
Width on slope	25	m	5m below wall and 20m downslope
Depth of Debris to clear	3	m	average thickness

https://becagroup.sharepoint.com/sites/project-74652/Shared Documents/Job Delivery/Technical - Working Files/Geotech Design/Option 10c/Option 10 c Quantities.xlsx

Depth for benching	1	m	bench in to CW rock
Overall excavation depth	4	m	
Volume of cut to waste	12000	m3	Volume of cut soil to waste

Slope Protection Rockfill (100mm to 400mm)

Extent on slope	20	m	20m downslope of the wall
thickness	0.5	m	
Lateral Extent	120	m	CH3925-CH4045
Rockfill volume	1200	m3	
Area	2400	m2	geotextile needed

Retaining Wall Backfill (GAP65)

Height	10	m	Varies, typically 10m in the main central section
Depth	12	m	probably a bit high, material will need to be excavated from the wall footprint
Extent	130	m	CH3920-CH4050
Backfill volume	15600	m3	Drainage blanket materials included in this volume
Subsoil pipes and seepage discharges	300	m	Allowance to include subsoils in the drainage layer

Pavement

New pavement length - wall	130	m	New pavement, also needs swale to carry stormwater to culvert
New pavement length - east	50	m	New pavement/realignment
New pavement West	50	m	New pavement/realignment

Cut Earthworks at Eastern Abutment

Extent	80	m	CH4010 to Ch4090
Cut Volume	12000	m3	Trim back existing cut, tie into existing cut.
Allowance for soil nailing face area	560	m2	Ch4010 to Ch4090, 7m high, 200mm thick reinforced shotcrete facing needed
Number of class 1 soil nails	280		One nail per 2m2

Allow for inclined bored drains in slope base. This is covered in the inclined bored drain quantities

Counterfort drains in lower slope

Extent	120	m	along wall
Spacing	2.7	m	
Number of counterfort drains	44.44444		

Number of counterfort drains	45		round up
Length of each drain	25	m	5m below wall plus 20m down slope
depth	3	m	
width	0.4	m	
Excavation volume	1350	m3	
Backfill volume	1350	m3	
Inclined bored drains			in slope above the wall
extent	180	m	130m wall plus 50m east
spacing	3	m	
number	60		
length per inclined drain	18	m	pick up unit 4a thickness
total length of drains installed	1080	m	
Culvert (allowance only)			
new culvert inlet	1	no.	
New 750mm diameter culvert	30	m	no design completed diameter bigger that the existing culvert
Discharge headwall	1	no.	
rock lined channel	60	m	carry stormwater in channel to property boundary