

16 December 2024

New Zealand Transport Agency Waka Kotahi  
P.O Box 1479  
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*Sent via email:* Kate Graham [Kate.Graham@beca.com](mailto:Kate.Graham@beca.com)

Our reference: D240003

Dear Kate

**D240002: New Zealand Transport Agency Notice of Requirement SH 1 Rolleston Access Improvements (Package 2)**

**Request for further information**

Your application for the above Notice of Requirement (NoR) has been assessed for completeness under s92 of the Resource Management Act 1991. A review has been undertaken of the NoR, with the following information request being issued to enable the Council to better evaluate the nature and effects of the NoR:

**General**

In accordance with section 92(1) of the Resource Management Act 1991, I request the following information:

**Noise Effects**

1. For the construction section, the discussion at bottom page 4 suggests it is unknown what may happen at night, whereas table 4 nominates specific activities, and section 4.4 mentions a range of possible reasons for and types of night-time work. Are the specific table 4.4 'activity that could also occur at night; the only activities which may occur at night?
2. We note the currently undeveloped section of MRZ land adjacent to 13A Rolleston Drive. Relative to other sites, this site is located quite close to the flyover. Would the prospect of future dwellings in that location make any difference to MDA's construction or operational noise assessments?
3. Please provide a conclusion on the extent and impact of construction noise and vibration effects over the duration of the project's construction stages, and confirm the definition of reasonable in regards to the acceptability of effects.

**Landscape and Visual Effects**

The LEA generally follows best practice methods for assessing landscape and visual effects. It provides a useful summary of the existing environment and of the proposed development. The assessment has considered effects at an appropriate landscape scale and has identified the viewing audience that is likely to be impacted. There are some areas where further information and/ or clarity is required to assist in the preparation of a full peer review of the LEA. These are summarised as:

4. **Proposed and Existing Planting and amenity.** The existing environment includes a reasonable amount of planting which contributes to the overall amenity of the area; however, it appears that new (or proposed) planting has not been considered as part of the effects assessment. Despite this, there are references where new planting is referenced:

*'The Project will provide a visual transition between the TCZ and MRZ, with avenue tree planting along Rolleston Drive framing and reinforcing the importance of the road while providing some visual softening'<sup>1</sup>.*

*'● Finishing works - lighting, signage, footpath/cycleway installation and line markings, streetscape elements and **landscaping** including street trees, mitigation planting and riparian/wetland planting (to be determined at detailed design stage of project)'.<sup>2</sup> (my emphasis)*

As stated, the LVA recommends a LMP is prepared in accordance with various NZTA landscaping guidelines. The effects assessment includes references to proposed planting, and is expanded upon within the Recommendations section, however there is no confirmation that proposed planting has been considered within the assessment. Further, a greater level of certainty is required to better understand the extent of how the project (along with new planting) will '*maintain amenity values*<sup>3</sup>'; and '*maintain the environmental qualities, aesthetics and amenity values that make the zone distinctive and attractive*<sup>4</sup> of the relevant zone objectives and policies. This is especially important for the landscape effects assessment, where there will be a 'reduction in visual amenity of the streetscape'<sup>5</sup>. A working concept or a preliminary version of the ULDF and LMP would assist to better understand this. This would also assist to better understand how the new gateway will contribute to landscape amenity<sup>6</sup>.

**Proposed and Existing Planting and amenity:**

- i) Provide additional information on the proposed planting and areas where new tree locations are proposed.
- ii) Detail areas where existing vegetation will be removed.
- iii) Provide draft or preliminary versions of the ULDF and LMP.
- iv) Confirm in the assessment how the proposal relates to the relevant objectives and policies of the affected zones.
- v) How the 'new' gateway will contribute to landscape amenity.

5. **Visual Effects on residents:** The LVA identifies two key areas where residents will receive potential visual effects (from properties on Wyndham Mews, Dalwood Crescent and Maitland Crescent, as well as on Rolleston Drive). These areas are each represented by Photosimulations<sup>7</sup>. In Section 6.1.2 under Perceptual Effects (in the Landscape Effects Section), the following is stated:

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<sup>1</sup> LVA, Section 6.2.2 b), and page 15.

<sup>2</sup> LVA, Section 6.3, page 16.

<sup>3</sup> GIZ-02

<sup>4</sup> CMUZ-P4 (1)

<sup>5</sup> LVA, Section 6.1.2, page 13.

<sup>6</sup> For instance, it is commented at the top of page 13 of the LVA that '*the location of the proposed overpass at the 'gateway' to Rolleston aims to improve function of this major intersection and provide a better overall experience for road users*', but no comment is made on how this will change/ improve landscape amenity.

<sup>7</sup> LVA, Section 6.2.1, page 14.

*'For the residential area to the southeast of the Project, effects on perceptual values may arise from the elevated nature of the overpass and a sense of overlooking, contributing to a perceived loss of privacy and increased presence of traffic and lighting. This is discussed in more detail in Section 6.2 Visual Effects Analysis. For some dwellings, the proposed interventions (such as extension of the second southbound lane) will mean that the road corridor and resulting vehicle movements will be closer to their properties and likely more noticeable, for example at 5A Seymour Drive (refer to Appendix 7 General Arrangement Sheet 3 of 7) where the proposed retaining wall comes within 2m of the property boundary (demarcated by the fence atop the earth bund). The degree of perceptual effect relates to the extent of the vegetation able to be retained - noting the earth bund, planting and vegetation is proposed to be retained'.*

It is not clear whether all residential properties have been fully assessed. As such, it is recommended that a **tabled effects assessment** (or similar) be provided of all affected residential properties that border SH1. This information would include each property's estimated current outlook, the degree of change to this outlook and the anticipated visual effects of this change (if any). Properties on Seymour Drive do not appear to be covered in the section above, and the above is very general for each property. A table may look like the example below (extending from Wyndham Mews to 5C Seymour Drive and also including those properties on Rolleston Drive):

<b>Residential Property</b>	<b>Current outlook</b>	<b>Degree change</b>	<b>of</b>	<b>Resultant visual effects</b>
5C Seymour Drive				
5B Seymour Drive				
5A Seymour Drive				

It is appreciated that there may be many properties that receive an overall 'no change' or negligible/ neutral visual effects, however, this style of assessment will provide clarity over this.

**Provide a more comprehensive visual effects assessment from adjoining residential properties in a tabled format (or similar).**

6. It would be helpful for **representative cross sections** of those properties fronting SH1 where a retaining wall is proposed so it can be clearly understood what the level of change is (i.e. what type of retaining wall, and associated alignment with existing property areas and retention of vegetation (and/ or proposed planting opportunities) in this area) and what the resultant visual effects are.

Provide representative cross sections of properties fronting SH1 illustrating the proposed changes

7. **Lighting effects:** The effects arising from additional street lighting within the night environment associated with the overpass and new intersections has not been adequately assessed from residential areas. Further information from a landscape perspective is required on this. Reference should be made to the separate lighting report within the AEE.

**Provide further information on the lighting effects from residential areas within the night environment, including referencing the Lighting Report.**

## Lighting Effects (marked up plans from Stantec attached)

8. Lighting Assessment Report Package 2 - The Executive Summary, paragraph 4, states that the Threshold Increment (TI) needs to be below 12% and the Upward Waste Light Ratio (UWLR) shall not exceed 0% to comply with NZTA M30, however these requirements differ from the corresponding section from the Lighting Assessment Report Package 1, plus NZTA M30 quotes a TI of 10% and an UWLR of 1% (not 12% and 0% as stated in the report). The Paragraph 4 TI and UWLR values are also contradicted later in the same report (Glare and Skyglow sections). The same report for Package 1 states that the TI needs to be below 15% and the UWLR shall not exceed 1% in accordance with AS/NZS 1158, and these requirements should still apply to Package 2. *This is not being noted as a lighting design non-compliance, but more of a query as to why the TI and UWLR requirements have changed since Package 1 was issued. Surely both packages (1 and 2) should have the same UWLR and TI requirements?*
9. Lighting Assessment Report Package 2 - There is a Section titled "Proposed Environment", which appears in the Table of Contents, and is between Sections 5.1 and 5.2, but is not numbered. I believe this Section should be numbered as 5.2 and the next section renumbered as Section 5.3. *This is not being noted as a lighting design non-compliance, but more of a heads-up to the lighting designer that the report formatting needs some attention due to a possible typo.*
10. Drawing 3338703-20-CU-3500 - Column Type M specifies a shear based double arm lighting pole, but I believe that this arrangement won't meet the structural requirements of NZTA M26, whereas a ground planted double arm pole will. *This is not being noted as a lighting design non-compliance; however, I think it would be prudent for the lighting designer to check with the pole supplier to confirm that the requirements of NZTA M26 are met with the proposed double arm lighting pole.*
11. Drawing 3338703-20-CU-3500 - Note 6 specifies a shorting cap to be fitted to each luminaire, however NZTA M30 (NZTA Specification and Guidelines for Road Lighting Design) requires that a CMS system is considered. The use of a shorting cap will require the power supply to be controlled by the local electricity company where they will switch the luminaires on and off remotely by whatever system they employ. Whereas a CMS system will require a Light Point Controller (LPC) to be installed on each luminaire where the switching and dimming is controlled via the CMS system. *Please get the lighting designer to confirm that NZTA is happy with the use of shorting caps on each new luminaire.*
12. Drawing 3338703-20-CU-3521 - Calculation Summary table presents one set of luminance calculation results, but what lane configuration does this calculation apply to? There appears to be single lanes diverging into double lanes and double lanes merging into single lanes. There needs to be multiple luminance calculations to account for the different lane configurations. *Please get the lighting designer to confirm that the luminance calculations apply to all of the lane configurations (4-lane and 2-lane divided carriageways) or supply additional calculation results to cover all arrangements.*
13. Drawing 3338703-20-CU-3521 - Calculation Summary table presents illuminance and uniformity calculations for the SH1 northbound diverging lanes, but according to the north symbol on the drawing the diverging lanes are going in an easterly direction, also where are the calculations for the westbound merging lanes on the other side of SH1? *Please get the lighting designer to change the lane directional description so that it aligns with the true geographic direction. Please get the designer to include illuminance calculations for the westbound merging lanes.*
14. Drawing 3338703-20-CU-3521 - Calculation Summary table presents illuminance and uniformity calculations for the Brookside and Tennyson intersections, and lane divergence, but these appear to be limited to the carriageway areas...where are the calculations for the surrounds? *Please get the lighting designer to provide calculations for all applicable design areas (carriageways and surrounds) at all locations in accordance with AS/NZS 1158.1.1 Figures 4.2, 4.4, 4.8 and 4.10.*



15. Drawing 3338703-20-CU-3522 – Same comment as Item 5 above. *Please get the lighting designer to change the lane directional descriptions so that they align with the true geographic direction. Please get the designer to include illuminance calculations for the westbound merging lanes.*
16. Drawing 3338703-20-CU-3522 - Calculation Summary table presents illuminance and uniformity calculations for the diverging and merging gore areas and the sharp bend, but these appear to be limited to the carriageway areas...where are the calculations for the surrounds? *Please get the lighting designer to provide calculations for all applicable design areas (carriageways and surrounds) at all locations in accordance with AS/NZS 1158.1.1 Figures 4.2, 4.4, 4.5 and 4.8.*
17. Drawing 3338703-20-CU-3523 - Calculation Summary table presents illuminance and uniformity calculations for the SH1 southbound diverging lanes, but according to the north symbol on the drawing the diverging lanes are going in a westerly direction. *Please get the lighting designer to change the lane directional description so that it aligns with the true geographic direction.*
18. Drawing 3338703-20-CU-3523 - Calculation Summary table presents illuminance and uniformity calculations for the diverging lanes, but these appear to be limited to the carriageway areas...where are the calculations for the surrounds? *Please get the lighting designer to provide calculations for all applicable design areas (carriageways and surrounds) in accordance with AS/NZS 1158.1.1 Figure 4.2.*
19. Drawing 3338703-20-CU-3525 - Calculation Summary table presents one set of luminance calculation results per road, but what lane configurations do these calculations apply to? For Kidman St, the eastbound side goes from a single lane to double lanes with one lane on the westbound side; and for Rolleston Dr there is a single lane diverging to three lanes on the northbound side and two lanes merging into one on the southbound side. There needs to be multiple luminance calculations to account for the different lane configurations. *Please get the lighting designer to confirm that the luminance calculations apply to all of the lane configurations (multilane divided carriageways) or supply additional calculation results to cover all arrangements.*
20. Drawing 3338703-20-CU-3525 - Calculation Summary table presents illuminance and uniformity calculations for two intersections and the diverging/merging lanes, but these appear to be limited to the carriageway areas...where are the calculations for the surrounds and splitter island nose areas? Also, where are the illuminance calculations for the curved exit lane? *Please get the lighting designer to provide calculations for all applicable design areas (carriageways and surrounds) at all locations in accordance with AS/NZS 1158.1.1 Figures 4.2, 4.3, 4.4, 4.5, 4.8 and 4.10.*
21. Drawing 3338703-20-CU-3526 - Calculation Summary table presents one set of luminance calculation results, but what lane configuration does this calculation apply to? The overpass goes from two northbound lanes to three lanes and a single southbound lane on the opposite side. There needs to be multiple luminance calculations to account for the different lane configurations. *Please get the lighting designer to confirm that the luminance calculations apply to all of the lane configurations or supply additional calculation results to cover all arrangements.*
22. Drawing 3338703-20-CU-3526 - Calculation Summary table presents illuminance and uniformity calculations for one intersection and diverging lanes, but these appear to be limited to the carriageway areas...where are the calculations for the surrounds and splitter island nose areas? There also appears to be some missing isolux lines from the overpass lights. *Please get the lighting designer to provide calculations for all applicable design areas (carriageways and surrounds) at all locations in accordance with AS/NZS 1158.1.1 Figures 4.2, 4.3 and 4.10. Please get the designer to plot all of the isolux lines.*

23. Drawing 3338703-20-CU-3527 - Calculation Summary table presents illuminance and uniformity calculations for one intersection and the diverging lanes on Johns Rd, but these appear to be limited to the carriageway areas...where are the calculations for the surrounds? Also, where are the illuminance calculations for the eastbound merging lanes on Johns Rd east of the intersection? *Please get the lighting designer to provide calculations for all applicable design areas (carriageways and surrounds) at all locations in accordance with AS/NZS 1158.1.1 Figures 4.2 and 4.9.*

### **Transport Effects (complete RFI from Abley attached)**

**Please Note** – that RFI items 1-8 were requested for Package 1 but also remain relevant in the context of Package 2 as both packages rely on the same ITA and underlying modelling. At the time of preparation of this technical note, the responses to the Package 1 RFI have not been reviewed by the Abley team.

24. RFI 1 - Please provide a copy of the Paramics transport model peer review report and any associated formal model calibration and validation reports. In lieu of formal reporting please supply the model themselves.
25. RFI 2 - Please provide evidence of any peer review of the Linsig and Sidra models and/or any associated formal reporting to evidence the calibration and validation of these models. In lieu of formal reporting please supply the model themselves.
26. RFI 3 – Please undertake a sensitivity test at 2038 in the morning and evening peak periods to demonstrate the impacts of the addition of traffic from the full development of PC73, PC80, PC81 and PC82 areas.
27. RFI 4 – Provide detail of the future growth assumptions out to 2038 with respect to the extent of growth in Izone and number of additional households in Rolleston urban area.
28. RFI 5 – Please provide commentary as to the impact of any of these changes in local road projects on the modelling results and wider assessment of traffic effects.
29. RFI 6 – Confirmation is sought that these are hourly travel totals, correspond to the full Paramics study area and whether further changes in travel totals might be expected beyond the study area.
30. RFI 7 – Additional assessment is requested at 2038 to calculate the capacity of local roads to demonstrate that they will operate well and future flows not exceed capacity.
31. RFI 8 – Please add a footnote or other reference to confirm the source of the models used for this assessment.
32. RFI 9 – For the avoidance of doubt it is recommended that the requirement for an LCSIA be added to the condition set noting proposed changes to the Hoskyns Road level crossing.
33. RFI 10 - Please provide further details on the additional distance and time that trips to and from these properties due to rerouting.
34. RFI 11: Please confirm whether the upgrade to this intersection should be an identified prerequisite for undertaking the Package 2 works, and if not, whether the potential safety and efficiency effects at this intersection are acceptable if the Package 2 works are undertaken without this intersection being upgraded.

35. RFI 12 - Please comment on the interrelationship between Package 1 and Package 2, and confirm whether any local road (Selwyn District Council) improvements are required to manage the effects of the Rolleston Access Improvements Project on local roads. Where interrelationship or dependencies exist, please confirm how this is proposed to be managed during the delivery of each Package.
36. RFI 13 - It is recommended that the CTMP condition be expanded to include at a minimum the requirements and objectives from section 7.5.2 of the ITA. This provides an important framework for the later preparation of CTMPs. Further, please comment on the extent to which Council approval and/or consultation with Council will be undertaken for Site-Specific Traffic Management Plans (SSTMPs) that affect local roads, either directly through temporary signage/markings, or indirectly through changes to traffic movements.
37. RFI 14 - It is recommended that consultation regarding property access be addressed through the proposed conditions.
38. RFI 15: Please confirm whether the extent of designation over Selwyn District Council roads will be removed once Package 2 works are completed.
39. RFI 16: Please provide an assessment of the performance of the 804 Jones Rd western access approach to the Rolleston Drive extension / Jones Road intersection, including how the phasing operates.
40. RFI 17: Please provide further details on how left in-left out movements for 808 Jones Road will be encouraged, and how vehicles are expected to turn around within George Holmes Road. Please provide further details of how left turns out may create safety and/or efficiency effects if drivers attempt to turn onto the overbridge.
41. RFI 18: Please provide further details access options that have been considered for 13A to 19B Rolleston Drive, and an estimate of additional travel time and travel distance resulting from the left in/left out restriction
42. RFI 19: Please provide further detail on how landowners that have turning restrictions for private vehicle accesses have been consulted, and provide a summary of any feedback provided by the landowner.
43. RFI 20 - Please provide:
- a) A copy of the preliminary Safe System Audit for the design which we understand has been prepared.
  - b) Commentary on whether the berm space on the southern side of SH1 provides the opportunity to provide the "Future Reserve Path" proposed by Selwyn District Council as part of its Walking and Cycling Strategy (and shown in Figure 5-10 of the ITA).
  - c) Confirmation of whether the turning head at the end of George Holmes Road and the "KiwiRail access track", both shown on General Arrangement Plan 3338703-20-CA-1201, form part of the Package 2 works.

## Air Discharge Effects

### 44. Compliance with accepted good practice:

The AEE frequently refers to the CASANZ GPG (2023) and NZTA Guideline (2019). NZTA have completed a draft update to their guideline (2024). NZTA have also provided guidance on how the CASANZ GPG should be used in New Zealand including detailed comments on how construction effects should be assessed.

Please:

- a) Review the NZTA 2024 guideline and NZTA advice on how the CASANZ GPG should be used in New Zealand. Note this may have bearing on how the answers to the following questions are responded to; and,
- b) Identify any areas with the Rolleston AEE that don't meet the current NZTA recommendations and amend those sections as necessary.

### 45. Construction Dust Assessment

The assessment relies on a buffer distance of 50 m to assess the impact of dust nuisance effect on residents, commercial activities and industrial activities. (Tables 7-1 to 7-3).

Please either:

- a) Provide evidence that construction dust will not travel further than 50 m; or
- b) Revise assessment to consider the NZTA recommendation - considering HSRs within 200m from the activity footprint; or
- c) Revise the assessment using the CASANZ Categorisation of Receptors by distance from Sound (Table G2); or,
- d) Consider the CASANZ recommendation of human receptors within 350 m and 500 m from construction site entrances.

### 46. NZTA Guideline requires:

"Any assessment of dust effects used to support a resource consent application must include a FIDOL (frequency, intensity, duration, offensiveness and location) assessment in accordance with the recommendations in the MfE Good practice guide for assessing and managing dust".

Section 7.2 of the AEE details the FIDOL factors and Section 7.3 details the assessment method. Section 7.3 doesn't address all the FIDOL factors (e.g. offensiveness or duration).

Please:

- a) Explain the relationship between the FIDOL assessment outlined in 7.2 and the method described in Section 7.3?;
- b) Revise the dust assessment method used to meet the recommendations of NZTA; and,
- c) Provide an updated assessment to reflect a complete FIDOL assessment.

### 47. Dust mitigation and Dust monitoring

NZTA highlight the Importance of Dust management and monitoring plan

*"Where there is a high risk of effects of amenity from construction activities, more stringent control measures will be required, and these should be set out in a specific Construction Air Quality Management Plan (CAQMP) (refer to Section 4.4 for further information). Waka Kotahi has developed a template to assist with preparing a CAQMP which is available at [Air quality | Waka Kotahi NZ Transport Agency \(nzta.govt.nz\)](https://www.nzta.govt.nz/air-quality/waka-kotahi-nz-transport-agency)." While Section 3.1.5 of the AEE lists generic*

dust mitigation measures, until a site specific Construction Air Quality Management Plan (CAQMP) it is very difficult to complete a review and check the conclusions of the project's dust assessment.

Please provide a dust management plan that fulfils the requirements of:

- a) And NZTA CAQMP including the types, sizes and locations of dust sources; and
- b) Includes a section on dust monitoring (See Section E.2.2 CASANZ GPG).

## Operational results

48. The NZTA Guideline and CASANZ both outline a tiered assessment method of considering the effects of the operational emissions:

- NZTA - Screening, preliminary technical and detailed assessment; and,
- CASANZ - Scoping, screening, and detailed assessment.

The Rolleston assessment presents a detailed assessment. Please explain how the detailed assessment method used for the Rolleston project fits in with the recommended tiered assessment methods required by both NZTA and CASANZ.

49. The effects of NO<sub>2</sub> are assessed by modelling GLCS of tailpipe direct NO<sub>2</sub> emissions being combined with background NO<sub>2</sub> concentrations. CASANZ GPG recommends the use of a NO<sub>x</sub>-NO<sub>2</sub> model. Rgw NZTA Guideline notes "*Post-processing of dispersion modelling outputs will be required, for example to account for the conversion of NO to NO<sub>2</sub>, and for calculations of total pollutant concentrations including background concentrations*". NZTA have just developed a roadside NO<sub>x</sub>-NO<sub>2</sub> for New Zealand conditions.

Please review the NZTA requirements for assessing NO to NO<sub>2</sub> conversion and either:

- a) Update the assessment to include the impact of NO to NO<sub>2</sub> conversion. Using the NZTA model would see an easy and appropriate approach for this task; or,
- b) Justify not accounting for NO to NO<sub>2</sub> conversion in the detailed assessment.

50. Some results presented in Tables 8.1 to 8.5 are hard to reconcile intuitively.

- a) Explain why the results are "similar for both Scenarios?" Comparing emission rates, vehicle speeds, vehicle numbers and composition of fleet would be very helpful.
- b) Explain differences in concentrations with and without project. Eg. GLCs of pollutants in Receptor Area Four and Receptor Area 5 decrease with project while Receptor area three increases with the project.
- c) Explain why Receptor Area 4 decreases with the project when road is closer to this receptor area. for with and without project.
- d) Please check and confirm the title of Table 8.5.
- e) Please present summary results (similar to Table 8.5) 24-hour NO<sub>2</sub> GLCs.

51. IAQM methods of defining the significance of the difference between with and without project is discussed in section 4.5.9 of the CASANZ and categorizing impacts.



Please review and, if necessary, revise the assessment of significance of effects presented in section 8.3.4 with consideration of the factors recommended in section 4.5.9 of the CASANZ GPG.

### **Modelling methodology Appendix B**

52. The AEE utilizes AERMOD RLine-EXT to model GLCs of pollutants. This model option has not been widely used in New Zealand for assessing the impacts of contaminants discharged during the operational phase of a roadway. This model option is not considered in either the NZTA Guideline or CASANZ GPG.

Please provide either:

- a) Evidence of RLine-EXT validation to demonstrate it matches requirements of this project:  
or.
- b) A high-level (semi-quantitative) validation of the model results using either roadside monitoring data from similar sites of the NZTA screening tool.

53. Please provide one example of each of the input and output RLine-EXT files.

54. Please provide a table of the traffic numbers, fleet composition and speed of the road links considered in the assessment. This will help with the understanding of the answers to questions 8, 9 and 10 above.

55. Please provide a readable screen shot/s of the VEPM model data input page.

56. Section of the AEE details the parameters used to configure RLine-EXT. Section 4.5.3 of the NZTA Guideline discusses the importance of understanding the accuracy and uncertainty of emission and dispersion modelling. Section 4.5.7 of the CASANZ GPG discusses model uncertainty and highlights the importance of this when there is a lack of data (e.g. model validation).

Please provide a high-level assessment on the uncertainty contained in the emission and dispersion model results presented in the AEE. This assessment should, at least, consider the sensitivity of the RLINE results to the source parameters selected.

### **Ecological Effects**

57. Lizard habitat extent - Most of the of the potential lizard habitat on site has been identified appropriately. However, based on aerial imagery there are a couple areas on the northern side of SH1 (see screen shot below) that appear to be a complex of rank grass, scrub and treeland, that has potential to be lizard habitat. These are not within the identified works footprint, but are within the identified Zone of Influence (ZOI).

It is noted that construction methodology had not been finalised (when the report was compiled) and the ZOI is wider than the planned works in most areas to allow for this. Therefore, if there is more up to date information on the extent of the works footprint then this should be provided, otherwise it is recommended the extent of the potential lizard habitat on the site is re-examined, to include all areas within the ZOI.

58. Lizard survey - A survey is not an effects management measure – it is used to guide effects management (i.e. to determine population extent, abundance and habitats throughout the impact area).

It is recommended that a lizard survey is undertaken by a suitably qualified and experienced herpetologist.

59. Lizard management - The report infers that the population at the site would not be fragmented by a salvage, which may not capture and translocate all lizards present within the impact site.

It is unclear what 'staged vegetation management' is and how this would not disrupt the lizard population. It is assumed that this would be 'staged vegetation removal' but further details are required on how this would be implemented. Specifically, where/if there is no suitable habitat immediately adjacent, for displaced lizards to move into.

It is recommended that the applicant provide further detail on how 'staged vegetation management' will be used to avoid disrupting lizard populations, that may already be limited by external factors, such as ongoing predation and habitat extent.

The report identifies the need for a Lizard Management Plan (LMP), but does not mention the need for Wildlife Act Authority (WAA). It is likely that any vegetation management would still directly disturb or harm indigenous lizards and therefore need a WAA. Given the long processing time for WAA, it is recommended that this process is commenced.

## **Stormwater Effects**

### **60. 2.3 Contaminated Land Detailed Site Investigation**

Note - At stormwater disposal relies on discharge to ground, it is critical that the contaminated land risk is understood. As indicated in the Package 2 report, we concur that it is critical that testing is done at the locations of the proposed ponds.

### **61. 2.3 Groundwater (incl Geotechnical Interpretive Report)**

The highest groundwater depth was based on a short monitoring period between 12 July and 12 August 2024. Has the highest recorded groundwater in the area been considered based on any other monitoring data? And if so, what was the highest recorded?

### **62. 2.6.3 Jones Road & Hoskyns Road**

Location of historic flooding mentioned, but location in Figure 2-8 is not shown. Can the location of the historic flooding be confirmed.

### **63. 3.2 Design Assumptions**

A key design assumption is that "As a minimum, the design will include first flush treatment, attenuation and disposal to ground up to the 1% AEP event for an impervious area equal to the additional impervious area created by the project". It is noted that some catchments with additional impervious area, no treatment is proposed. Refer to RFI 71.

### **64. 3.2 Design Assumptions**

Note - A key design assumption is that the existing site levels in critical locations will be retained as to not alter existing overland flow paths. From the SDC flood hazard mapping (200-year), a major overland flow path is to the north of the proposed overpass and a lesser to the south. A flood risk assessment as per the SDC Engineering Code of Practice may not be required if it can be confirmed that there is no change.

### **65. 3.4.1 Rainfall Applicant to confirm the location or station used to extract the data. It appears that the rainfall data is from the Burnham RAWs station. This is similar to Package 1.**

### **66. 3.4.5 Ground Soakage Rates**

The total contributing catchment is > 1,000 m<sup>2</sup> and there is a residential area downstream of the proposed site. Based on Table 3-4, what was the justification for the lower factor of safety applied (i.e., 5 vs the table recommended 10)?

### **67. 3.4.5 Ground Soakage Rates**

Observation - The SDC engineering code of practice requires consideration to WWDG Chapter 6 when considering infiltration rates. The recorded infiltration rates are high (as expected for the type of soils) and the design soakage rate is higher than the 75 mm/hr recommended by WWDG.

This is acceptable based on the result and agree with recommendation made that further soakage test is required during construction. Test should be done at location and depth proposed of proposed soakage basins.

68. 4.3.1 Road Corridor Catchment

Referencing Figure 4.1, there will be an expected change in slope in some areas in the catchment (e.g., overpass). Has consideration been given to the effect on stormwater runoff due to the change in slope and/or material (hardfill)?

69. 4.3.3 Cross-Drainage Catchments

Note - This is a critical design assumption and it is recommended that the design levels are verified against existing.

70. 4.4.2 Treatment

For both the infiltration basin and the proprietary devices - To understand the potential effect of runoff, the contaminants expected from the road is listed, but will there be an increase or decrease in the concentrations due to the proposed activity? What is the expected removal efficiency of the proposed devices and, based on the efficiency to remove the required pollutants, is the conclusion that the proposed treatment provided is sufficient treatment (based on relevant water quality guidelines and/or consents)? [Urban Runoff Quality Information System \(URQIS\) | NIWA](#) can be consulted for water quality data

71. 4.4.3 Discharge to Ground

Refer to RFI #2 - Consideration needs to be given to the highest recorded groundwater level (the recorded period of July to August 2024 is considered short) and that should be used to determine if the performance of the proposed infiltration basin will be affected by groundwater mounding or not. It is likely that the highest historical recorded groundwater level is well outside of the influence of groundwater mounding, however it is important to consider available historic information as part of the assessment.

72. 4.4.4 Attenuation

Can sizing calculations be provided for both the sizing of the attenuation and the treatment?

73. 4.4.4 Attenuation

Reference is made in the last paragraph to the small sections of new impervious areas not being able to be conveyed to the basins. The report states that the stormwater from these areas will be managed in a way that matches the existing network in each catchment and that allowance will be made to cater for the increase in impervious areas. Would this allowance be to match pre-development runoff up to and including the 1% AEP runoff event?

74. 4.4.5 Cross-Drainage

The cross-drainage has been designed to collect the eastern and western cross-catchments. In section 2.5 it is indicated that there is no existing cross-drainage through SH. Will the proposed cross-drainage infrastructure result in a change in flood risk downstream now that there is new flow paths via the proposed cross-drainage infrastructure? If so, what will the effect of this cross-drainage infrastructure be?

75. 5.2.1 Overpass North Catchment

The second paragraph has missing text

76. 5.2.1 Overpass North Catchment & 5.2.2 Overpass South Catchment It is proposed that catchpits and pipes will capture and convey the stormwater runoff towards the basins. Will this infrastructure be sized to capture up to and including the 1% AEP runoff?

### 77. 5.3 Minor Catchments

Refer to RFI #4 - It is indicated that runoff from the increased impervious areas will not be treated, but in the design assumptions it is stated that runoff from additional impervious areas will be treated. It is noted that for Jones Road Catchment (450 m<sup>2</sup>), the additional area is due to a shared walkway and this may not require treatment. It is unclear if this is the same for the Western Catchment (580 m<sup>2</sup>). The impact of the additional impervious catchment can be assessed and compared to the existing (e.g., NZTA Stormwater Treatment Standard for State Highway Infrastructure).

### 78. 6 Construction Stormwater Management

Is there an increased risk of flooding during the construction phase and if so, how will it be managed?

### 79. DRG 2102: Civil - Drainage (Sheet 2 of 7)

Runoff captured by SWSD-9 is proposed to be directed to the first flush and soakage basins. Will this be feasible considering the RL (based on the plan contours) are roughly 54.4 m (rough rim elevation) and the GL around the basins are 55.0 m RL. It does not look like the basins have been modelled, but the water level in the basins may impact the hydraulic performance of SWMH-8 and SWSD-9. Something that should be resolved as part of design development going forward.

## Geotechnical

80. Please confirm that there will be a full geotechnical report prepared as part of detailed design, that will include site testing and other geotechnical information, such that the ground conditions, environmental effects and risks can be confirmed and mitigation measures adapted to suit.

## Contaminated Land

The Review of Contaminated Land report is attached to this RFI request.

81. The status of contamination on land north of the Rolleston Drive and Main South Road intersections (future overpass location at 801 Jones Road) needs clarification. This piece of land could not be accessed for testing by Beca (northwest of Rolleston Drive and Main South Road) since it appears to be confused with land indicated by Stantec as previously tested and remediated.

82. Update the Beca DSI report to address reporting errors highlighted in Section 2.2 of the Review of Contaminated Land Report. We recommend that a cursory check of the report is undertaken after it is updated to ensure that no significant errors remain.

83. Address by further investigations areas of uncontrolled fill, hydrocarbon contamination and coal tar in surficial roading, to delineate the extents of these areas of concern. Conversely, these requirements could be incorporated into the NESCS consent issued by SDC as a condition to be implemented prior to breaking ground for NOR Package 2 works.

## Process

You must respond in writing to this request before 27 January 2024 and do one of the following:

- a) Provide the information.
- b) Tell us that you agree to provide the information, but propose an alternative reasonable date.
- c) Tell us that you refuse to provide the information.

Once the Council is satisfied that it has adequate information, a report will be finalised to consider and make a recommendation on how to deal with your request.

Please contact me on (021) 721 623 or [m.mcconnell@harrisingrierson.com](mailto:m.mcconnell@harrisingrierson.com) if you have any questions.

I have put the processing of your application on hold until we receive your complete response.

Please contact me if you have any questions.

Yours faithfully

A handwritten signature in blue ink, appearing to read 'Mary McConnell', is positioned above the printed name.

Mary McConnell  
**Consultant Planner**

**Appendices:**

Abley – Transport Planning and Engineering RFI

Stantec - Lighting Drawings

PDP – Review of Contaminated Land Report



# NZ Transport Agency Waka Kotahi SH1 Rolleston Access Improvements | Package 2

## Transport Planning and Engineering s92 RFIs

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<b>Prepared for</b>	Selwyn District Council
<b>Project Number</b>	SDC-J084
<b>Revision</b>	A
<b>Issue Date</b>	10 December 2024
<b>Prepared by</b>	Mat Collins, Associate Transportation Planner; Dave Smith, Technical Director - Transportation Planning
<b>Reviewed by</b>	Dave Smith, Technical Director - Transportation Planning

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## 1. Introduction

Abley Limited (Abley) has been engaged by Selwyn District Council (Council) to provide independent transport planning advice in respect of several Notices of Requirements (NoR) in Rolleston prepared by NZ Transport Agency Waka Kotahi NZ Transport Agency (NZTA) for the SH1 Rolleston Access Improvements Project.

SH1 Rolleston Access Improvements Project has been divided into two packages:

- Package 1 - comprising the construction and operation of a new roundabout and associated improvements at the intersections of SH1 and Dunns Crossing Road/Walker Road and associated works.
- Package 2 – comprising the construction and operation of the balance of the Rolleston Access Improvements including an overpass of SH1 connecting Rolleston Drive North and Jones Road, changes to nearby intersections (including Hoskyns Rd, Tennyson St, and Rolleston Drive South) and associated works.

Abley requested additional information about Package 1 in our technical note dated 12 November 2024. This technical note requests additional information in relation to Package 2. Noting that both packages share the same ITA report, where requests were made in the Package 1 technical note that also relate to the assessment of the Package 2 improvements these matters have been repeated here for completeness sake.

The Package 2 NoR boundary is shown in Figure 1.1 and the works include:

- Closure of the existing intersection of SH1 and Rolleston Drive North and construction of an overpass, over SH1 and the railway, to connect to Jones Road, with walking and cycling facilities.
- A new exit lane from SH1 southbound to Rolleston Drive North and a new service lane.
- Left turn only access / egress at Tennyson Street, Brookside Road, and Rolleston Drive South.
- A left turn only egress from Hoskyns Road onto SH1 northbound.

- Various ancillary works including, but not limited to, the construction of stormwater detention basins,

reconfiguration of property access and associated road works within the local road network.

This technical note has been requested to confirm whether the submitted information is sufficient, or whether further information is required to understand the effects of the NoRs under section 92 of the Resource Management Act 1991 (RMA) in relation to transport matters. We have reviewed the following documents

- Notice of Requirement for Alteration of a Designation – Designation NZTA-1 – State Highway 1 prepared by Mr Pearson for NZ Transport Agency dated 26<sup>th</sup> November 2024.
- Package 2 Assessment of Effects on the Environment (AEE), prepared by NZTA, dated 30 November 2024 – introduction and transport sections only.
- AEE Appendix H Integrated Transport Assessment, prepared by Beca, dated 29 October 2024.
- AEE Appendix C General Arrangement revision C, prepared by Beca, dated 11 October 2024.
- Consent Order issued by the Environment Court in relation to ENV-2023-CHC-113, dated 31 October 2024.

This technical note does not contain any recommendation on whether or not the proposal should be approved or declined by the decision-maker.

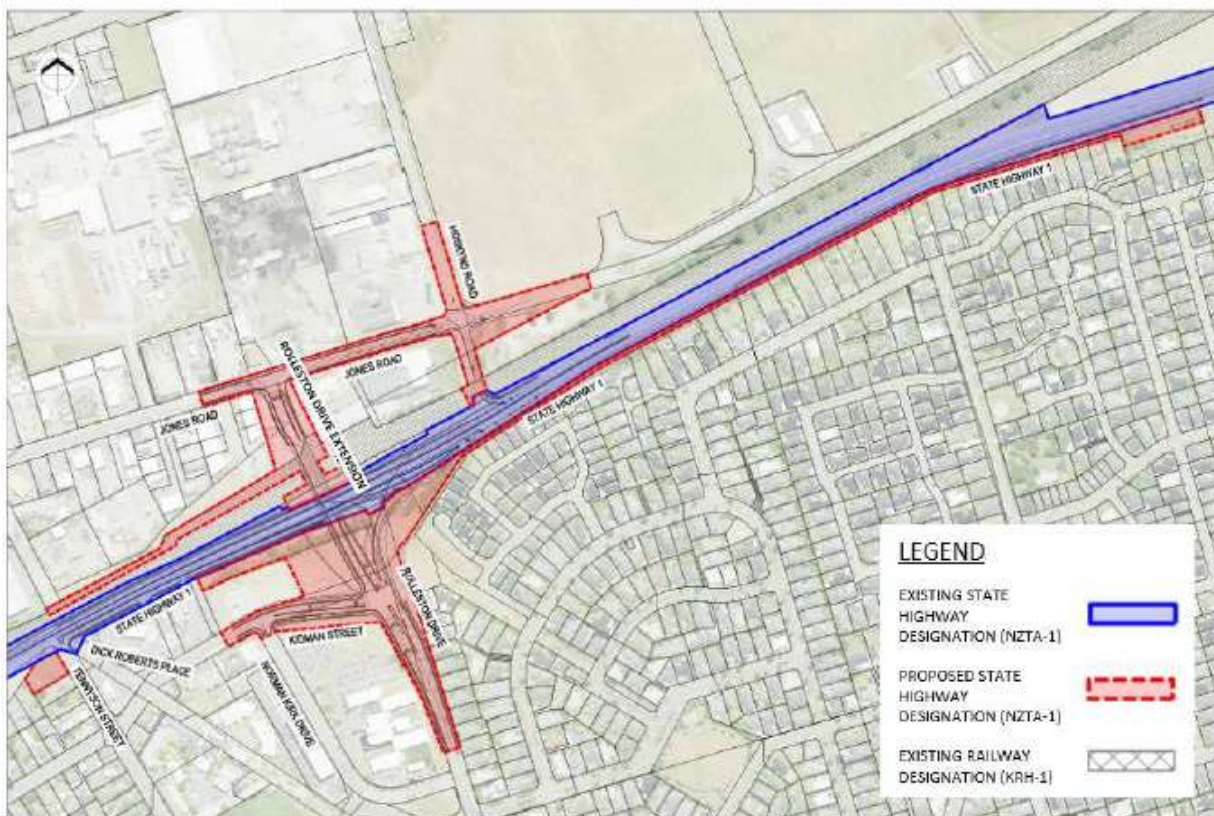


Figure 1.1 Designation plan (reproduced from the AEE)

## 2. Section 92 information requests

The following subsections include our discussion of where we consider that the lodged documents have gaps in the description and extent of the activity, and the nature of its effects.

**PLEASE NOTE** – that RFI items 1-8 were requested for Package 1 but also remain relevant in the context of Package 2 as both packages rely on the same ITA and underlying modelling. At the time of preparation of this technical note, the responses to the Package 1 RFI have not been reviewed by the Abley team.

### 2.1 Transport model assumptions and peer review

Section 4.2 of the ITA states that the DBC Paramics transport model has been independently peer reviewed. It is important to understand the scope of the peer review, and any limitations or caveats that may have been cited by the peer reviewer.

It is essential that the calibration and validation of the model is well understood to confirm that it is fit-for-purpose.

**RFI 1 - Please provide a copy of the Paramics transport model peer review report and any associated formal model calibration and validation reports. In lieu of formal reporting please supply the model themselves.**

It is further understood that Linsig and Sidra models have been developed to supplement the transportation modelling assessment, although it is not clear whether these have also been peer reviewed.

**RFI 2 - Please provide evidence of any peer review of the Linsig and Sidra models and/or any associated formal reporting to evidence the calibration and validation of these models. In lieu of formal reporting please supply the model themselves.**

### 2.2 Future transport modelling assumptions

Section 4.3 of the ITA identifies that PC80, 73, 81 and 82 traffic has not been included in the modelling assessment, and does note that PC80 has recently become operative. Subsequent to the lodgement of the ITA, a consent order has been issued by the Environment Court which approves the rezoning of up to 3,770 households on the PC 73, 81 and 82 land. These are anticipated to have the potential to generate in the order of 3,200-3,400 vehicle movements in peak hour (based on 0.85-0.9 trips per household) to the east of the Dunns Crossing Road corridor. The impact of this traffic including in combination with PC80 traffic is unknown.

The ITA notes that this has been assessed through these Plan Changes, however it is noted that (in the instance of PC73) the modelling assumed two right turn lanes out of Dunns Crossing Road and a roundabout at Rolleston Drive south with two right turn lanes<sup>1</sup>. The PC80, 81 and 82 modelling assumes dual circulating lanes on all approaches of the roundabout<sup>2</sup>. As only a single circulating lane is proposed as part of the NOR it is unclear whether there will be sufficient capacity to accommodate future traffic volumes. Given some of these studies also assumed a roundabout may be installed at the SH1 / Rolleston Drive south roundabout, they are also likely to assume lower levels of traffic demand through the Dunns Crossing roundabout compared to the NOR proposal.

This matter is of importance to both Package 1 and Package 2 as there are implications for the total traffic generated and subsequent routing of traffic to access the wider strategic transport network.

<sup>1</sup> Refer section 2.2 of [https://www.selwyn.govt.nz/\\_data/assets/pdf\\_file/0009/396216/Appendix-D-Integrated-Transport-Assessment.pdf](https://www.selwyn.govt.nz/_data/assets/pdf_file/0009/396216/Appendix-D-Integrated-Transport-Assessment.pdf)

<sup>2</sup> Refer Figure 12 of [https://www.selwyn.govt.nz/\\_data/assets/pdf\\_file/0016/530206/Two-Chain-Road-Appendix-B-Transport.pdf](https://www.selwyn.govt.nz/_data/assets/pdf_file/0016/530206/Two-Chain-Road-Appendix-B-Transport.pdf); figure 14 of [https://www.selwyn.govt.nz/\\_data/assets/pdf\\_file/0006/571245/Appendix-D-Integrated-Transport-Assessment-Including-Appendix-1,2-and-3.pdf](https://www.selwyn.govt.nz/_data/assets/pdf_file/0006/571245/Appendix-D-Integrated-Transport-Assessment-Including-Appendix-1,2-and-3.pdf); Refer paragraph 18 of [https://www.selwyn.govt.nz/\\_data/assets/pdf\\_file/0003/1084539/PC81-and-PC82-evidence-Chris-Blackmore.pdf](https://www.selwyn.govt.nz/_data/assets/pdf_file/0003/1084539/PC81-and-PC82-evidence-Chris-Blackmore.pdf)

*Note: For transparency, Abley staff undertook transportation modelling using Selwyn District Council's Rolleston transport model under the instruction of Nick Fuller from Novogroup for each of these Plan Changes.*

**RFI 3 – Please undertake a sensitivity test at 2038 in the morning and evening peak periods to demonstrate the impacts of the addition of traffic from the full development of PC73, PC80, PC81 and PC82 areas.**

Section 5.2.2 of the ITA shows the level of future growth in traffic out to 2038. It is noted that the growth rates are substantially less than those in the Selwyn District Council model.

**RFI 4 – Provide detail of the future growth assumptions out to 2038 with respect to the extent of growth in Izone and number of additional households in Rolleston urban area.**

Section 5.2.3 details infrastructure assumptions out to 2038. It is noted that some of these differ from our understanding of likely future local roading projects including:

- a) Moore street extension – it is understood that funding for this is uncertain and this has been removed from Council's transport model.
- b) Lowes/Levi/Lincoln Rolleston Road intersection – To be upgraded to signals but is stated in results as a roundabout.
- c) Selwyn/Lincoln-Rolleston Road intersection – To be upgraded to a roundabout but stated to be a priority seagull.

**RFI 5 – Please provide commentary as to the impact of any of these changes in local road projects on the modelling results and wider assessment of traffic effects.**

### **2.3 Assessment of transport effects**

Section 6.2.1 summarises the 2028 and 2038 network travel totals. The specific time periods and extent of the network is not clear.

**RFI 6 – Confirmation is sought that these are hourly travel totals, correspond to the full Paramics study area and whether further changes in travel totals might be expected beyond the study area.**

Table 6-4 presents daily two-way traffic volumes at key locations on the State Highway and local road networks. Noting that there are substantial increases on some local road corridors including Sites 6 and 9 there is no additional commentary to compare these volumes to the capacity of these corridors.

**RFI 7 – Additional assessment is requested at 2038 to calculate the capacity of local roads to demonstrate that they will operate well and future flows not exceed capacity.**

Sections 6.6.2 and 6.6.3 present an assessment of anticipated reductions in DSIs.

**RFI 8 – Please add a footnote or other reference to confirm the source of the models used for this assessment.**

Section 6.6.4 discusses rail level crossing safety and proposes safety improvements are to be identified by and agreed with Kiwirail through an LCSIA process.

**RFI 9 – For the avoidance of doubt it is recommended that the requirement for an LCSIA be added to the condition set noting proposed changes to the Hoskyns Road level crossing.**

Section 8.3.3 of the AEE identifies that 13A to 19B Rolleston Drive will be restricted to left in and left out movements only.

**RFI 10 - Please provide further details on the additional distance and time that trips to and from these properties due to rerouting.**



Table 6-7 of the ITA demonstrates that delays at the intersection of Levi Road and Weedons Road increase from 60 seconds to 669 seconds in the 2038 morning peak with the text noting that an upgrade is identified in the Regional Land Transport Plan and Selwyn District Council Long Term Plan. However, we are concerned that funding for the upgrade of this intersection may not align with the delivery of the Package 2 works, creating significant delays and potential safety effects at this intersection.

**RFI 11: Please confirm whether the upgrade to this intersection should be an identified pre-requisite for undertaking the Package 2 works, and if not, whether the potential safety and efficiency effects at this intersection are acceptable if the Package 2 works are undertaken without this intersection being upgraded.**

## 2.4 Project interdependencies

ITA assesses the transport effects of the Rolleston Access Improvements Project Package 1 and Package 2, and Section 8.3.3 of the AEE acknowledges that staged delivery is required to manage effects. Section 3.4 of the ITA identifies interdependencies between the Rolleston Access Improvements Project and local road (Selwyn District Council) improvements, and that many of these projects are not funded. However, Section 5.2.3 of the ITA identifies that it has assumed that multiple local road improvements have been implemented.

Section 6.1 of the ITA indicates that changes to access on SH1 will require rerouting via the local road network, and Table 6-4 of the ITA indicates that some local roads are expected to experience significant increases in traffic due to the Rolleston Access Improvements Project.

It is unclear how the interdependencies between Package 1 and Package 2, and between the Rolleston Access Improvements Project and local road improvements, will be appropriately managed during future delivery. There is a concern that there may be safety and efficiency effects, particularly for local roads, should delivery of the Rolleston Access Improvements Project not be staged within the project and with supporting local road improvements.

**RFI 12 - Please comment on the interrelationship between Package 1 and Package 2, and confirm whether any local road (Selwyn District Council) improvements are required to manage the effects of the Rolleston Access Improvements Project on local roads. Where interrelationship or dependencies exist, please confirm how this is proposed to be managed during the delivery of each Package.**

## 2.5 Construction traffic management plans

Section 8.3.2 of the AEE discusses temporary construction traffic effects, including objectives and potential effects, and Section 7 of the ITA makes multiple recommendations to address construction traffic effects. In section 7.5.1 under the traffic effects heading, traffic modelling is proposed to inform traffic management activities. It is supported that this be undertaken to identify local road impacts and subsequent mitigations during the construction period.

However, in contrast, the proposed Construction Traffic Management Plan (CTMP) condition provides very little direction on what the CTMP is required to address, or the mitigations recommended in the AEE and ITA.

**RFI 13 - It is recommended that the CTMP condition be expanded to include at a minimum the requirements and objectives from section 7.5.2 of the ITA. This provides an important framework for the later preparation of CTMPs. Further, please comment on the extent to which Council approval and/or consultation with Council will be undertaken for Site-Specific Traffic Management Plans (SSTMPs) that affect local roads, either directly through temporary signage/markings, or indirectly through changes to traffic movements.**

Section 8.3.6 of the AEE recommends consultation regarding property access as a mitigation however this is not reflected in the proposed conditions.



**RFI 14 - It is recommended that consultation regarding property access be addressed through the proposed conditions.**

## **2.6 NoR boundary**

Figure 5-1 of the AEE indicates that multiple Selwyn District Council roads are within the NoR boundary. This may create the situation where Selwyn District Council experiences delays/barriers to undertaking maintenance and renewals activities on its assets as it will require NZTA approval, unless NZTA uplifts the designation once the Package 2 works are completed.

**RFI 15: Please confirm whether the extent of designation over Selwyn District Council roads will be removed once Package 2 works are completed.**

## **2.7 Existing vehicle accesses**

The 804 Jones Rd western access is included as a fourth leg at the Rolleston Drive extension / Jones Road intersection. The performance of this approach is not included in the model outputs in Appendix D of the ITA. Has the addition of this fourth leg been modelled to understand its impact on signal operations?

**RFI 16: Please provide an assessment of the performance of the 804 Jones Rd western access approach to the Rolleston Drive extension / Jones Road intersection, including how the phasing operates.**

Section 8.3.3 of the AEE discusses operational effects on 808 Jones Road. The AEE concludes that *“right turns may become challenging due to increased traffic flow. To address this, property owners and customers will be encouraged to use left in/ left-out movements. Alternative access routes are available, including the nearby George Holmes Road cul-de-sac turning facility, which provides a safe turnaround point for vehicles travelling from the east or Rolleston township”*. However, it is not clear how the left in/left out movement will be encouraged, nor how u-turns will be undertaken in George Holmes Road as there is no existing turn facility within this road.

Further, left turns out could be difficult, particularly for movements that want to use the overbridge, as there is very little room between the vehicle crossing and the limit line of the intersection. The AEE notes that there is the possibility to access 808 Jones Road via the adjacent site (804 Jones Road) as they are owned by the same party. In our view the access to 808 Jones Road may introduce unacceptable safety and efficiency risks, and alternative access should be provided.

**RFI 17: Please provide further details on how left in-left out movements for 808 Jones Road will be encouraged, and how vehicles are expected to turn around within George Holmes Road. Please provide further details of how left turns out may create safety and/or efficiency effects if drivers attempt to turn onto the overbridge.**

Section 8.3.3 of the AEE discusses operational effects on 13A to 19B Rolleston Drive, concluding that restricting access to these properties to left in/left out only will have less than minor effect. Was a service lane with a shared vehicle crossing with the existing crossing to 10 – 12 Rolleston Drive considered? Further, please provide an estimate of additional travel time and travel distance resulting from the left in/left out restriction.

**RFI 18: Please provide further details access options that have been considered for 13A to 19B Rolleston Drive, and an estimate of additional travel time and travel distance resulting from the left in/left out restriction**

Section 8.3.3 of the AEE discusses operational effects of turning restrictions for private vehicle accesses, and notes that discussions with some affected landowners have been undertaken. However the AEE does not identify if other affected landowners, such as 13A to 19B Rolleston Drive and BP service station and McDonalds restaurant, have been consulted.

**RFI 19: Please provide further detail on how landowners that have turning restrictions for private vehicle accesses have been consulted, and provide a summary of any feedback provided by the landowner.**

## **2.8 Design review**

Additional detail is sought with respect to transport engineering aspects of the design as follows.

**RFI 20 - Please provide:**

- a) A copy of the preliminary Safe System Audit for the design which we understand has been prepared.**
- b) Commentary on whether the berm space on the southern side of SH1 provides the opportunity to provide the “Future Reserve Path” proposed by Selwyn District Council as part of its Walking and Cycling Strategy (and shown in Figure 5-10 of the ITA).**
- c) Confirmation of whether the turning head at the end of George Holmes Road and the “KiwiRail access track”, both shown on General Arrangement Plan 3338703-20-CA-1201, form part of the Package 2 works.**

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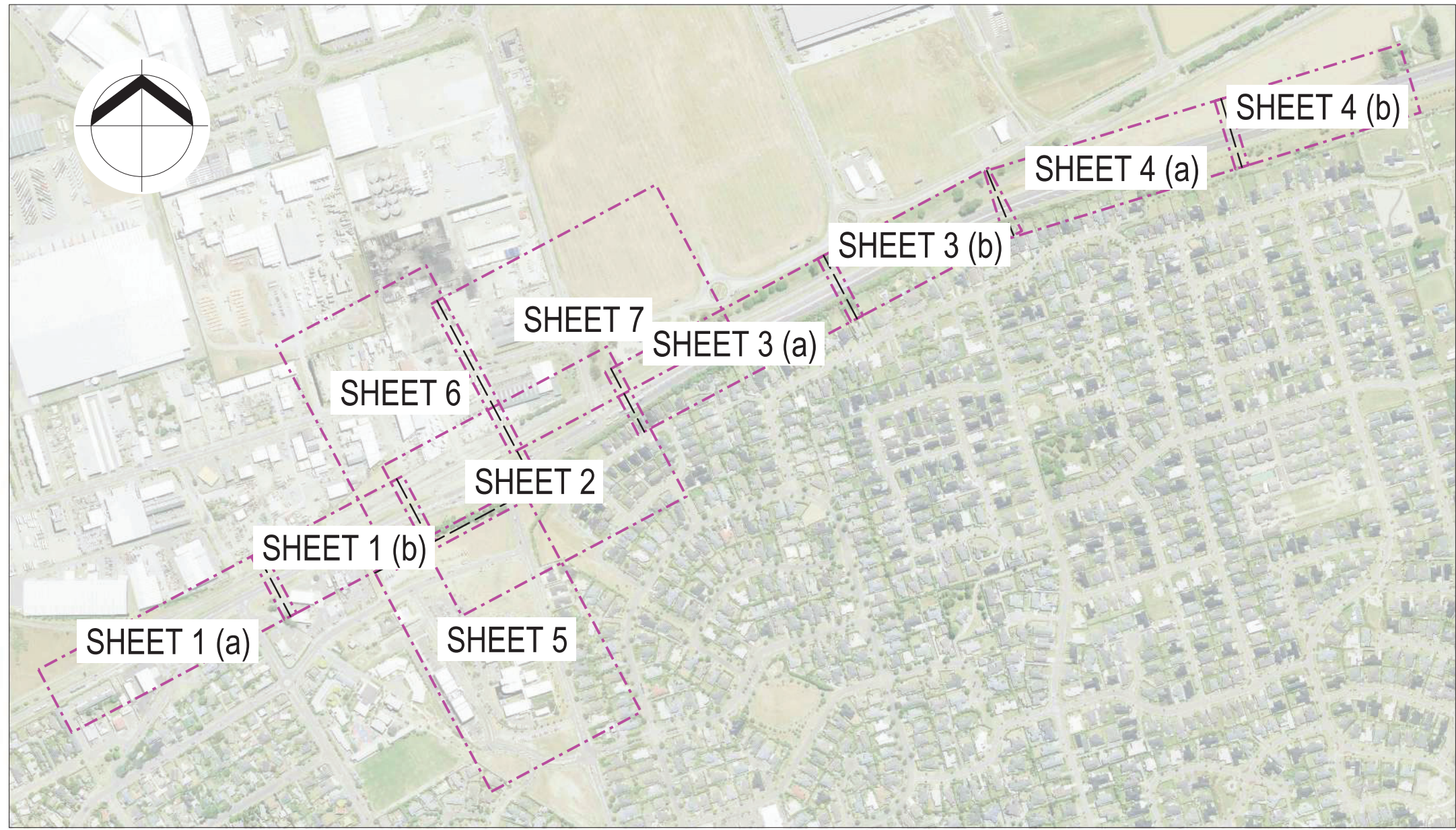
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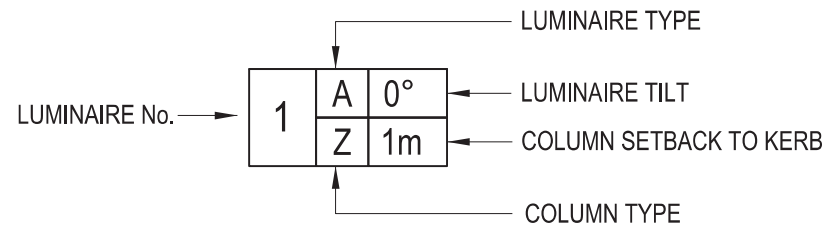
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TYPICAL COLUMN DESIGNATION:



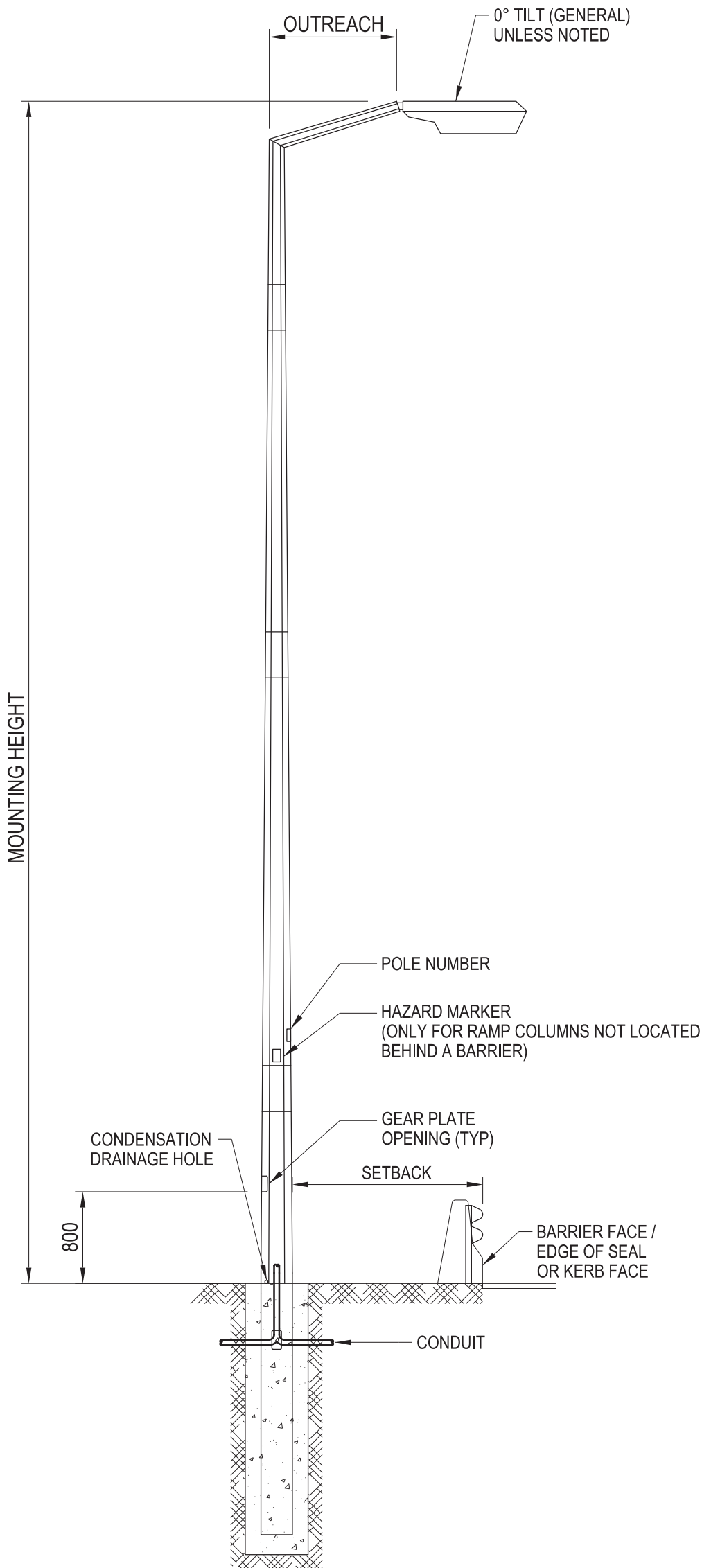
LUMINAIRE TYPE LEGEND:

- A EXISTING, NO CHANGE.
- B ADD NEW UNDERPASS LIGHT PLACE SURVIVOR 100 CLASSIC CORNICE SVR100CLA-COR1200-DA2840060-WHT LED LUMINAIRE IN CONTINUOUS EXTRUSION
- D LUMINAIRE TO BE REMOVED.
- E ADD NEW STREET LIGHT PLACE TECEO GEN2 1 5308 350mA 4000K LED LUMINAIRE.
- F ADD NEW STREET LIGHT PLACE TECEO GEN2 1 5308 500mA 4000K LED LUMINAIRE.
- G ADD NEW STREET LIGHT PLACE TECEO GEN2 1 5308 850mA 4000K LED LUMINAIRE.
- H ADD NEW STREET LIGHT PLACE TECEO GEN2 1 5308 1000mA 4000K LED LUMINAIRE.
- J ADD NEW DITTO 700mA 4000K LED LUMINAIRE.
- K ADD NEW STREET LIGHT PLACE NEW ITALO-2 0F2H1 S05 4-100.5M 4000K LED LUMINAIRE.
- L ADD NEW STREET LIGHT PLACE NEW ITALO-2 0F2H1 S05 4-100.7M 4000K LED LUMINAIRE.
- LUMINAIRE SHOWN FOR REFERENCE WHEN NOT ON ROAD OF FOCUS

COLUMN TYPE, MOUNTING HEIGHT:

- M PLACE NEW DOUBLE MITRED OUTREACH 180DEG FRANGIBLE SHEAR BASE OCTAGONAL STEEL COLUMN 12.5m MOUNTING HEIGHT 2m OUTREACH
- N PLACE NEW FLANGE BASED MITRED OUTREACH FRANGIBLE IMPACT ABSORBING OCTAGONAL STEEL COLUMN 12.5m MOUNTING HEIGHT 2m OUTREACH
- O PLACE NEW GROUND PLANTED MITRED OUTREACH FRANGIBLE IMPACT ABSORBING OCTAGONAL STEEL COLUMN 12.5m MOUNTING HEIGHT 4m OUTREACH
- P PLACE NEW GROUND PLANTED MITRED OUTREACH FRANGIBLE SHEAR BASE OCTAGONAL STEEL COLUMN 12.5m MOUNTING HEIGHT 4m OUTREACH
- S PLACE NEW GROUND PLANTED MITRED OUTREACH FRANGIBLE IMPACT ABSORBING OCTAGONAL STEEL COLUMN 10.5m MOUNTING HEIGHT 2m OUTREACH
- T REMOVE COLUMN
- U PLACE NEW GROUND PLANTED MITRED OUTREACH FRANGIBLE SHEAR BASE OCTAGONAL STEEL COLUMN 12.5m MOUNTING HEIGHT 2m OUTREACH
- V PLACE NEW GROUND PLANTED MITRED OUTREACH FRANGIBLE IMPACT ABSORBING OCTAGONAL STEEL COLUMN 10m MOUNTING HEIGHT 2m OUTREACH
- W PLACE NEW GROUND PLANTED MITRED OUTREACH FRANGIBLE IMPACT ABSORBING OCTAGONAL STEEL COLUMN 14m MOUNTING HEIGHT 4m OUTREACH
- X PLACE NEW MITRED OUTREACH FRANGIBLE SHEAR BASE OCTAGONAL STEEL COLUMN 14m MOUNTING HEIGHT 4m OUTREACH WITH ADDITIONAL SPIGOT AT 180DEG 8m MOUNTING HEIGHT 0m OUTREACH
- Y EXISTING COLUMN, MOUNTING HEIGHT AND SETBACK FROM KERB.
- Z EXISTING, NO CHANGE.

I don't think you can get a multi-arm lighting pole to be slip base and comply with NZTA M26. To meet the M26 requirements the pole needs to be ground planted. Please check with the pole supplier for confirmation.

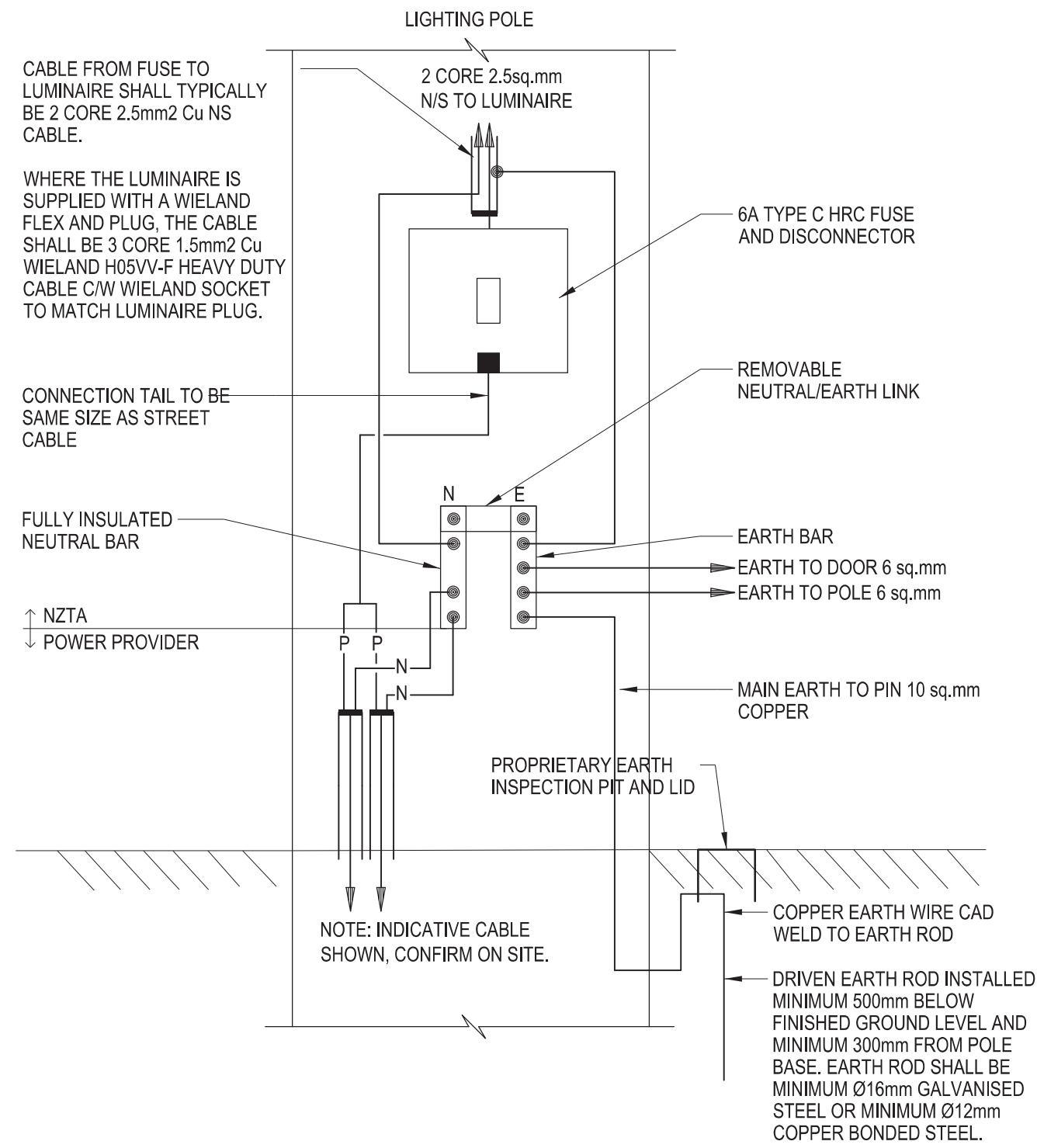


TYPICAL GROUND MOUNTED SECTIONAL GALVANISED POLE WITH MITRED OUTREACH FOR NZTA POLES

SCALE: NTS

STREET LIGHTING NOTES:

- ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF POWER UTILITY ( ORION ) , LOCAL TERRITORIAL AUTHORITY ( SELWYN DISTRICT COUNCIL ) AND THE REQUIREMENTS OF ELECTRICAL (SAFETY) REGULATIONS 2010, AS/NZS 3000, AS/NZS 3008 AND AS/NZS 1158.
- ONLY CONTRACTORS APPROVED BY LOCAL TERRITORIAL AUTHORITY CAN WORK ON THE LOCAL TERRITORIAL AUTHORITY STREET LIGHT NETWORK. PLEASE CONTACT THE TEAM LEADER STREET LIGHTS IF YOU REQUIRE FURTHER CLARIFICATION.
- ENSURE THE RAMM AND SLIM DATABASE IS ACCURATELY UPDATED WITHIN 24 HOURS OF THE INSTALLATION FOR EVERY NEW OR MODIFIED STREETLIGHT LOCATION, AND LIAISE WITH LOCAL TERRITORIAL AUTHORITY TO ENSURE RECORDS ARE APPROPRIATELY COMPLETED.
- THESE WORKS SHALL INCLUDE THE REMOVAL AND DISPOSAL OF OLD LUMINAIRES AND POLES, UNLESS SPECIFIED OTHERWISE.
- ALL LUMINAIRES SHALL BE TILTED AT AN ANGLE OF 0° TO THE HORIZONTAL UNLESS STATED OTHERWISE.
- EACH LUMINAIRE SHALL BE PROVIDED WITH A 7 - PIN NEMA SOCKET AND A BLANKING CAP.
- A MINIMUM TEN (10) YEAR WARRANTY FROM DATE OF ON SITE INSTALLATION SHALL BE PROVIDED FOR THE LUMINAIRES.
- SERVICES AS-BUILTS PROVIDED ON AN AS IS BASIS, CONTRACTOR TO CONFIRM LOCATIONS OF CONDUITS AND ORION CABLES ON SITE BEFORE CONSTRUCTION COMMENCES. CONTRACTOR RESPONSIBLE FOR COORDINATING FINAL DESIGN WITH ORION AND NOTIFYING ENGINEER OF ANY DEVIATIONS TO THE PROVIDED DESIGN.
- MINIMUM STREET LIGHTING SUPPLY CABLE SIZE SHALL BE 1C 10mm² NEUTRAL SCREEN CABLE.
- CABLE PROTECTION SHALL BE IMPLEMENTED AS PER POWER UTILITY REQUIREMENTS AND AS/NZS 3000.
- ALL METAL COLUMNS, OUTREACH ARMS AND LUMINAIRES ARE TO BE EFFECTIVELY EARTHED. EARTHING IS TO BE DESIGNED TO CONFORM TO THE REQUIREMENTS OF THE NZ ELECTRICITY (SAFETY) REGULATIONS AND AS/NZS 3000:2007.
- MOUNTING HEIGHTS ARE TO BE MEASURED WITH RESPECT TO THE LUMINAIRES ABOVE THE CARRIAGEWAY.
- WHERE A POLE IS WITHIN 2m OF THE DRIPLINE OF THE TREE, ASSESS WHETHER THE TREE REQUIRES TRIMMING TO MINIMISE SHADOWING, AND NOTIFY THE ENGINEER FOR FURTHER ACTION IF REQUIRED.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FINAL LOCATION OF LIGHTING POLES ON SITE BY TAKING INTO ACCOUNT THE FOLLOWING PRIOR TO INSTALLATION:
  - LOCATION OF EXISTING SERVICES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UNDERGROUND SERVICES AND LAND INFORMATION NEW ZEALAND MARKERS BEFORE WORK COMMENCES. ANY DAMAGE CAUSED TO EXISTING SERVICES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
  - WORK ON OR NEAR EXISTING SERVICES.
    - THE CONTRACTOR SHALL LIAISE WITH THE APPROPRIATE SERVICE PROVIDER IN RELATION TO WORKING ON OR NEAR SERVICES, GIVING APPROPRIATE NOTICE PERIOD. IF NECESSARY, POSITIONS MAY BE ALTERED UP TO 1M WHILE RETAINING GENERAL POLE ARRANGEMENT TO AVOID CLASHES WITH UNDERGROUND SERVICES. CONFIRM WITH ENGINEER FIRST.
    - THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FIXING OF OUTREACHES TAKING INTO ACCOUNT WORK ON OR NEAR EXISTING SERVICES.
  - PERMITTED LOCATION TOLERANCE
    - 0.5m PARALLEL TO THE CARRIAGEWAY
    - 0.2m PERPENDICULAR TO THE CARRIAGEWAY
    - 0.2m VERTICALLYIF THE FINAL POLE LOCATION EXCEEDS THE PERMITTED TOLERANCE FURTHER LIGHTING DESIGN MAY BE REQUIRED.
- POLE DETAILS SHALL BE AS PER LOCAL TERRITORIAL AUTHORITY ENGINEERING STANDARDS. DEPARTING FROM THE STANDARD INSTALLATION DUE TO GROUND CONDITIONS SHALL BE CONFIRMED BY A WRITTEN APPROVAL PRIOR TO INSTALLATION.
- LIGHTING COLUMNS SHALL BE INSTALLED AS PER MANUFACTURER INSTRUCTION AND STANDARDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FOUNDATION DESIGN OF THE LIGHTING COLUMN IF GROUND CONDITIONS DO NOT SUIT THE COLUMN MANUFACTURER'S STANDARD FOUNDATION DESIGN.



GEARPLATE TWO CORE CABLE TERMINATION WITHIN POLE FOR SHEAR BASE POLES

SCALE: NTS

PRELIMINARY  
NOT FOR CONSTRUCTION

A	FOR PRELIMINARY SAFE SYSTEM AUDIT	RAA	KC	DA	06.11.24
No.	Revision	By	Chk	Appd	Date

Original Scale (A1)	Design	K.CUTTLE	24.09.24	Approved For Construction
NTS	Drawn	R.ANDERSON	24.09.24	
Reduced Scale (A3)	Design Verifier			
NTS	Dwg Checks			
	* Refer to Revision 1 for Original Signature			

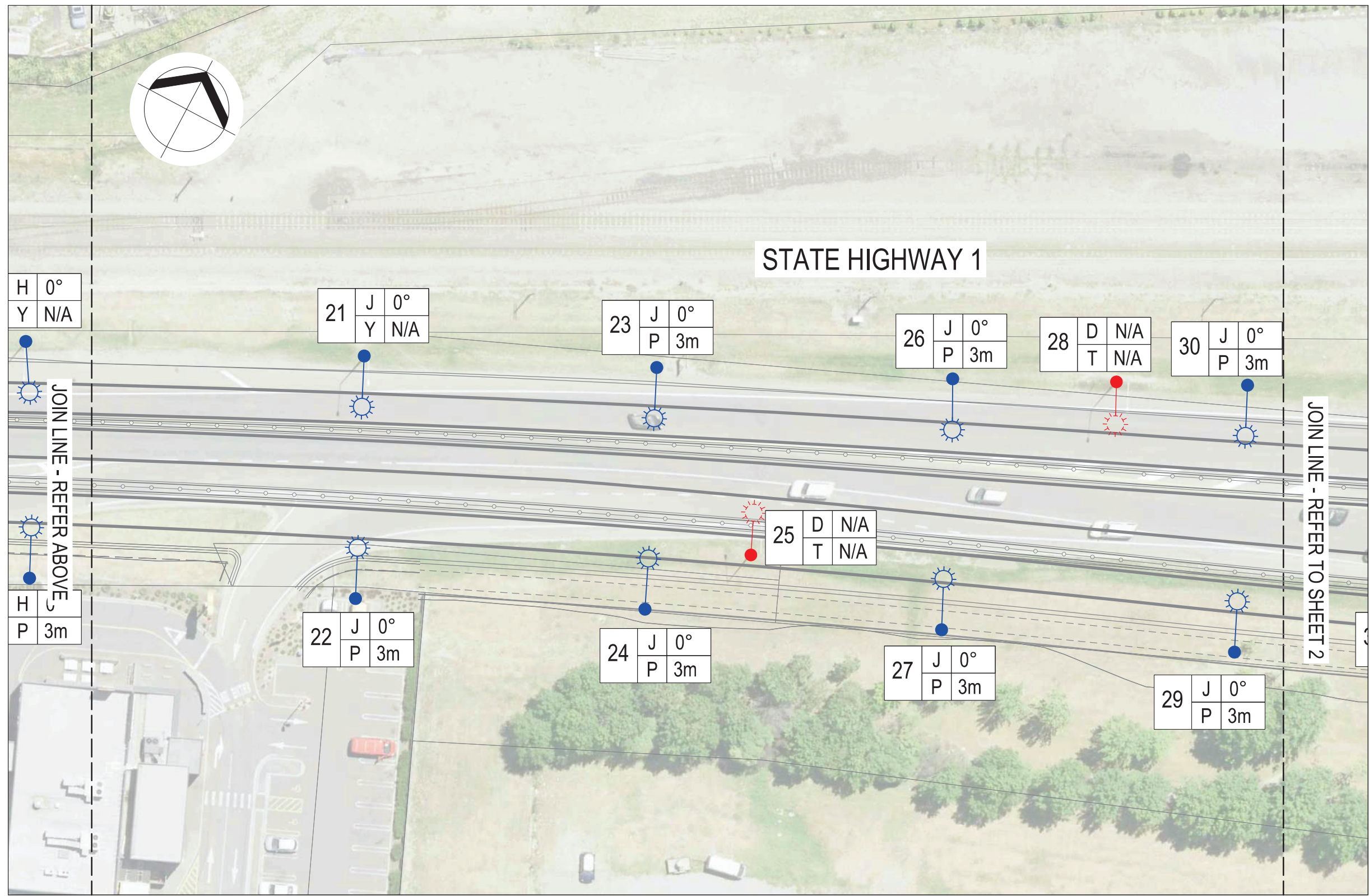
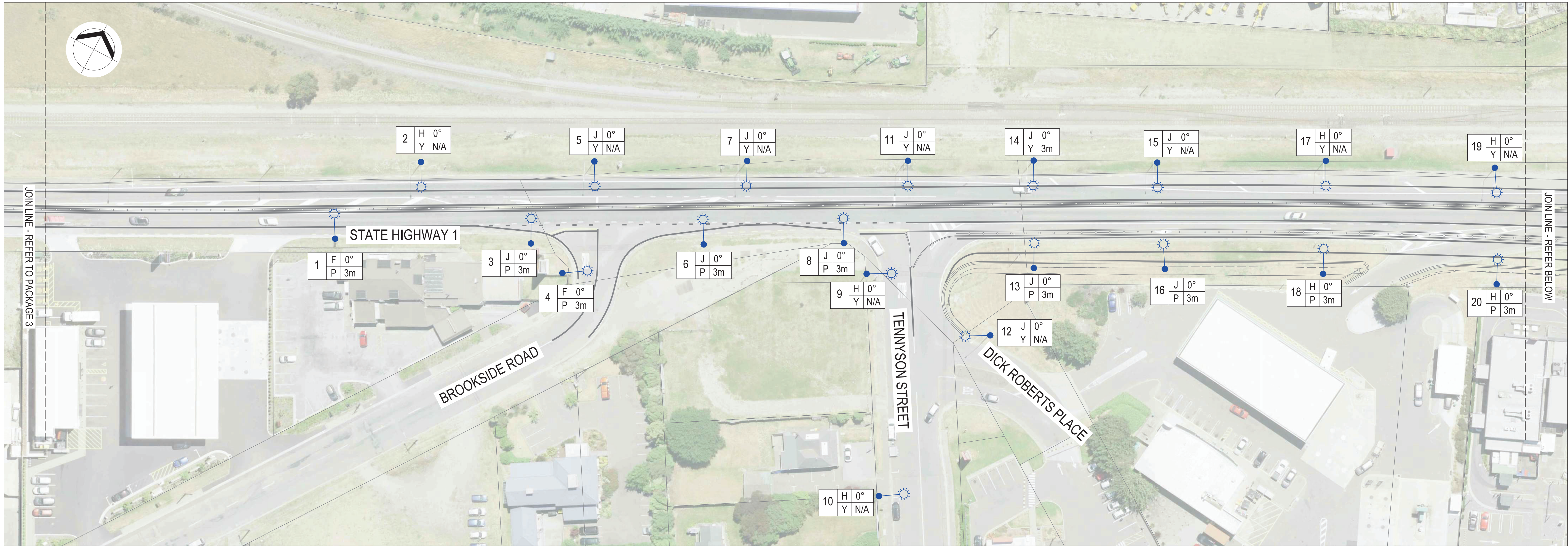


Client:	SH1 ROLLESTON ACCESS IMPROVEMENTS PACKAGE 2
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Title:	LIGHTING DRAWING KEY, NOTES AND LUMINAIRE SCHEDULE
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Discipline:	CIVIL ENGINEERING
Drawing No.	3338703-20-CU-3500
Rev.	A





A		FOR PRELIMINARY SAFE SYSTEM AUDIT	RAA	KC	DA	06.11.24
No.	Revision	By	Chk	Appd	Date	

Original Scale (A1)	Design	K.CUTTLE	21.08.24	Approved For Construction*
1:500	Drawn	R.ANDERSON	21.08.24	
Reduced Scale (A3)	Design Verifier			
1:1000	Design Check			
* Refer to Revision 1 for Original Signature				



Client: SH1 ROLLESTON  
ACCESS IMPROVEMENTS  
PACKAGE 2

Title: LIGHTING LAYOUT PLANS  
SHEET 1 OF 7

PRELIMINARY NOT FOR CONSTRUCTION	
Discipline	CIVIL ENGINEERING
Drawing No.	3338703-20-CU-3511
Rev.	A



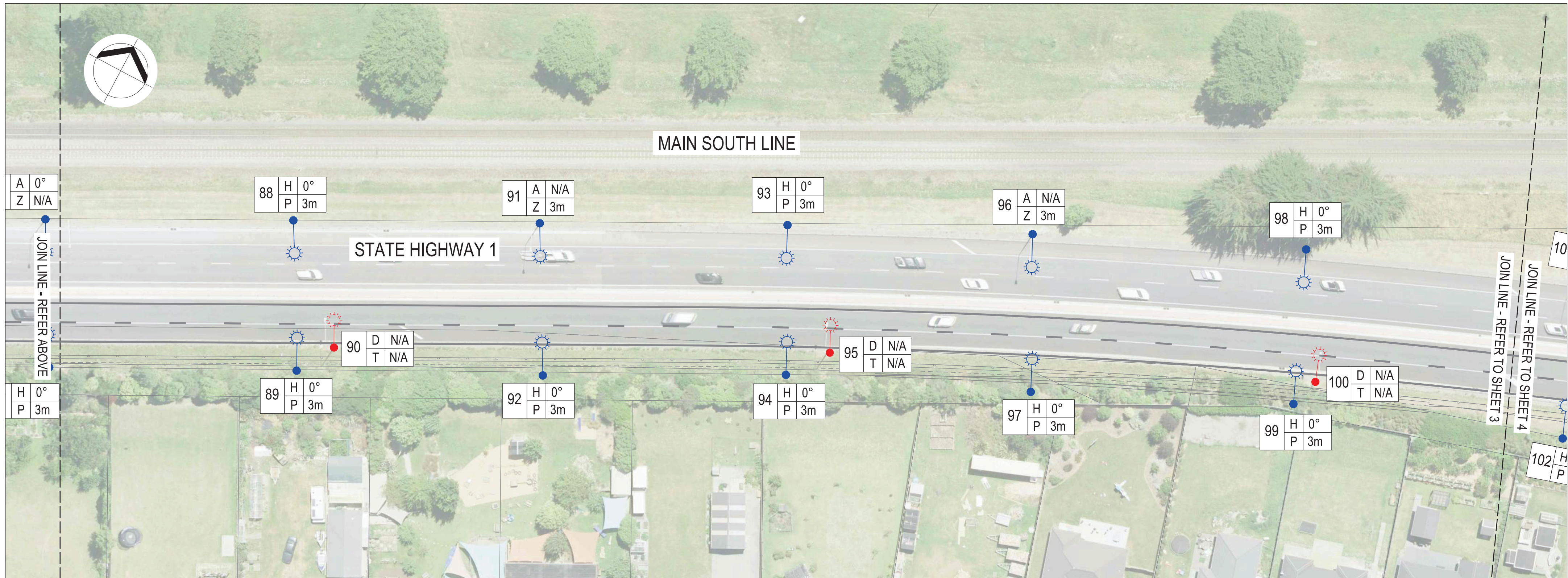
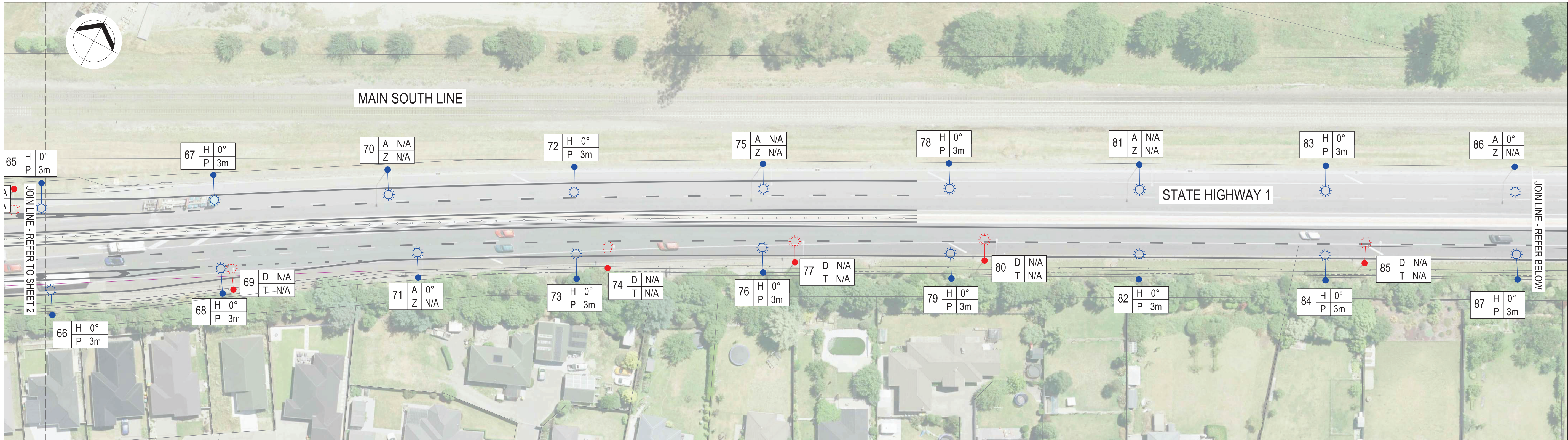


FOR KIDMAN STREET, ROLLESTON DRIVE,  
JONES ROAD, AND HOSKYN'S ROAD SEE  
SHEETS 5, 6, AND 7

3338703-20-CU-3512

Discipline		CIVIL ENGINEERING
Drawing No.	3338703-20-CU-3512	Rev. A





A		FOR PRELIMINARY SAFE SYSTEM AUDIT	RAA	KC	DA	06.11.24	
No.	Revision		By	Chk	Appd	Date	

Original Scale (A1)	Design	M.HARRIS	03.04.24	Approved For Construction*
1:500	Drawn	R.ANDERSON	03.04.24	
Reduced Scale (A3)	Design Verifier			
1:1000	Design Check			
* Refer to Revision 1 for Original Signature				
Date				



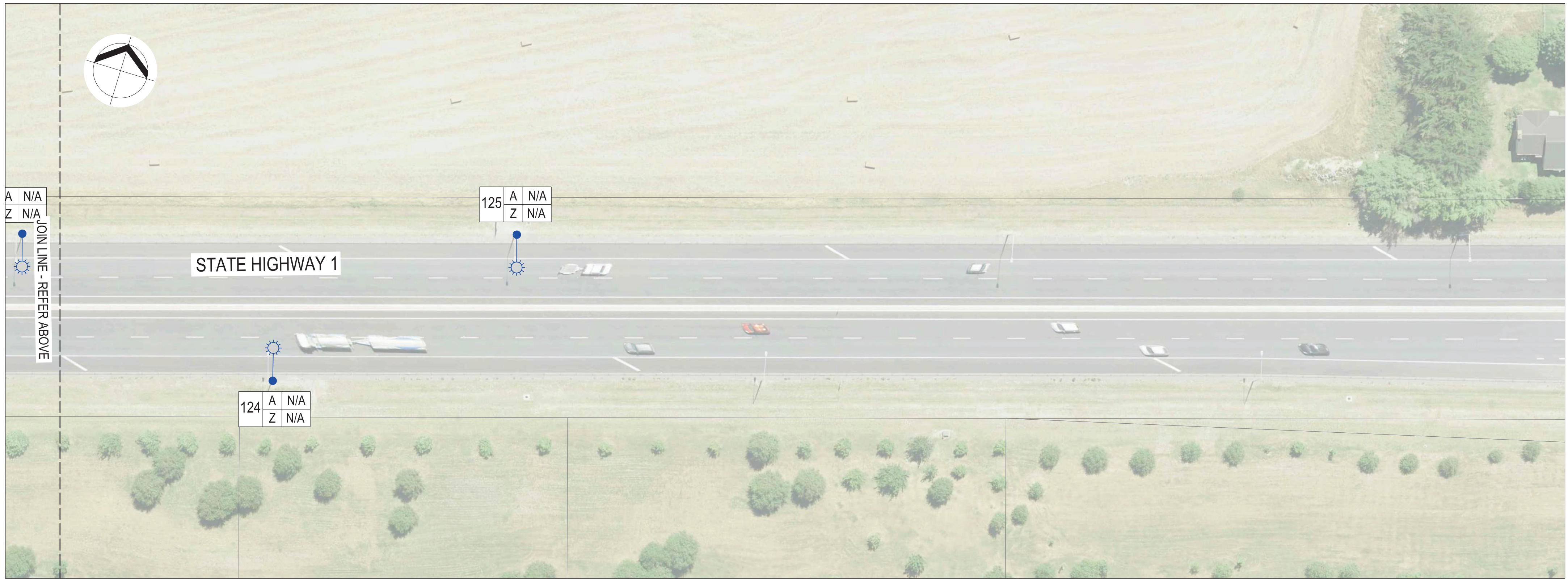
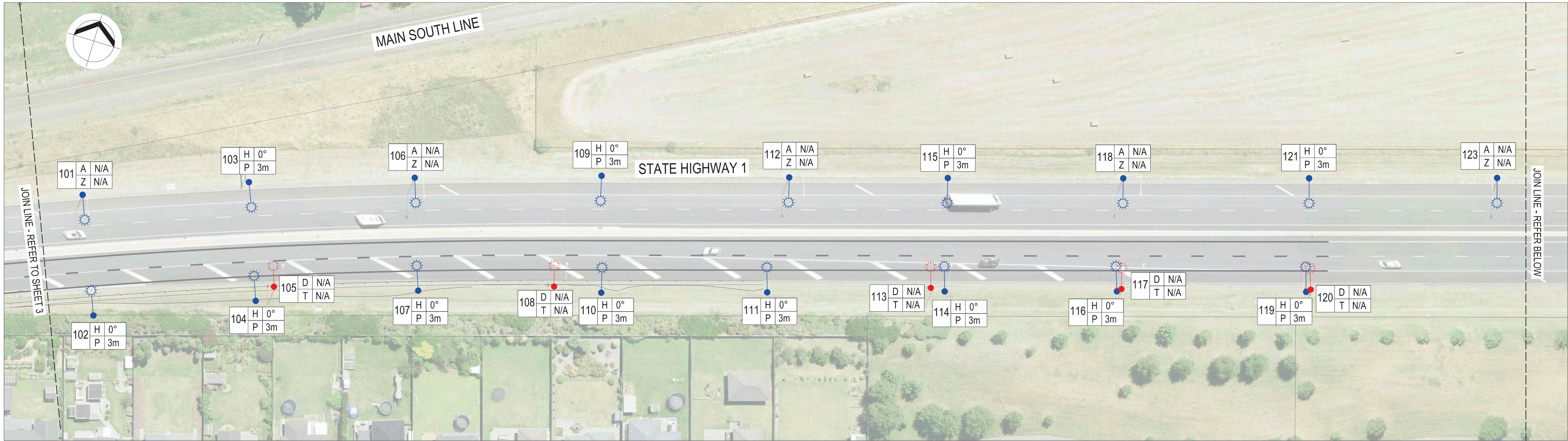
Client: SH1 ROLLESTON  
ACCESS IMPROVEMENTS  
PACKAGE 2

Title: LIGHTING PLANS  
SHEET 3 OF 7

Discipline		CIVIL ENGINEERING
Drawing No.	3338703-20-CU-3513	Rev. A

**PRELIMINARY**  
**NOT FOR CONSTRUCTION**





A	FOR PRELIMINARY SAFE SYSTEM AUDIT	RAA	KC	DA	06.11.24
No.	Revision	By	Chk	Appd	Date

Original Scale (A1)	Design	M.HARRIS	03.04.24	Approved For Construction*
1:500	Drawn	R.ANDERSON	03.04.24	
Reduced Scale (A3)	Design Verifier			Date
1:1000	Dwg Check			
	* Refer to Revision 1 for Original Signature			



Client: SH1 ROLLESTON  
ACCESS IMPROVEMENTS  
PACKAGE 2

Title: LIGHTING PLANS  
SHEET 4 OF 7

Discipline	CIVIL ENGINEERING
Drawing No.	3338703-20-CU-3514
Rev.	A





**PRELIMINARY**  
**NOT FOR CONSTRUCTION**

A FOR PRELIMINARY SAFE SYSTEM AUDIT		RAA	KC	DA	06.11.24
No.	Revision	By	Chk	Appd	Date

Original Scale (A1)	Design	M.HARRIS	28.03.24	Approved For Construction*
1:500	Drawn	R.ANDERSON	28.03.24	Date
Reduced Scale (A3)	Design Verifier			
1:1000	Dwg Check			
* Refer to Revision 1 for Original Signature				



Client: SH1 ROLLESTON  
ACCESS IMPROVEMENTS  
PACKAGE 2

Title: LIGHTING PLANS  
SHEET 5 OF 7

Discipline	CIVIL ENGINEERING
Drawing No.	3338703-20-CU-3515
Rev.	A



NOTES  
FOR STATE HIGHWAY 1 SEE SHEETS 1 - 4



A	FOR PRELIMINARY SAFE SYSTEM AUDIT	RAA	KC	DA	06.11.24
No.	Revision	By	Chk	Appd	Date

Original Scale (A1)	Design	M.HARRIS	02.04.24	Approved For Construction*
1:500	Drawn	R ANDERSON	02.04.24	
Reduced Scale (A3)	Design Verifier			Date
1:1000	Dwg Check			
	* Refer to Revision 1 for Original Signature			



Client: SH1 ROLLESTON  
ACCESS IMPROVEMENTS  
PACKAGE 2

Title: LIGHTING PLANS  
SHEET 6 OF 7

Discipline	CIVIL ENGINEERING
Drawing No.	3338703-20-CU-3516
Rev.	A



NOTES  
FOR STATE HIGHWAY 1 SEE SHEETS 1 - 4



**PRELIMINARY**  
**NOT FOR CONSTRUCTION**

A	FOR PRELIMINARY SAFE SYSTEM AUDIT	RAA	KC	DA	06.11.24
No.	Revision	By	Chk	Appd	Date

Original Scale (A1)	Design	M.HARRIS	02.04.24	Approved For Construction*
1:500	Drawn	R ANDERSON	02.04.24	
Reduced Scale (A3)	Design Verifier			Date
1:1000	Dwg Check			
	* Refer to Revision 1 for Original Signature			

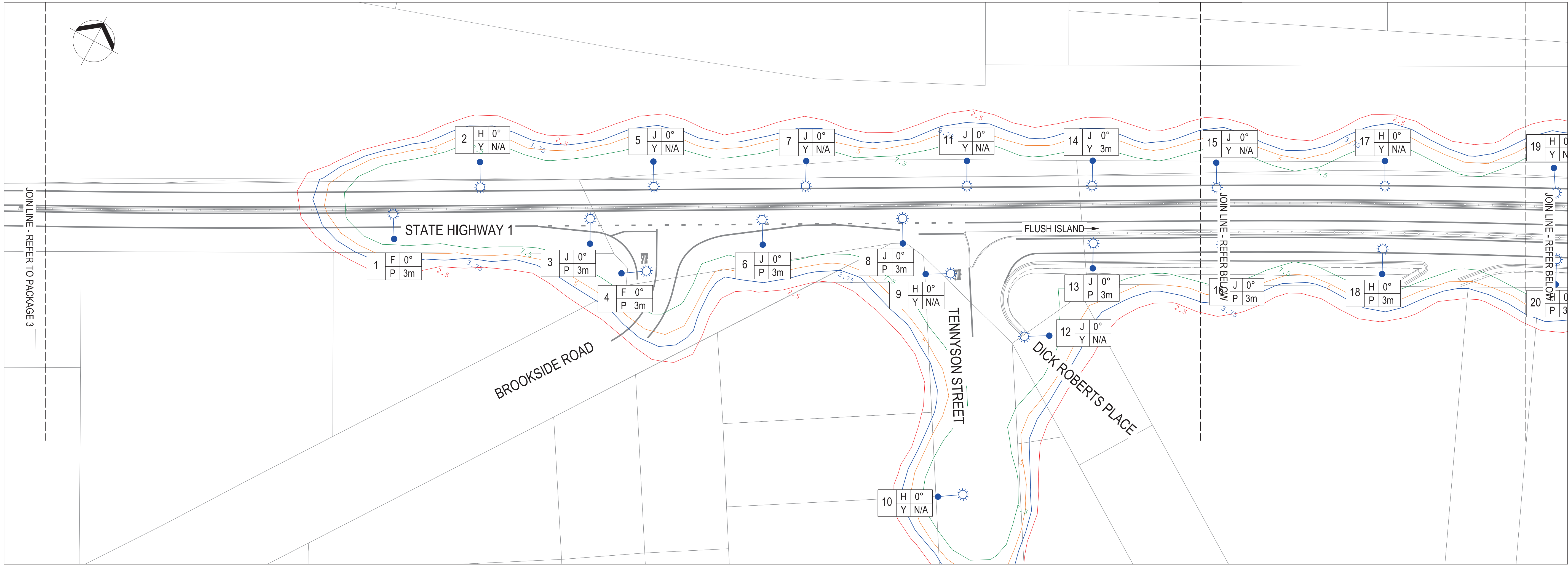


Client: SH1 ROLLESTON  
ACCESS IMPROVEMENTS  
PACKAGE 2

Title: LIGHTING PLANS  
SHEET 7 OF 7

Discipline	CIVIL ENGINEERING
Drawing No.	3338703-20-CU-3517
Rev.	A





What lane configuration does this calculation apply to? SH1 appears to have single lanes diverging into double lanes and double lanes merging into single lanes, so the calculation needs to account for all lane configurations.

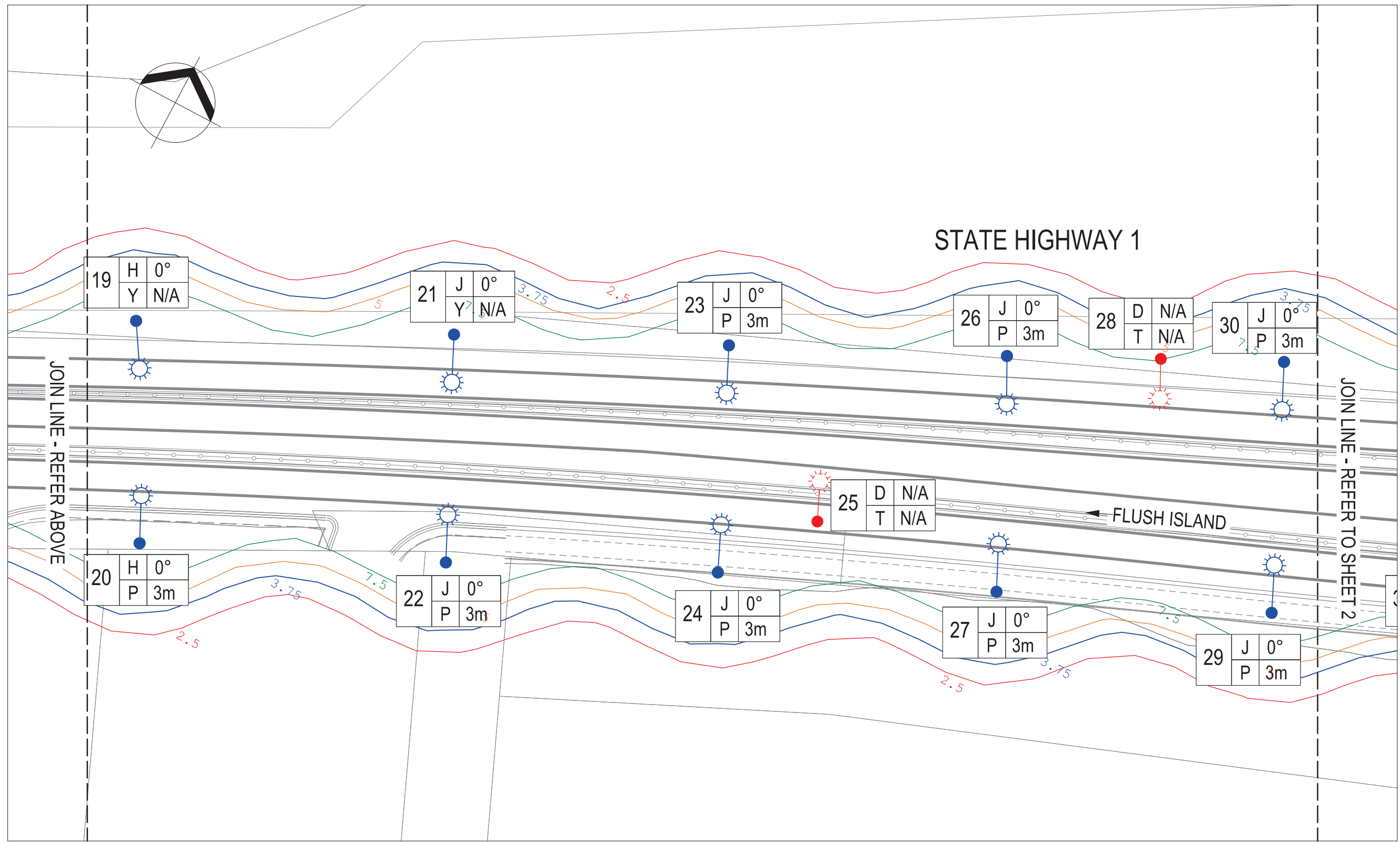


TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022								
1	2	3	4	5	6	7	8	9
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)							
	AVERAGE CARRIAGEWAY LUMINANCE <sup>(a,b)</sup> (L) cd/m <sup>2</sup>	OVERALL UNIFORMITY <sup>(c,d)</sup> (U <sub>o</sub> )	LONGITUDINAL UNIFORMITY <sup>(b)</sup> (U <sub>l</sub> )	THRESHOLD INCREMENT <sup>(d,e)</sup> (TI) %	SURROUND VERGE ILLUMINANCE <sup>(b)</sup> (E <sub>sv</sub> and E <sub>sr</sub> ) %	POINT HORIZONTAL ILLUMINANCE <sup>(a,b)</sup> (E <sub>ph</sub> ) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY <sup>(d)</sup> (U <sub>h1</sub> )	UPWARD WASTE LIGHT RATIO <sup>(d)</sup> (UWLR)
V3	0.75	0.33	0.3	12	50	7.5	8	0.01

- a. THESE VALUES ARE MAINTAINED.  
b. CONFORMANCE IS ACHIEVED BY BEING GREATER THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
c. THE VALUE OF U<sub>l</sub> MAY BE 0.32 OR 0.31 PROVIDED THE VALUE FOR L IS 5% OR 10% RESPECTIVELY, ABOVE THE SPECIFIED VALUE IN COLUMN 2.  
d. CONFORMANCE IS ACHIEVED BY BEING LESS THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
e. WHERE LEGACY INSTALLATIONS WITH HID LUMINAIRES ARE UPGRADES, THE THRESHOLD INCREMENT VALUE MAY BE NO GREATER THAN THE EXISTING HID INSTALLATION AND MAY NOT EXCEED 20%.  
f. V4 IS THE MINIMUM SUBCATEGORY RECOMMENDED FOR APPLICATION IN NEW ZEALAND.

LIGHTING DESIGN CALCULATION SUMMARY										
AREA	2 AVERAGE CARRIAGEWAY LUMINANCE <sup>(a,b)</sup> (L) cd/m <sup>2</sup>	3 OVERALL UNIFORMITY <sup>(c,d)</sup> (U <sub>o</sub> )	4 LONGITUDINAL UNIFORMITY <sup>(b)</sup> (U <sub>l</sub> )	5 THRESHOLD INCREMENT <sup>(d,e)</sup> (TI) %	6 SURROUND VERGE ILLUMINANCE <sup>(b)</sup> (E <sub>sv</sub> ) lx	7 POINT HORIZONTAL ILLUMINANCE <sup>(a,b)</sup> (E <sub>ph</sub> ) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY <sup>(d)</sup> (U <sub>h1</sub> )	9 UPWARD WASTE LIGHT RATIO <sup>(d)</sup> (UWLR)	MAX SPACING (m)	COMPLIANCE TO CATEGORY
MAIN SOUTH ROAD SH1 TECEO 1000mA	0.75	0.40	0.53	5.02	76.07	N/A	N/A	0.00	58	V3
SH1/ BROOKSIDE ROAD INTERSECTION	N/A	N/A	N/A	N/A	N/A	10.7	2.6	N/A	N/A	V3
SH1/ TENNYSON STREET INTERSECTION	N/A	N/A	N/A	N/A	N/A	12.8	2.48	N/A	N/A	V3
SH1 NORTHBOUND LANE DIVERGENCE	N/A	N/A	N/A	N/A	N/A	12.0	2.79	N/A	N/A	V3

Is the north symbol not correctly orientated? Should this be EASTBOUND LANE DIVERGENCE? Also, where are the calculations for the WESTBOUND merging lanes on the other side of SH1?

Where are the illuminance calculations for the surrounds?

**PRELIMINARY**  
**NOT FOR CONSTRUCTION**

Original Scale (A1) 1:500				Design M.HARRIS 03.04.24				Approved For Construction 03.04.24			
Reduced Scale (A3) 1:1000				Drawn R.ANDERSON 03.04.24				Date			
FOR PRELIMINARY SAFE SYSTEM AUDIT				RAA				06.11.24			
Revision				By				Date			



Client: SH1 ROLLESTON ACCESS IMPROVEMENTS PACKAGE 2

Title: LIGHTING CALCULATION PLAN SHEET 1 OF 7

Discipline: CIVIL ENGINEERING  
Drawing No: 3338703-20-CU-3521  
Rev: A



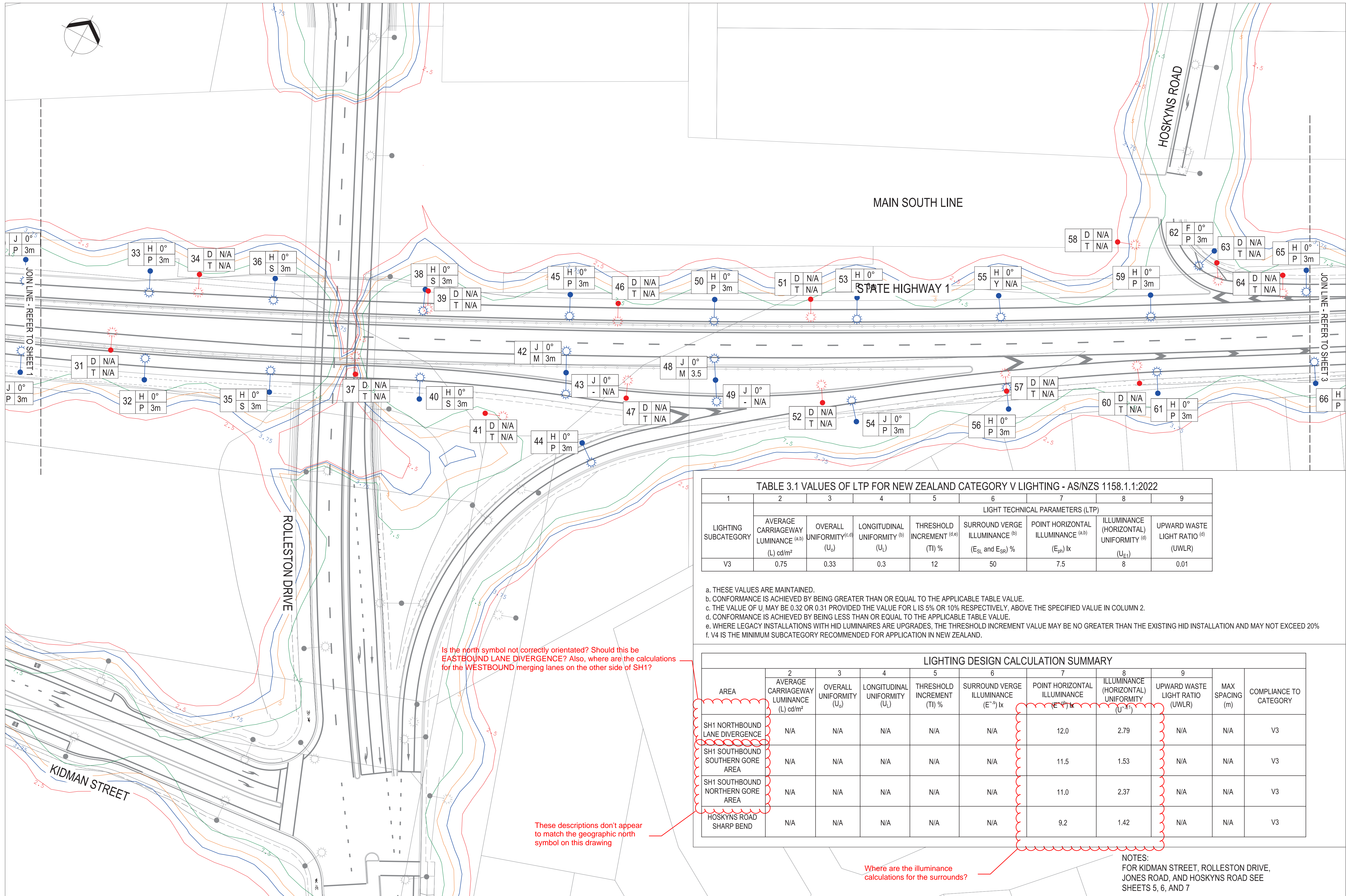


TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022								
1	2	3	4	5	6	7	8	9
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)							
	AVERAGE CARRIAGEWAY LUMINANCE <sup>(a,b)</sup>	OVERALL UNIFORMITY <sup>(c,d)</sup>	LONGITUDINAL UNIFORMITY <sup>(b)</sup>	THRESHOLD INCREMENT <sup>(d,e)</sup>	SURROUND VERGE ILLUMINANCE <sup>(b)</sup>	POINT HORIZONTAL ILLUMINANCE <sup>(a,b)</sup>	ILLUMINANCE (HORIZONTAL) UNIFORMITY <sup>(d)</sup>	UPWARD WASTE LIGHT RATIO <sup>(d)</sup>
	(L) cd/m <sup>2</sup>	(U <sub>o</sub> )	(U <sub>l</sub> )	(TI) %	(E <sub>sv</sub> and E <sub>sr</sub> ) %	(E <sub>ph</sub> ) lx	(U <sub>E1</sub> )	(UWLR)
V3	0.75	0.33	0.3	12	50	7.5	8	0.01

- a. THESE VALUES ARE MAINTAINED.  
b. CONFORMANCE IS ACHIEVED BY BEING GREATER THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
c. THE VALUE OF U<sub>l</sub> MAY BE 0.32 OR 0.31 PROVIDED THE VALUE FOR L IS 5% OR 10% RESPECTIVELY, ABOVE THE SPECIFIED VALUE IN COLUMN 2.  
d. CONFORMANCE IS ACHIEVED BY BEING LESS THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
e. WHERE LEGACY INSTALLATIONS WITH HID LUMINAIRES ARE UPGRADES, THE THRESHOLD INCREMENT VALUE MAY BE NO GREATER THAN THE EXISTING HID INSTALLATION AND MAY NOT EXCEED 20%  
f. V4 IS THE MINIMUM SUBCATEGORY RECOMMENDED FOR APPLICATION IN NEW ZEALAND.

LIGHTING DESIGN CALCULATION SUMMARY										
AREA	2 AVERAGE CARRIAGEWAY LUMINANCE (L) cd/m <sup>2</sup>	3 OVERALL UNIFORMITY (U <sub>o</sub> )	4 LONGITUDINAL UNIFORMITY (U <sub>l</sub> )	5 THRESHOLD INCREMENT (TI) %	6 SURROUND VERGE ILLUMINANCE (E <sup>-3</sup> ) lx	7 POINT HORIZONTAL ILLUMINANCE (E <sup>-3</sup> ) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY (U <sub>E1</sub> )	9 UPWARD WASTE LIGHT RATIO (UWLR)	MAX SPACING (m)	COMPLIANCE TO CATEGORY
SH1 NORTHBOUND LANE DIVERGENCE	N/A	N/A	N/A	N/A	N/A	12.0	2.79	N/A	N/A	V3
SH1 SOUTHBOUND SOUTHERN GORE AREA	N/A	N/A	N/A	N/A	N/A	11.5	1.53	N/A	N/A	V3
SH1 SOUTHBOUND NORTHERN GORE AREA	N/A	N/A	N/A	N/A	N/A	11.0	2.37	N/A	N/A	V3
HOSKYN'S ROAD SHARP BEND	N/A	N/A	N/A	N/A	N/A	9.2	1.42	N/A	N/A	V3

**PRELIMINARY**  
**NOT FOR CONSTRUCTION**

No.	Revision	By	Chk	Appd	Date
A	FOR PRELIMINARY SAFE SYSTEM AUDIT	RAA	KC	DA	06.11.24

Original Scale (A1)	Design	M.HARRIS	03.04.24	Approved For Construction
1:500	Drawn	R.ANDERSON	03.04.24	
Reduced Scale (A3)	Design Verifier			
1:1000	Design Checker			
	* Refer to Revision 1 for Original Signature			



Client: NZ TRANSPORT AGENCY  
Project: SH1 ROLLESTON ACCESS IMPROVEMENTS PACKAGE 2

Title: LIGHTING CALCULATION PLAN  
SHEET 2 OF 7

Discipline: CIVIL ENGINEERING  
Drawing No: 3338703-20-CU-3522  
Rev: A



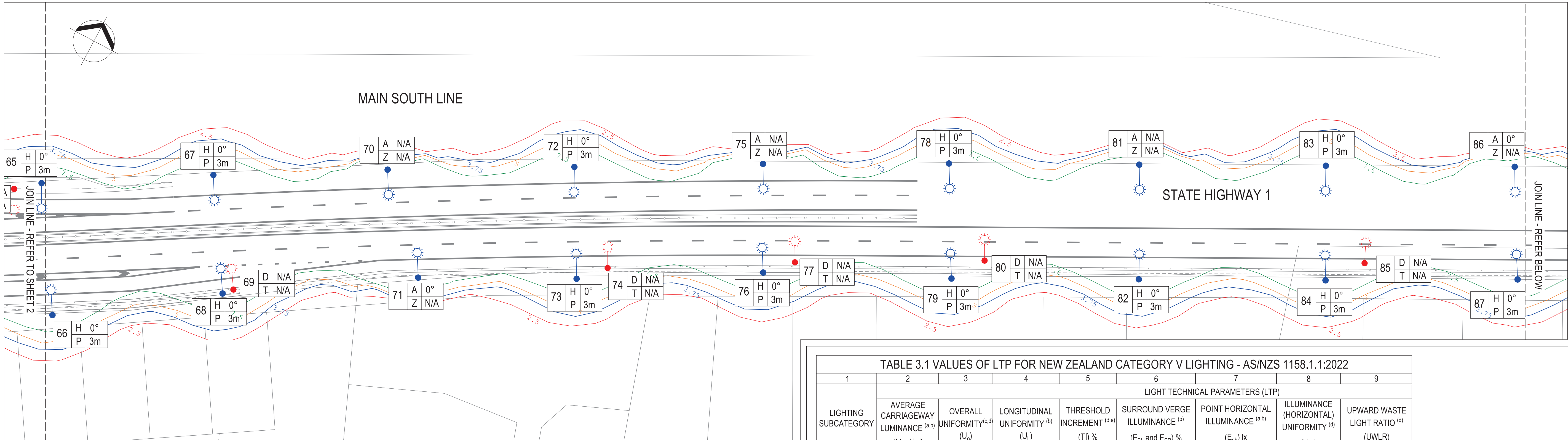


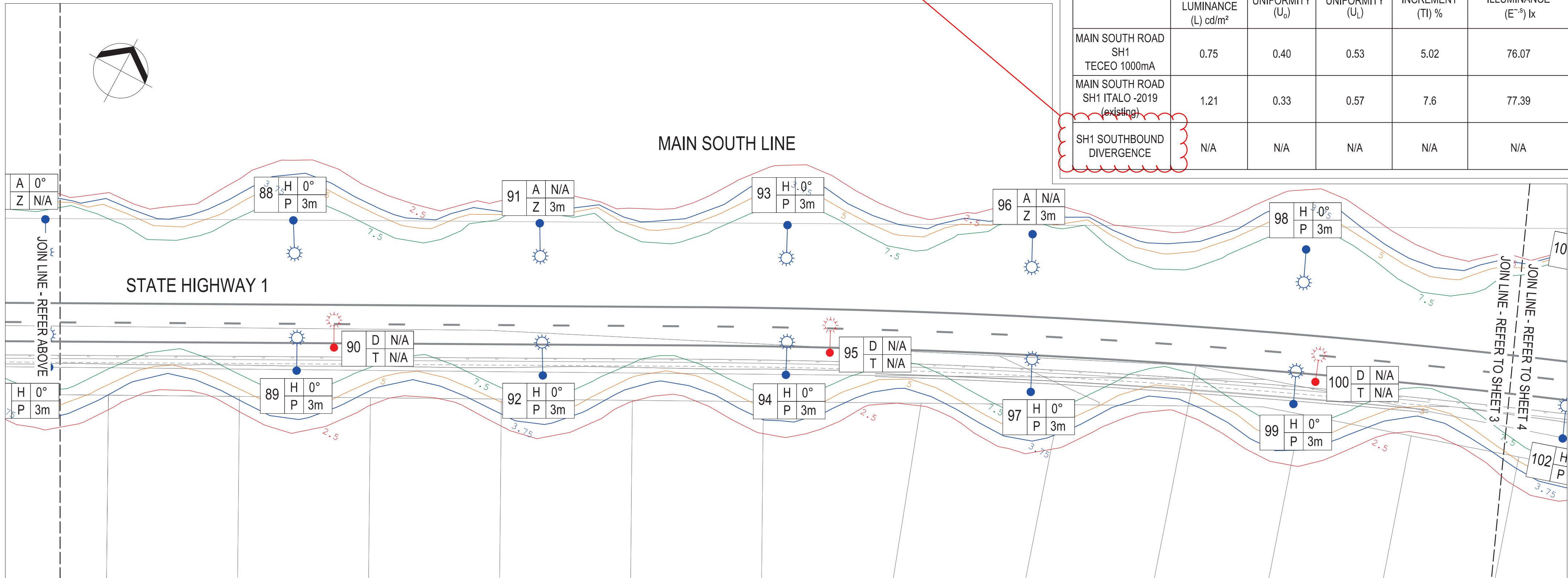
TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022								
LIGHTING SUBCATEGORY	1	2	3	4	5	6	7	8
	LIGHT TECHNICAL PARAMETERS (LTP)							
	AVERAGE CARRIAGEWAY LUMINANCE <sup>(a,b)</sup> (L) cd/m <sup>2</sup>	OVERALL UNIFORMITY <sup>(c,d)</sup> (U <sub>o</sub> )	LONGITUDINAL UNIFORMITY <sup>(b)</sup> (U <sub>L</sub> )	THRESHOLD INCREMENT <sup>(e,f)</sup> (TI) %	SURROUND VERGE ILLUMINANCE <sup>(b)</sup> (E <sub>SL</sub> and E <sub>SR</sub> ) %	POINT HORIZONTAL ILLUMINANCE <sup>(a,b)</sup> (E <sub>ph</sub> ) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY <sup>(d)</sup> (U <sub>E1</sub> )	UPWARD WASTE LIGHT RATIO <sup>(d)</sup> (UWLR)
V3	0.75	0.33	0.3	12	50	7.5	8	0.01

- a. THESE VALUES ARE MAINTAINED.  
b. CONFORMANCE IS ACHIEVED BY BEING GREATER THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
c. THE VALUE OF U<sub>o</sub> MAY BE 0.32 OR 0.31 PROVIDED THE VALUE FOR L IS 5% OR 10% RESPECTIVELY, ABOVE THE SPECIFIED VALUE IN COLUMN 2.  
d. CONFORMANCE IS ACHIEVED BY BEING LESS THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
e. WHERE LEGACY INSTALLATIONS WITH HID LUMINAIRES ARE UPGRADES, THE THRESHOLD INCREMENT VALUE MAY BE NO GREATER THAN THE EXISTING HID INSTALLATION AND MAY NOT EXCEED 20%.  
f. V4 IS THE MINIMUM SUBCATEGORY RECOMMENDED FOR APPLICATION IN NEW ZEALAND.

LIGHTING DESIGN CALCULATION SUMMARY										
AREA	2 AVERAGE CARRIAGEWAY LUMINANCE <sup>(a,b)</sup> (L) cd/m <sup>2</sup>	3 OVERALL UNIFORMITY <sup>(c,d)</sup> (U <sub>o</sub> )	4 LONGITUDINAL UNIFORMITY <sup>(b)</sup> (U <sub>L</sub> )	5 THRESHOLD INCREMENT <sup>(e,f)</sup> (TI) %	6 SURROUND VERGE ILLUMINANCE <sup>(b)</sup> (E <sup>-3</sup> ) lx	7 POINT HORIZONTAL ILLUMINANCE <sup>(a,b)</sup> (E <sup>-3</sup> ) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY <sup>(d)</sup> (U <sup>-E1</sup> )	9 UPWARD WASTE LIGHT RATIO <sup>(d)</sup> (UWLR)	MAX SPACING (m)	COMPLIANCE TO CATEGORY
MAIN SOUTH ROAD SH1 TECEO 1000mA	0.75	0.40	0.53	5.02	76.07	N/A	N/A	0.00	58	V3
MAIN SOUTH ROAD SH1 ITALO -2019 (existing)	1.21	0.33	0.57	7.6	77.39	N/A	N/A	0.00	54	V3
SH1 SOUTHBOUND DIVERGENCE	N/A	N/A	N/A	N/A	N/A	8.1	2.62	N/A	N/A	V3

Should this be WESBOUND DIVERGENCE? to line with the geographic north symbol

Where are the illuminance calculations for the surrounds?



Original Scale (A1)				Design				Approved For Construction			
1:500				M.HARRIS				03.04.24			
Reduced Scale (A3)				R.ANDERSON				03.04.24			
1:1000				* Refer to Revision 1 for Original Signature				Date			

FOR PRELIMINARY SAFE SYSTEM AUDIT				RAA	KC	DA	06.11.24
No.	Revision	By	Chk	Appd	Date		



Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS PACKAGE 2

Title: LIGHTING CALCULATION PLAN SHEET 3 OF 7

Discipline: CIVIL ENGINEERING

Drawing No: 3338703-20-CU-3523

Rev: A



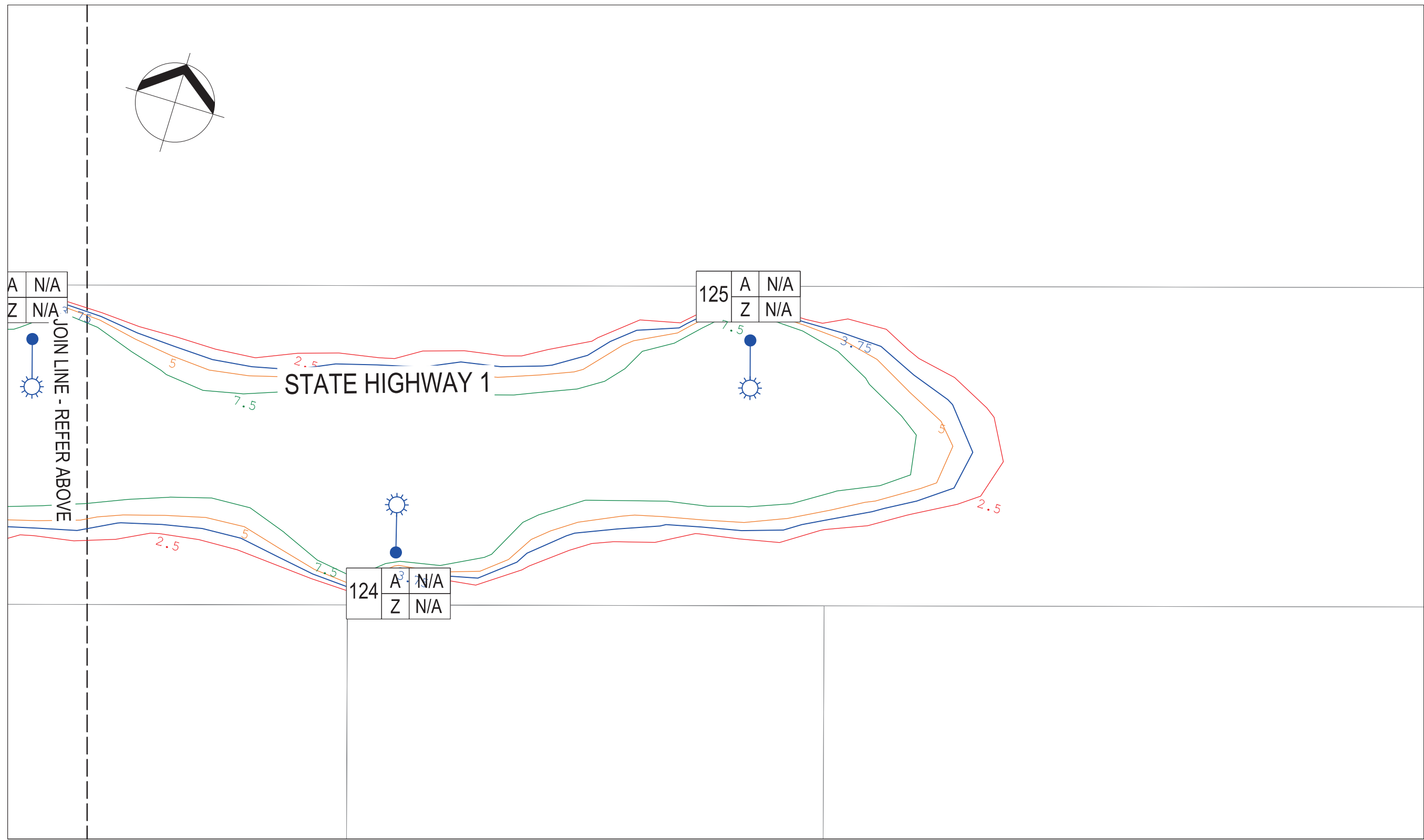
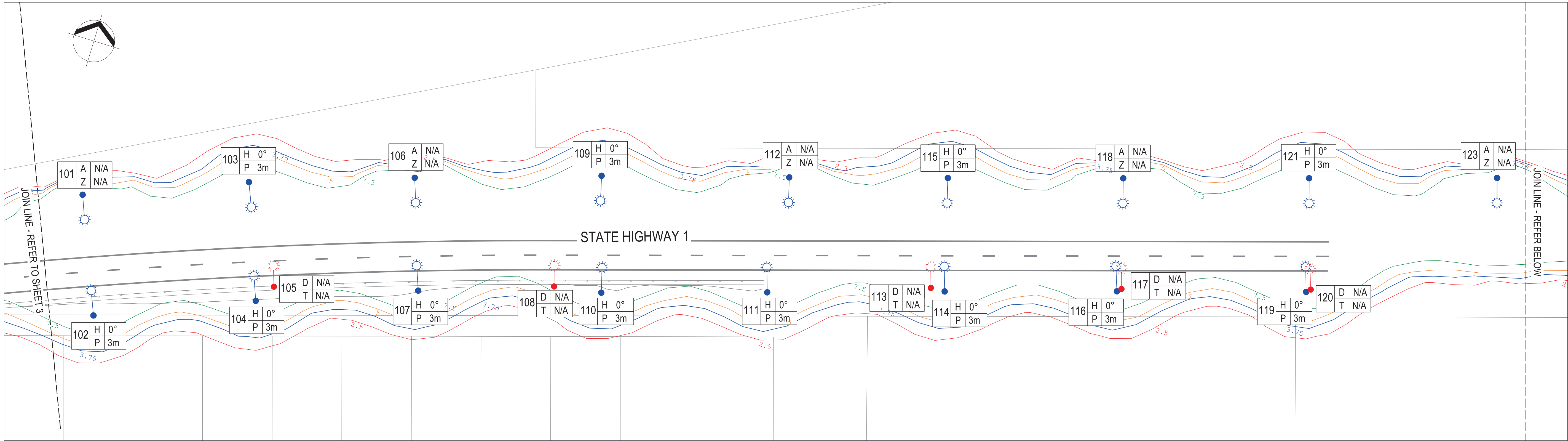


TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022								
1	2	3	4	5	6	7	8	9
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)							
	AVERAGE CARRIAGEWAY LUMINANCE <sup>(a,b)</sup> (L) cd/m <sup>2</sup>	OVERALL UNIFORMITY <sup>(c,d)</sup> (U <sub>o</sub> )	LONGITUDINAL UNIFORMITY <sup>(b)</sup> (U <sub>l</sub> )	THRESHOLD INCREMENT <sup>(d,e)</sup> (TI) %	SURROUND VERGE ILLUMINANCE <sup>(b)</sup> (E <sub>SL</sub> and E <sub>SR</sub> ) %	POINT HORIZONTAL ILLUMINANCE <sup>(a,b)</sup> (E <sub>ph</sub> ) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY <sup>(d)</sup> (U <sub>E1</sub> )	UPWARD WASTE LIGHT RATIO <sup>(d)</sup> (UWLR)
	V3	0.75	0.33	0.3	12	50	7.5	8

- a. THESE VALUES ARE MAINTAINED.  
b. CONFORMANCE IS ACHIEVED BY BEING GREATER THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
c. THE VALUE OF U<sub>l</sub> MAY BE 0.32 OR 0.31 PROVIDED THE VALUE FOR L IS 5% OR 10% RESPECTIVELY, ABOVE THE SPECIFIED VALUE IN COLUMN 2.  
d. CONFORMANCE IS ACHIEVED BY BEING LESS THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
e. WHERE LEGACY INSTALLATIONS WITH HID LUMINAIRES ARE UPGRADES, THE THRESHOLD INCREMENT VALUE MAY BE NO GREATER THAN THE EXISTING HID INSTALLATION AND MAY NOT EXCEED 20%.  
f. V4 IS THE MINIMUM SUBCATEGORY RECOMMENDED FOR APPLICATION IN NEW ZEALAND.

LIGHTING DESIGN CALCULATION SUMMARY										
AREA	2 AVERAGE CARRIAGEWAY LUMINANCE (L) cd/m <sup>2</sup>	3 OVERALL UNIFORMITY (U <sub>o</sub> )	4 LONGITUDINAL UNIFORMITY (U <sub>l</sub> )	5 THRESHOLD INCREMENT (TI) %	6 SURROUND VERGE ILLUMINANCE (E <sup>-s</sup> ) lx	7 POINT HORIZONTAL ILLUMINANCE (E <sup>-ph</sup> ) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY (U <sup>-E1</sup> )	9 UPWARD WASTE LIGHT RATIO (UWLR)	MAX SPACING (m)	COMPLIANCE TO CATEGORY
MAIN SOUTH ROAD SH1 TECEO 1000mA	0.75	0.40	0.53	5.02	76.07	N/A	N/A	0.00	58	V3
MAIN SOUTH ROAD SH1 ITALO -2019 (existing)	1.21	0.33	0.57	7.6	77.39	N/A	N/A	0.00	54	V3

No.	Revision	By	Chk	Appd	Date	Original Scale (A1) 1:500 Reduced Scale (A3) 1:1000	Design M.HARRIS 03.04.24 Drawn R.ANDERSON 03.04.24 Dig Verifier Drg Check	Approved For Construction Date
A	FOR PRELIMINARY SAFE SYSTEM AUDIT	RAA	KC	DA	06.11.24			



Client: SH1 ROLLESTON ACCESS IMPROVEMENTS PACKAGE 2

Title: LIGHTING CALCULATION PLAN SHEET 4 OF 7

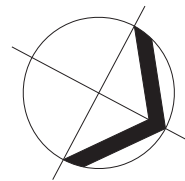
Discipline: CIVIL ENGINEERING  
Drawing No: 3338703-20-CU-3524  
Rev: A



TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022								
1	2	3	4	5	6	7	8	9
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)							
	AVERAGE CARRIAGEWAY LUMINANCE <sup>(a,b)</sup>	OVERALL UNIFORMITY <sup>(c,d)</sup>	LONGITUDINAL UNIFORMITY <sup>(b)</sup>	THRESHOLD INCREMENT <sup>(d,e)</sup>	SURROUND VERGE ILLUMINANCE <sup>(b)</sup>	POINT HORIZONTAL ILLUMINANCE <sup>(a,b)</sup>	ILLUMINANCE (HORIZONTAL) UNIFORMITY <sup>(d)</sup>	UPWARD WASTE LIGHT RATIO <sup>(d)</sup>
	(L) cd/m <sup>2</sup>	(U <sub>o</sub> )	(U <sub>l</sub> )	(TI) %	(E <sub>SL</sub> and E <sub>SR</sub> ) %	(E <sub>ph</sub> ) lx	(U <sub>E1</sub> )	(UWLR)
	V3	0.75	0.33	0.3	12	50	7.5	8

- a. THESE VALUES ARE MAINTAINED.  
b. CONFORMANCE IS ACHIEVED BY BEING GREATER THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
c. THE VALUE OF U<sub>o</sub> MAY BE 0.32 OR 0.31 PROVIDED THE VALUE FOR L IS 5% OR 10% RESPECTIVELY, ABOVE THE SPECIFIED VALUE IN COLUMN 2.  
d. CONFORMANCE IS ACHIEVED BY BEING LESS THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
e. WHERE LEGACY INSTALLATIONS WITH HID LUMINAIRES ARE UPGRADES, THE THRESHOLD INCREMENT VALUE MAY BE NO GREATER THAN THE EXISTING HID INSTALLATION AND MAY NOT EXCEED 20%  
f. V4 IS THE MINIMUM SUBCATEGORY RECOMMENDED FOR APPLICATION IN NEW ZEALAND.

LIGHTING DESIGN CALCULATION SUMMARY										
AREA	AVERAGE CARRIAGEWAY LUMINANCE <sup>(a,b)</sup> (L) cd/m <sup>2</sup>	OVERALL UNIFORMITY <sup>(c,d)</sup> (U <sub>o</sub> )	LONGITUDINAL UNIFORMITY <sup>(b)</sup> (U <sub>l</sub> )	THRESHOLD INCREMENT <sup>(d,e)</sup> (TI) %	SURROUND VERGE ILLUMINANCE <sup>(b)</sup> (E <sub>SL</sub> and E <sub>SR</sub> ) %	POINT HORIZONTAL ILLUMINANCE <sup>(a,b)</sup> (E <sub>ph</sub> ) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY <sup>(d)</sup> (U <sub>E1</sub> )	UPWARD WASTE LIGHT RATIO <sup>(d)</sup> (UWLR)	MAX SPACING (m)	COMPLIANCE TO CATEGORY
KIDMAN STREET TECEO 500mA	0.84	0.63	0.70	4.56	75.48	N/A	N/A	0.0	51	V3
ROLLESTON DRIVE TECEO 1000mA	0.75	0.63	0.65	5.02	84.99	N/A	N/A	0.0	26	V3
KIDMAN STREET/ NORMAN KIRK DRIVE INTERSECTION	N/A	N/A	N/A	N/A	N/A	7.5	3.04	N/A	N/A	V3
KIDMAN STREET DIVERGENCE	N/A	N/A	N/A	N/A	N/A	10.0	2.45	N/A	N/A	V3
KIDMAN STREET/ ROLLESTON DRIVE INTERSECTION	N/A	N/A	N/A	N/A	N/A	7.5	3.04	N/A	N/A	V3
ROLLESTON DRIVE CONVERGENCE	N/A	N/A	N/A	N/A	N/A	8.6	3.14	N/A	N/A	V3
ROLLESTON DRIVE SOUTH DIVERGENCE	N/A	N/A	N/A	N/A	N/A	8.4	3.12	N/A	N/A	V3



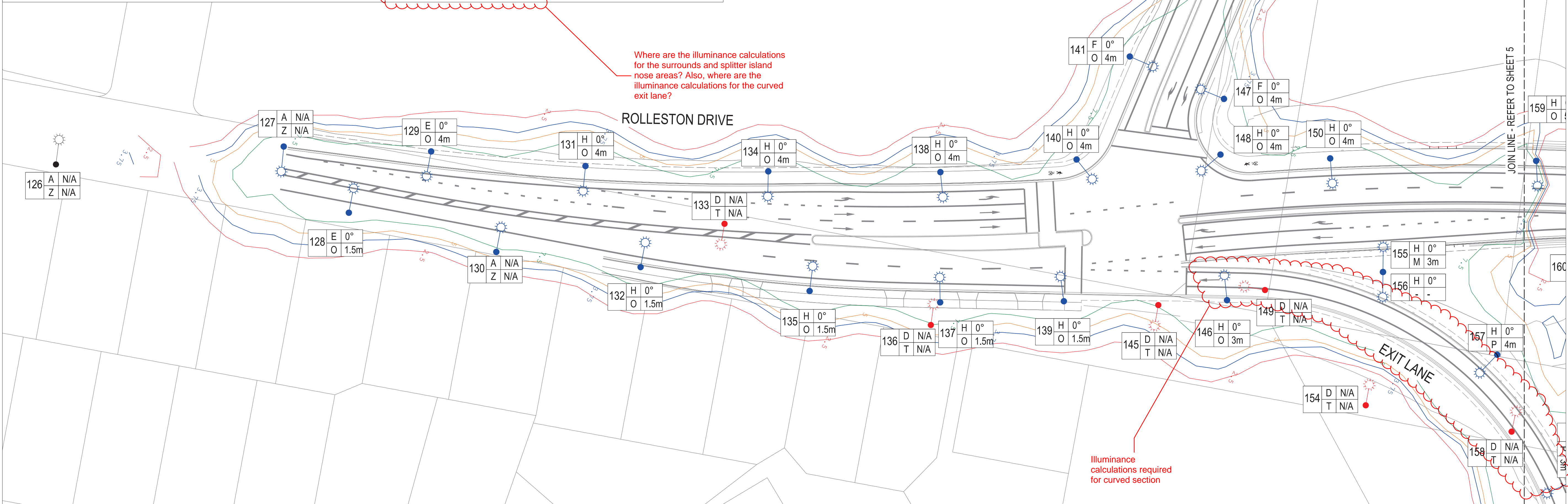
NORMAN KIRK DRIVE

KIDMAN STREET

What lane configuration(s) do these calculations apply to? e.g. Kidman St goes from single lane to double lane on the eastbound side with only one lane on the westbound side; and Rolleston Dr goes from single lane to three lanes on the northbound side and two lanes merging into one lane on the southbound side.

Where are the illuminance calculations for the surrounds and splitter island nose areas? Also, where are the illuminance calculations for the curved exit lane?

Illuminance calculations required for curved section



**PRELIMINARY**  
**NOT FOR CONSTRUCTION**

No.	Revision	RAA	KC	DA	06.11.24
A	FOR PRELIMINARY SAFE SYSTEM AUDIT				

Original Scale (A1)	Design	M.HARRIS	28.03.24	Approved For Construction
1:500	Drawn	R.ANDERSON	28.03.24	
Reduced Scale (A3)	Design Verifier			
1:1000	Design Check			
	* Refer to Revision 1 for Original Signature			



Client:	SH1 ROLLESTON ACCESS IMPROVEMENTS PACKAGE 2
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Title:	LIGHTING CALCULATION PLAN SHEET 5 OF 7
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Discipline:	CIVIL ENGINEERING
Drawing No.	3338703-20-CU-3525
Rev.	A

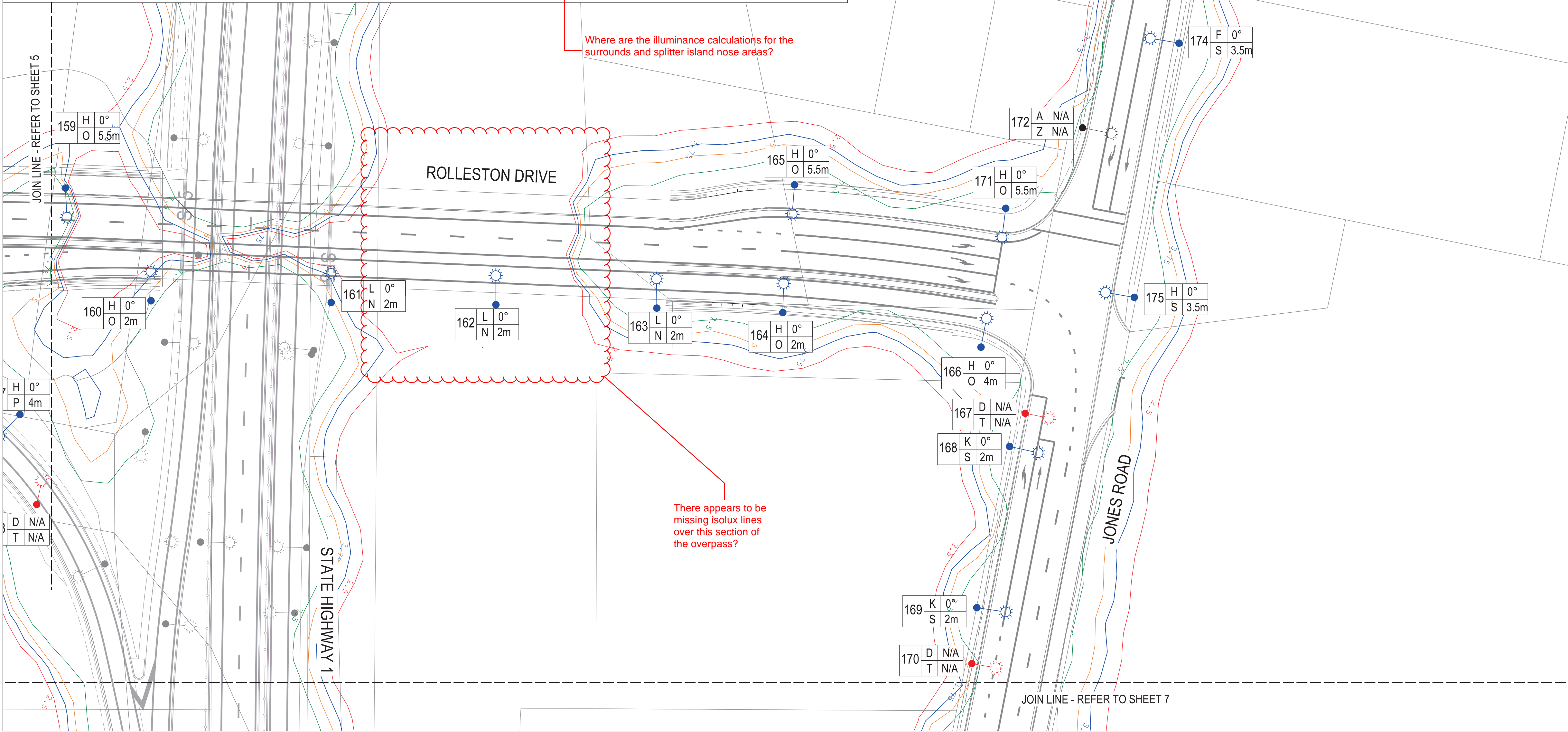


TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022								
1	2	3	4	5	6	7	8	9
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)							
	AVERAGE CARRIAGEWAY LUMINANCE <sup>(a,b)</sup> (L) cd/m²	OVERALL UNIFORMITY <sup>(c,d)</sup> (U <sub>o</sub> )	LONGITUDINAL UNIFORMITY <sup>(b)</sup> (U <sub>L</sub> )	THRESHOLD INCREMENT <sup>(d,e)</sup> (TI) %	SURROUND VERGE ILLUMINANCE <sup>(b)</sup> (E <sub>SL</sub> and E <sub>SR</sub> ) %	POINT HORIZONTAL ILLUMINANCE <sup>(a,b)</sup> (E <sub>ph</sub> ) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY <sup>(d)</sup> (U <sub>E1</sub> )	UPWARD WASTE LIGHT RATIO <sup>(d)</sup> (UWLR)
	V3	0.75	0.33	0.3	12	50	7.5	8

- a. THESE VALUES ARE MAINTAINED.  
b. CONFORMANCE IS ACHIEVED BY BEING GREATER THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
c. THE VALUE OF U<sub>o</sub> MAY BE 0.32 OR 0.31 PROVIDED THE VALUE FOR L IS 5% OR 10% RESPECTIVELY, ABOVE THE SPECIFIED VALUE IN COLUMN 2.  
d. CONFORMANCE IS ACHIEVED BY BEING LESS THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
e. WHERE LEGACY INSTALLATIONS WITH HID LUMINAIRES ARE UPGRADES, THE THRESHOLD INCREMENT VALUE MAY BE NO GREATER THAN THE EXISTING HID INSTALLATION AND MAY NOT EXCEED 20%.  
f. V4 IS THE MINIMUM SUBCATEGORY RECOMMENDED FOR APPLICATION IN NEW ZEALAND.

LIGHTING DESIGN CALCULATION SUMMARY										
AREA	2 AVERAGE CARRIAGEWAY LUMINANCE (L) cd/m <sup>2</sup>	3 OVERALL UNIFORMITY (U <sub>o</sub> )	4 LONGITUDINAL UNIFORMITY (U <sub>L</sub> )	5 THRESHOLD INCREMENT (TI) %	6 SURROUND VERGE ILLUMINANCE (E <sub>SL</sub> and E <sub>SR</sub> ) %	7 POINT HORIZONTAL ILLUMINANCE (E <sub>ph</sub> ) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY (U <sub>E1</sub> )	9 UPWARD WASTE LIGHT RATIO (UWLR)	MAX SPACING (m)	COMPLIANCE TO CATEGORY
OVERPASS ITALO S05 4-100.7	0.75	0.41	0.62	5.51	80.74	N/A	N/A	0.00	42	V3
ROLLESTON DRIVE NORTH DIVERGENCE	N/A	N/A	N/A	N/A	N/A	12.1	2.53	N/A	N/A	V3
JONES ROAD/ ROLLESTON DRIVE INTERSECTION	N/A	N/A	N/A	N/A	N/A	7.5	4.53	N/A	N/A	V3

FOR STATE HIGHWAY 1 SEE SHEETS 1 - 4



What lane configuration do these calculations apply to? e.g. the overpass goes from two northbound lanes to three lanes and a single southbound lane on the other side.

Where are the illuminance calculations for the surrounds and splitter island nose areas?

There appears to be missing isolux lines over this section of the overpass?

No.	Revision	By	Chk	Appd	Date
A	FOR PRELIMINARY SAFE SYSTEM AUDIT	RAA	KC	DA	06.11.24

Original Scale (A1)	Design	M.HARRIS	02.04.24	Approved For Construction
1:500	Drawn	R.ANDERSON	02.04.24	
Reduced Scale (A3)	Design Verifier			
1:1000	Design Checker			
* Refer to Revision 1 for Original Signature				



Client: SH1 ROLLESTON ACCESS IMPROVEMENTS PACKAGE 2

Title: LIGHTING CALCULATION PLAN SHEET 6 OF 7

Discipline: CIVIL ENGINEERING  
Drawing No.: 3338703-20-CU-3526  
Rev.: A



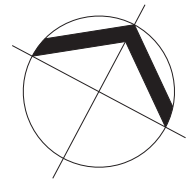
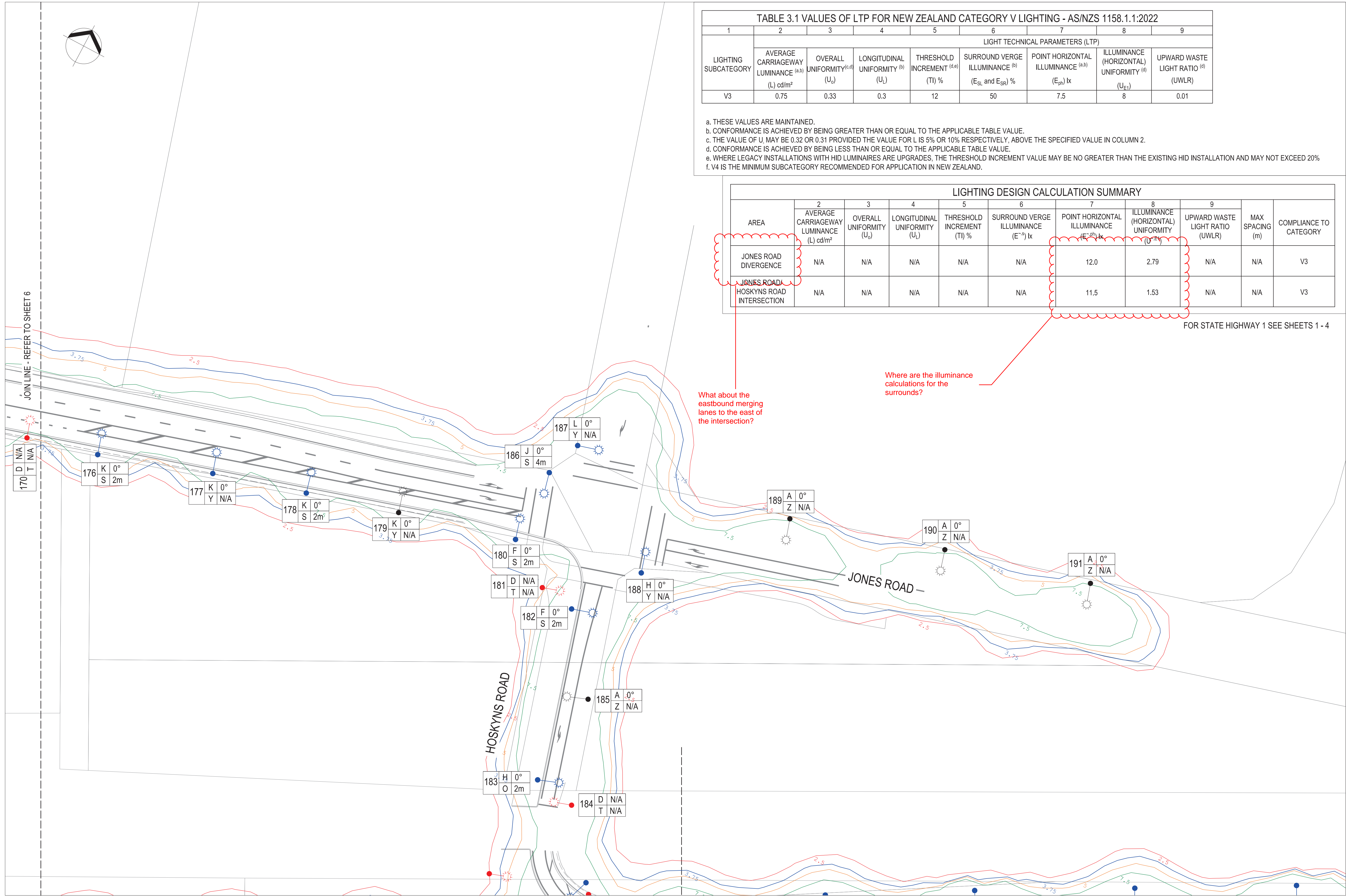


TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022								
LIGHTING SUBCATEGORY	2	3	4	5	6	7	8	9
	LIGHT TECHNICAL PARAMETERS (LTP)							
	AVERAGE CARRIAGEWAY LUMINANCE <sup>(a,b)</sup> (L) cd/m <sup>2</sup>	OVERALL UNIFORMITY <sup>(c,d)</sup> (U <sub>o</sub> )	LONGITUDINAL UNIFORMITY <sup>(b)</sup> (U <sub>l</sub> )	THRESHOLD INCREMENT <sup>(d,e)</sup> (TI) %	SURROUND VERGE ILLUMINANCE <sup>(b)</sup> (E <sub>SV</sub> and E <sub>SR</sub> ) %	POINT HORIZONTAL ILLUMINANCE <sup>(a,b)</sup> (E <sub>ph</sub> ) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY <sup>(d)</sup> (U <sub>Et</sub> )	UPWARD WASTE LIGHT RATIO <sup>(d)</sup> (UWLR)
V3	0.75	0.33	0.3	12	50	7.5	8	0.01

- a. THESE VALUES ARE MAINTAINED.  
b. CONFORMANCE IS ACHIEVED BY BEING GREATER THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
c. THE VALUE OF U<sub>l</sub> MAY BE 0.32 OR 0.31 PROVIDED THE VALUE FOR L IS 5% OR 10% RESPECTIVELY, ABOVE THE SPECIFIED VALUE IN COLUMN 2.  
d. CONFORMANCE IS ACHIEVED BY BEING LESS THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.  
e. WHERE LEGACY INSTALLATIONS WITH HID LUMINAIRES ARE UPGRADES, THE THRESHOLD INCREMENT VALUE MAY BE NO GREATER THAN THE EXISTING HID INSTALLATION AND MAY NOT EXCEED 20%  
f. V4 IS THE MINIMUM SUBCATEGORY RECOMMENDED FOR APPLICATION IN NEW ZEALAND.

LIGHTING DESIGN CALCULATION SUMMARY										
AREA	2 AVERAGE CARRIAGEWAY LUMINANCE (L) cd/m <sup>2</sup>	3 OVERALL UNIFORMITY (U <sub>o</sub> )	4 LONGITUDINAL UNIFORMITY (U <sub>l</sub> )	5 THRESHOLD INCREMENT (TI) %	6 SURROUND VERGE ILLUMINANCE (E <sup>SV</sup> ) lx	7 POINT HORIZONTAL ILLUMINANCE (E <sup>ph</sup> ) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY (U <sup>Et</sup> )	9 UPWARD WASTE LIGHT RATIO (UWLR)	MAX SPACING (m)	COMPLIANCE TO CATEGORY
JONES ROAD DIVERGENCE	N/A	N/A	N/A	N/A	N/A	12.0	2.79	N/A	N/A	V3
JONES ROAD HOSKYNS ROAD INTERSECTION	N/A	N/A	N/A	N/A	N/A	11.5	1.53	N/A	N/A	V3

FOR STATE HIGHWAY 1 SEE SHEETS 1 - 4



Original Scale (A1)				Design				Approved For Construction*			
1:500				M.HARRIS				02.04.24			
Reduced Scale (A3)				R ANDERSON				02.04.24			
1:1000				* Refer to Revision 1 for Original Signature							

A	FOR PRELIMINARY SAFE SYSTEM AUDIT	RAA	KC	DA	06.11.24
No.	Revision	By	Chk	Appd	Date



Client: SH1 ROLLESTON ACCESS IMPROVEMENTS PACKAGE 2

Title: LIGHTING CALCULATION PLAN SHEET 7 OF 7

Discipline: CIVIL ENGINEERING  
Drawing No. 3338703-20-CU-3527  
Rev. A