ANZ Centre, 267 High Street,
PO Box 13960, Christchurch,
8141, New Zealand
T: +64 3 366 3521 // **F:** +64 3 366 3188
E: info@beca.com // www.beca.com

Selwyn District Council
2 Norman Kirk Drive
PO Box 90
Rolleston, 7643

4 December 2024

Attention: Mary McConnell

Dear Mary,

D240002: New Zealand Transport Agency Notice of Requirement SH1 Rolleston Access Improvements Package 1 (Roundabout) - s92(1) RMA Request for Information (RFI) Response

Thank you for your letter dated 13 November with a number of queries in respect to **D240002**.

As outlined in the Notice of Requirement (NOR) altering the existing State Highway designation pursuant to s181(1) this Project is referred to as Package 1 of the Wider Project and relates to approximately 34,304m^2 of land located either side of State Highway (SH1) in the vicinity of Duns Crossing Road/Walkers Road intersection with SH1.

The requirement includes Crown land (administered by KiwiRail Holdings Limited and Minister of Corrections) and private land owned by several parties.

For completeness purposes, we have collated all RFI matters as raised and responses into Table 1, as attached.

Yours sincerely,

Kate Graham

Senior Planner

on behalf of

Beca Limited

Phone Number: +6439669136
Email: Kate.Graham@beca.com

make everyday better.

General	
Q1	Section 1.4 of the Assessment of Environmental Effects (AEE) states that written agreement is being sought from the Minister of Corrections/ Rolleston Prison (28 Runners Road, Rolleston), Kiwirail, 17 Fountain Place and Section 2 SO 480906. If these have been obtained, please provide them as part of the response to this RFI.
A1	Written agreement has been provided from: • Minister of Corrections NZTA are undergoing final discussions with the owners of 17 Fountain Place, KiwiRail Holdings Limited and Section 2 SO 480906 to obtain written agreement.
Q2	Section 2.1 of the AEE discusses PPC73 and if approved, PPC73 would be rezoned to Medium Density zone (MDZ). Consent Order [2024] NZEnvC 269 issued 31 October 2024 contains the following direction (full consent order attached to this RFI). Please comment on the implications of this consent order on the NoR and any resulting changes to the existing environment.
A2	At the time of lodgement, PPC73 had been declined by SDC and had been appealed to Environment Court. This was resolved through mediation where the parties agreed to resolve the appeal by rezoning the land to General Residential Zone and amending the Partially Operative Selwyn District Plan ('POSDP'). A Consent Order was issued by the Court subsequent to this NOR being served. The Outline Development Plan (ODP) DEV-RO7 – Rolleston 7 Development Area states *'The intersection of State Highway 1, Dunns Crossing Road and Walkers Road is planned to be upgraded with a roundabout by Waka Kotahi NZTA. To accommodate this upgrade, any development within the 'future intersection upgrade' area needs to take into account any additional land requirements for this upgrade, as well as ensuring the subdivision pattern appropriately integrates with the location of the intersection.'* As outlined in SUB-REQ13 Conditions Precedent (DEV-RO7 G) no development (including earthworks or construction related activities) shall occur prior to the commencement of the upgrade of the SH1/Dunns Crossing Road/ Walkers Road intersection. Additionally, the matters of discretion

	under SUB-MAT13 7.a direct applicants and the Council to have regard to *'Whether the pattern and staging of development: a. takes into account the upgrade of the Dunns Crossing Road / Main South Road (SH1) / Walkers Road intersection by Council and NZTA, including any land requirements; and b. commences adjacent to Dunns Crossing Road to maximise connectivity and the efficient provision of infrastructure.'* As the development of PC73 cannot commence prior to this Project being commenced, no further regard is required to be given to PC73 and its rezoning. For the avoidance of doubt, the development of land subject to PC73 will need to have regard to this Project.
Q3	Have Regional Consents (discussed in Section 5.3) been lodged with Canterbury Regional Council, and if so, what are the consent references?
A4	We have noted in the NOR that regional consents are being sought. However, a subsequent global consents issued by Canterbury Regional Council, reference numbers CRC2310133 and CRC231034 provides for the discharge of construction phase and operational phase stormwater. Additionally, the Project complies with Rule 7.32 of the Canterbury Air Regional Plan (CARP). No additional consents are required.
Noise	
Q4	The noise level at sites 15 & 17 Fountain Place is predicted to slightly decrease. We assume this is due to vehicles slowing down when they approach the roundabout. Would Marshall Day Acoustics (MDA) be able to clarify what vehicle speed assumptions they have used in their modelling at this location?
A4	A negligible reduction in noise level is predicted for 15 and 17 Fountain Place – 0.1 and 0.3 dB respectively. Vehicle numbers, speed and surfacing all have a bearing on the resultant noise level and the modelling assumptions (50km/h) are provided in Appendices D and E of the Operational Noise Technical Report (dated 21 October 2024). Additionally, the proposed relocation of Dunns Crossing Road further to the west will also contribute to the reduced noise levels for these particular dwellings and others in the vicinity.
Q5	Can MDA clarify why the increase in noise level at 380 Dunns Crossing Road is +1.5 dB, as this is notably higher than the increase experienced for other dwellings along Dunns Crossing Road, which average around +0.5 dB.
A5	This dwelling is at the southern extent of the modelled area and the noise level difference is likely to be due to sound propagation anomalies caused by the traffic noise source terminating close to this dwelling – this can be seen in the noise contour plot in Appendix F of the Noise report. However,

	the changes in noise level for 380 Dunns Crossing Road, and adjacent dwellings at 376 and 382, are all **negligible in the context of what is subjectively perceptible.**
Q6	With regard to construction noise – as MDA note there are specific Rules in the PDP. Is it possible to be more definitive as to what specific PPF's (by address) non-compliances are anticipated, and the general magnitude of non-compliance expected?
A6	The assessment has been undertaken on the basis of an indicative construction methodology but a detailed construction methodology is not available at this stage of the Project, as such it is not possible to provide this level of detail. However, as a guide, Table 4 of the Construction Noise Technical Report, provides the setback distances that would be required to achieve a noise level of 70 dB LAeq. For example, construction noise levels will be 70 dB LAeq or below at a distance of approximately 58 metres from a hydro excavator. Noise levels will change during each phase of the construction programme as different activities occur. It is reasonable to expect that the Dunns Crossing Road dwellings will receive the highest noise levels when construction is occurring in their proximity. A condition has been volunteered requiring the implementation of a Construction Noise and Vibration Management Plan (CNVMP) that will enable the contractor to identify potential breaches of the applicable noise limits once the methodology is better understood, and to implement noise management and mitigation measures as far as reasonably practicable.
Q7	Following the issue of Consent Order [2024] NZEnvC 269, have MDA considered whether future dwellings in the land to the south of Dunns Crossing Road make any difference to their construction or operational noise assessments?
A7	With respect to the Consent Order, our interpretation of NZS 6806:2010 *Acoustics - Road-traffic noise - New and altered roads* is that potential future dwellings on this land are not considered to be Protected Premises and Facilities (PPFs) and are therefore excluded from assessment against the Standard. The developer is unable to commence the subdivision prior to the proposed intersection upgrade, so no occupied dwellings will be affected by noise from construction work. With regard to future operational traffic noise effects, all residential development on this land within the State Highway Noise Control Overlay, is subject to Rule NOISE-R3 of the Partially Operative District Plan which provides appropriate protection against traffic noise.
Landscape and Visual	

Q8	Construction effects: The Landscape and Visual Assessment (LVA) methodology set out in Appendix 6 notes that effects fall into two categories – temporary (i.e. effects during construction) and permanent (i.e. operational effects). However, no consideration of construction effects has been presented in the LVA. Given the level of vegetation removal, site disturbance and other construction activity required to facilitate construction of the development, I consider that the appraisal of construction effects is pertinent in understanding the full effect of the proposed development on the landscape and visual resource.
A8	The vegetation proposed to be removed can be removed as a permitted activity. Notwithstanding this, construction activities and enabling works such as vegetation clearance and earthworks may result in localised effects on the visual amenity values for residents of Dunns Crossing Road. Section 4 of the LVA report outlines the extent of vegetation to be removed within the designation boundary. Construction activities may create temporary visual clutter, reducing the level of amenity experienced by these residents for the period of time that the proposal is being constructed. Change and development is expected in this landscape (afforded by the LLRZ and PC73) which lowers the level of sensitivity. Temporary effects will be less than minor with much of the construction activity being located at distance from the existing properties on Dunns Crossing Road. The following recommendations may be considered to help manage these effects: 1. Site compounds and construction yards: Locate yards in discrete locations where possible, away from residential areas. Reinstate construction and site compound areas by removing any left-over fill and shaping ground to integrate with surrounding landform. Reinstate land with consideration for the future use of the site or reinstate with grass at the completion of works. 2. Screening: Provide fencing screening around works, yards and compounds where they are adjacent or in close proximity to residential dwellings to contain or hide activities where possible, to reduce visual clutter.
Q9	Vegetation removal: Information on the extent of vegetation removal (i.e. length of existing shelterbelt along SH1 and at the edge of Rolleston Prison) is required to provide an informed understanding of the impact of this removal, particularly with regards to effects on views from residents at Dunns Crossing Road.
A9	As noted above the removal of this vegetation is not an activity that requires approval under the district plan and these views are not protected. Nevertheless Section 4 of the LVA report outlines the extent of vegetation to be removed within the designation boundary. Refer also to Appendix 4 Proposed Designation Plan.

Q10	Proposed Planting: It is noted in Section 4 of the LVA that planting does not form part of the proposals, and therefore the assessment has been prepared on this basis. The LVA recommends a Landscape Management Plan is prepared in accordance with various NZTA landscaping guidelines. There are a number of effects or reasons provided in the LVA which refer to proposed planting (some of which will result in a positive effect) however it is difficult to agree with these findings without certainty on any formal planting proposals. For instance, Section 8 of the LEA notes that: *for the majority of viewing audiences the proposal will result in negligible and positive effects. For residents on Dunns Crossing Road this is primarily influenced by the scale of additional planting and offset of vehicular traffic. Visual effects on future LLRZ properties directly adjacent the roundabout have the potential to be Low-Moderate. While proposed planting will demarcate the western edge and help to soften and reduce the prominence of the roundabout the visual presence of traffic will appear pervasive for adjacent LLRZ properties.* This conclusion relies on the presence of proposed planting, however aside from being included as a recommendation, no evidence of this proposed planting is provided. It is strongly recommended that a planting plan is prepared as part of this application to provide greater clarity on how effects will be mitigated.
A10	Section 7 of the LVA Report outlines both general outcomes and specific considerations to be addressed by a Landscape Management Plan. These are recommended conditions, volunteered by NZTA, and provide for landscaping plans to be addressed at detailed design stage of the Project as part of the s176 Outline Plan process. Accordingly, an appropriate amount of detail has been provided to manage the outcomes of the proposal and draw conclusions around the nature and degree of effect arising. Please see attached DRAFT ULDF, noting this may be subject to amendments prior to finalisation.
Q11	Lighting effects: The effects arising from street lighting of the roundabout and its approach roads is addressed in the assessment, but no detail is provided on the lighting strategy. Further information on these structures is necessary (i.e. how many streetlights are proposed and where they will be situated) to fully establish their impact on the landscape, and on views.
A11	Refer to Appendix O for the Lighting Assessment. This includes proposed lighting layouts and lighting spill plans.
Q12	Visual effects on residents at Dunns Crossing Road: The Lighting Effect Assessment (LFA) identifies that: *the removal of the roadside vegetation and the creation of open grassed areas surrounding the new road would amplify the visibility of new roading, creating a stark environment that contrasts against the residential interface.* The project description also notes that a section of the mature pine shelterbelt which extends along the southbound edge of the SH1 carriageway would also be removed to facilitate the development however this is not captured in the visual assessment. It is likely that removal of this vegetation would open up additional, longer distance views of SH1 from those properties located between SH1 and Newman Road (and just south of Newman Road), changing their outlook (and perception of the landscape) from one of largely rural character to one which is

	largely occupied by road infrastructure (i.e. carriageway, lighting, signage, stormwater infrastructure). Further consideration of effects on these residents taking account of this vegetation removal would be useful in understanding the full impact on this viewing audience.
A12	Refer above to A8 and A10. The following will mitigate potential effects on residential properties on Dunns Crossing Road: • Planting around the stormwater basins and the residual land between Dunns Crossing Road and the southern leg of the roundabout including between SH1 and the new Dunns Crossing Road turning head and south of Newman Road. • Implementation of the LMP through the detailed design stages will address the outlook toward new roading infrastructure. Given that the shelterbelt in question is further west of the development, it is considered that any additional further views are able to be managed by the recommendations made. • Additionally, the zoning of the land west of Dunns Crossing Road is LLRZ, so it is expected that the outlook of the existing residents with become one with more suburban residential character. Furthermore, this land is subject to PC73, and the decision has confirmed that this land will be rezoned General Residential. Accordingly, the changing character is anticipated through the planning framework. The LVA assessment concludes that the proposal will be able to contribute a high-quality piece of roading infrastructure to the local community both now, and in the future.
Q13	Effects on views for Road Users: A description of the effect on road users is presented in Section 6.2.3 of the LEA, however no effect rating is given. Please provide effect ratings for this viewing audience.
A13	The description of effects for road users within Section 6.2.3 of the LVA report outlines the nature of effect for three different types of road user views. The quality and experience for this viewing audience is expected to be enhance by the proposal, resulting in positive effects.
Lighting Effects	
Q14	Drawing 3338703-10-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 Central Management System (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.
A14	The lighting assessment, including luminaire typology, has been reviewed and agreed by the NZTA Subject Matter Expert (SME).
Q15	Drawing 3338703-10-CU-3521 - Table 3.1 column 5 presents a TI requirement of 9.81%, however this appears to be a typo as the standard requires a maximum TI of 15%. Table 3.1 column 9 presents an UWLR requirement of 3%, however this appears to be a typo as the standard requires a maximum TI of 1% for LED luminaires and 3% for HID luminaires, and as this job involves new luminaires 1% should be the applicable value. The above comments have been noted as possible typos (to the lighting designer) as information only and are not non-compliances as the calculated TI is 5.53% and UWLR is 0% which are well within the permissible limits.
A15	NZTA M30 supersedes the lighting standard. 9.81 is a typo, and the target TI is less than 10%, which the design achieves in any case.
Q16	The TI and UWLR comments in Note 2 (above) are also applicable to drawings 3522, 3523 and 3524
A16	Refer to A15.
Q17	Drawing 3338703-10-CU-3521 - Luminance Calculation Summary table presents one calculation result, but what lane configuration does this calculation apply to? SH1 on either side of the RAB changes from a 4-lane divided carriageway to a 2-lane divided carriageway. The luminaire arrangement also changes from an opposite arrangement to a single sided arrangement at the eastern end SH1. There needs to be multiple luminance calculations to account for the different lane configurations and luminaire arrangements. 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) and luminaire arrangements (SS and Opp) or supply additional calculation results to cover all arrangements.
A17	Luminance calculations apply to all lane configurations and present the worst case.
Q18	Drawing 3338703-10-CU-3522 - Calculation Table for Railway Crossings presents a point horizontal illuminance result of 10.89 Lux, however this is the wrong type of calculation for a rail level crossing. AS/NZS 1158.1.1 Section 4.6 requires an average vertical illuminance calculation (rather than a horizontal calculation) to be made for a single track and two-way traffic with the vertical plane and calculation points facing the oncoming

	traffic, so in this case there should be two sets of average vertical illuminance values. This is a non-compliance with the standards so please get the lighting designer to complete average vertical illuminance calculations in accordance with AS/NZS 1158.1.1 Section 4.6.
A18	Calculations have been carried out and will be corrected in the detailed design phase of the Project, noting this is an engineering matter as opposed to a Notice of Requirement matter.
Q19	Drawing 3338703-10-CU-3522 - Locations of Poles 16 and 19 appear to within 10m of the Kiwirail crossing boundary. The drawing does not show the rail crossing or boundary lines. AS/NZS 1158.1.1 Figure 4.17 provides a no column zone extending from the Kiwirail crossing boundary 10m in each direction from the crossing. This appears to be a non-compliance with the standards so please get the lighting designer to move Poles 16 and 17 to be outside this no column zone or add the rail crossing boundary lines and dimensions to the drawing to demonstrate compliance
A19	NZTA are aware of this requirement and drawings will be updated in the detailed design phase of the Project, noting this is an engineering matter as opposed to a Notice of Requirement matter.
Q20	Drawing 3338703-10-CU-3522 - Illuminance Calculation Summary table only appears to include the carriageway areas. AS/NZS 1158.1.1 requires illuminance calculations at roundabouts and tee intersections that include the carriageway, surrounds and raised island design areas. Please get the lighting designer to provide calculations for the surrounds and raised islands at both intersections in accordance with AS/NZS 1158.1.1 Figures 4.10 and 4.11.
A20	NZTA are aware of this requirement and drawings will be updated in the detailed design phase of the Project.
Q21	Drawing 3338703-10-CU-3523 - Refer Note 4 (above).
A21	NZTA are aware of this requirement and drawings will be updated in the detailed design phase of the Project.
Q22	Drawing 3338703-10-CU-3524 - Carriageway geometry shows 2 curves both having a radius of curvature of 120m (scaled off the drawing), but what design method was employed? AS/NZS 1158.1.1 Section 4.3.2 (b) provides a choice of illuminance design or application of the curve spacing chart (to alter the luminance design spans) for curves with a radius greater than or equal to 100m and less than 200m. Please get the lighting designer to conform which design method was used and provide supporting calculations
A22	This is not within the Project scope.

Q23	Drawings 3338703-10-CU-3521 to 3224 - Thes drawings show V3 luminance calculations for SH1 (Main South Road), but there appear to be no V4 luminance calculations for Walkers Road or Dunns Crossing Road. Please get the design to submit V4 luminance calculations for Walkers Road and Dunns Crossing Road.
A23	This is not within the Project scope.
Q24	Drawings 3338703-10-CU-3532 to 3534 - These drawings show spill light calculation results for certain address (e.g. 15 Fountain Place), however none of these drawings show the property numbers so there is no way to correlate the calculation results with the properties without having to look up Google maps. Please get the lighting designer to add the street addresses to the evaluated properties.
A24	Please see attached revised drawings with property numbers included.
Transport Effects	
Q25	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.
A25	The model development report including calibration and validation reports is included in Appendix G - Rolleston DBC - Model Development Report of the DBC.
Q26	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.
A26	As reported in Section 4.2 of the ITA, the Linsig models were only used to estimate signal timing settings to be used in the Paramics model for the Project. Subsequently, the Linsig models were not calibrated as the future scenarios do not currently exist. The SIDRA models were only used as a cross check of the Paramics model. The effects assessment relies only on the reported Paramics results. As neither Linsig nor Sidra models were used to assess the effects of the Project, it is not necessary to provide these models.
Q27	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.

A27	PC80 has been approved but was subject to its own effects assessment. The effects of PC80 were assessed with a roundabout assumed at the SH1 / Walkers Road / Dunns Crossing Road intersection. The only difference between the roundabout assumed for the PC80 assessment and the Project roundabout is that PC80 assumed two through lanes on Walkers Road and Dunns Crossing Road which merged to one lane shortly after the roundabout. The through volumes reported in the PC80 ITA are fairly low and would not be expected to require two approach and exit lanes especially given the spare capacity indicated by the ITA for these movements. A sensitivity test for PC80 is not considered necessary. As discussed in section 4.3 of the ITA, the effects of proposed Plan Changes (e.g. PC73, PC81, PC82) on the transport system will be assessed through an independent process. It is therefore not considered appropriate for this assessment of a transport project to demonstrate the impacts of those land use proposals.
Q28	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.
A28	The future growth assumptions are documented in section 2.2.2 of Appendix S - Rolleston DBC - Scheme Modelling and Economics report of the DBC are outlined below. of additional trips between the 2021 and 2038 demand scenarios are noted below: • Industrial Area, Bulk Retail Site South of Link Drive: 85% turn-over level of published 'almost 2,000 car park spaces' during typical weekday PM peak. • Southwest Acland Park Residential Area: 750-1000 additional households. • Northeast Branthwaite Residential Area: 400-500 additional households. • Southeast Farringdon Residential Area: 250-350 additional households. • Falcons Landing Residential Area: 250-350 additional households. The forecast assumptions have been agreed with the Client group and peer reviewed during the DBC process. The forecast models are considered to still be appropriate for the AEE. SDC Strategic Transport Lead Manager Andrew Mazey has been involved in these discussions and is in agreement with this approach.
Q29	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.

A29	Rolleston is a rapidly growing area with a range of localised upgrades to the network identified to support growth in the surrounding area. The timing and form of these assumptions are subject to significant uncertainty regarding funding and prioritisation. Therefore, it is appropriate to assume such upgrades, and these were agreed with the Client group including SDC (during the DBC). It is noted that the reference to Lowes/Levi/Lincoln Rolleston Road roundabout is a typographical error in the ITA and was in fact modelled as a signal. The other differences identified are remote from the Project and therefore changes in these assumptions will not have any material impact on the effects assessment of the Project.
Q30	Please comment on the impact of Christchurch Southern Motorway Stage 2 (CSM2) opening during the five-year period over which Crash Analysis System (CAS) data has been assessed, on the crash analysis conclusions.
A30	The influence of CSM2 had minimal impact on the safety at the SH1/Dunns Crossing Road/Walkers Road as this is approximately 3km downstream of the CSM2 extents with few viable alternative routes for vehicles coming to and from the south. Therefore, the crash history extracted from CAS is considered an accurate representation of the risk at the SH1/Dunns Crossing Road/Walkers Road intersection.
Q31	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.
A31	Table 6-2 and 6-3 in the ITA correspond to the full modelled period ie 3.5hrs in the AM, PM and 3hrs in the IP and to the full modelled extent as shown in Figure 4-1 of the ITA. The modelled extent is shown in Figure 4.1 of the ITA. The Paramics model extent is sufficient to capture the effects of Project.
Q32	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.
A32	As reported in Section 3.1 of the ITA, the Project was developed with consideration of the network framework and hierarchy to focus traffic movements on arterial and major movement corridors. Site 6 and Site 9 represent Rolleston Drive and Jones Road respectively. These are primary traffic corridors and are expected to accommodate high volumes. With the scale of growth in these areas, it is expected that there will be capacity constraints particularly at intersections. Site 9 is proposed to be widened as part of the project. While the model shows some delay at the critical intersections, it does not indicate that the links are over capacity. It is therefore considered that these arterial roads can accommodate the higher flows predicted as a result of this Project and no further assessment is required.

Q33	Please add a footnote or other reference to confirm the source of the models used for this assessment
A33	The Paramics models have been used to estimate the traffic volumes which inform the DSI assessment.
Q34	For the avoidance of doubt, it is recommended that the requirement for an Level Crossing Safety Impact Assessment (LCSIA) be added to the condition set.
A34	A Level Crossing Safety Impact Assessment (LCSIA) has been completed and approved by KiwiRail. As the LCSIA is not a NZTA document or approval process, it is not appropriate to form part of the condition set.
Q35	Commentary is requested on the likelihood and impact of these projects not being in place prior to Package 1 being operational.
A35	The Project is not reliant on these improvements being undertaken as this Project is focused on improving safety at the SH1 / Dunns Crossing Road / Walkers Road intersection. There are no restrictions of movements at this intersection so wider network impacts are expected to be minimal. The local road networks projects are currently being progressed independently by SDC, as agreed with SDC as part of the DBC. These projects are subject to SDC procedures, so the Project is unable to influence the delivery of these projects. It is understood that SDC are currently on track to deliver these projects.
Q36	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.
A36	This Project can be delivered immediately independent of Package 2 and SDC local road projects. While not relevant to this Project, as discussed in Section 3.4 of the ITA, the key interdependency of Package 2 is the Levi Rd / Weedons Rd intersection upgrade. This is expected to be managed with the on-going joint planning and maintenance of the network between SDC and NZTA.
Q37	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.
A37	See amended proposed condition, additions showed in red underlined text:

	A CTMP shall be prepared prior to the start of construction. The objective of the CTMP is to avoid, remedy or mitigate, as far as practicable, adverse construction traffic effects. The Construction Traffic Management Plan (SEMP 004) shall include, but need not be limited to, the following: *1. the staging of the works, including details of any proposals to work on multiple sections of the Project route concurrently;* *2. details of traffic management activities proposed within each section of the project;* *3. the potential effects of traffic management activities and how these will be managed to ensure safety for all road users;* *4. a process for the development and submission of site specific traffic management plans;* *5. monitoring, auditing and reporting requirements; and* *6. training requirements for staff.*
Q38	It is recommended that consultation regarding property access be addressed through the proposed conditions.
A38	There will no permanent changes to property access as a result of the Project. Access will also be maintained throughout
Q39	Additional detail is sought with respect to transport engineering aspects of the design as follows. Please provide: a) A copy of the preliminary Safe System Audit for the design which we understand has been prepared. b) Approach Sight Distance (ASD) and Safe Intersection Sight Distance (SISD) assessments for Walkers Road/Runners Road and Dunns Crossing Road/Newman Road intersections. c) Forward sight distance assessment for cyclists and pedestrians, between “Old Dunns Road North” and the KiwiRail crossing. d) Commentary on whether the width of the pedestrian and cycle underpass, which is shown to be 2.5m wide in the General Arrangement Plans, is sufficient to allow passing movements, considering that the functional/usable width will be less than 2.5m. e) Commentary on whether the pinch point, shown in Figure 2.1, forecloses 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). f) Commentary on why the walking and cycling path along the realigned Two-Chain Road terminates at the Walkers Road/Runners Road intersection, despite the adjacent land to the east of the designation boundary being zoned for General Industrial. g) Heavy vehicle tracking for "Old Dunns Road South", demonstrating whether a waste collection truck can turn around within the new stub road. h) 85th percentile car tracking for 388 Dunns Crossing Road, and confirmation of whether changes to the existing vehicle crossing are required due to the amended kerb line for "Old Dunns Road South" i) Commentary on the practicalities of Council having to maintain/replace the carriageway for the southern section of "Old Dunns Road South" in the vicinity of 388 Dunns Crossing Road, shown in Figure 2.2, as the tapering of the carriageway may lead to accumulation of debris and difficulty for laying new carriageway surfacing.
A39	Refer to specific responses below: a) Design safe system audit will be completed on the detailed design. At the preliminary stage, a safety review was completed to identify any major issues with the design and layout. No just issues were found. b) ASD and SISD for both intersections are achieved. V = 60kph, ASD = 73m, SISD = 123m. This is achieved. c) 35m minimum is achieved for pedestrian forward sight distance (1.07m eye height to 1.07m object height). This equates to an approx. 20kph design speed. For cyclists (1.4m eye height to 0m object height), 35m minimum is also achieved in the southbound direction (downhill approach to the subway from the rail crossing). This equates to a 20kph design speed. d) The shared path for the subway will be 5m wide. This was a drafting error in the general arrangement drawing. e) 'This pinch point' is approximately 10m long with a narrowest width from back of barrier to face of retaining wall of 2m. Any future path will utilise this space. The likely approaches of this future path would be generally straight and would provide good sight distance.

f) The shared path proposed as part of this project is to be extended east along old Runners Road and then north along old Walkers Road to terminate near the extent of works. It is understood that as part of the development to the east of Walkers Road, this shared path will be extended through to Two Chain Road.

g) Tracking plan provided below for an 11m large rigid vehicle to complete a 3-point turn on Old Dunns Road south at the proposed turning pad. This pad will be moved further south to reduce the length of vehicle reversing.

h) No changes are required to the existing crossing. Tracking paths are shown below for entry and exit. This will be discussed at the next SDC design meeting and developed through the detail design. If the tracking is deemed unacceptable by SDC, access to this property will be modified to come directly off the realigned Dunns Crossing Road.

i) This area will have extremely low traffic volumes so will not need regular maintenance or resurfacing. This will be discussed at the next SDC design meeting and developed through the detail design.

Figure 2.2 Narrowed carriageway of Old Dunns Road South

Air Quality Effects	
Q40	This section is lacking detail on the dust generating activities: Provide the following details: • Type of material to be excavated – content of fines. Moisture content • Method of extraction and material handling • Volume of material to be excavated

	• Location of excavations • Volume of material to be stockpiled – likely locations of stockpiles • Volume of material to be exported off site • Volume and type of material to be imported on to site • Duration of the activity • Type and number of machines involved • Location of any unsealed haul Roads • Number of vehicle movements on unsealed haul roads
A40	Details will vary throughout construction and will be managed through a Construction Environmental Plan (CEMP) or Dust Management Plan (DMP).
Q41	Please detail the area and location of the site works which will require water dust suppression. Please quantity the water demand for dust suppression. Please qualify the volume of water available at the site for dust suppression. Please demonstrate there is sufficient water available for the purposes of dust suppression.
A41	Rolleston has a reticulated water network therefore water will be available for dust control purposes.
Q42	Please consider the benefits of meteorology monitoring and indicate whether any meteorological monitoring is proposed.
A42	Meteorological and dust monitoring procedures will be detailed in the CEMP/DMP. It is expected that dust management will include visual monitoring procedures. The contractor may also choose to instrumental methods if considered beneficial.
Q43	Please consider the benefits of visual and instrument dust monitoring and indicate whether any dust monitoring is proposed.
A43	Meteorological and dust monitoring procedures will be detailed in the CEMP/DMP. It is expected that dust management will include visual monitoring procedures. The contractor may also choose to instrumental methods if considered beneficial.
Q44	Section 3.16 vehicle emissions during construction

	Please provide some (at least qualitative) information to support the statements: •“based on the expected vehicle movements, vehicle emissions will be relatively low and well dispersed before reaching sensitive receptors”, and • “discharges will be minimal and very unlikely to exceed air quality criteria concentration limits” Section 3.2.1 Primary pollutants 45. Please check NO2 assessment method against recommendations made in the relevant good practice guides and provide justification for not considering the impact of secondary NO2.
A44	Given the scale of the Project, and therefore the number of construction vehicle movements, emissions from construction will have a negligible impact on air quality at any of the nearest receptors. This can be demonstrated using the online NZTA Air Quality Screening model. For example, even for a nominal 1000 heavy vehicle movement per day, the contributions of vehicle emission to ambient air quality level at a receptor located 10m away would be no more than 1% of guideline levels
Q45	Please check NO2 assessment method against recommendations made in the relevant good practice guides and provide justification for not considering the impact of secondary NO2.
A45	The method used its rationale is detailed in the report (refer Appendix B - Dispersion modelling methodology of the Air Quality Assessment Report). This is consistent with the approach taken in other air quality assessments in NZ. The different MfE GPG do not recommend methods, instead they provide details of possible approaches which may be used in assessments. The methods are also intended to apply to emission industrial stack sources. The applicability of these methods to the assessment of kerbside NO2 concentration is questionable.
Q46	3.2.2 Vehicle emission rates Please provide and reference the input data used to configure Vehicle emissions prediction model. (VEPM) including: • Fleet profile • Average speed • Gradient • Congestion

	• Cold start • And any VEPM other variables used.
A46	The VEPM model default input values were used. The same VEPM model assumptions were used to predict vehicle emissions for the 'with project' and 'do-minimum' scenarios.
Q47	3.2.3. Vehicle emission rates Please reference the source of the Annual Average Daily Traffic Volume (AADT) data provided in tables 3.2 and 3.3.
A47	The AADTs have extracted from the project traffic model predictions (scenarios 'Test 6' and 'Do minimum'). The traffic model predictions for the 'with project' scenario assume this Project (Package 1) and Package 2 have been completed.
Q48	Please explain the key differences in AADT for each roadway link between do-minimum and with project-scenarios. Eg: There are decreases in AADT with both the 2028 and 2038 years between the with-project and do minimum scenarios.
A48	Traffic predictions are outside scope of work.
Q49	Despite a decrease in AADT in the 2028 with project scenario, the emissions increase in the 2028 with project scenario. Please explain.
A49	In addition to AADT, predicted emission rates are also influenced by vehicle speed and percentage of heavy vehicles. Figure 3.1 shows the impact that vehicle speeds have on predicted contaminants. Vehicle speeds will change on the approach and departure to the intersection and roundabout. The location at which the emissions rate were calculated will reflect these changes.
Q50	5.5 Background Air Quality Please comment on the potential impact of the railway emissions on background air quality.
A50	Trains can be expected to have a negligible effect on background air quality levels. Trains only infrequently use the train line and will therefore only infrequently be a source of air contaminants, and only for a few seconds at any location. The contribution of these emission would be negligible

	when averaged over the ambient air quality criteria which are defined in terms of 1-hour, 24-hours, and annual averages. The nearest dwelling is also located more than 70m from the train line.
Q51	6 Dust Nuisance Effects Given no instrumental dust monitoring is proposed, are the MfE trigger levels relevant to this assessment? If not, please provide an alternative set of assessment criteria for dust nuisance effects which are relevant.
A51	Any monitoring criteria will be detailed in the CEMP/DMP. It is possible that the contractor may choose to use instrumental monitoring for dust management and could adopt the MfE trigger levels
Q52	7.1 Potential Dust Effects It is stated: "A small portion of the of the emitted dust will be in the form of PM10 and PM2.5. However, these emissions are unlikely to exceed any of the relevant health-based air criteria concentration". Please provide an explanation and or references to support this statement.
A52	Most particulate matter emission from the construction process are larger particle sizes which will deposit to the ground. A small proportion of the particulate matter will remain suspended in the air (TSP). TSP largely consists of particles which are less than 30-40µm in diameter. The USEPA AP-42 emission factor estimated proportion of TSP emitted from unpaved roads in the form of PM10 and PM2.5 to be 30% and 3% respectively (AP-42 Section 13.2.2 Unpaved Roads). Implementing appropriate dust control procedures will also minimise the risk of exposure to PM10 and PM2.5.
Q53	FIDOL Factors Section 7.2 defines the FDIOL factors and notes that CRC require this assessment method to assess whether dust discharge has caused an objectional or offensive effect. While this is accurate, having read section 7.3, there are three issues that arise from this statement: a) The assessment method does not consider all the FIDOL factors b) The assessment method does not reference or seem to consider the good practice guidance provided in the relevant guideline documents. c) How does the Dust emission potential tie (DEP section 7.3.3) align with and/or support the FIDOL method?

A53	The assessment was conducted in accordance with the MfE 'Good practice guide for assessing and managing dust' (2016) (GPG Dust) and has considered the FIDOL factors either singularly or collectively. The CASANZ GPG Road dust risk assessment method used in the assessment is derived directly from the IAQM dust risk assessment method which is specifically identified in the GPG Dust as a useful assessment methodology. CASANZ GPG Road and IAQM methods consider FIDOL factors and the risk of dust effects in term of the characteristics of the emission source (i.e. the magnitude and type of emissions), the transportation and dispersion of the emitted dust (proximity of receptor, and frequency they are downwind), and sensitivity of the receptor to dust nuisance effects.
Q54	Considering the three questions above, please explain how the dust impact assessment method used in 7.31. to 7.3.3. was arrived at.
A54	The assessment was conducted in accordance with the MfE 'Good practice guide for assessing and managing dust' (2016) (GPG Dust) and has considered the relevant source and environmental factors when drawing conclusions and making recommendations.
Q55	7.3.3 Separation distances to sensitive receptors Please compare the three separation distances listed in table 7.1 and 7.2 to those discussed in the MfE Dust GPG and other guides which provide recommended buffer distances. Explain why the separation distances listed in table 7.1 and 7.2 were used in the assessment.
A55	The MfE GPG Dust does not recommend any separation distances. The GPG only notes that the Victoria EPA separation distances were the most recently published separation distance at the time of publication in 2016. The recommended Vic EPA separation distance only apply to industrial discharges. No separation distances are specified for road construction activities.
Q56	Section 8.2 Assessment method (Operational Discharges). The NZTA assessment guide outlines a three-tiered assessment scheme for roadway developments: • Environmental Screen • Preliminary technical assessment • Detailed technical assessment
A56	It appears the reviewer is asking why a detail assessment was undertaken rather than using a simpler less accurate screening method. It is first important to note NZTA Guide has no regulatory. The assessment approach is designed to assist NZTA in the assessment of air quality effects, it is

	not intended to be used as a template by regulatory authorities for reviewing applications. The first tier of the approach is an ESR screen, which in this instance triggers further assessment by the proximity of residential properties to the project, the second tier is a screening technical assessment which uses a simple NZTA online screening model. This approach is not suitable for this assessment as the online screening model is not able to simulate the complex changes in the road alignment. The model was also developed in about 2011 and the assumed vehicle emission rate have not been updated since. Therefore, detailed assessment of effect was appropriate in this instance. The detailed assessment will provide a more accurate assessment of effects.
Q57	The Rolleston assessment aligns with a tier 3 - Detailed technical assessment. Please describe how this assessment fits within the requirements of the NZTA three-tiered assessment scheme and explain why a tier 3 assessment was provided. The response should include a discussion on whether a screening and a preliminary technical assessment undertaken to inform the decisions on undertaking a detailed technical assessment.
A57	Refer to A56 above.
Q58	Provide information to support the choice of 2019 as a typical meteorological year. Discuss the potential impact of an extreme (cold and still) year on the results and conclusion.
A58	Please refer to the Figure 5-2 - wind rose for years 2019 to 2023, and Figure B4 wind rose for model year 2019. The comparison clearly shows the modelled year is representative.
Q59	Sections 8.3.1 to 8.3.3 Prediction of pollutant concentrations Please provide a first cut (sanity check) validation of the results presented. E.g. Compare the predicted results with: a) Roadside monitoring data from roads with similar traffic number. And/or b) Results from the NZTA air quality screening tool.
A59	There is no benefit in comparing the detail model prediction against a simpler and less accurate screening method. The modelling predictions (refer Table 8-7) clearly show the contribution of vehicle emission to ambient air quality to be level to be minimal for both the 'do minimum' and 'with project' scenarios when compared to ambient air quality criteria. The results show that even if contribution from vehicle emissions to ambient air quality level were higher than those predicted, cumulative ambient air quality levels would remain below air quality criteria levels.

Q60	Section 8.3.4. Summary of Package 1 model predictions. Please detail which scenario and year is presented in table 8.7.
A60	Refer to Section 3.8, modelling was only conducted for the year 2028.
Q61	Effects of development on the emissions from wider road network Please consider the recommendations made in the relevant guidance documents and explain whether or not an assessment of effects of development on emissions (including C02) from wider road network is required. Please explain why such an assessment is not needed - if that is your finding. Please provide the assessment if your review suggests that it is needed to assist the decision makers on this project.
A61	The Project represents a relatively minor change in the roading network and any effects on air quality will be localised in the vicinity of the proposed roundabout. The Air Quality assessment considered these effects in detail.
Q62	Appendix B: Dispersion Modelling Methodology Please justify your choice of AERMOD RLINE-EXT considering the recommendations given in the relevant guidance documents.
A62	As discussed in Appendix B, AERMOD is the USEPA regulatory model and has been validated by the USEPA
Q63	Please briefly discuss the validation process that RLINE-EXT has been through and confirm Beca are confident this model is fit for purpose?
A63	As discussed in Appendix B, AERMOD is the USEPA regulatory model and has been validated by the USEPA
Q64	Please provide a figure showing the receptor grid used for the modelling.
A64	Refer to Figure 1 of Appendix A.
Q65	Please provide a copy of VEPM model used to quantify the vehicle emissions.
A65	Refer to Appendix B.

Q66	Please provide an example AERMOD output file which show model configuration and results.
A66	Refer to Appendix C.
Ecological Effects	
Q67	The extent of vegetation and habitats types on site is not clear from the report, as only two have been listed. Most of the site to the north of the State Highway 1 (SH1) contains a mosaic of exotic habitats including rank grass, scrub, treeland and forest. Rank grass and lizard habitat is potentially present throughout this area (even within denser stands of trees, due in part to the deciduous nature of the trees). Potential lizard habitat is also present along the southern side of SH1 throughout the pine shelterbelt, indigenous amenity plantings and associated scrub and rank grass. Additionally, during a walk over of the site on the 11th of November 2024 a lizard was observed within the designation area, but outside of the mapped lizard habitat. Therefore, it is recommended the extent of the potential lizard habitat on the site is re-examined.
A67	The distinction between rank grass and amenity planting was not made as they often overlap. Most of the area north of SH1 is included in the habitat map however does not include the full length as it is unlikely that all areas will be removed. The pine shelterbelt/southern side of SH1 is included in the mapped potential lizard habitat area. It doesn't extend the full length of the designation boundary as that is existing designation and works at that point are to tie into the existing road. A lizard survey will be undertaken in December which will inform a Lizard Management Plan (LMP) based on lizard habitat areas.
Q68	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.
A68	A survey will assist to confirm or otherwise the presence of lizards. A lizard survey will be undertaken in December, the results of which will inform a Lizard Management Plan (LMP). A Lizard Management Plan is proposed given the preliminary assessment suggest lizards may be present particularly in the rank vegetation on the road side.
Q69	Lizard Management It is unclear what 'staged vegetation management' is and how this would not disrupt the population. 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 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 availability. 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 and therefore need a WAA. Given the long processing time for WAA, it is recommended that this process is commenced.
A69	Staged vegetation management can also be referred to as a Vegetation Removal Protocol (VRP). VRP involves progressive mowing and subsequent removal of rank grass. This progressive mowing and removal of habitat will encourage lizards to vacate the site and disburse into adjacent habitat. Making and keeping an area unattractive to lizards from well before the works start and when works are staged is possible through applying the VRP early on. The VRP is as follows: • The VRP must only be implemented in areas demarcated as suitable (i.e., where suitable habitat is immediately adjacent where displaced lizards can move into). • The VRP must only be conducted during suitable seasonal and weather conditions. • In areas where the VRP is suitable, this may be implemented well in advance of site impacts and maintained to reduce the risk to lizards, so long as the VRP is completed during appropriate seasonal and weather conditions and maintained as unsuitable for lizards (i.e., if works are planned for winter, the VRP can be implemented prior to May to remove the habitat and be maintained as unsuitable for lizards until work commences.). • If the VRP is not conducted well in advance of works, the VRP must be commenced at least 5 days prior to site establishment and the commencement of construction works, initial high-level mowing must occur. • Initial mowing must be no lower than 150 mm above ground level (AGL). • Two days later, the site must be mowed to 50 mm AGL (Figure 20) in a strategic manner towards the adjacent habitat. • Transects of mowing must commence from the road edge and progressively move towards adjacent habitat, encouraging skinks towards the adjacent habitat that will be avoided. • 24 hours later a final ground level removal of grass to bare earth, typically by excavator (Figure 20), following the same strategic manner must be conducted. • Once rank grass is removed from the site, site establishment can occur, or the site can be maintained as unsuitable habitat until works occurs. - The construction footprint must remain bare, or unsuitable (i.e.: no higher than approximately 25 mm),for the remainder of construction works, which will minimise the likelihood of lizards migrating back onto the construction site. o Maintenance (<25 mm) can occur indefinitely and through winter so long as the initial VRP to bare earth occurs within optimal seasonal conditions in the first instance. o If the construction site cannot remain bare or <25 mm, lizard exclusion fencing (Section 4.4) must be installed to isolate the construction zone and avoid the risk of impacting lizards that may recolonise the construction site, or the VRP must be implemented again.

Stormwater	
Q70	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?
A70	The monitoring period was limited to the duration of site works, which occurred over winter when the water table was expected to be higher. The nearest piezometer to the Project site is M36/0085 (1km west from roundabout) on CanterburyMaps, which shows groundwater levels from 7.4 to 20.9m below ground level (based on data from 1982 to 2010). The level adopted for design is at approximately the 90th percentile of levels observed in M36/0085. More recent data at piezometer M36/0217 3.5km northeast of overpass) shows levels from 10.5-21.8m bgl (from 1974 to 2024).
Q71	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.
A71	It is confirmed the HIRDS V4 data was taken from the BURNHAM RAWS site (ID:O00886).
Q72	3.4.3 Catchments - Key assumption that the cross-catchments outside of the NOR footprint are generally assumed not to enter the Package 1 stormwater system. Does this apply to the catchments to the north of Two Chain Road? What confidence/proof is there to confirm this assumption?
A72	The assessment of the cross-catchments used a combination of LIDAR data and the Selwyn District Council Flood Hazard Map. The LIDAR around the Two Chain Road / Walker Road intersection shows the levels falling east and west along Two Chain Road, rather than south down Walkers Road. The Flood Hazard Map flood depths would seem to correlate with the major flow paths heading further east and west from the Walkers Road / SH1 junction. This is reflected in the cross-catchments shown in drawing 3338703-10-CD-2011.
Q73	3.4.5 Ground Soakage Rates - The total contributing catchment is > 1,000 m2 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)?
A73	Stormwater runoff from at least the additional impervious area within the project extents will be discharged to ground, up to the 1% AEP event. As discussed in Section 5 of the Stormwater Management Report, due to the geometric design and proposed catchments, the proposed basins are

	likely to provide attenuation and soakage to ground for an area greater than the additional impervious area created by the Project. The basins and swales will be located and designed so that during events larger than the 1% AEP design event (or if the soakage does not perform as intended and the basin overflows in a smaller event), stormwater will follow the existing overland flow paths. In terms of the factor of safety applied to the soakage test rates to arrive at design rates based on Table 3-4 of the report (from CIRIA SuDS manual, Table 25.2), while the catchment areas are greater than 1,000m², the consequence of failure (i.e. overflow to existing overland flow paths) is considered to be minor and therefore a factor of 5 has been applied.
Q74	3.4.5 Ground Soakage Rates Observation - The SDC engineering code of practice requires consideration to Waterways, Wetlands and Drainage Guide (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 that 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.
A74	The infiltration media for the first flush basins will be design during the detailed design stage of the project. The design will follow best practice guidance from "CRC for Water Sensitive Cities - Appendix C: Guidelines for filter media in stormwater biofiltration systems, which is based on extensive research and operational experience. Infiltration through the design soakage media is likely to be in the region of 100mm-300mm/hr initially, but this can fluctuate over time due to clogging and compaction. The basins are sized to capture the first flush runoff volume (i.e. runoff from 25mm of rainfall) and the drain down time for the long-term case is checked assuming a minimum 20mm/hr infiltration rate (with clogging), with a maximum drain down of 24 hours to maintain healthy grass cover. Further testing of the soakage rates of the underlying ground will be carried out during construction to confirm soakage rates in the locations of first flush and soakage basins. If poor rates are identified then the assumed infiltration and soakage rates and design will be re-assessed, however this is considered unlikely.
Q75	4.3 Overview of Stormwater Approach - Has a flood risk assessment been completed to determine the effect if the proposed stormwater infrastructure exceeds the level of service it is designed for? This is a requirement as per the SDC engineering code of practice.
A75	A flood risk assessment or hydraulic modelling has not been undertaken for the Project, as the cross-catchment flows have been managed and site runoff up to the 1% AEP as part of the design. Cross-catchment drainage will be designed to capture and convey flows up to the 1% AEP event across the alignment to existing overland flow paths. Runoff from the road corridor will be managed by the proposed stormwater system with collection, conveyance and soakage basins and soak pits that discharge to ground up to the 1% AEP event, mitigating the water quantity effects. In events greater than the 1% AEP, there will be stormwater overflow from the basins, which will follow along the existing overland flow paths.

Q76	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., on ramps, subway). Has consideration been given to the effect on stormwater runoff due to the change in slope and/or material (hardfill)?
A76	No additional factors have been applied to changes in slope as the impact is anticipated to be minor / insignificant.
Q77	4.3.2 Cross-Drainage Catchments - Has a pre-development catchment(s) been delineated to determine the current cross-drainage catchment and flow paths? The post-development cross- drainage catchment should be compared and assessed against the pre-development catchments to determine if there is any change in catchment (e.g., flow) on the downstream (and upstream if applicable) environment. Current Figure 4-3 presents the proposed post-development catchment plan for package 1 only.
A77	A pre vs post assessment is not required. The impact of the proposed geometric design has been assessed and the cross-catchments delineated. The cross-drainage network collects these cross-catchment flows and conveys them across the project footprint and back to the existing overland flow paths, which were determined using a combination of LIDAR and the Selwyn District Council Flood Hazard Map.
Q78	4.4.2 Treatment - The removal efficiency of the infiltration treatment is listed very broad. To understand the potential effect of runoff, what are the contaminants expected from the road and will there be an increase or decrease in the concentrations due to the proposed activity? What is the expected removal efficiency of the infiltration basin and, based on the efficiency to remove the required pollutants, is the conclusion that the proposed treatment provided is sufficient (based on relevant water quality guidelines and/or consents)? https://niwa.co.nz/freshwater/urban-runoff-quality-information-system-urqis can be consulted for water quality data.
A78	Treatment via first flush is an industry accepted method of treatment with very good removal efficiencies. Section 4.4.2 lists the expected contaminants including total suspended sediment (TSS), metals, and hydrocarbons, and good removal of nutrients. In accordance with WWDG Chapter 6 Section 6.4 First Flush Interception, the detailed design accounts for the capture of runoff from the first 25mm of stormwater rainfall depth. This is generally accepted to achieve treatment of 78% of the rainfall depth as noted in Section 6.4. Currently, only informal treatment occurs in the project catchment within the grassed berm areas. The first flush basins have a catchment area greater than the additional impermeable created as part of the project. Therefore, the impact of the project is expected to be less than minor.
Q79	4.4.3 Discharge to Ground Refer to RFI #70 - 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.
A79	The monitoring period was limited to the duration of site works, which occurred over winter when the water table was expected to be higher. Longer term monitoring may indicate shallower levels than that measured, particularly after large rainfall events. The nearest piezometer to the Package 1 site is M36/0085 (1km west from roundabout) on Canterbury Maps, which shows groundwater levels from 7.4 to 20.9m below ground level (based on data from 1982 to 2010). The level adopted for design is at approx. the 90th percentile. More recent data at piezometer M36/0217 3.5km northeast of overpass) shows levels from 10.5-21.8m bgl (from 1974 to 2024). Additional mounding assessment necessary given nearby data.
Q80	Section 4.4.4 Attenuation - Can sizing calculations be provided for both the sizing of the attenuation and the treatment?
A80	At this stage, the preliminary design informs the consenting requirements and provides for the footprint. The calculations will be refined during the detailed design based on geometric detailed design. Detailed design calculations will be included in the detailed design reports.
Q81	Section 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?
A81	There is no existing cross-drainage network across SH1, however, there are cross-catchment flow paths across SH1. The cross-drainage network will be designed to collect those cross-catchment 1% AEP flows and convey them beneath the project footprint and discharge them into the existing flow paths. The short sections of pipe across the project footprint are not expected to change the routing or timing of the peak flows. No change is therefore expected on downstream flood risk.
Q82	Section 5.1 Overview - in Figure 5-1, what happens to the post-development runoff from the catchment between the Northern Catchment and the Subway Catchment?
A82	A soak pit is proposed to capture and discharge to ground the runoff from this area.
Q83	Section 6 Construction Stormwater Management - Is there an increased risk of flooding during the construction phase and if so, how will it be managed?

A83	Construction stormwater will be managed through the erosion and sediment control (E&SC) plan and will follow the fundamental principles of good E&SC practice for the Canterbury region.
Q84	DRG 2102: Civil - Drainage Inlets - Has the proposed inlets (sumps) been sized to capture the 1% AEP event and has consideration been given to reduced performance due to blockage? Will secondary flow paths direct the runoff towards the proposed attenuation and infiltration basins?
A84	In low points, double sumps have been provided where only single sumps are required for capacity, to provide some redundancy for blockage. Where no secondary overland flow path is available off the road corridor of SH1, the network has been designed for the 1% AEP for capture and conveyance to manage peak flows.
Q85	DRG 2102: Civil - Drainage Cross-drainage infrastructure (SWSD 9 and 11): The location o the cross-drainage inlets needs to be confirmed as currently they are shown to be located within the proposed abandoned road portions.
A85	The location of the cross-catchment inlets and oulets will be confirmed during the detailed design stage.
Q86	DRG 2102: Civil - Drainage Cross-drainage infrastructure (SWSD 9 and 11): Will this system operate as a bubble-up and if so, how will sediment and the potential loss of conveyance due to sediment build-up be managed?
A86	This system will operate as a bubble up due to the local ground levels and sediment build-up will be managed via a maintenance schedule. Sediment build-up is likely to be limited as the inflows are via grassed areas surrounding the cross-drainage inlets, which will provide sediment capture. A sump will also be provided at the cross-drainage outlet point for sediment capture.
Q87	DRG 2102: Civil - Drainage Cross-drainage infrastructure (SWSD 9 and 11): Refer to RFI #12. Would the proposed cross-drainage result in an increased flood risk downstream where previously no cross-drainage was present?
A87	Refer to A81.
Q88	DRG 2102: Civil - Drainage Cross-drainage infrastructure (SWSD12): How will the captured upstream runoff discharging into the proposed conveyance swale be manage to not drain/spill into the proposed southern attenuation basin?

A88	The cross-drainage infrastructure will be designed to accommodate the flow from the cross-catchments, up to and including the 1% AEP.

SH1 ROLLESTON ACCESS IMPROVEMENTS

URBAN AND LANDSCAPE DESIGN FRAMEWORK

Beca

NZ TRANSPORT AGENCY WAKA KOTAHI

DRAFT

20 September 2024

Revision 1

Revision History

Revision	Prepared By	Description	Date
1	Jesse Byrne & Ryan Aranyi	DRAFT Urban and Landscape Design Framework For Review	20/09/2024

Document Acceptance

Action	Name	Signed	Date
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Approved by	Dave Aldridge		20/09/2024

on behalf of Beca Ltd.

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Contents

1. INTRODUCTION

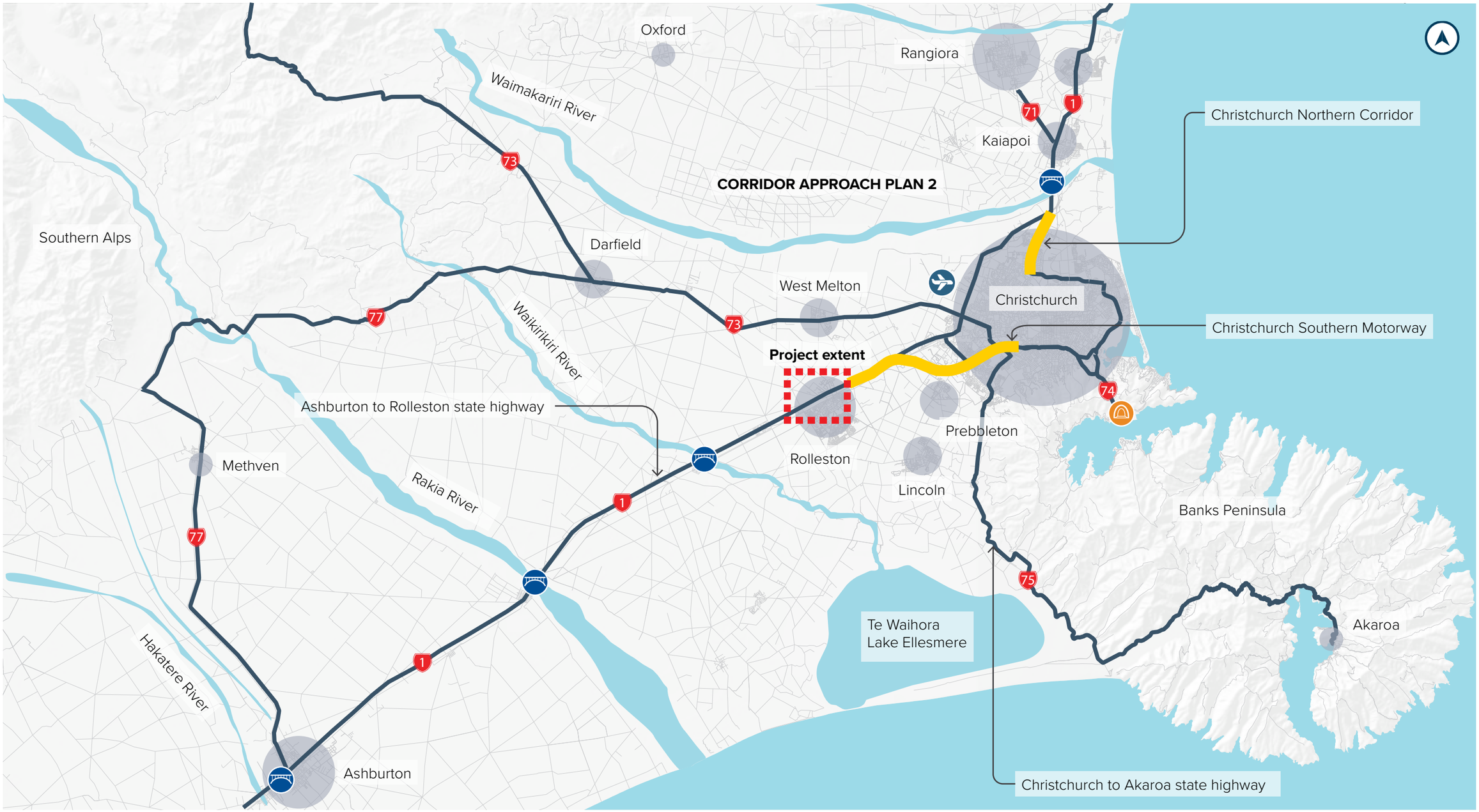


Figure 1 - Location map with wider Canterbury context

1.1 PROJECT OVERVIEW

The SH1 Rolleston Access Improvements Project is a 5km length of highway on the State Highway 1 (SH1) corridor approximately 22km southwest of Christchurch which passes through the existing Rolleston township (see Figure 1). It has been identified [by the Minister of Transport] as a Road of Regional Significance (RORS), previously recognised through New Zealand's Upgrade Programme (NZUP).

The Project is part of a wider State Highway network that services the region and forms an extension to the existing Christchurch Southern Motorway (CSM). It is has been split out into two packages of work, Package 1 includes the Dunns Crossing Road/ Walkers Road/ SH1 Roundabout and subway and Package 2 is includes the Rolleston Drive Overpass and associated State Highway widening and intersection upgrades.

The Project responds to existing transport deficiencies while providing for the forecast future growth pressures in the area. It includes a number of safety improvements to intersections along SH1 and directly adjacent to Rolleston, to manage the forecast future growth in traffic volumes and reduce serious injuries and deaths.

These include;

- Extending the second southbound lane from the CSM.
- A southbound service lane and off-ramp for people exiting SH1 to Rolleston town centre, and businesses beside the highway.
- Removal of a singalised intersections at SH1 and Rolleston Drive.
- A multi modal overpass which will pass over SH1 connecting the Rolleston Industrial Zone (RIZ), Rolleston Town Centre and the residential areas between Rolleston Drive North and Jones Road.
- Rolleston Drive South, Brookside Drive, and Tennyson Street to become left-in left-out only at the highway.
- A free left turn from Hoskyns Road onto the highway (over the rail crossing) and into its own lane on the motorway.
- A two-lane roundabout at the SH1 and Dunns Crossing/Walkers Roads intersection with a pedestrian and cycling subway/underpass under the State Highway connecting into the existing network.
- Upgraded rail level crossing for pedestrians and cyclists.
- Wire rope, W-beam and TL5 concrete barriers within the corridor.

The project will provide a range of transport benefits including:

- A reliable, resilient transport network where journey times across the State Highway are quicker and more reliable for all users.
- A safer corridor with less crashes to cause disruption.
- Better walking and cycling choices, with safer and higher quality connections across the State Highway and linking with the Selwyn District's expanding cycle network.
- Reduced risk of a collision between a train and vehicle at the Hoskyns Road level crossing, which sees numerous 'near-misses' each year.

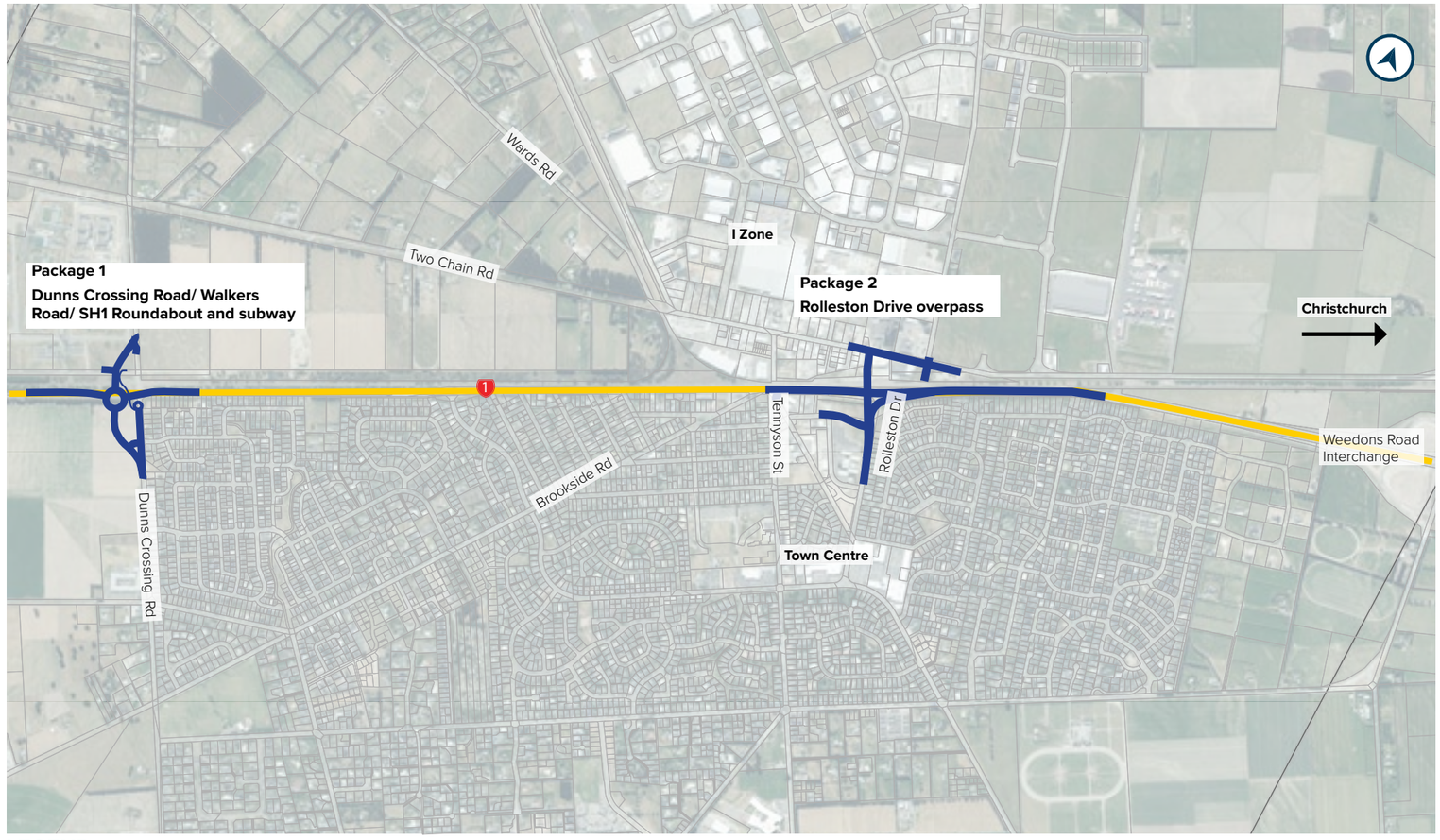


Figure 2 - Project improvements diagram

1.3 OBJECTIVES

The following objectives were set out by the NZ Transport Agency at the establishment of the project:

1. Improve the safety and efficiency of travel along SH1,
2. Improve safety and accessibility for goods and people traveling between the residential and industrial areas of Rolleston for all transport modes.
3. Improve safety and accessibility for goods and people traveling to the Rolleston residential and industrial areas from the State Highway.

These project objectives have informed the development of this Urban and Landscape Design Framework (ULDF).

Specific Urban Design and Landscape Project Objectives

The project will:

- Provide for cultural and historical expression throughout the project.
- Enhance the existing landscape within the project corridor addressing both environmental and social aspects.
- Create and enhance connectivity across the corridor that strengthen supports local communities.
- Deliver a landscape that contributes to user experience and that is integrated with stormwater management.
- Creation of a transport corridor that delivers a high level of personal safety and CPTED outcomes.
- Incorporate landscape treatments that seeks to deliver whole of life value that reduces future maintenance operations.

1.4 PURPOSE

The purpose of this Urban and Landscape Design Framework is to provide;

- A technical report demonstrating how the Project fulfills the Urban Design and Landscape Requirements of NZTA.
- A guidance document that describes the urban design and landscape opportunities, design approach and outcomes sought to inform the future design phases.
- A supplement to the Detailed Business Case (DBC) that is specific to the relevant investment objectives, visually describing the outcomes sought.

The ULDF sets out the anticipated Urban Design and Landscape outcomes of the project, why these are required, and how the NZTA expects them to be implemented and maintained. It sets out a broad overview of the key project objectives and defining the context of the project area, before identifying and explaining the design intervention opportunities along the route. It also identifies future opportunities for the NZTA and project partners, in particular iwi, that can be considered alongside the construction of this project and may require input from other parties.

It is intended that the ULDF be used by:

- Designers of the next phases of the project as a reference for the overall design objectives, the identified opportunities and anticipated or required design interventions and outcomes sought.
- NZTA to guide how the detailed design phases of the project are aligned with its various design and management objectives, policies and requirements.
- Resource consent processing planners.
- The project Cultural Advisory Group (CAG).
- Community engagement teams.

The ULDF has been prepared as a requirement of the NZTA and will be submitted as part of the projects resource consent application to Selwyn District Council (SDC).

1.5 METHODOLOGY

The broad approach taken to the urban and landscape design of the project has been to:

- Provide an urban and landscape design presence throughout the development phases of the project, advocating for good design outcomes.
- Establish a set of design objectives for the project in conjunction with the NZTA and the CAG. (Final objectives to be confirmed)
- Identify key aspects of the project where quality design outcomes need to be considered by the technical teams and through design integration discussions arrive at a preferred solution.
- Review and incorporate recommendations from other technical specialists.
- Record in the ULDF the urban design and landscape design requirements that will inform future phases of the project.
- Identify how the project might support or enhance the work of other agencies or authorities in the future.

The preparation of this ULDF included a site visit to the project area, coordination with other design professionals and a review of Draft technical assessments. To date it has not included engagement with the CAG, it is expected that this will be resolved prior to the resource consent application being submitted.

2. DESIGN CONTEXT

2.1 STRATEGIC & POLICY CONTEXT

NZTA Urban and Landscape Design Principles

The NZTA has a suite of over arching urban design and landscape principles relevant to all its projects that are captured in its key documents Bridging the gap: NZTA Urban Design Guidelines and the NZTA Landscape Guidelines. There are 10 over arching principles in each document, with some cross over between them and these inform the high level design approach as well as a basis to cross check against any design along the State Highway corridor.

Urban Design

- Designing to the context
- Integrating transport and land use
- Contributing to good urban form
- Integrating all modes of transport
- Supporting community cohesion
- Maintaining local connectivity
- Respecting cultural heritage values
- Designing with nature
- Creating a positive road user experience
- Achieving a low maintenance design

Landscape

- A context sensitive and place based approach
- Facilitate green infrastructure and landscape integration
- Understand the physical conditions
- The right plant in the right place
- Promote biodiversity and build in resilience
- Champion water sensitive design
- Deliver visual quality and a quality user experience
- Facilitate community engagement and a collaborative approach
- Low maintenance and whole of life value
- Safety in design

References to Statutory and Non-statutory documents

Design standards and guidance to be used for the further development of Urban Design and Landscape input to this project are:

- NZTA Bridging the Gap : NZ Transport Agency Urban Design Guidelines, 2013
- NZTA Landscape Guidelines, 2018
- NZTA Pedestrian Planning and Design Guide, 2009
- NZTA Cycle Network and Route Planning Guide, 2015
- NZTA Bridge Design Manual, 2022
- NZTA P39 Standard specification for Highway Landscape Treatments, 2013

Local Government

- SDC Operative Selwyn District Plan
- SDC Walking & Cycling Strategy, 2018
- SDC Rolleston Structure Plan, 2009
- SDC Rolleston Towncentre Masterplan, 2013
- Greater Christchurch Partnership Spatial Plan, 2024

Cultural Impact Assessments

- Te Ngāi Tuahuriri and Te Taumutu Rūnanga
- Document in developed, expected completion October 2024

2.2 TRANSPORT & CONNECTIVITY

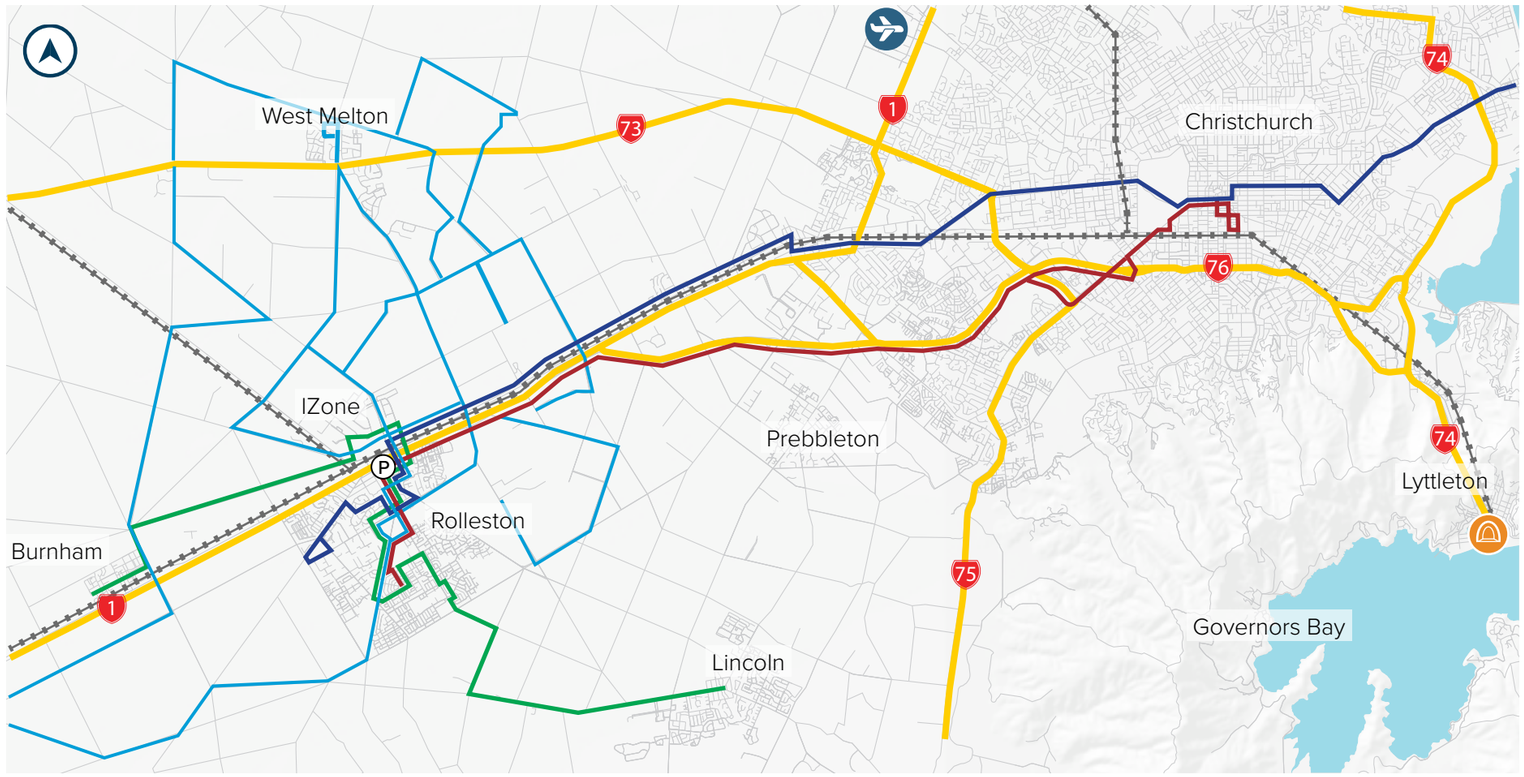
Due to the amount of growth that has occurred in the area, the existing transport network and level of service for accommodating increased demand is compromising access and connectivity. This is impacting negatively on the corridor users and their experience. The Project provides support for increased travel choices and safer journeys for all modes.

Overarching transport context

Due to its location, Rolleston has also grown to become an industrial hub for Canterbury and the wider South Island. Located on SH1 and the Main South rail line. Rolleston has convenient access to the airport, Lyttelton Port and the Christchurch CBD. It is estimated that 90% of Canterbury's exports pass through Rolleston. The inland port was established on the northern side of the rail line and is now known as the Izone Business Hub and Iport Business Park. The combined industrial area accommodates over 120 businesses and covers more than 300ha. This has resulted in a high demand for access by both workers and heavy traffic.
There are increasing volumes of traffic and conflict between the residential zone to the south and the industrial zone to the north.

Public transport

A Park'n'Ride is located on Kidman Street in Rolleston with the objective for providing a service for people to access the Christchurch CBD by bus. Public transport usage between Rolleston and Christchurch city is currently low, however, with plans for future public transport upgrades there may be an opportunity to expand the Kidman Street Park'n'ride to include a bus hub with commercial businesses in the future.



LEGEND

- State Highway
- Arterials/Local Roads
- Railway
- Park and Ride
- No. 85 Bus - Rolleston / City Direct
- No. 5 Bus - Rolleston / New Brighton
- No. 820 Bus - Burnham / Lincoln via Rolleston
- Local school bus routes

Figure 3 - Transport Network

Walking and Cycling

Selwyn District Councils Walking and Cycling Strategy (2018) highlights the proposed network plan for Rolleston including several strategic routes. Existing walking and cycling corridors that connect with this project include a shared path adjacent to Rolleston Drive, v shared path between Seymour Drive and Weedon Ross interchange and the Dunns Crossing Road shared path to West Rolleston Primary School. Future relevant connections proposed within the SDC Strategy include Rolleston to Templeton (Johns Road), Rolleston to West Melton (Hoskyns Road) and Rolleston to Burnham (Two Chain Road). The strategy also provides connections with the existing Christchurch Major Cycleway Programme which is under development.

Severance

There are three critical severance points which highly compromise safety for people walking and cycling in this area. These are:

- SH1 between Rolleston Drive and Hoskyns Road (including Izone, Iport train station and future retail developments)
- Rolleston Drive between residential zones and the town centre
- Dunns Crossing Road between residential zones and future industrial development

SH1

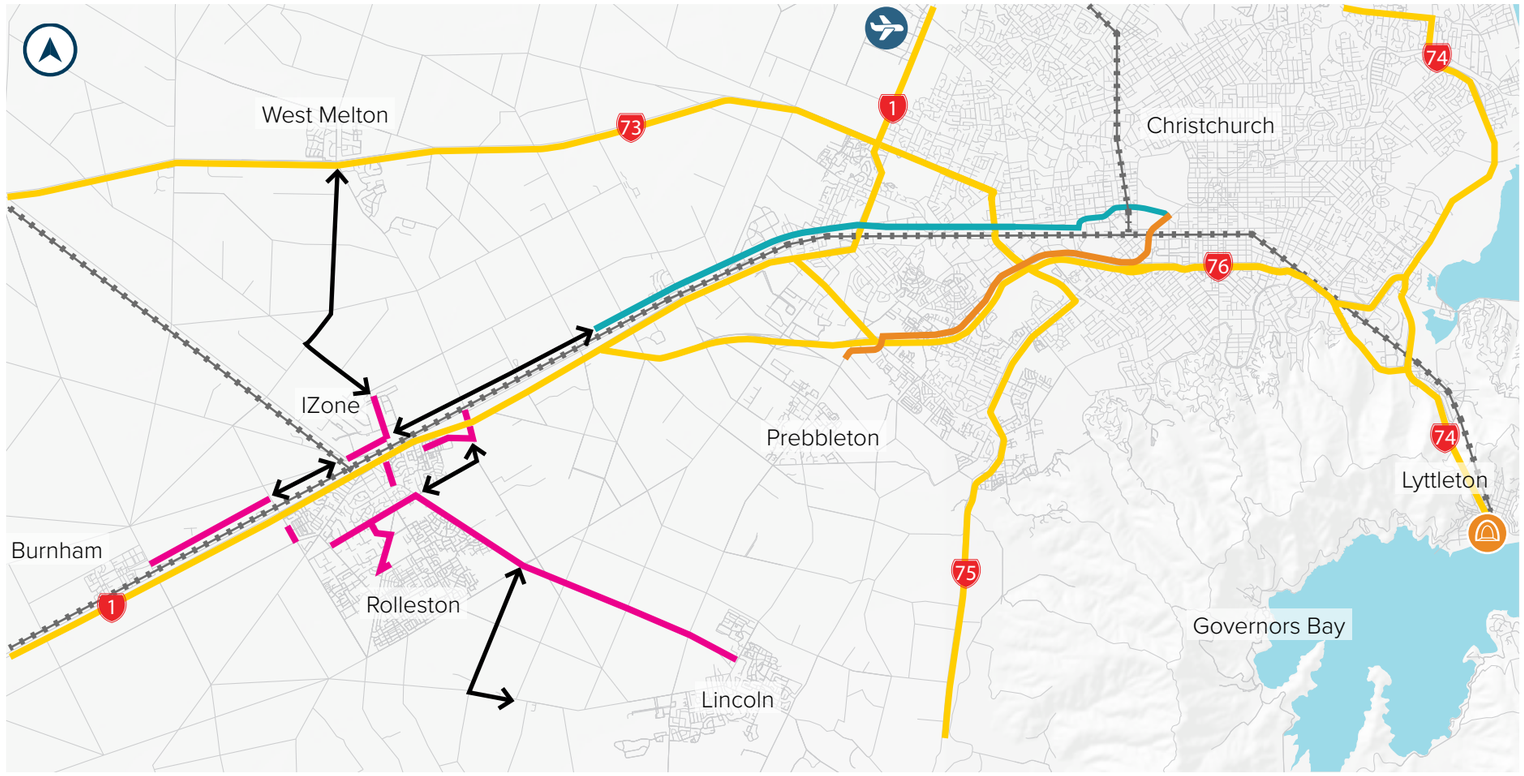
As defined in the Walking and Cycling Strategy the SH1 overpass is an important component to allow people to walk and cycle more safely between the residential and industrial areas of Rolleston which are currently separated by SH1 and to reduce car dependency for those that work and live in Rolleston. This link will also form part of a future between-township cycling link between Rolleston and West Melton that has been identified as part of this Strategy.

Rolleston Drive

There are clear desire lines between residential zones to the west of Rolleston Drive to the businesses and school to the east. There is an opportunity to support walking and cycling access from the south of SH1 to the northern business zones to enhance transport choice.

Dunns Crossing Road

A future desire line is likely to occur at the western end of Rolleston between residential zones and future industrial land that is proposed between Two Chain Road and the Main South rail line. The grade separated crossing will provide a safe walking and cycling connection. This will also firm part of the future between-township cycling link between Rolleston and Burnham.



LEGEND

- SDC Cycleways / shared path network
- South Express Cycleway
- Little River Link Cycleway
- Future SDC Cycleways / shared path network

Figure 4 - Cycle network

2.3 LANDUSE & DESTINATIONS

Local Context

Rolleston (Roretana or Tauwharekākaho) is the largest town in the Selwyn District and is located 22 kilometres south west of Christchurch. The town is part of the wider Christchurch metropolitan area. Rolleston was established in 1866 as a railway junction town where the Midland Line to the West Coast branches from the Main Line to the south.

As one of the fastest growing towns in New Zealand the population has recently grown to over 28,000 people. Given the scale and speed of population growth around Rolleston, and a high volume of Rolleston residents that work in the city there has been an increasing demand on the access point to SH1 into Christchurch particularly at the Rolleston Drive intersection. The Rolleston overpass will provide safer and more efficient access for Rolleston residents on and off of SH1.

Land Use

Since 2001 Rolleston has experienced rapid residential growth and more recently industrial growth with over 90% of Canterbury's exports passing through the inland port at Rolleston. South of SH1 and the main trunk rail line is predominantly residential zoning with an expanding town centre with retail, commercial and community amenities. North of the SH1 is the industrial and business zone.

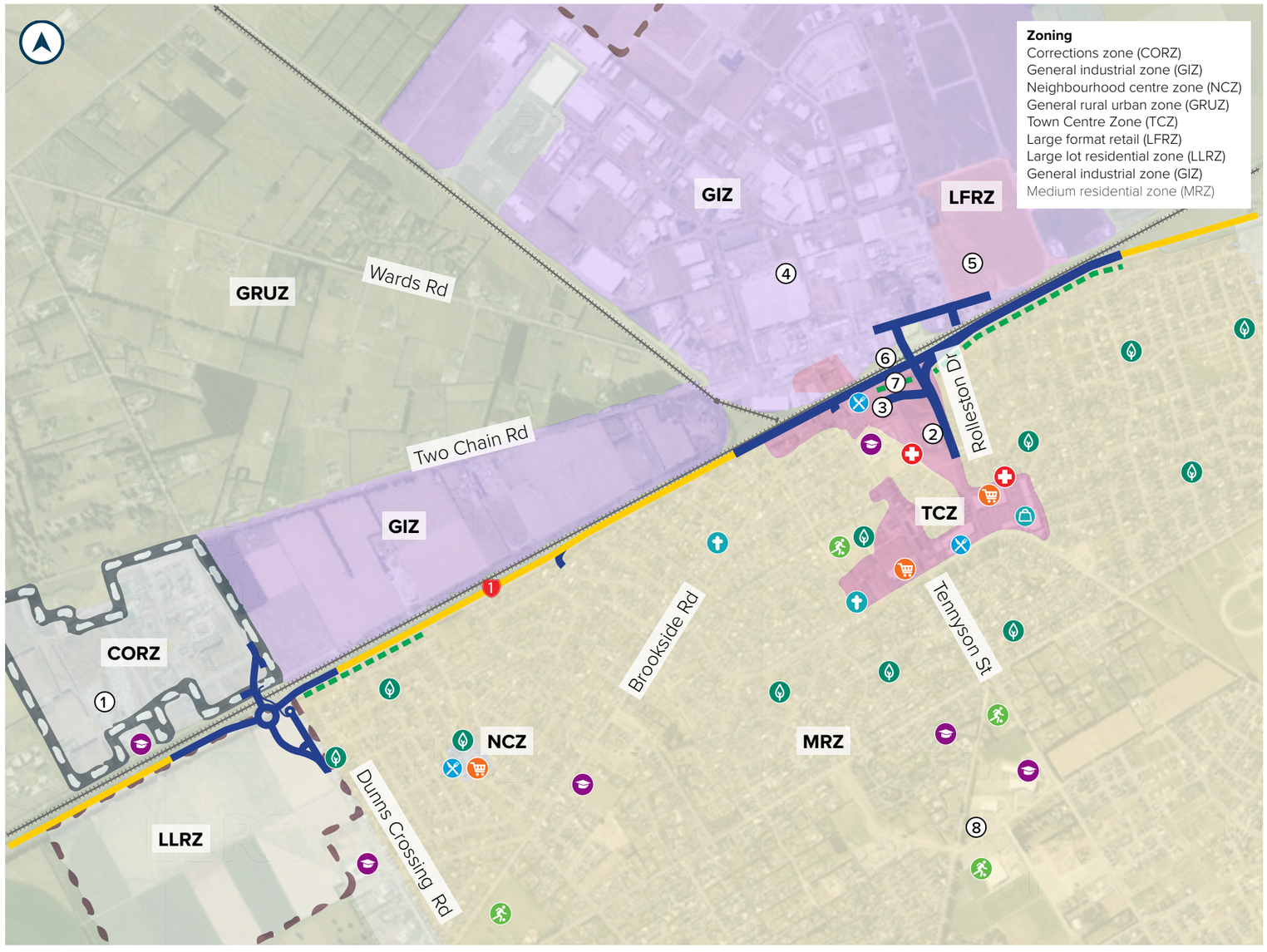
The land use surrounding the project area is comprised of residential, commercial, industrial and some retail activities within the General Industrial zone (GIZ), Medium Density Zone (MDZ), and Town Centre Zone (TCZ) of the Partially Operative Selwyn District Plan. Existing infrastructure including SH1 and South Island Main Trunk (SIMT) rail line (both designated in the POSDP) demarcate land use activities within the area and serve as prominent elements within the landscape.

Key Destinations

The industrial 'Izone' is the District's largest employment centre. Other key areas of employment are the Rolleston Towncentre, retail precincts, health hub and the Selwyn District Council offices which are accessed from Rolleston Drive immediately to the south of SH 1. Fuel stations, food outlets and the Rolleston train station are located adjacent to SH1. These are also key destinations for SH1 travelers and the local community.

Green and Blue Network

There are no significant ecological features associated within the project area. The residential, commercial and industrial sites within the extent of the proposed works are highly modified sites. Tree cover within the commercial / industrial street environment is generally poor with limited mature cover found also within the private space. Existing areas of vegetation that contribute to the character of the area are identified on the plan.



LEGEND

- State Highway
- Railway
- Proposed works
- Zoning under appeal
- Planted bund - Native
- Hospital/ Medical Centre
- Shopping Centre
- Supermarket
- Hospitality/dining
- School
- Church
- Parks and reserves
- Sport and recreation
- (1) Rolleston Prison
- (2) Selwyn District Council
- (3) St Johns Ambulance
- (4) I Zone - Inland port
- (5) Future retail centre
- (6) Train station
- (7) Park and Ride
- (8) Aquatic centre

Figure 5 - Land use plan

2.4 HISTORICAL CONTEXT

European

Rolleston (Roretana or Tauwharekākaho in Māori/Te reo) originated as a railway terminus in 1866, and is named after the Canterbury statesman William Rolleston. Rolleston, who was born in Yorkshire in 1831 and died in 1903, served as Superintendent of the Province of Canterbury from 1868 until 1876 (when central government abolished the New Zealand provinces). He also served as a Member of Parliament.

Fine grain residential housing development began south of SH1 in the 60's and 70's as the township gained popularity. The late 00's saw a more intensive development of this residential area including essential facilities and the beginnings of the industrial area to the north. Since 2010 both the north and south sides of SH1 have been developed into the township that we know today.

Maori

To be provided by the CAG.

1942

1982

2010

2016

2020

3. CORRIDOR STRATEGY

3.1 OPPORTUNITIES

A. Dunns Crossing Road/ Walkers Road/ SH1 Roundabout and subway

The proposed roundabout at Dunns Crossing Road will provide an opportunity for landscape treatments and cultural design elements to enhance amenity values and provide visual cues for drivers of the change to an urban highway environment.

The proposed stormwater management basins will provide and opportunity to create a passive recreation space for the neighbouring residents, softening the interface with the proposed roundabout and stormwater infrastructure.

The proposed subway will provide a safe and separated connection for people walking and cycling across the SH1 corridor, providing a much needed connection from the residential properties to both the Inland Port (Izone) business park and Rolleston Prison (employment centres).

Figure 6 - Plan A

B. Rolleston Drive overpass

The key component of the project is the proposed multi-modal overpass which will provide a much needed connection between Rolleston's residential area to the southeast of SH1 and the industrial area to the northwest. The design will also include road links/ slip lanes and integration of pedestrian and cycle facilities and nearby intersection upgrades.

The areas adjacent to the overpass include key employment and retail centres as well as two significant public transport connections including the Park and Ride facility on Kidman Street (south of SH1) and the TranzAlpine rail station to the north. Kidman Street is proposed to become a new public transport hub with street improvements.

The overpass structure and approaches provide an opportunity to create a new gateway to the township as well signifying the gateway to Christchurch and the beginning of the CSM.

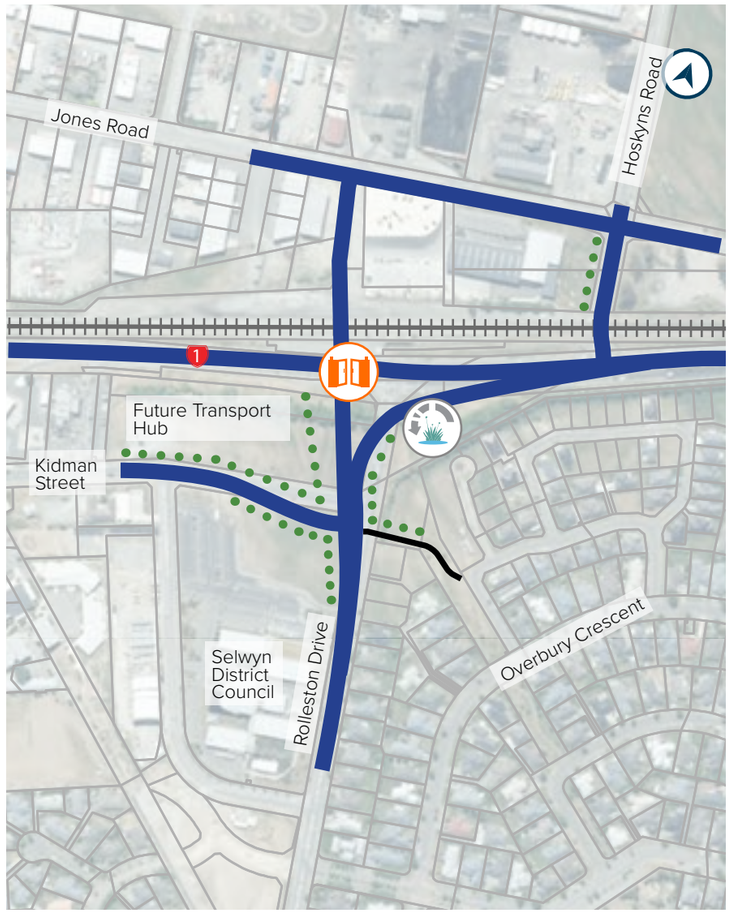


Figure 7 - Plan B

C. Weedons Road/ Weedons Ross Road interchange

The already developed interchange at Weedons Road/ Weedons Ross Road is a critical way finding point for vehicle movements accessing the IPort business park and adjacent industrial area. This interchange is already established. However, there are opportunities to integrate way finding to highlight to users desired destinations and exits from the motorway.

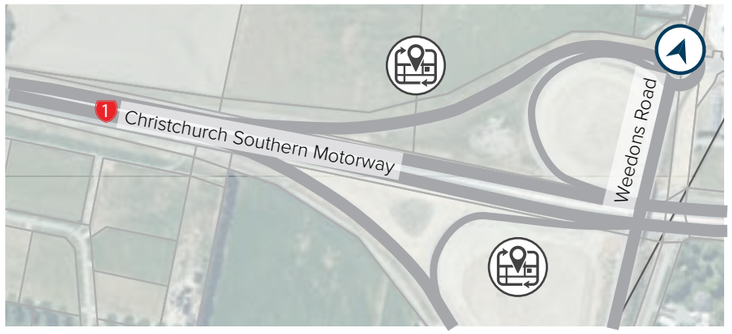
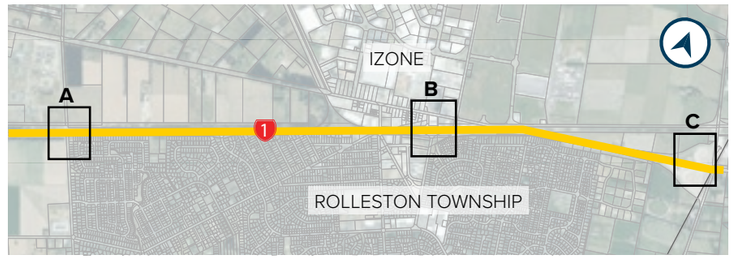


Figure 8 - Plan C

LEGEND

- State Highway
- Proposed upgrade
- Proposed walking / cycling connection
- Proposed Subway
- Landscape and Stormwater opportunity
- Way finding and decision-making point
- Street / reserve tree planting opportunity
- Gateway opportunity
- Recreation / open space opportunity

KEY PLAN



3.2 CULTURAL NARRATIVE

Cultural Design Strategy & Integrated Outcomes

A high-level cultural narrative discussion has taken place with Mana whenua through Mahaanui Kurataiao Ltd in May 2022. A cultural narrative sub-committee from the Cultural Advisory Group (CAG) are yet to inform the design outcomes of the project.

The May 2022 outcomes included the following commentary;

The overpass represents protection and welcome for commuters north and south of the township, a name for the birdge has been developed which speaks to this representation;

Tai o Mihi = "Tides of Welcome"

Three key elements of the cultural narrative include:

Direction for the flyover structure

- Ki uta ki tai – from the mountains to the sea - east to west
- Waikirikiri/Selwyn River
- Linkage with Selwyn District Council projects including Te Ara Ātea (Rolleston Library on Tennyson Street)

Our travels

- Selwyn District to Te Arātia - connection to the trails and plains

Relationship between Taumutu and Ngāi Tūāhuriri

- Ancestors that connect us together
- One side of the structure might represent Tane Tiki
- Te Rakitāmau is Taumutu connection to the interland and trails
- Rich tapestry of relationship from Moki from Tūāhuriri and Te Rakitāmau
- Concept of kākahu (cloak) and represent wahine elements

Figure 9 - Cultural opportunities plan

4. OUTCOMES SOUGHT

4.1 CHARACTER & SENSE OF PLACE

Gateways

Given the proposed growth in the area and the role this project will have in connecting communities, it is important to acknowledge and accentuate the transition from rural to urban and the Rolleston township.

Consideration should be given to the expression of entry points to the township as well as celebrating the overpass structure, which will provide a sense of arrival and a visual cue for the speed transition. Views and vistas to the surrounding landscapes should be maintained and enhanced as part of the overpass design.

The removal of the existing Rolleston township 'gateway' wall sign at Rolleston Drive will provide an opportunity to develop a new entry sign for the township. The design for any entry sign should be developed outside of this project scope.

Cultural design themes will inform the plant palette and guide the overall landscape planting strategy which aims to reinstate and enhance the underlying landscape patterns and processes of the site.

Green corridor planting approach on the Christchurch souther motorway

The proposal includes a new roundabout at the intersection between SH1 and Dunns Crossing Road. The roundabout design and associated stormwater infrastructure will build upon the project gateway themes, with user safety and sight lines in mind.

Walking and cycling connectivity beneath the State Highway and Rail corridor will be achieved through the introduction of a subway and upgraded level crossing.

Roundabout and subway layout

Planted roundabout

Mahi toi / Public art

There is opportunity to introduce mahi toi or tohu whenua to provide key way finding or place making elements to the corridor, building upon the gateway and cultural design themes. Opportunities include;

- The overpass structure barrier walls
- The overpass structure abutments
- The roundabout

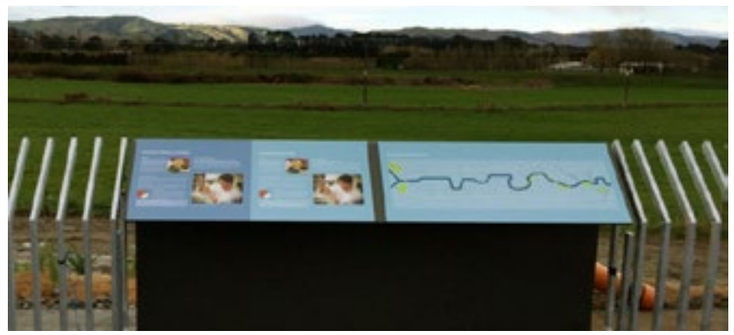
The project CAG have developed a cultural narrative that will inform the development of these elements. Refer to section 3.2 for further information.

Example of bridge artwork on Christchurch northern corridor

Example of tohu whenua on similar NZTA project

Way finding

The design should consider incorporating interpretive way finding signage to reflect the historic, cultural and environmental narratives of the area, and locate it at key points along pedestrian and cycle networks. Final panel information to be developed out side of this project.



Example of interpretation signage

4.2 LANDSCAPE & STORMWATER

Landscape

The overall landscape planting strategy will aim to reinstate and enhance the underlying landscape elements, patterns, and processes adjacent to the road corridor, including displaced and lost native plant populations.

Grass can be considered where tying into existing verges and maintain areas of open space.

The design should;

- Provide planting that focuses indigenous revegetation to address indigenous landcover loss.
- Promote a slow speed environment through low planting to road verges and islands.
- Include amenity understory and canopy tree planting that improves community and user experience.
- Provide an integrated approach to stormwater infrastructure.
- Consider whole of life costs and maintenance requirements.
- Avoid the removal of established planting along the existing southern noise bund where possible.

Planted stormwater infrastructure

Native plant palette

Embankment slopes

The landscape design will work within the parameters of the NZTA guidelines where possible which specify that mowable cut and fill slopes shall not be steeper than 4H:1V. The current scheme design allows for 6H:1V slopes along most of the corridor with some steeper areas of 4H:1V in localised areas. Where this is not achievable steeper slopes will be planted.

In order to reduce project costs a number departures for batters with grades of 2H:1V-2.5H:1V are to be submitted to NZTA. A slope system comprising of scarified batters and Ecojute matting will be developed to reduce risk of erosion to these areas. The proposed 2H:1V embankment batters to the bridge approaches are in keeping with the wider corridor designs in CSM1 and CSM2, which have been vegetated successfully.

Planted slopes on Christchurch Southern Motorway with access tracks

Stormwater elements

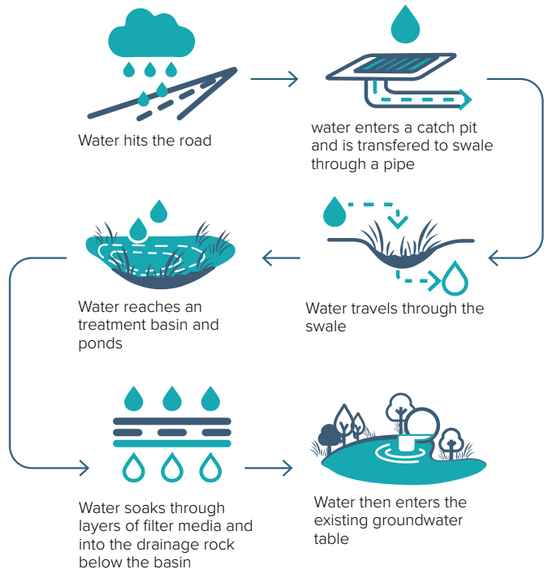
The stormwater design will prioritise treatment devices for the on site management of water from rain events.

There will be three key types of devices; grassed conveyance swales, planted treatment swales and bio filtration basins. This approach will provide stormwater flow control treatment and soakage. The design will improve on the existing piped network and provide treatment along the corridor.

The proposed infrastructure should allow for multiple uses through integrating community passive recreation spaces into the proposed stormwater management areas. Ongoing maintenance and access should be considered when determining types and extents of landscape treatments.

Planted verges / swales to reduce ongoing maintenance requirements

Landscaped open space and stormwater infrastructure



4.3 STRUCTURES

Overpass

The overpass structure should be part of a consistent ‘family of elements’ and consider the relationship of the design to the wider corridor design treatments. Elements included within the design TL5 barrier and steel rail, concrete piers and closed abutment walls.

The design should;

- Achieve a form, scale and finish that is suitable for the context and is of a quality that can be experience and appreciated by all users.
- Achieve a slender deck form and balance of structural elements.
- Consider the experience of traveling across the overpass, capturing opportunities to create new views to the landscape and enable side views from vehicles over side barriers.
- Consider the road user under bridge experience with simplicity and elegance in the junctions between the bridge structure, pillars and abutments equal to the attention given to the side elevations.
- Eliminate hiding places.
- Reduce visual clutter by concealing services and providing appropriately placed signage.
- Consider the materiality and treatment of the abutment faces to break up expanse and create visual interest.

Steel shroud applied to bridge barrier

Precast concrete bridge barrier with pattern applied

Concrete abutment walls with patterns applied

Concrete abutment walls, with vapor blasted patterns

Subway

The subway structure shall be part of a consistent ‘family of elements’ and consider the relationship of the design to the wider corridor approach designs.

The design should;

- Include the minimum clearance dimensions to allow multi modal users and reduce sense of tunneling affect.
- Provide adequate passive surveillance within and on the approaches by minimising bends and visual obstructions.
- Provide lighting inside and on the approaches of the subway .
- Provide opportunity for murals or embossed surface treatment to subway and abutment walls.
- Provide gradual accessible grade approaches, where this is not achievable provide landing and handrails for less able users.

Example of subway entrance - treatments include low level planting, minimum clearance dimensions, pedestrian balustrades, clear sight lines and abutment wall patterning

Retaining walls

A number of low height (500-1200mm) retaining walls are required throughout the route and are limited to localised areas.

Design should;

- Combine landform, planting and structure to create an holistic design solution that contributes to amenity.
- Use appropriate materials, such as concrete or timber, that reflect the local area and adjacent structures.
- Achieve a clean finish and not encourage accumulation of litter, soil or weeds.
- Allow appropriate maintenance access and adequate graffiti protection.

Timber and steel retaining wall - simple clean finish

Concrete panel retaining wall - opportunity for applying patterning and in keeping with other corridor materials

4.4 ACTIVE MODES

Design considerations

The design should provide;

- Shared path facilities that consider connections to existing and proposed walking and cycling networks within the township and increase safety and comfort for users.
- An asphalt surface finish to all shared paths, excluding the concrete bridge surface.
- Priority to the pathway user at driveway access.
- Clear signage and or surface markings to indicate entrance/exit and conflict points for cyclists.
- Planting that enables clear sight lines on and off the road corridor.

Off road asphalt shared path with native planted verges

Appropriate planting to shared path

Example of surface markings that can be used to warn users of conflicts

Example of conflict zone surface markings

Way finding and Signage

Way finding should be provided at key nodes along the proposed shared path network.

The Selwyn District Council Walking and Cycling Strategy, 2018 does not provide any guidance or standards for way finding, which limits opportunities to connect into the existing shared path and cycle network.

Road signage and gantries shall be located so as to not block or screen views to other features, ie. Public artwork or restrict landscape maintenance operations.

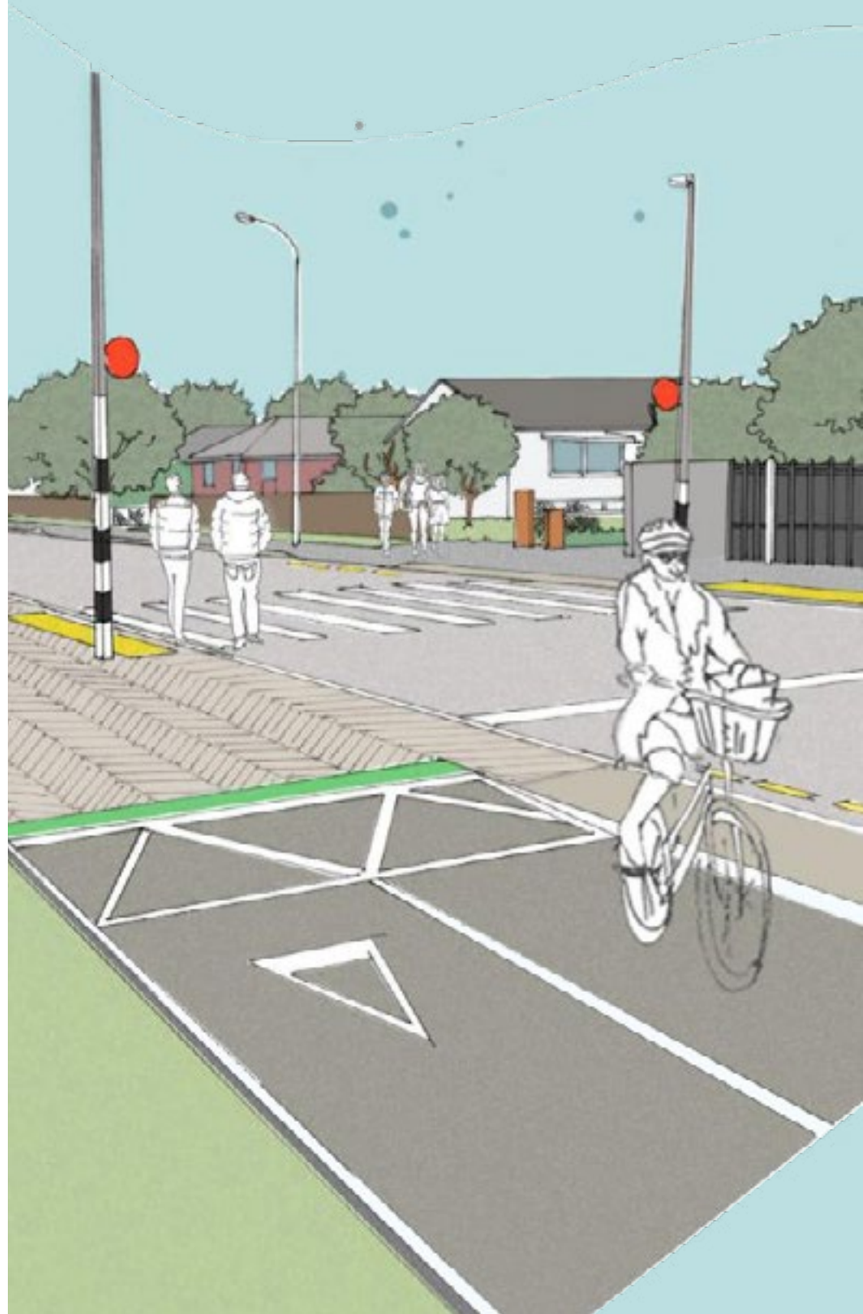
Example of surface markings that can be used for way finding

Illustration of signage layout that does not limit maintenance operations

CPTED (Crime Prevention Through Environmental Design)

Throughout the design there will be consideration of CPTED principles, with a CPTED audit proposed as part of the Preliminary design phase. The following principles will be integrated into the designs through the design process:

- Provision of low vegetation as required to avoid unsafe hiding areas.
- Enhancement of passive surveillance through plant species selection and maintaining clear sight lines.
- Provision of clear demarcation between private and public property.
- Lighting provided along the shared user path network to increase perceived safety.
- Landscape design that is high quality and well maintained. In turn this will attract more people to use the corridor and thus support greater surveillance.



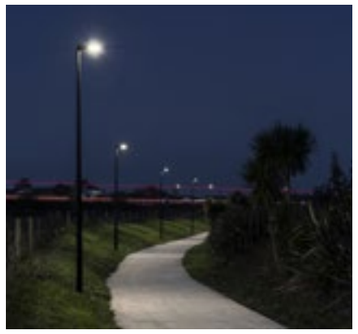
4.5 FURNITURE

Lighting

Light poles are proposed to illuminate both the State Highway corridor and the shared paths. The design should consider;

- Lighting along the shared user path network and other connected open spaces should be selected to provide a safe, secure, legible and comfortable environment for all operators and users; and
- A coordinated lighting approach should be employed to provide consistency across the corridor defining high activity zones, which addresses CPTED requirements and provides an inviting environment to all users.
- Existing lighting columns along the SH will be replaced where affected by the proposed geometric alignment with new luminaires proposed to all columns in the corridor.
- Consider location of trees near light poles to prevent impact on both flora and fauna.

Lighting in subway



Lighting along shared path network

Fences, balustrades and bollards

Where road corridor widening is required, and existing fencing is removed – replacement fences should match the existing fencing types, rural post and wire for example.

For areas of new fencing, consider standard post and wire fencing in rural areas and a folded steel option within the urban environment. Materials and finishing to match fencing used within the existing corridor.

Post and rail fencing to existing rural properties

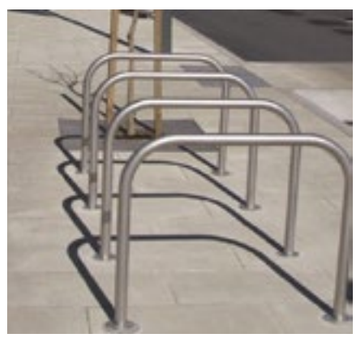
Folded wire pedestrian balustrade

Street furniture

The design should provide;

- Street furniture in response to specific activities in the area and consider the placement so it will not obstruct direct movement and visual outlook.
- Products, materials and finishes shall meet existing palettes used within the Rolleston township.

Example of town centre timber bench



Example of town centre cycle racks

Cabinets / service lids

The design should provide;

- Above ground services cabinets should be located within garden areas to avoid clutter within the pathway network and have dark recessive paint finish that is compliant with asset owners standards.
- Flush service covers to be placed outside of conflict zones and to have non slip coating where in shared path.

Utilities cabinet located in verge out of pathway alignment

Service lid in shared path

5. SECTOR PLANS

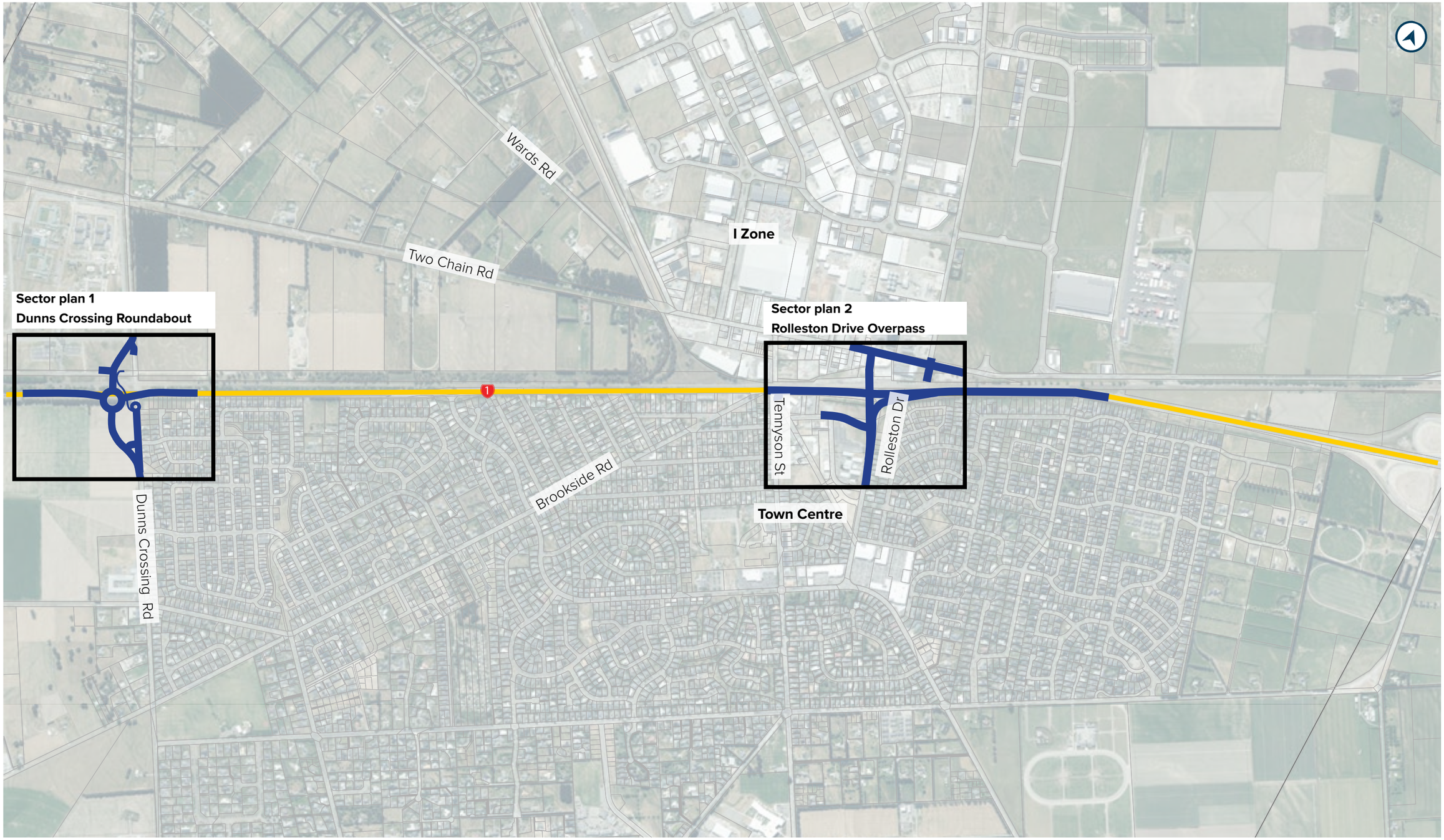


Figure 10 - Key Plan - Sector plans

5.1 DUNNS CROSSING ROAD

LEGEND

- State Highway
- Proposed Designation
- Grass
- Planting (native mixes)
- Tree
- Carriageway
- Shared path / Footpath
- Pedestrian balustrade

Figure 11 - Sector plan 1 - Dunns Crossing Roundabout

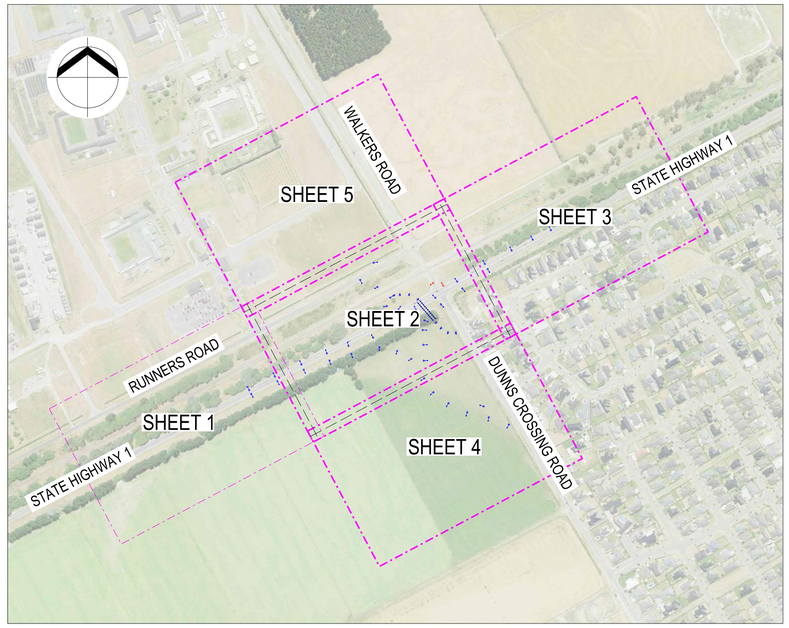
5.2 ROLLESTON DRIVE OVERPASS

LEGEND

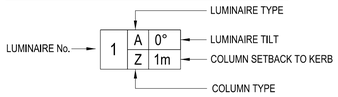
- State Highway
- Proposed Designation
- Grass
- Planting (native mixes)
- Tree
- Carriageway
- Shared path / Footpath
- Pedestrian balustrade
- Concrete bridge barrier

Note:
Carriageway lighting design for this sector expected October 2024

Figure 12 **-** Sector plans 2 - Rolleston Drive Overpass



TYPICAL COLUMN DESIGNATION:

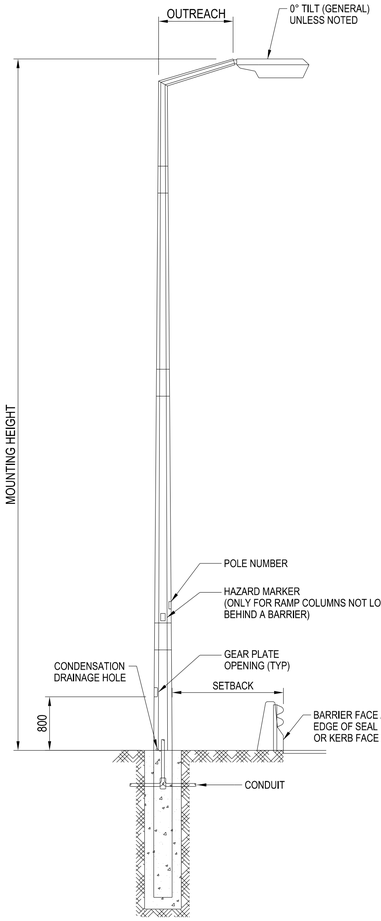


LUMINAIRE TYPE LEGEND:

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.
	LUMINAURE 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.



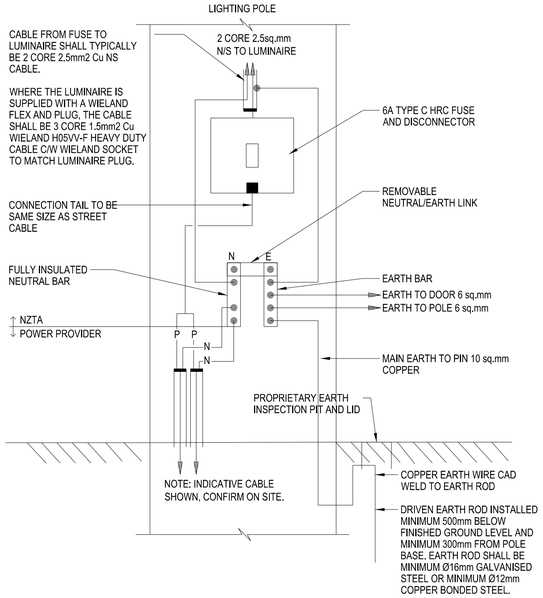
TYPICAL GROUND MOUNTED SECTIONAL GALVANISED POLE WITH MITRED OUTREACH FOR NZTA POLES

SCALE: NTS

STREET LIGHTING NOTES:

1. 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.
2. 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.
3. 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.
4. THESE WORKS SHALL INCLUDE THE REMOVAL AND DISPOSAL OF OLD LUMINAIRES AND POLES, UNLESS SPECIFIED OTHERWISE.
5. ALL LUMINAIRES SHALL BE TILTED AT AN ANGLE OF 0° TO THE HORIZONTAL UNLESS STATED OTHERWISE.
6. EACH LUMINAIRE SHALL BE PROVIDED WITH A 7 - PIN NEMA SOCKET AND A BLANKING CAP.
7. A MINIMUM TEN (10) YEAR WARRANTY FROM DATE OF ON SITE INSTALLATION SHALL BE PROVIDED FOR THE LUMINAIRES.
8. 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.
9. MINIMUM STREET LIGHTING SUPPLY CABLE SIZE SHALL BE 1C 10mm² NEUTRAL SCREEN CABLE.
10. CABLE PROTECTION SHALL BE IMPLEMENTED AS PER POWER UTILITY REQUIREMENTS AND AS/NZS 3000.
11. 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.
12. MOUNTING HEIGHTS ARE TO BE MEASURED WITH RESPECT TO THE LUMINAIRES ABOVE THE CARRIAGEWAY.
13. 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.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FINAL LOCATION OF LIGHTING POLES ON SITE BY TAKING INTO ACCOUNT THE FOLLOWING PRIOR TO INSTALLATION:
    a. 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.
    b. 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.
    c. PERMITTED LOCATION TOLERANCE
       - 0.5m PARALLEL TO THE CARRIAGEWAY
       - 0.2m PERPENDICULAR TO THE CARRIAGEWAY
       - 0.2m VERTICALLY

    IF THE FINAL POLE LOCATION EXCEEDS THE PERMITTED TOLERANCE FURTHER LIGHTING DESIGN MAY BE REQUIRED.
15. 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.
16. 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 NO SUIT THE COLUMN MANUFACTURER'S STANDARD FOUNDATION DESIGN.



GEARPLATE TWO CORE CABLE TERMINATION WITHIN POLE FOR SHEAR BASE POLES

SCALE: NTS

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Drawn	R.ANDERSON	24.07.24	
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Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING DRAWING KEY, NOTES & LUMINAIRE SCHEDULE

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3500

Rev.: A

Document No. ...\Plans\3338703-10-CU-3500

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Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING LAYOUT PLANS SHEET 1 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3511

Rev.: A

Document No. ...\Plans\3338703-10-CU-3511

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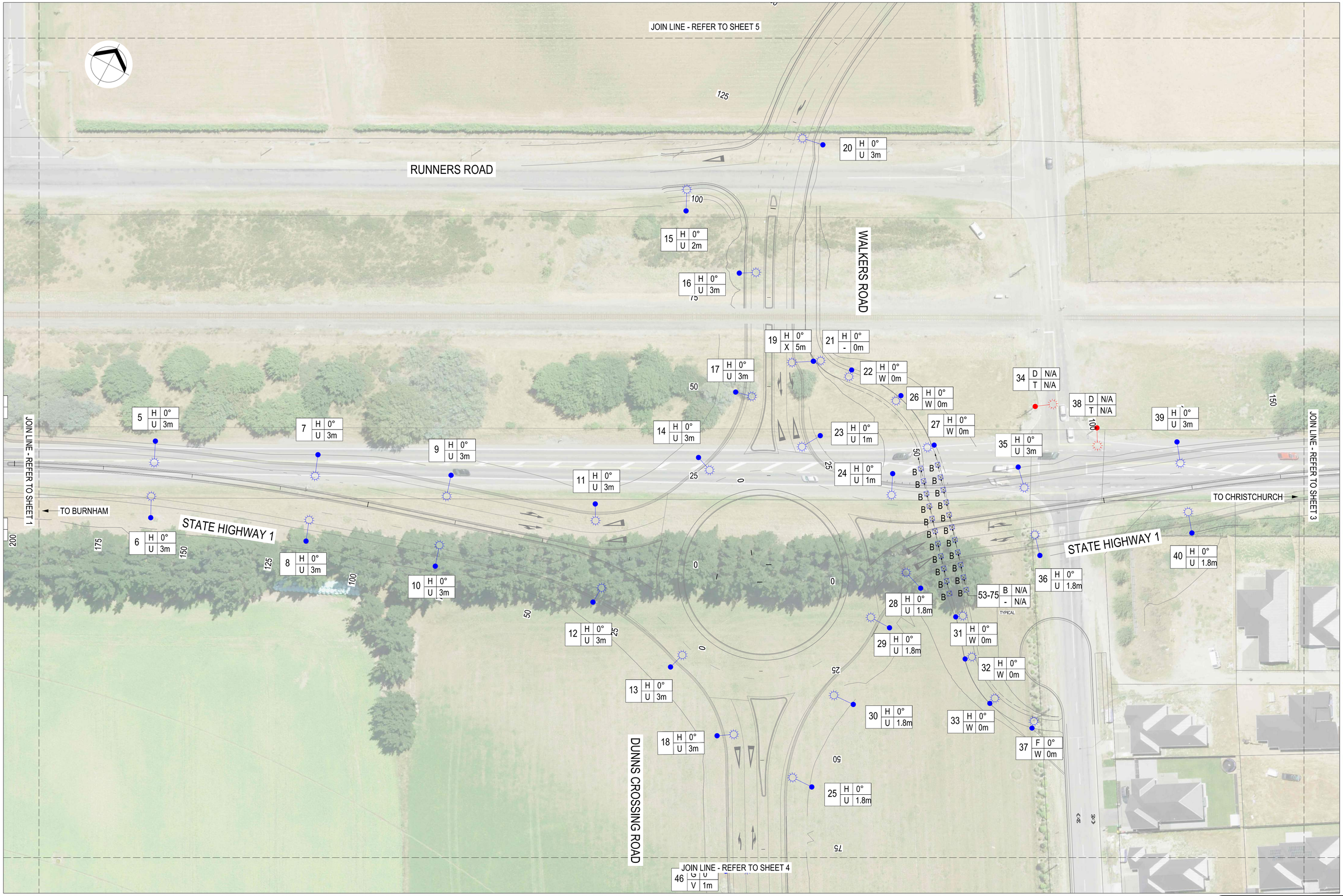

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Discipline: CIVIL ENGINEERING

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Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING LAYOUT PLAN SHEET 3 OF 5

Discipline: CIVIL ENGINEERING

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Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING LAYOUT PLAN SHEET 4 OF 5

Discipline: CIVIL ENGINEERING

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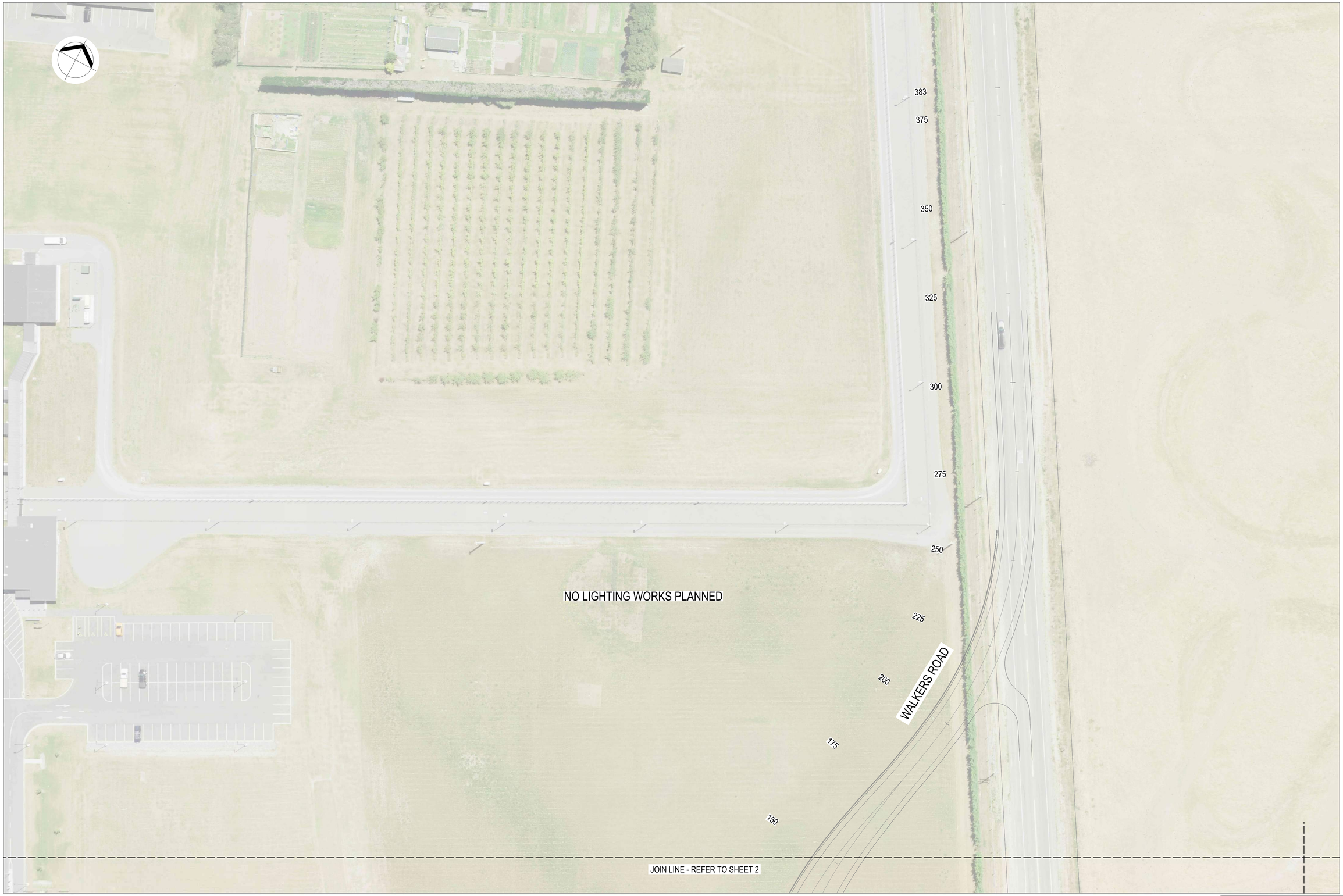

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Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING LAYOUT PLAN SHEET 5 OF 5

Discipline: CIVIL ENGINEERING

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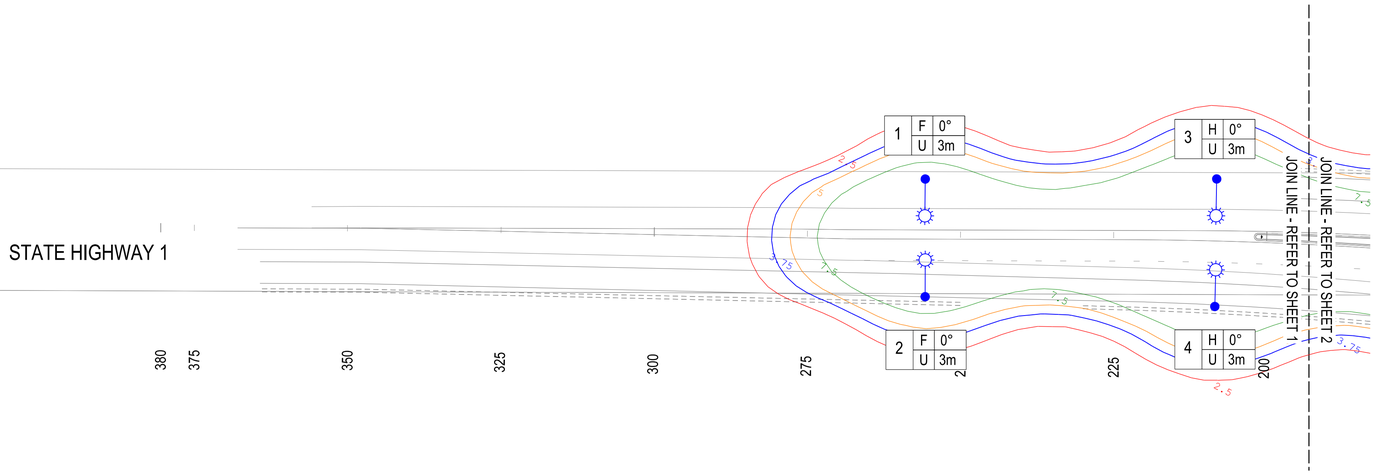
TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022									AT TECH DESIGN MANUAL CH 12 CLAUSE 12.3.2
1	2	3	4	5	6	7	8	9	
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)								
	AVERAGE CARRIAGEWAY LUMINANCE [a,b] (L) cd/m²	OVERALL UNIFORMITY[c,d] (U_o)	LONGITUDINAL UNIFORMITY [b] (U_L)	THRESHOLD INCREMENT [d,e] (TI) %	SURROUND VERGE ILLUMINANCE [b] (E_{SL} and E_{SR}) %	POINT HORIZONTAL ILLUMINANCE [a,b] (E_{ph}) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY [d] (U_{E1})	UPWARD WASTE LIGHT RATIO [d] (UWLR)	POWER DENSITY LIMIT W/m²
V3	0.75	0.33	0.3	9.81	50	7.5	8	3	0.29
V4	0.50	0.33	0.3	9.81	50	5.0	8	3	0.26

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_o MAY BE 0.32 OR 0.31 PROVIDED THE VALUE FOR U_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/m²	3 OVERALL UNIFORMITY (U_o)	4 LONGITUDINAL UNIFORMITY (U_L)	5 THRESHOLD INCREMENT (TI) %	6 SURROUND VERGE ILLUMINANCE (E^{-S}) lx	7 POINT HORIZONTAL ILLUMINANCE (E^{-ph}) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY (U^{-E1})	9 UPWARD WASTE LIGHT RATIO (UWLR)	MAX SPACING (m)	POWER DENSITY W/m²	COMPLIANCE TO CATEGORY
SH1 MAIN SOUTH ROAD CARRIAGEWAY	0.76	0.35	0.47	5.53	75.61	N/A	N/A	0.00	52	0.20	V3



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Client: NZ TRANSPORT AGENCY WAKA KOTAHI
Project: SH1 ROLLESTON ACCESS IMPROVEMENTS
Title: LIGHTING CALCULATION PLANS SHEET 1 OF 5
Discipline: CIVIL ENGINEERING
Drawing No.: 3338703-10-CU-3521
Rev.: A

Document No. ...\Plans\3338703-10-CU-3521

TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022

AT TECH DESIGN MANUAL CH 12 CLAUSE 12.3.2

1	2	3	4	5	6	7	8	9	
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)								
	AVERAGE CARRIAGEWAY LUMINANCE [a,b] (L) cd/m²	OVERALL UNIFORMITY [c,d] (U_o)	LONGITUDINAL UNIFORMITY [b] (U_L)	THRESHOLD INCREMENT [d,e] (TI) %	SURROUND VERGE ILLUMINANCE [b] (E_{SL} and E_{SR}) %	POINT HORIZONTAL ILLUMINANCE [a,b] (E_{ph}) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY [d] (U_{E1})	UPWARD WASTE LIGHT RATIO [d] (UWLR)	POWER DENSITY LIMIT W/m²
V3	0.75	0.33	0.3	9.81	50	7.5	8	3	0.29
V4	0.50	0.33	0.3	9.81	50	5.0	8	3	0.26

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_o 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/m²	3 OVERALL UNIFORMITY (U_o)	4 LONGITUDINAL UNIFORMITY (U_L)	5 THRESHOLD INCREMENT (TI) %	6 SURROUND VERGE ILLUMINANCE (E^{-s}) lx	7 POINT HORIZONTAL ILLUMINANCE (E^{-ph}) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY (U^{-E1})	9 UPWARD WASTE LIGHT RATIO (UWLR)	MAX SPACING (m)	POWER DENSITY W/m²	COMPLIANCE TO CATEGORY
RAB INTERSECTION	N/A	N/A	N/A	N/A	N/A	7.7	2.45	N/A	N/A	N/A	V3
WALKERS RD/ RUNNERS RD INTERSECTION	N/A	N/A	N/A	N/A	N/A	7.7	2.45	N/A	N/A	N/A	V3

TABLE 3.6 VALUES OF LIGHT TECHNICAL PARAMETERS FOR CONNECTING ELEMENT

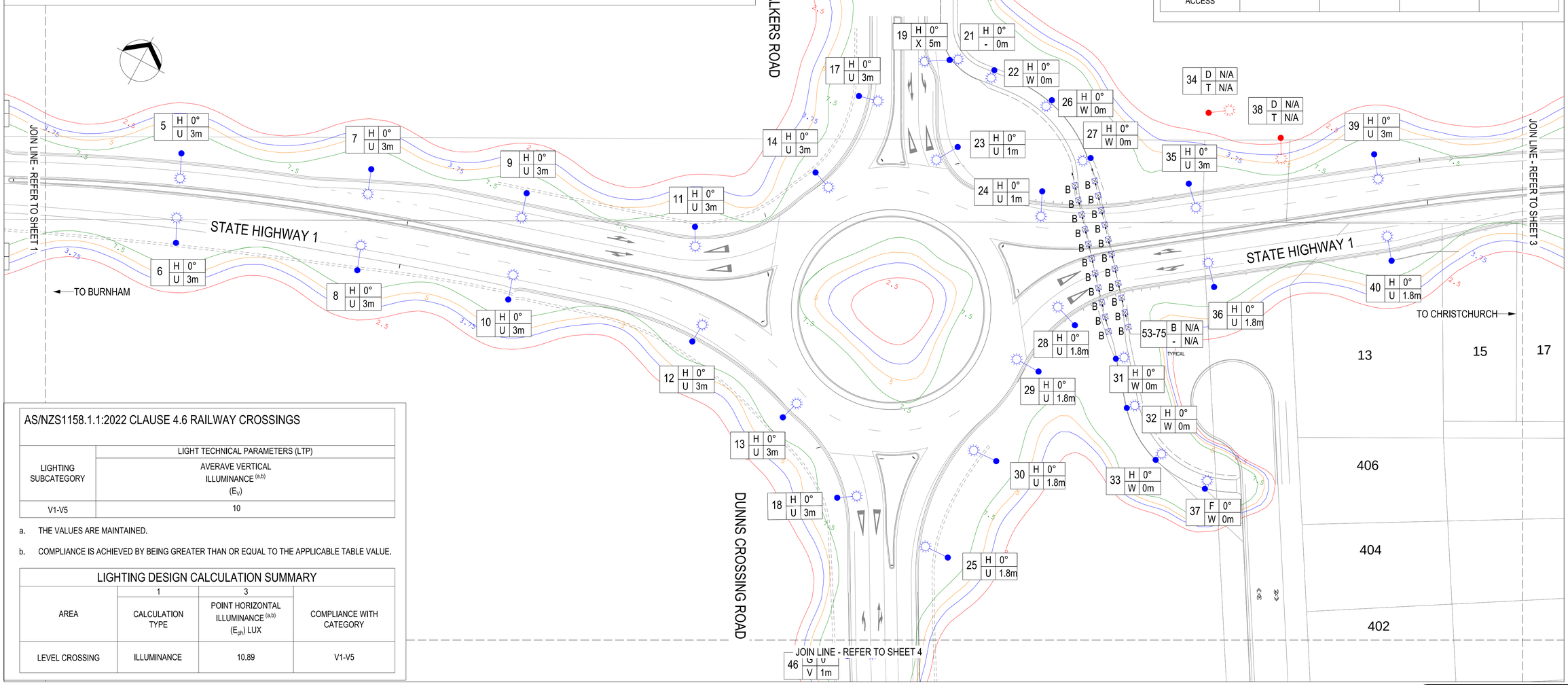
1	2	3	4	5
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)			
	AVERAGE HORIZONTAL ILLUMINANCE [a,b] (E_h) lx	POINT HORIZONTAL ILLUMINANCE [a,b] (E_{ph}) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY [c] Cat. P (U_{E2})	POINT VERTICAL ILLUMINANCE [a,b] (E_{Pv}) lx
PE1	35	17.5	8	17.5

a. THESE VALUES ARE MAINTAINED.
b. CONFORMANCE IS ACHIEVED BY BEING GREATER THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.
c. CONFORMANCE IS ACHIEVED BY BEING LESS THAN OR EQUAL TO THE APPLICABLE VALUE.

LIGHTING DESIGN CALCULATIONS SUMMARY

(CALCULATIONS BASED ON THE LIGHT OUTPUT FROM PEDESTRIAN CROSSING LUMINAIRES ONLY)

1 AREA	2 AVERAGE HORIZONTAL ILLUMINANCE [a,b] (E_h)	3 POINT HORIZONTAL ILLUMINANCE - SURROUNDS (E_{PH})	4 ILLUMINANCE (HORIZONTAL) UNIFORMITY [c] Cat. P (U_{E2})	5 POINT VERTICAL ILLUMINANCE [a,b] (E_{Pv})
UNDERPASS	148.65 lx	86.1 lx	1.27	30.4 lx
UNDERPASS SOUTH ACCESS	76.44 lx	50.5 lx	1.31	19.2 lx
UNDERPASS NORTH ACCESS	61.47 lx	44.0 lx	1.40	18.4 lx



AS/NZS1158.1.1:2022 CLAUSE 4.6 RAILWAY CROSSINGS

LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP) AVERAVE VERTICAL ILLUMINANCE [a,b] (E_V)
V1-V5	10

a. THE VALUES ARE MAINTAINED.

b. COMPLIANCE IS ACHIEVED BY BEING GREATER THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.

LIGHTING DESIGN CALCULATION SUMMARY

AREA	1 CALCULATION TYPE	3 POINT HORIZONTAL ILLUMINANCE [a,b] (E_{ph}) LUX	COMPLIANCE WITH CATEGORY
LEVEL CROSSING	ILLUMINANCE	10.89	V1-V5

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	PRELIMINARY DESIGN	---	---	---	---

Original Scale (A1) 1:500
Reduced Scale (A3) 1:1000

Design	K.CUTTLE	24.07.24	Approved For Construction*
Drawn	R.ANDERSON	24.07.24	
Dsg Verifier			
Drg Check			Date

* Refer to Revision 1 for Original Signature

Client: NZ TRANSPORT AGENCY WAKA KOTAHI
Project: SH1 ROLLESTON ACCESS IMPROVEMENTS
Title: LIGHTING CALCULATION PLAN SHEET 2 OF 5
Discipline: CIVIL ENGINEERING
Drawing No.: 3338703-10-CU-3522
Rev.: A

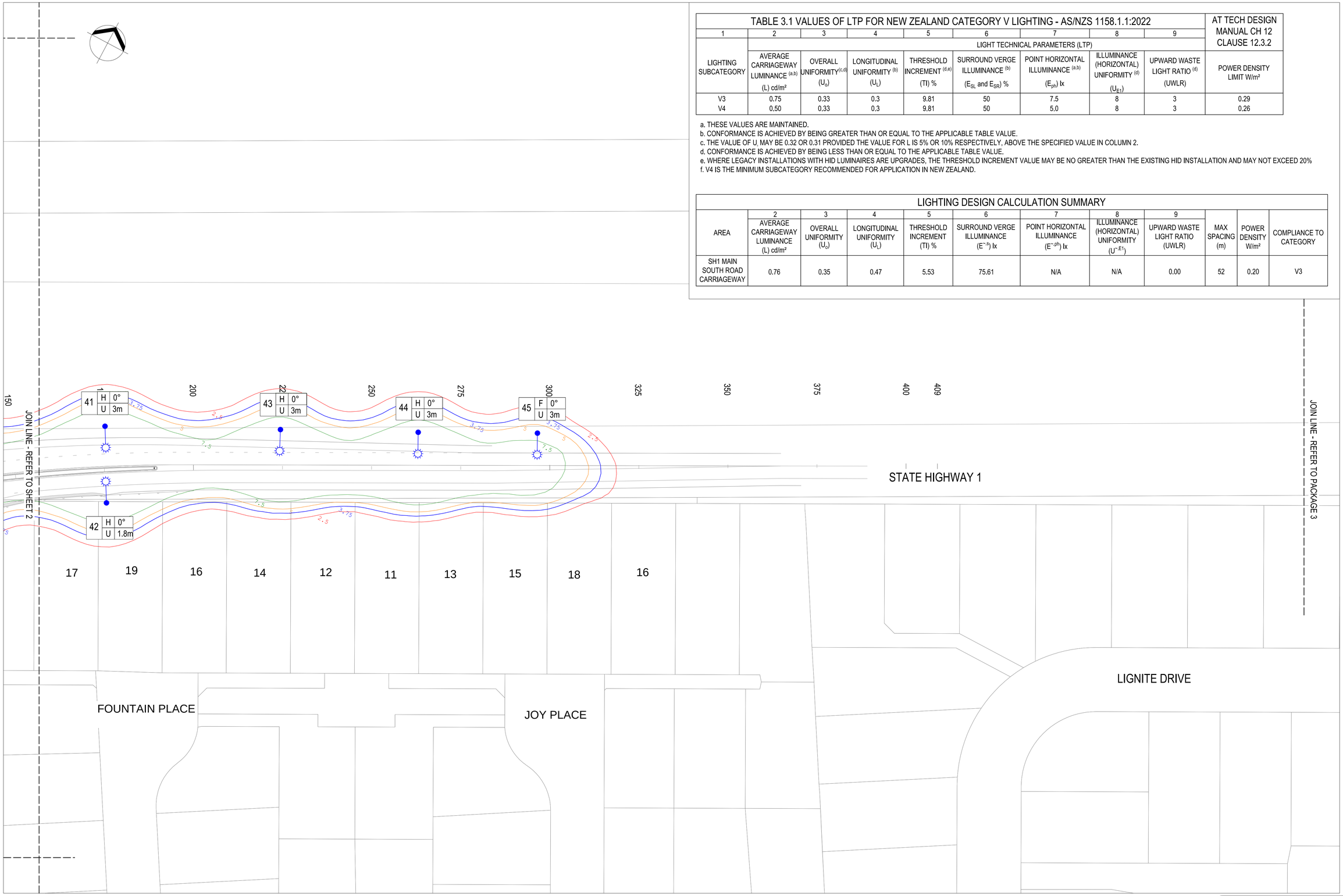
Document No. ...\Plans\3338703-10-CU-3522

DO NOT SCALE FOR SET OUT DIMENSIONS
DO NOT SCALE
IF IN DOUBT ASK.

TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022									AT TECH DESIGN MANUAL CH 12 CLAUSE 12.3.2
1	2	3	4	5	6	7	8	9	
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)								
	AVERAGE CARRIAGEWAY LUMINANCE [a,b] (L) cd/m²	OVERALL UNIFORMITY [c,d] (U_o)	LONGITUDINAL UNIFORMITY [b] (U_L)	THRESHOLD INCREMENT [d,e] (TI) %	SURROUND VERGE ILLUMINANCE [b] (E_{SL} and E_{SR}) %	POINT HORIZONTAL ILLUMINANCE [a,b] (E_{ph}) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY [d] (U_{E1})	UPWARD WASTE LIGHT RATIO [d] (UWLR)	POWER DENSITY LIMIT W/m²
V3	0.75	0.33	0.3	9.81	50	7.5	8	3	0.29
V4	0.50	0.33	0.3	9.81	50	5.0	8	3	0.26

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_o 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/m²	3 OVERALL UNIFORMITY (U_o)	4 LONGITUDINAL UNIFORMITY (U_L)	5 THRESHOLD INCREMENT (TI) %	6 SURROUND VERGE ILLUMINANCE (E^{-S}) lx	7 POINT HORIZONTAL ILLUMINANCE (E^{-ph}) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY (U^{-E1})	9 UPWARD WASTE LIGHT RATIO (UWLR)	MAX SPACING (m)	POWER DENSITY W/m²	COMPLIANCE TO CATEGORY
SH1 MAIN SOUTH ROAD CARRIAGEWAY	0.76	0.35	0.47	5.53	75.61	N/A	N/A	0.00	52	0.20	V3



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No.	Revision	By	Chk	Appd	Date
A	PRELIMINARY DESIGN	---	---	---	

DO NOT SCALE FOR SET OUT DIMENSIONS

Original Scale (A1)	1:500
Reduced Scale (A3)	1:1000

Design	K.CUTTLE	24.07.24	Approved For Construction*
Drawn	R.ANDERSON	24.07.24	
Dsg Verifier			
Drg Check			Date

* Refer to Revision 1 for Original Signature

Beca

Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING CALCULATION PLAN SHEET 3 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3523

Rev.: A

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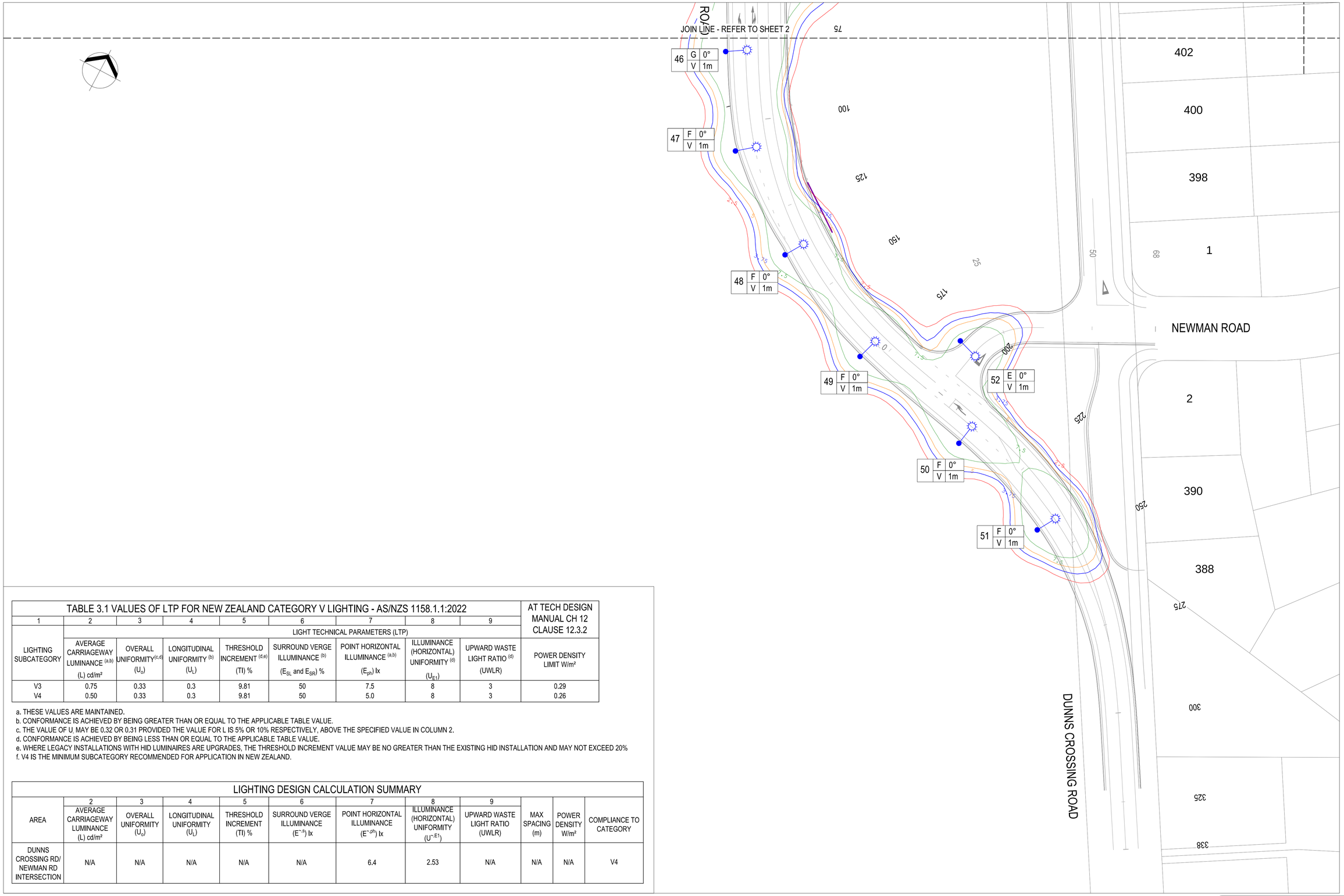

TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022									AT TECH DESIGN MANUAL CH 12 CLAUSE 12.3.2
1	2	3	4	5	6	7	8	9	
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)								
	AVERAGE CARRIAGEWAY LUMINANCE [a,b] (L) cd/m²	OVERALL UNIFORMITY [c,d] (U_o)	LONGITUDINAL UNIFORMITY [b] (U_L)	THRESHOLD INCREMENT [d,e] (TI) %	SURROUND VERGE ILLUMINANCE [b] (E_{SL} and E_{SR}) %	POINT HORIZONTAL ILLUMINANCE [a,b] (E_{ph}) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY [d] (U_{E1})	UPWARD WASTE LIGHT RATIO [d] (UWLR)	POWER DENSITY LIMIT W/m²
V3	0.75	0.33	0.3	9.81	50	7.5	8	3	0.29
V4	0.50	0.33	0.3	9.81	50	5.0	8	3	0.26

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 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/m²	3 OVERALL UNIFORMITY (U_o)	4 LONGITUDINAL UNIFORMITY (U_L)	5 THRESHOLD INCREMENT (TI) %	6 SURROUND VERGE ILLUMINANCE ($E^{-,s}$) lx	7 POINT HORIZONTAL ILLUMINANCE ($E^{-,ph}$) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY ($U^{-,E1}$)	9 UPWARD WASTE LIGHT RATIO (UWLR)	MAX SPACING (m)	POWER DENSITY W/m²	COMPLIANCE TO CATEGORY
DUNNS CROSSING RD/ NEWMAN RD INTERSECTION	N/A	N/A	N/A	N/A	N/A	6.4	2.53	N/A	N/A	N/A	V4

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	PRELIMINARY DESIGN	---	---	---	

Original Scale (A1)	1:500	Reduced Scale (A3)	1:1000

Design	K.CUTTLE	24.07.24	Approved For Construction*
Drawn	R.ANDERSON	24.07.24	
Dsg Verifier			
Drg Check			Date

* Refer to Revision 1 for Original Signature

Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING CALCULATION PLAN SHEET 4 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3524

Rev.: A

Document No. ...\Plans\3338703-10-CU-3524

Drawing Ploted: 30/07/2024 4:42:41 pm

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No.	Revision	By	Chk	Appd	Date
A	PRELIMINARY DESIGN	---	---	---	

Original Scale (A1) 1:500	Design	K.CUTTLE	24.07.24
	Drawn	R.ANDERSON	24.07.24
Reduced Scale (A3) 1:1000	Dsg Verifier		
	Drg Check		

Approved For Construction* Date

* Refer to Revision 1 for Original Signature

Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING CALCULATION PLAN SHEET 5 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3525

Rev.: A

Document No. ...\Plans\3338703-10-CU-3525

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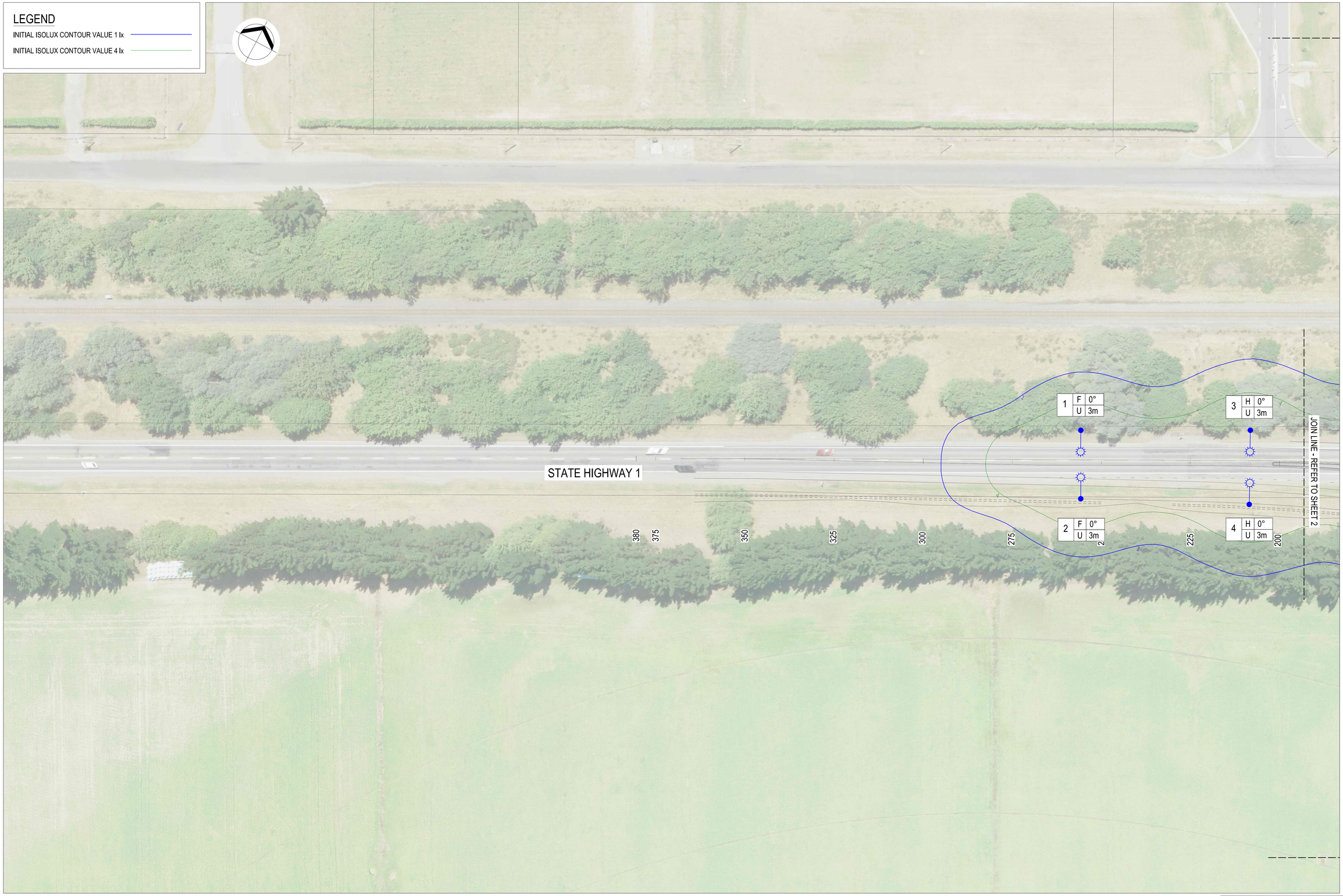
Drawing Ploted: 30/07/2024 4:30:15 pm

LEGEND

INITIAL ISOLUX CONTOUR VALUE 1 lx

INITIAL ISOLUX CONTOUR VALUE 4 lx



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No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	---	---	---	

Original Scale (A1) 1:500	Design	K.CUTTLE	24.07.24
	Drawn	R.ANDERSON	24.07.24
	Dsg Verifier		
Reduced Scale (A3) 1:1000	Drg Check		Date

Approved For Construction*

* Refer to Revision 1 for Original Signature

Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: SPILL LIGHTING LAYOUT SHEET 1 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3531

Rev.: A

Document No. ...\Plans\3338703-10-CU-3531

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Drawing Ploted: 30/07/2024 4:30:59 pm

LIGHTING DESIGN VERTICAL SPILL CALCULATION SUMMARY		
AREA	1 CALCULATION TYPE	2 POINT VERTICAL ILUMINANCE [a] (E_{PV}) LUX
15 FOUNTAIN PLACE	ILLUMINANCE	1.2
16 FOUNTAIN PLACE	ILLUMINANCE	0.8
17 FOUNTAIN PLACE	ILLUMINANCE	1.6

LEGEND

INITIAL ISOLUX CONTOUR VALUE 1 lx

INITIAL ISOLUX CONTOUR VALUE 4 lx

JOIN LINE - REFER TO SHEET 5

RUNNERS ROAD

WALKERS ROAD

DUNNS CROSSING ROAD

STATE HIGHWAY 1

TO BURNHAM

TO CHRISTCHURCH

JOIN LINE - REFER TO SHEET 1

JOIN LINE - REFER TO SHEET 3

JOIN LINE - REFER TO SHEET 4

5 H 0° U 3m

6 H 0° U 3m

7 H 0° U 3m

8 H 0° U 3m

9 H 0° U 3m

10 H 0° U 3m

11 H 0° U 3m

12 H 0° U 3m

13 H 0° U 3m

14 H 0° U 3m

15 H 0° U 2m

16 H 0° U 3m

17 H 0° U 3m

18 H 0° U 3m

19 H 0° X 5m

20 H 0° U 3m

21 H 0° - 0m

22 H 0° W 0m

23 H 0° U 1m

24 H 0° U 1m

25 H 0° U 1.8m

26 H 0° W 0m

27 H 0° W 0m

28 H 0° U 1.8m

29 H 0° U 1.8m

30 H 0° U 1.8m

31 H 0° W 0m

32 H 0° W 0m

33 H 0° W 0m

34 D N/A T N/A

35 H 0° U 3m

36 H 0° U 1.8m

37 F 0° W 0m

38 D N/A T N/A

39 H 0° U 3m

40 H 0° U 1.8m

46 S 0° V 1m

53-75 B N/A - N/A TYPICAL

B

15

17

13

406

404

402

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	---	---	---	

Original Scale (A1) 1:500
Reduced Scale (A3) 1:1000

Design	K.CUTTLE	24.07.24	Approved For Construction*
Drawn	R.ANDERSON	24.07.24	
Dsg Verifier			
Drg Check			Date

* Refer to Revision 1 for Original Signature

Beca

Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: SPILL LIGHTING LAYOUT SHEET 2 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3532

Rev.: A

Document No. ...\Plans\3338703-10-CU-3532

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Drawing Ploted: 30/07/2024 4:31:48 pm

LIGHTING DESIGN VERTICAL SPILL CALCULATION SUMMARY		
	1	2
AREA	CALCULATION TYPE	POINT VERTICAL ILUMINANCE [a] (E_{PV}) LUX
12-14 FOUNTAIN PLACE	ILLUMINANCE	0.5
11-16 JOY PLACE	ILLUMINANCE	0.4

LEGEND

INITIAL ISOLUX CONTOUR VALUE 1 lx

INITIAL ISOLUX CONTOUR VALUE 4 lx

FOR INFORMATION
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No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	---	---	---	

Original Scale (A1) 1:500
Reduced Scale (A3) 1:1000

Design	K.CUTTLE	24.07.24	Approved For Construction*
Drawn	R.ANDERSON	24.07.24	
Dsg Verifier			
Drg Check			Date

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Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: SPILL LIGHTING LAYOUT SHEET 3 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3533

Rev.: A

Document No. ...\Plans\3338703-10-CU-3533

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LIGHTING DESIGN VERTICAL SPILL CALCULATION SUMMARY		
AREA	1 CALCULATION TYPE	2 POINT VERTICAL ILUMINANCE [a] (E_{PV}) LUX
2 NEWMAN RD	ILLUMINANCE	0.1
390 DUNNS CROSSING RD	ILLUMINANCE	0.2
398-406 DUNNS CROSSING RD	ILLUMINANCE	0.4

LEGEND

INITIAL ISOLUX CONTOUR VALUE 1 lx

INITIAL ISOLUX CONTOUR VALUE 4 lx

FOR INFORMATION
NOT FOR CONSTRUCTION

A	FOR INFORMATION	---	---	---	
No.	Revision	By	Chk	Appd	Date

Original Scale (A1) 1:500	Design	K.CUTTLE	24.07.24
	Drawn	R.ANDERSON	24.07.24
Reduced Scale (A3) 1:1000	Dsg Verifier		
	Drg Check		
* Refer to Revision 1 for Original Signature			Date

Approved For Construction*

Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: SPILL LIGHTING LAYOUT SHEET 4 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3534

Rev.: A

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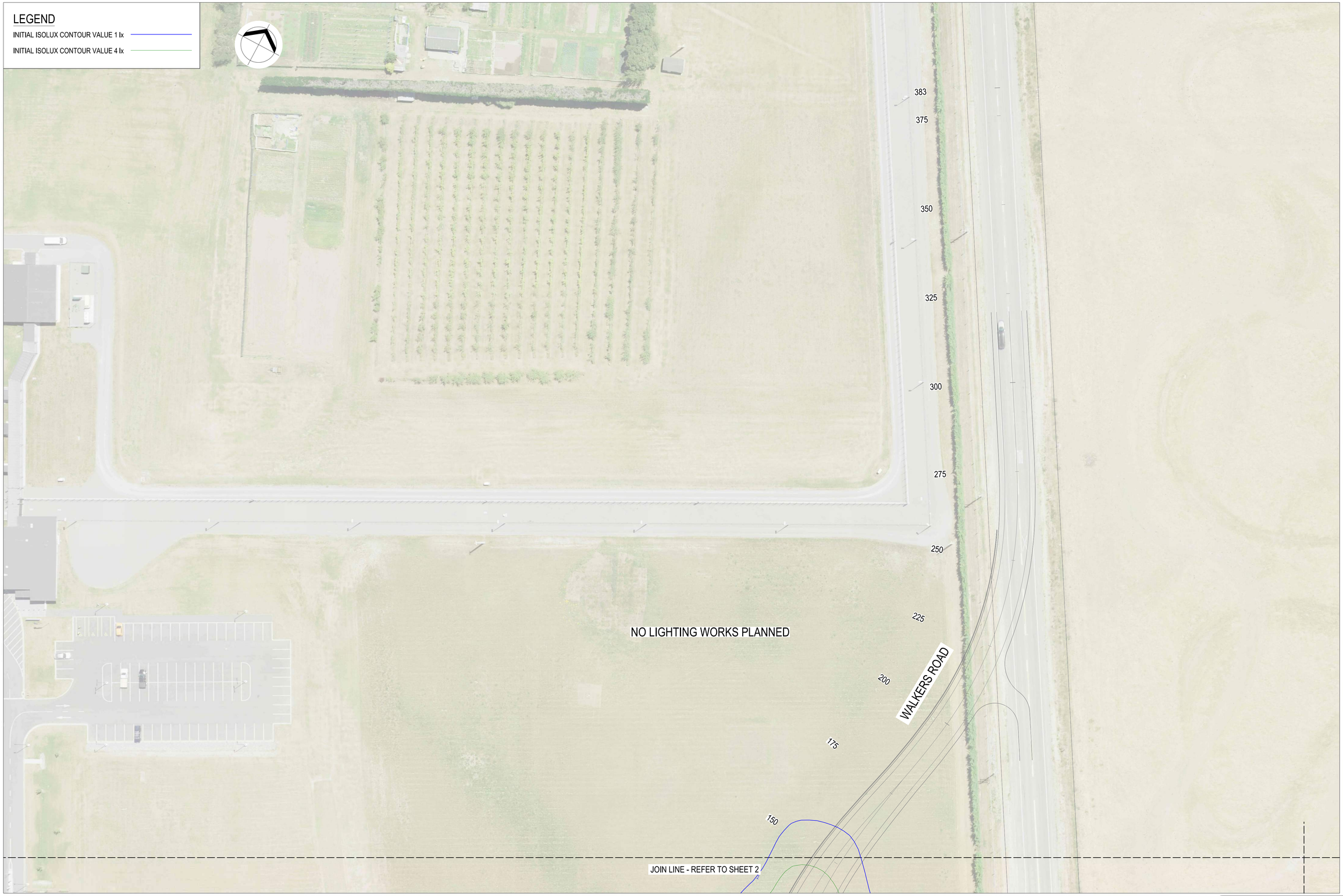
Drawing Ploted: 30/07/2024 4:33:33 pm



FOR INFORMATION
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No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	---	---	---	

Original Scale (A1)	1:500	Approved For Construction*	
Reduced Scale (A3)	1:1000		

Design	K.CUTTLE	24.07.24	Approved For Construction*
Drawn	R.ANDERSON	24.07.24	
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Drg Check			Date

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Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: SPILL LIGHTING LAYOUT SHEET 5 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3535

Rev.: A

Document No. ...\Plans\3338703-10-CU-3535

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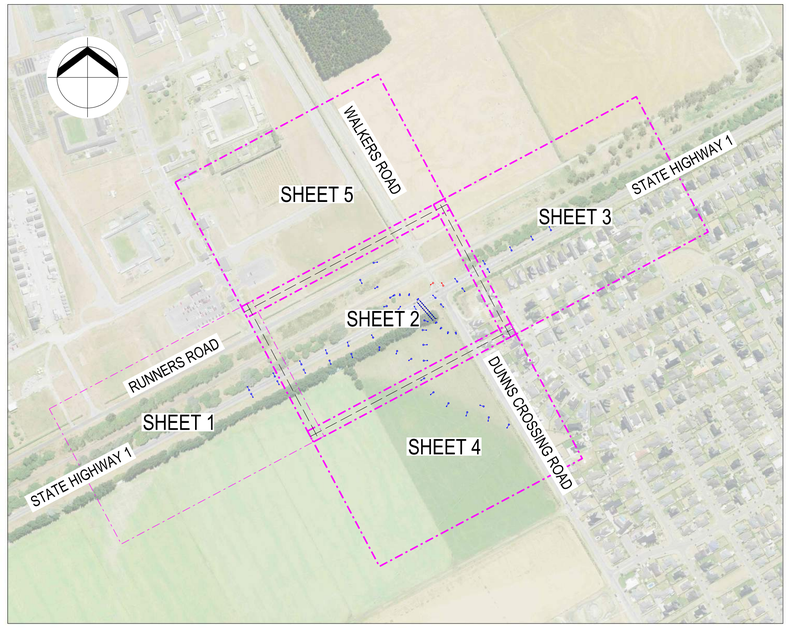
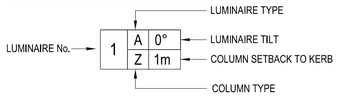


TYPICAL COLUMN DESIGNATION:

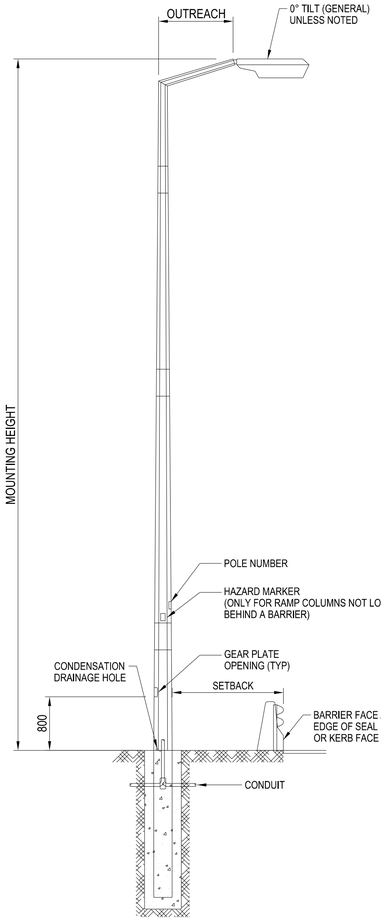


LUMINAIRE TYPE LEGEND:

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.
	LUMINAURE 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.



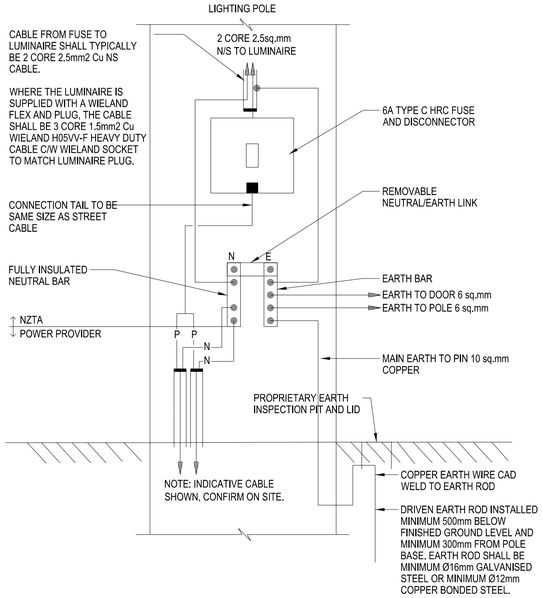
TYPICAL GROUND MOUNTED SECTIONAL GALVANISED POLE WITH MITRED OUTREACH FOR NZTA POLES

SCALE: NTS

STREET LIGHTING NOTES:

1. 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.
2. 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.
3. 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.
4. THESE WORKS SHALL INCLUDE THE REMOVAL AND DISPOSAL OF OLD LUMINAIRES AND POLES, UNLESS SPECIFIED OTHERWISE.
5. ALL LUMINAIRES SHALL BE TILTED AT AN ANGLE OF 0° TO THE HORIZONTAL UNLESS STATED OTHERWISE.
6. EACH LUMINAIRE SHALL BE PROVIDED WITH A 7 - PIN NEMA SOCKET AND A BLANKING CAP.
7. A MINIMUM TEN (10) YEAR WARRANTY FROM DATE OF ON SITE INSTALLATION SHALL BE PROVIDED FOR THE LUMINAIRES.
8. 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.
9. MINIMUM STREET LIGHTING SUPPLY CABLE SIZE SHALL BE 1C 10mm² NEUTRAL SCREEN CABLE.
10. CABLE PROTECTION SHALL BE IMPLEMENTED AS PER POWER UTILITY REQUIREMENTS AND AS/NZS 3000.
11. 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.
12. MOUNTING HEIGHTS ARE TO BE MEASURED WITH RESPECT TO THE LUMINAIRES ABOVE THE CARRIAGEWAY.
13. 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.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FINAL LOCATION OF LIGHTING POLES ON SITE BY TAKING INTO ACCOUNT THE FOLLOWING PRIOR TO INSTALLATION:
    a. 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.
    b. 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.
    c. PERMITTED LOCATION TOLERANCE
       - 0.5m PARALLEL TO THE CARRIAGEWAY
       - 0.2m PERPENDICULAR TO THE CARRIAGEWAY
       - 0.2m VERTICALLY

    IF THE FINAL POLE LOCATION EXCEEDS THE PERMITTED TOLERANCE FURTHER LIGHTING DESIGN MAY BE REQUIRED.
15. 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.
16. 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 NO SUIT THE COLUMN MANUFACTURER'S STANDARD FOUNDATION DESIGN.



GEARPLATE TWO CORE CABLE TERMINATION WITHIN POLE FOR SHEAR BASE POLES

SCALE: NTS

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No.	Revision	By	Chk	Appd	Date
A	PRELIMINARY DESIGN	---	---	---	

Original Scale (A1)	NTS		
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Drawn	R.ANDERSON	24.07.24	
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Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING DRAWING KEY, NOTES & LUMINAIRE SCHEDULE

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3500

Rev.: A

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Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING LAYOUT PLANS SHEET 1 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3511

Rev.: A

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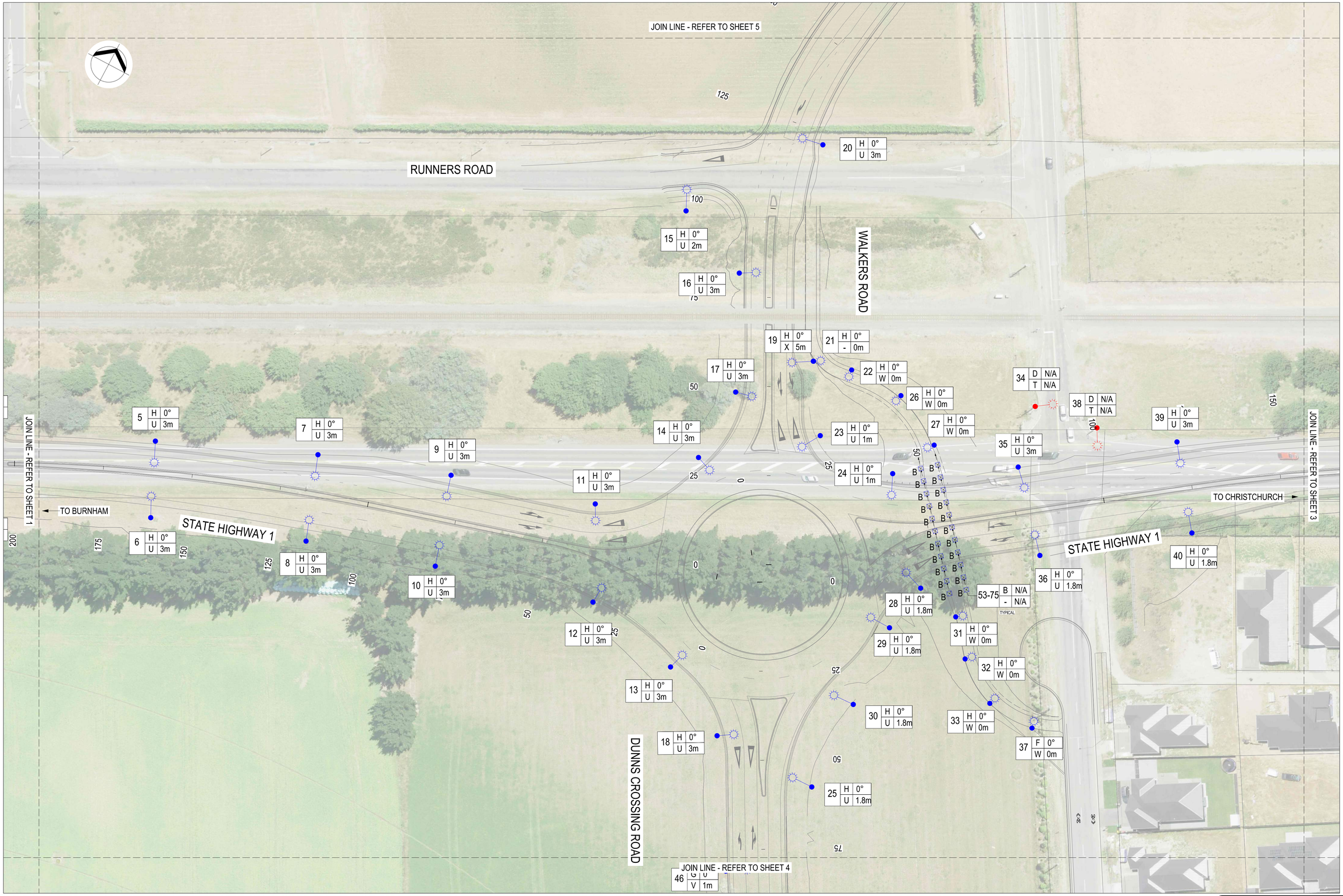

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No.	Revision	By	Chk	Appd	Date
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Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING LAYOUT PLAN SHEET 2 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3512

Rev.: A

Document No. ...\Plans\3338703-10-CU-3512

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Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING LAYOUT PLAN SHEET 3 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3513

Rev.: A

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Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING LAYOUT PLAN SHEET 4 OF 5

Discipline: CIVIL ENGINEERING

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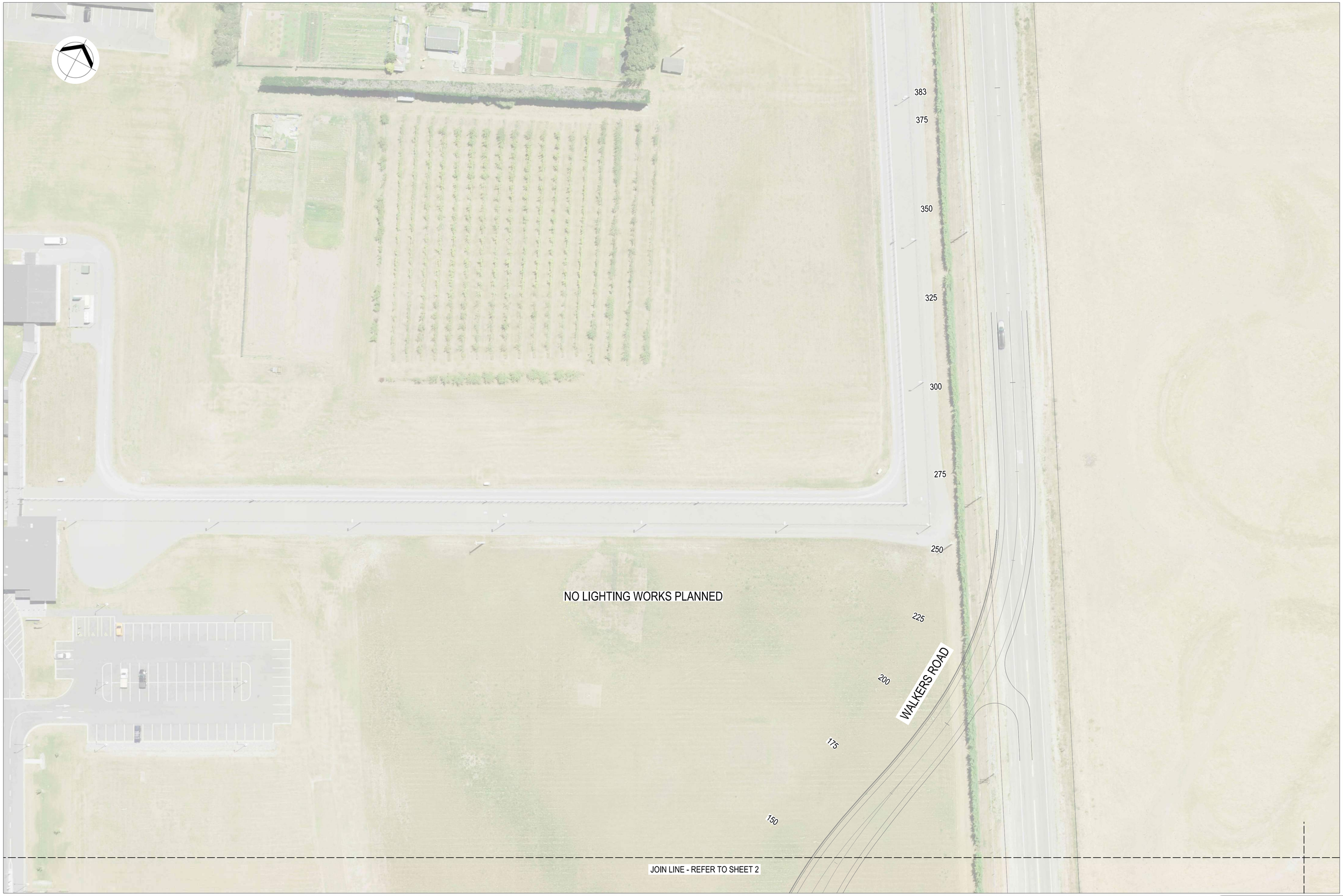

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Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING LAYOUT PLAN SHEET 5 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3515

Rev.: A

Document No. ...\Plans\3338703-10-CU-3515

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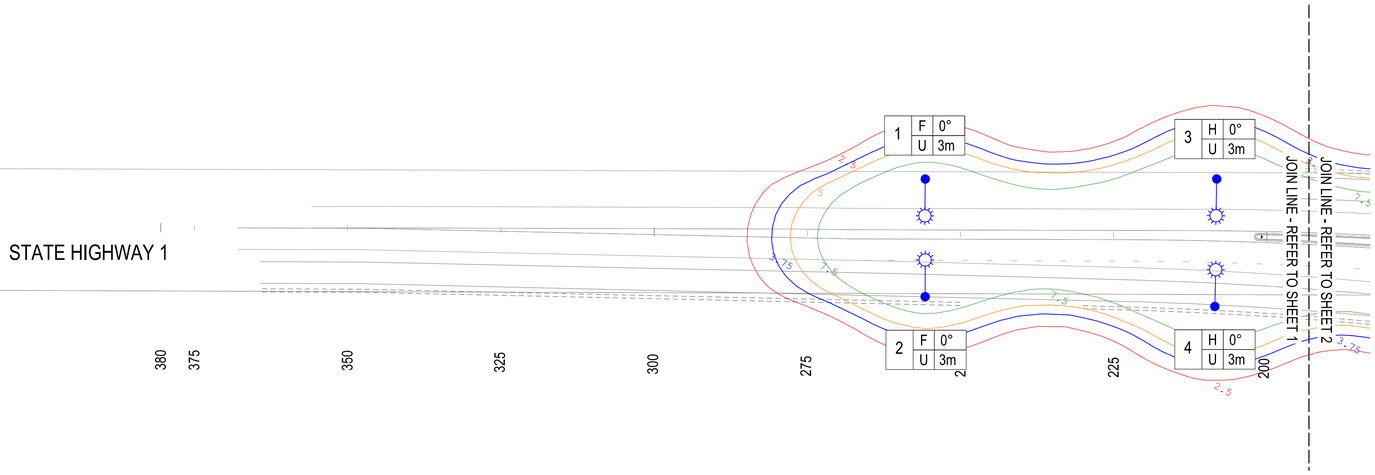
TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022									AT TECH DESIGN MANUAL CH 12 CLAUSE 12.3.2
1	2	3	4	5	6	7	8	9	
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)								
	AVERAGE CARRIAGEWAY LUMINANCE [a,b] (L) cd/m²	OVERALL UNIFORMITY[c,d] (U_o)	LONGITUDINAL UNIFORMITY [b] (U_L)	THRESHOLD INCREMENT [d,e] (TI) %	SURROUND VERGE ILLUMINANCE [b] (E_{SL} and E_{SR}) %	POINT HORIZONTAL ILLUMINANCE [a,b] (E_{ph}) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY [d] (U_{E1})	UPWARD WASTE LIGHT RATIO [d] (UWLR)	POWER DENSITY LIMIT W/m²
V3	0.75	0.33	0.3	9.81	50	7.5	8	3	0.29
V4	0.50	0.33	0.3	9.81	50	5.0	8	3	0.26

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_o MAY BE 0.32 OR 0.31 PROVIDED THE VALUE FOR U_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/m²	3 OVERALL UNIFORMITY (U_o)	4 LONGITUDINAL UNIFORMITY (U_L)	5 THRESHOLD INCREMENT (TI) %	6 SURROUND VERGE ILLUMINANCE (E^{-S}) lx	7 POINT HORIZONTAL ILLUMINANCE (E^{-ph}) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY (U^{-E1})	9 UPWARD WASTE LIGHT RATIO (UWLR)	MAX SPACING (m)	POWER DENSITY W/m²	COMPLIANCE TO CATEGORY
SH1 MAIN SOUTH ROAD CARRIAGEWAY	0.76	0.35	0.47	5.53	75.61	N/A	N/A	0.00	52	0.20	V3



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No.	Revision	By	Chk	Appd	Date
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Original Scale (A1) 1:500
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Drawn	R.ANDERSON	24.07.24	
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Client: NZ TRANSPORT AGENCY WAKA KOTAHI
Project: SH1 ROLLESTON ACCESS IMPROVEMENTS
Title: LIGHTING CALCULATION PLANS SHEET 1 OF 5
Discipline: CIVIL ENGINEERING
Drawing No.: 3338703-10-CU-3521
Rev.: A

Document No. ...\Plans\3338703-10-CU-3521

TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022

AT TECH DESIGN MANUAL CH 12 CLAUSE 12.3.2

1	2	3	4	5	6	7	8	9	
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)								
	AVERAGE CARRIAGEWAY LUMINANCE [a,b] (L) cd/m²	OVERALL UNIFORMITY [c,d] (U_o)	LONGITUDINAL UNIFORMITY [b] (U_L)	THRESHOLD INCREMENT [d,e] (TI) %	SURROUND VERGE ILLUMINANCE [b] (E_{SL} and E_{SR}) %	POINT HORIZONTAL ILLUMINANCE [a,b] (E_{ph}) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY [d] (U_{E1})	UPWARD WASTE LIGHT RATIO [d] (UWLR)	POWER DENSITY LIMIT W/m²
V3	0.75	0.33	0.3	9.81	50	7.5	8	3	0.29
V4	0.50	0.33	0.3	9.81	50	5.0	8	3	0.26

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_o 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/m²	3 OVERALL UNIFORMITY (U_o)	4 LONGITUDINAL UNIFORMITY (U_L)	5 THRESHOLD INCREMENT (TI) %	6 SURROUND VERGE ILLUMINANCE (E^{-s}) lx	7 POINT HORIZONTAL ILLUMINANCE (E^{-ph}) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY (U^{-E1})	9 UPWARD WASTE LIGHT RATIO (UWLR)	MAX SPACING (m)	POWER DENSITY W/m²	COMPLIANCE TO CATEGORY
RAB INTERSECTION	N/A	N/A	N/A	N/A	N/A	7.7	2.45	N/A	N/A	N/A	V3
WALKERS RD/ RUNNERS RD INTERSECTION	N/A	N/A	N/A	N/A	N/A	7.7	2.45	N/A	N/A	N/A	V3

TABLE 3.6 VALUES OF LIGHT TECHNICAL PARAMETERS FOR CONNECTING ELEMENT

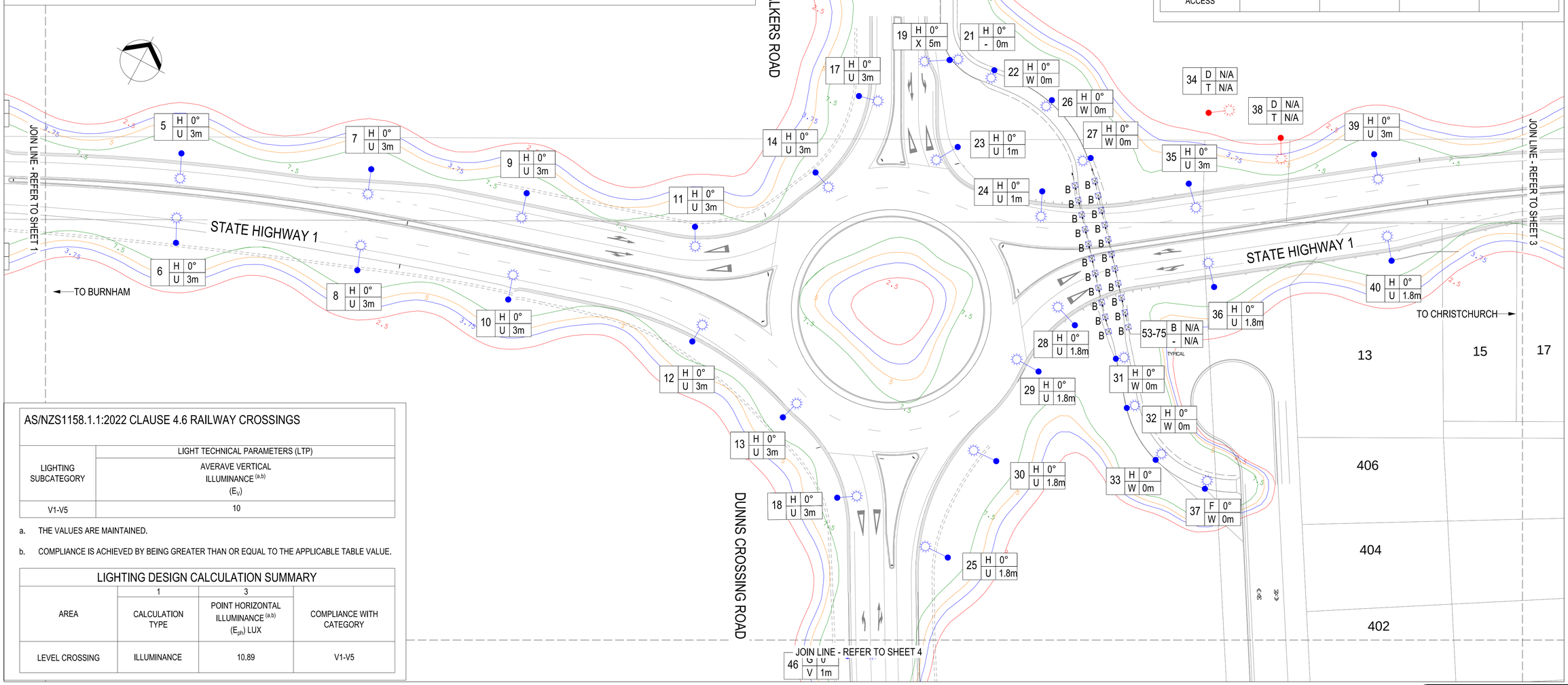
1	2	3	4	5
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)			
	AVERAGE HORIZONTAL ILLUMINANCE [a,b] (E_h) lx	POINT HORIZONTAL ILLUMINANCE [a,b] (E_{ph}) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY [c] Cat. P (U_{E2})	POINT VERTICAL ILLUMINANCE [a,b] (E_{Pv}) lx
PE1	35	17.5	8	17.5

a. THESE VALUES ARE MAINTAINED.
b. CONFORMANCE IS ACHIEVED BY BEING GREATER THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.
c. CONFORMANCE IS ACHIEVED BY BEING LESS THAN OR EQUAL TO THE APPLICABLE VALUE.

LIGHTING DESIGN CALCULATIONS SUMMARY

(CALCULATIONS BASED ON THE LIGHT OUTPUT FROM PEDESTRIAN CROSSING LUMINAIRES ONLY)

1 AREA	2 AVERAGE HORIZONTAL ILLUMINANCE [a,b] (E_h)	3 POINT HORIZONTAL ILLUMINANCE - SURROUNDS (E_{PH})	4 ILLUMINANCE (HORIZONTAL) UNIFORMITY [c] Cat. P (U_{E2})	5 POINT VERTICAL ILLUMINANCE [a,b] (E_{Pv})
UNDERPASS	148.65 lx	86.1 lx	1.27	30.4 lx
UNDERPASS SOUTH ACCESS	76.44 lx	50.5 lx	1.31	19.2 lx
UNDERPASS NORTH ACCESS	61.47 lx	44.0 lx	1.40	18.4 lx



AS/NZS1158.1.1:2022 CLAUSE 4.6 RAILWAY CROSSINGS

LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP) AVERAVE VERTICAL ILLUMINANCE [a,b] (E_V)
V1-V5	10

a. THE VALUES ARE MAINTAINED.

b. COMPLIANCE IS ACHIEVED BY BEING GREATER THAN OR EQUAL TO THE APPLICABLE TABLE VALUE.

LIGHTING DESIGN CALCULATION SUMMARY

AREA	1 CALCULATION TYPE	3 POINT HORIZONTAL ILLUMINANCE [a,b] (E_{ph}) LUX	COMPLIANCE WITH CATEGORY
LEVEL CROSSING	ILLUMINANCE	10.89	V1-V5

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Client: NZ TRANSPORT AGENCY WAKA KOTAHI
Project: SH1 ROLLESTON ACCESS IMPROVEMENTS
Title: LIGHTING CALCULATION PLAN SHEET 2 OF 5
Discipline: CIVIL ENGINEERING
Drawing No.: 3338703-10-CU-3522
Rev.: A

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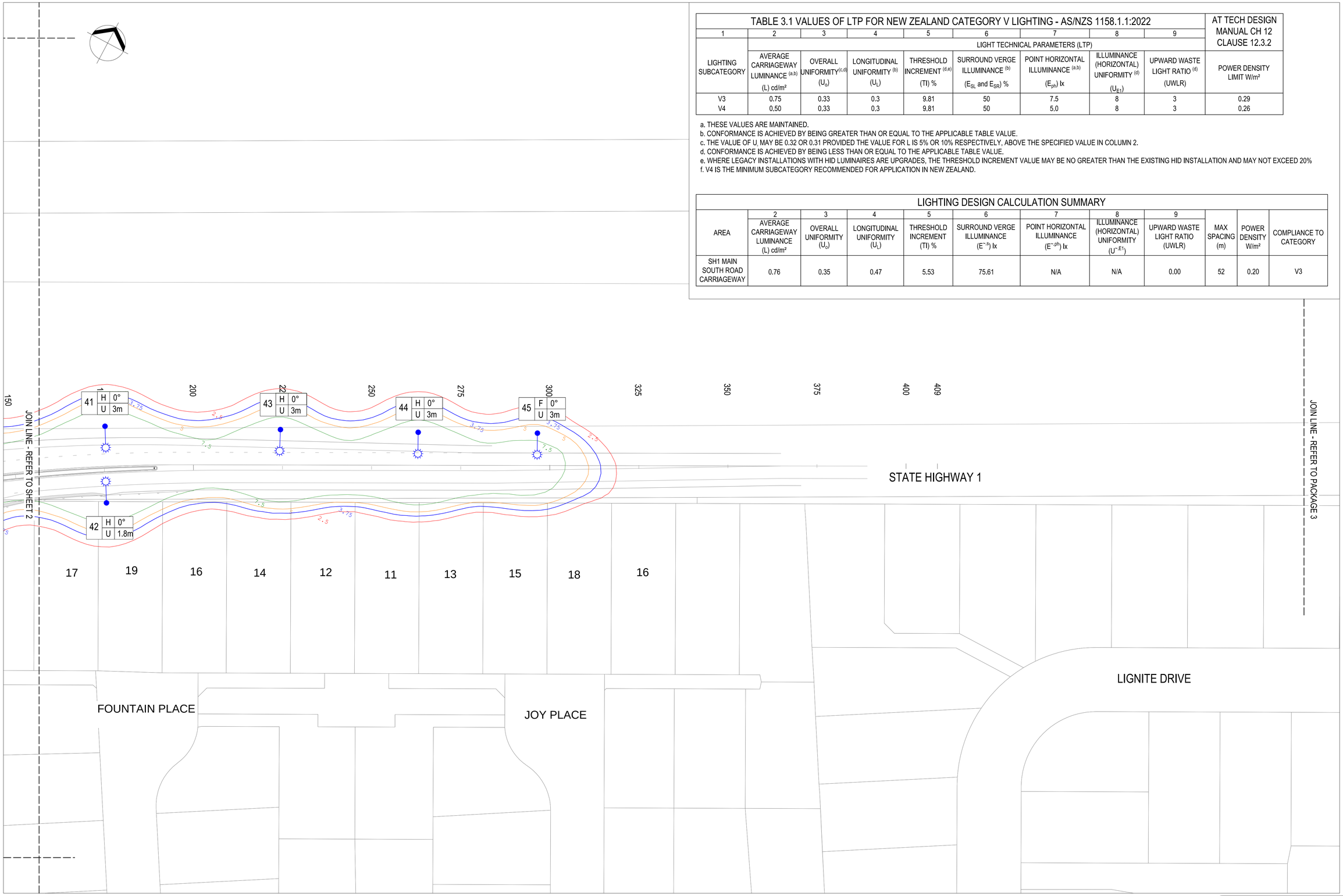
TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022									AT TECH DESIGN MANUAL CH 12 CLAUSE 12.3.2
1	2	3	4	5	6	7	8	9	
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)								
	AVERAGE CARRIAGEWAY LUMINANCE [a,b] (L) cd/m²	OVERALL UNIFORMITY [c,d] (U_o)	LONGITUDINAL UNIFORMITY [b] (U_L)	THRESHOLD INCREMENT [d,e] (TI) %	SURROUND VERGE ILLUMINANCE [b] (E_{SL} and E_{SR}) %	POINT HORIZONTAL ILLUMINANCE [a,b] (E_{ph}) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY [d] (U_{E1})	UPWARD WASTE LIGHT RATIO [d] (UWLR)	POWER DENSITY LIMIT W/m²
V3	0.75	0.33	0.3	9.81	50	7.5	8	3	0.29
V4	0.50	0.33	0.3	9.81	50	5.0	8	3	0.26

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_o 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/m²	3 OVERALL UNIFORMITY (U_o)	4 LONGITUDINAL UNIFORMITY (U_L)	5 THRESHOLD INCREMENT (TI) %	6 SURROUND VERGE ILLUMINANCE (E^{-S}) lx	7 POINT HORIZONTAL ILLUMINANCE (E^{-ph}) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY (U^{-E1})	9 UPWARD WASTE LIGHT RATIO (UWLR)	MAX SPACING (m)	POWER DENSITY W/m²	COMPLIANCE TO CATEGORY
SH1 MAIN SOUTH ROAD CARRIAGEWAY	0.76	0.35	0.47	5.53	75.61	N/A	N/A	0.00	52	0.20	V3



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Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING CALCULATION PLAN SHEET 3 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3523

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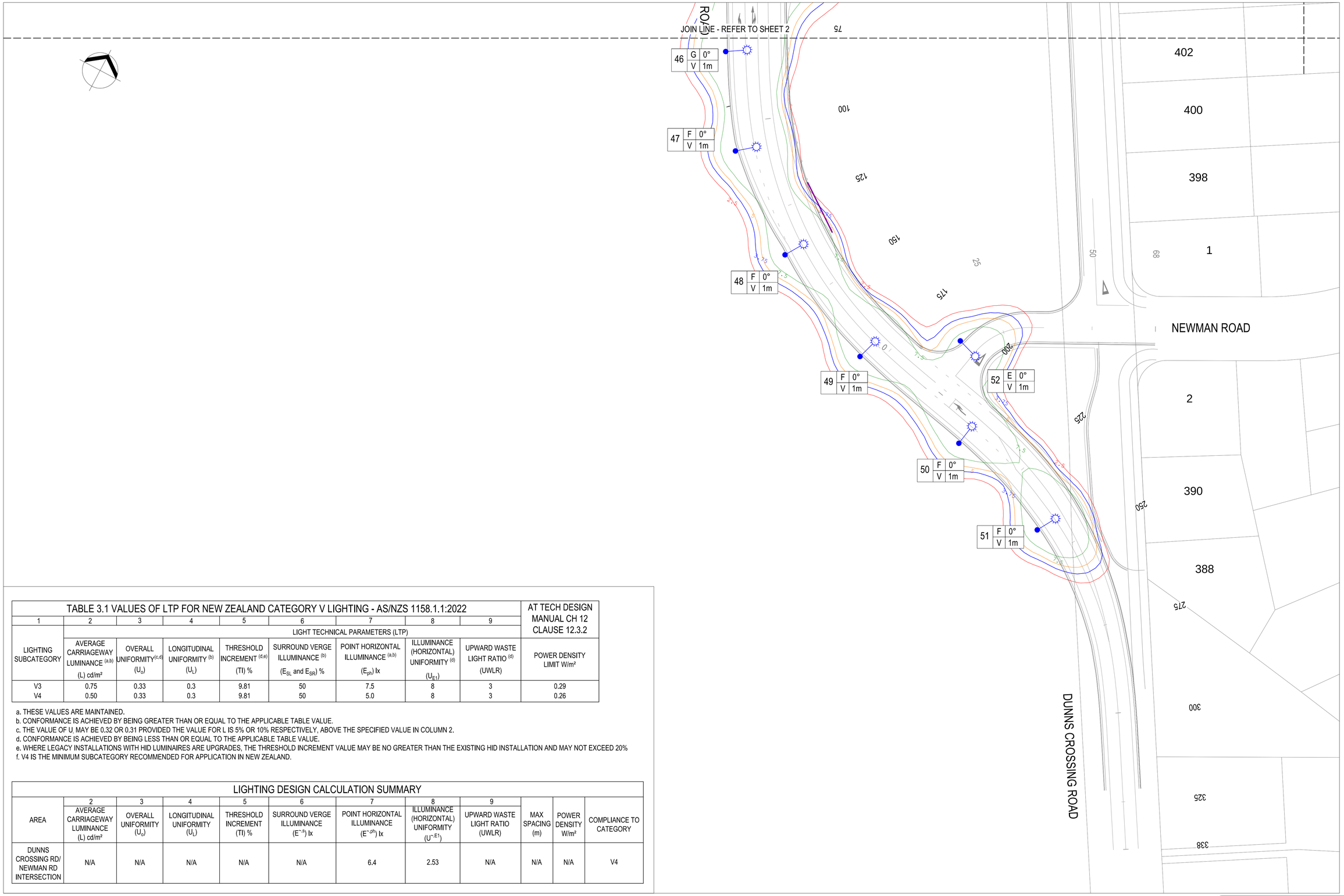

TABLE 3.1 VALUES OF LTP FOR NEW ZEALAND CATEGORY V LIGHTING - AS/NZS 1158.1.1:2022									AT TECH DESIGN MANUAL CH 12 CLAUSE 12.3.2
1	2	3	4	5	6	7	8	9	
LIGHTING SUBCATEGORY	LIGHT TECHNICAL PARAMETERS (LTP)								
	AVERAGE CARRIAGEWAY LUMINANCE [a,b] (L) cd/m²	OVERALL UNIFORMITY [c,d] (U_o)	LONGITUDINAL UNIFORMITY [b] (U_L)	THRESHOLD INCREMENT [d,e] (TI) %	SURROUND VERGE ILLUMINANCE [b] (E_{SL} and E_{SR}) %	POINT HORIZONTAL ILLUMINANCE [a,b] (E_{ph}) lx	ILLUMINANCE (HORIZONTAL) UNIFORMITY [d] (U_{E1})	UPWARD WASTE LIGHT RATIO [d] (UWLR)	POWER DENSITY LIMIT W/m²
V3	0.75	0.33	0.3	9.81	50	7.5	8	3	0.29
V4	0.50	0.33	0.3	9.81	50	5.0	8	3	0.26

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 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/m²	3 OVERALL UNIFORMITY (U_o)	4 LONGITUDINAL UNIFORMITY (U_L)	5 THRESHOLD INCREMENT (TI) %	6 SURROUND VERGE ILLUMINANCE ($E^{-,s}$) lx	7 POINT HORIZONTAL ILLUMINANCE ($E^{-,ph}$) lx	8 ILLUMINANCE (HORIZONTAL) UNIFORMITY ($U^{-,E1}$)	9 UPWARD WASTE LIGHT RATIO (UWLR)	MAX SPACING (m)	POWER DENSITY W/m²	COMPLIANCE TO CATEGORY
DUNNS CROSSING RD/ NEWMAN RD INTERSECTION	N/A	N/A	N/A	N/A	N/A	6.4	2.53	N/A	N/A	N/A	V4

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Original Scale (A1)	1:500	Reduced Scale (A3)	1:1000

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Drg Check			Date

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Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING CALCULATION PLAN SHEET 4 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3524

Rev.: A

Document No. ...\Plans\3338703-10-CU-3524

Drawing Ploted: 30/07/2024 4:42:41 pm

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	PRELIMINARY DESIGN	---	---	---	

Original Scale (A1) 1:500	Design	K.CUTTLE	24.07.24
	Drawn	R.ANDERSON	24.07.24
Reduced Scale (A3) 1:1000	Dsg Verifier		
	Drg Check		

Approved For Construction* Date

* Refer to Revision 1 for Original Signature

Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: LIGHTING CALCULATION PLAN SHEET 5 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3525

Rev.: A

Document No. ...\Plans\3338703-10-CU-3525

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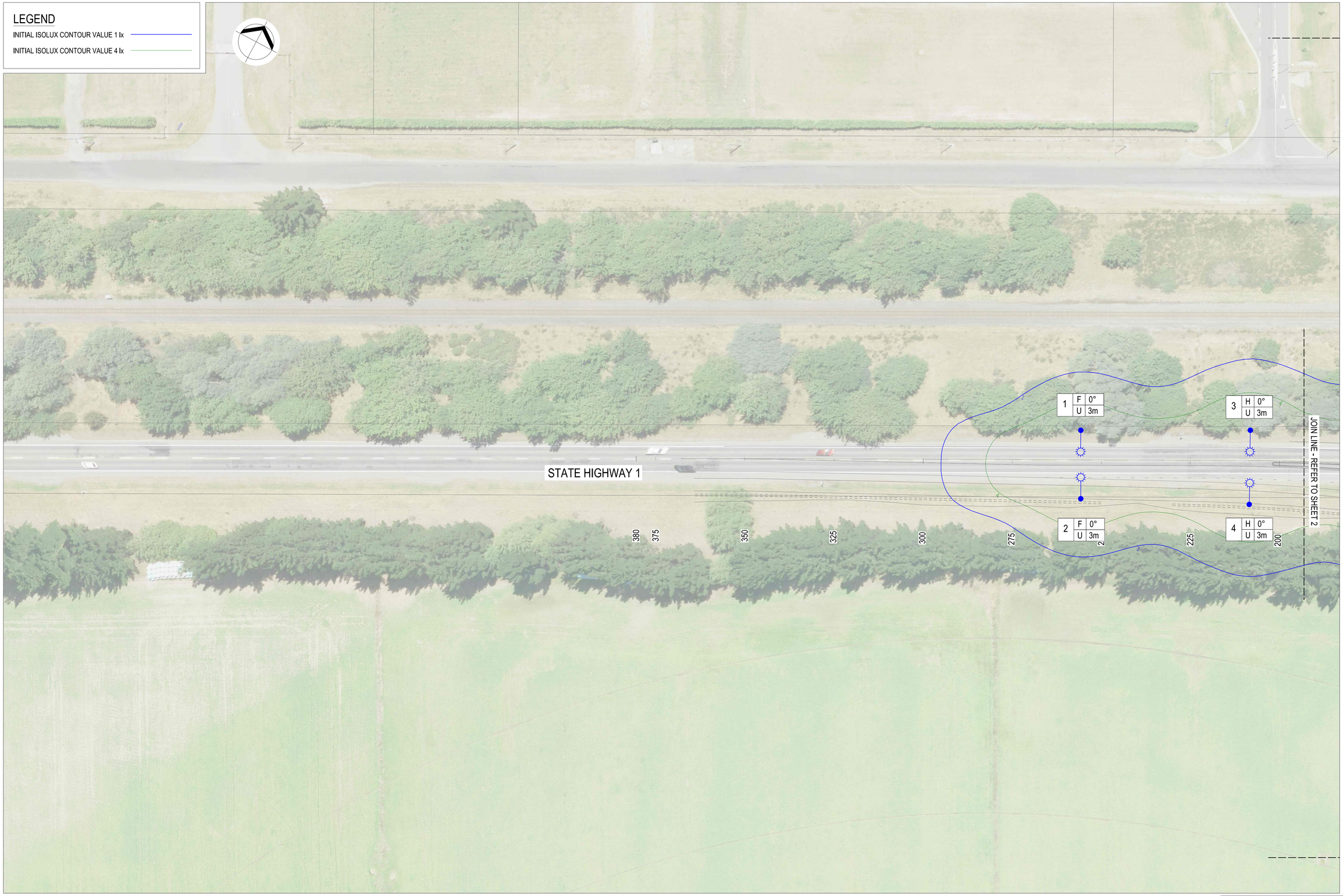
Drawing Ploted: 30/07/2024 4:30:15 pm

LEGEND

INITIAL ISOLUX CONTOUR VALUE 1 lx

INITIAL ISOLUX CONTOUR VALUE 4 lx



FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	---	---	---	

Original Scale (A1) 1:500	Design	K.CUTTLE	24.07.24
	Drawn	R.ANDERSON	24.07.24
	Dsg Verifier		
Reduced Scale (A3) 1:1000	Drg Check		Date

Approved For Construction*

* Refer to Revision 1 for Original Signature

Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: SPILL LIGHTING LAYOUT SHEET 1 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3531

Rev.: A

Document No. ...\Plans\3338703-10-CU-3531

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Drawing Ploted: 30/07/2024 4:30:59 pm

LIGHTING DESIGN VERTICAL SPILL CALCULATION SUMMARY		
AREA	1 CALCULATION TYPE	2 POINT VERTICAL ILUMINANCE [a] (E_{PV}) LUX
15 FOUNTAIN PLACE	ILLUMINANCE	1.2
16 FOUNTAIN PLACE	ILLUMINANCE	0.8
17 FOUNTAIN PLACE	ILLUMINANCE	1.6

LEGEND

INITIAL ISOLUX CONTOUR VALUE 1 lx

INITIAL ISOLUX CONTOUR VALUE 4 lx

JOIN LINE - REFER TO SHEET 5

RUNNERS ROAD

WALKERS ROAD

DUNNS CROSSING ROAD

STATE HIGHWAY 1

TO BURNHAM

TO CHRISTCHURCH

JOIN LINE - REFER TO SHEET 1

JOIN LINE - REFER TO SHEET 3

JOIN LINE - REFER TO SHEET 4

5 H 0° U 3m

6 H 0° U 3m

7 H 0° U 3m

8 H 0° U 3m

9 H 0° U 3m

10 H 0° U 3m

11 H 0° U 3m

12 H 0° U 3m

13 H 0° U 3m

14 H 0° U 3m

15 H 0° U 2m

16 H 0° U 3m

17 H 0° U 3m

18 H 0° U 3m

19 H 0° X 5m

20 H 0° U 3m

21 H 0° - 0m

22 H 0° W 0m

23 H 0° U 1m

24 H 0° U 1m

25 H 0° U 1.8m

26 H 0° W 0m

27 H 0° W 0m

28 H 0° U 1.8m

29 H 0° U 1.8m

30 H 0° U 1.8m

31 H 0° W 0m

32 H 0° W 0m

33 H 0° W 0m

34 D N/A T N/A

35 H 0° U 3m

36 H 0° U 1.8m

37 F 0° W 0m

38 D N/A T N/A

39 H 0° U 3m

40 H 0° U 1.8m

46 S 0° V 1m

53-75 B N/A - N/A TYPICAL

B

15

17

13

406

404

402

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	---	---	---	

Original Scale (A1) 1:500
Reduced Scale (A3) 1:1000

Design	K.CUTTLE	24.07.24	Approved For Construction*
Drawn	R.ANDERSON	24.07.24	
Dsg Verifier			
Drg Check			Date

* Refer to Revision 1 for Original Signature

Beca

Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: SPILL LIGHTING LAYOUT SHEET 2 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3532

Rev.: A

Document No. ...\Plans\3338703-10-CU-3532

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Drawing Ploted: 30/07/2024 4:31:48 pm

LIGHTING DESIGN VERTICAL SPILL CALCULATION SUMMARY		
	1	2
AREA	CALCULATION TYPE	POINT VERTICAL ILUMINANCE [a] (E_{PV}) LUX
12-14 FOUNTAIN PLACE	ILLUMINANCE	0.5
11-16 JOY PLACE	ILLUMINANCE	0.4

LEGEND

INITIAL ISOLUX CONTOUR VALUE 1 lx

INITIAL ISOLUX CONTOUR VALUE 4 lx

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	---	---	---	

Original Scale (A1) 1:500
Reduced Scale (A3) 1:1000

Design	K.CUTTLE	24.07.24	Approved For Construction*
Drawn	R.ANDERSON	24.07.24	
Dsg Verifier			
Drg Check			Date

* Refer to Revision 1 for Original Signature

Beca

Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: SPILL LIGHTING LAYOUT SHEET 3 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3533

Rev.: A

Document No. ...\Plans\3338703-10-CU-3533

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LIGHTING DESIGN VERTICAL SPILL CALCULATION SUMMARY		
AREA	1 CALCULATION TYPE	2 POINT VERTICAL ILUMINANCE [a] (E_{PV}) LUX
2 NEWMAN RD	ILLUMINANCE	0.1
390 DUNNS CROSSING RD	ILLUMINANCE	0.2
398-406 DUNNS CROSSING RD	ILLUMINANCE	0.4

LEGEND

INITIAL ISOLUX CONTOUR VALUE 1 lx

INITIAL ISOLUX CONTOUR VALUE 4 lx

FOR INFORMATION
NOT FOR CONSTRUCTION

A	FOR INFORMATION	---	---	---	
No.	Revision	By	Chk	Appd	Date

Original Scale (A1) 1:500	Design	K.CUTTLE	24.07.24
	Drawn	R.ANDERSON	24.07.24
Reduced Scale (A3) 1:1000	Dsg Verifier		
	Drg Check		
* Refer to Revision 1 for Original Signature			Date

Approved For Construction*

Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: SPILL LIGHTING LAYOUT SHEET 4 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3534

Rev.: A

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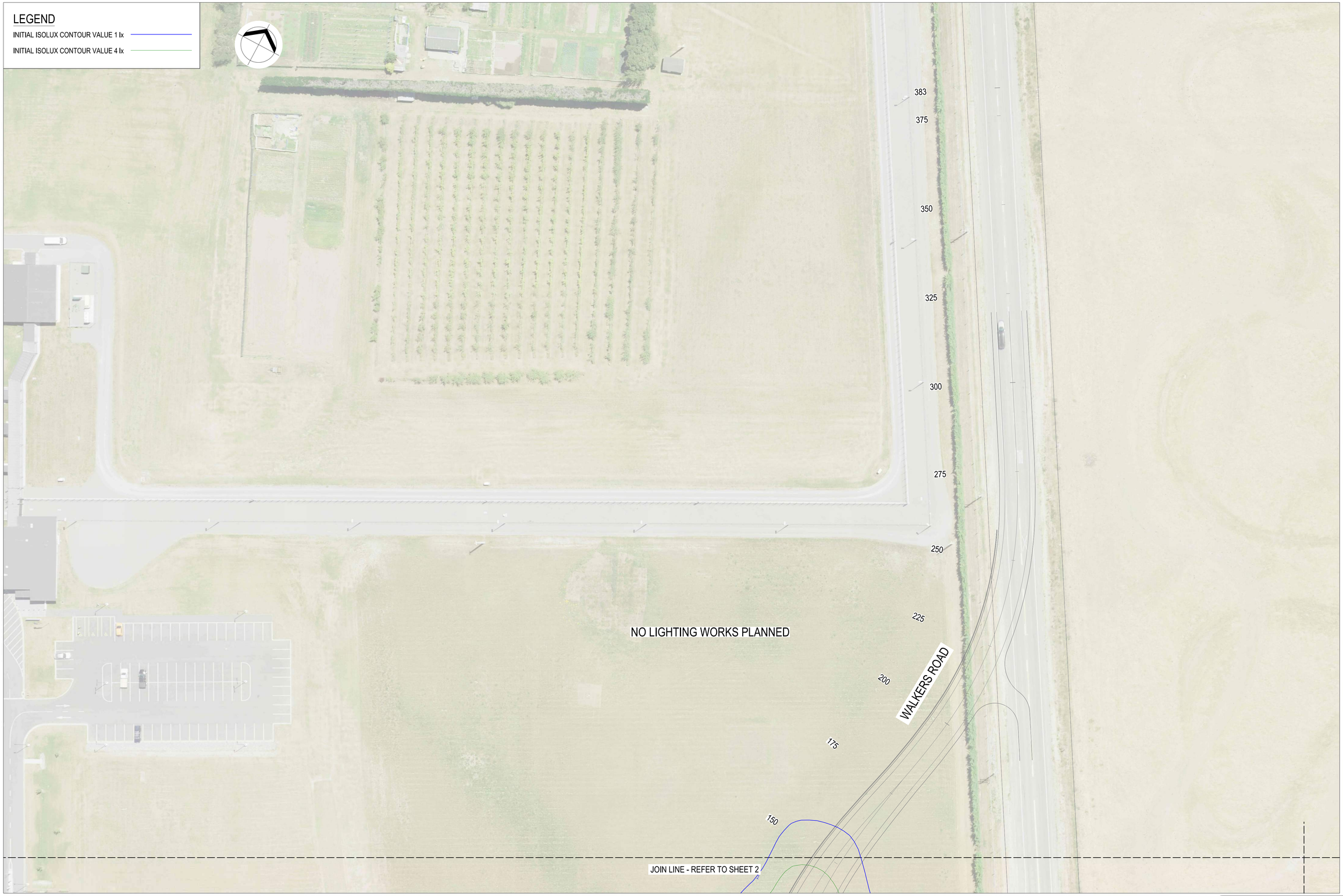
Drawing Ploted: 30/07/2024 4:33:33 pm



FOR INFORMATION
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No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION	---	---	---	

Original Scale (A1)	1:500	Approved For Construction*	
Reduced Scale (A3)	1:1000		

Design	K.CUTTLE	24.07.24	Approved For Construction*
Drawn	R.ANDERSON	24.07.24	
Dsg Verifier			
Drg Check			Date

* Refer to Revision 1 for Original Signature

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Client: NZ TRANSPORT AGENCY WAKA KOTAHI

Project: SH1 ROLLESTON ACCESS IMPROVEMENTS

Title: SPILL LIGHTING LAYOUT SHEET 5 OF 5

Discipline: CIVIL ENGINEERING

Drawing No.: 3338703-10-CU-3535

Rev.: A

Document No. ...\Plans\3338703-10-CU-3535

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