5 Items For Resolution

5.1 'Hold' schedule

The following areas of the design are currently on 'Hold' for this design package.

Table 5-1: Items on Hold

HOLD	ITEMS ON HOLD	STATUS
Nil.		

5.2 Outstanding items

The following outstanding items in Table 5-2 are to be resolved during the development of the subsequent design stage.

Table 5-2: Outstanding items

ITEM	DESCRIPTION	STATUS
Castlereagh connection	A preliminary sketch has been completed to demonstrating future integration with Castlereagh Connection (by others), refer to 4.8 for details. Detailed checks including sight distance and aquaplaning for the future intersections will be completed in SDD.	Ongoing.
Maintenance provisions	The DCD documents the intended access strategy and maintenance provisions to a conceptual / schematic level only. The maintenance provisions and parking bay infrastructure will be further developed and incorporated into the design during the SDD phase based on TfNSW feedback and other relevant parties. Refer Section 4.6 for details.	Ongoing.
Shared path alignment	Shared path alignment at the north-west corner of the Richmond Road and Rooty Hill Road intersection to be adjusted to have a more streamlined alignment that is integrated with the Urban Design strategy.	Ongoing. Consultation with Urban Design required.
Flood relief channel	Ongoing design development of the flood relief channel dimensions, refer to SD02 for further details.	Ongoing.
Basin location and dimension	Ongoing design development of the basin location and dimensions, refer to SD02 for further details.	Ongoing.
Street lighting build outs	Lighting design is underdevelopment, lighting buildouts will be provided at part of SDD.	Ongoing.
Coordination with key external stakeholders	The design is to be developed in consultation with key external stakeholders throughout the design process. A summary of the key external stakeholders for the Project and the interfaces with the design is discussed in Section 5.3	Ongoing. Consultation with key external stakeholders is to remain ongoing throughout the design process to ensure a coordinated, integrated, economic, safe and constructible solution is achieved.
Landscaping design co-ordination	Co-ordination with the landscaping design to ensure sight lines are not obstructed	Ongoing. Consultation with Landscaping required.
Landscape mound	The design of the landscape earth mounds for spoil disposal will be further developed in the next design phase.	Ongoing. To be resolved in the SDD submission.

5.3 Consultation requirements with Third Parties

5.3.1 Blacktown Council

Future consultation with Blacktown Council will be undertaken with outcomes incorporated into the development of the design.

5.3.2 Blacktown Native Institute

Future consultation with Blacktown Native Institute will be undertaken with outcomes incorporated into the development of the design.

5.3.3 Utilities Authorities

Future consultation with Utility Authorities will be undertaken. Refer to the Utilities Package (UT-series) for further information.

5.3.4 Property owner consultation

Future consultation with property owners and stakeholders will be undertaken with outcomes incorporated into the development of the design.

5.4 Design risks and opportunities

5.4.1 Design Risks

The design risks applicable to this design package are noted in Table 5-3 below.

Table 5-3: Design Risks

ITEM	DESCRIPTION
Survey risk	Inaccuracies in the survey data provided by TfNSW to develop the design, including the presence of uncharted services and utilities within the Project Corridor. Risk to be managed with ongoing ground survey and utilities investigations conducted throughout the design process. Survey data to be incorporated into the 3d model.
Geotechnical investigations	Unsuitable ground conditions (e.g. soft soils, acid sulphate rock etc.) encountered within the road corridor which requires a change in road alignment. Risk to be managed with ongoing geotechnical investigations along the Project Corridor. Refer to Geotechnical Interpretive Report Package (GE03) for details.
Environmental risk	Presence of unknown protected fauna or flora species within the road corridor which requires a change in road alignment to avoid impacts. Risk to be managed with ongoing environmental investigations and reporting.
Consultation with Utility Authorities	Extended lead time for design review and acceptance of relocation strategy for the Project. Risk to be managed with ongoing consultation with the relevant utility authorities throughout the design process.
Consultation with key external stakeholders (Blacktown Council, Blacktown Native Institute, Utility Authorities, Property Owners)	Extended lead time for design review and key inputs required for the development of the design. Risk to be managed with ongoing and regular interface meetings with the key external stakeholders with updates on the development of the design.

5.4.2 Design opportunities

Nil at present.

Appendix A
Design Documents List

DRAWING NUMBER	DRAWING TITLE	REVISION
RRM7-GEDT-0537-RW-DRG-000001	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - COVER SHEET	A
RRM7-GEDT-0537-RW-DRG-000002	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - DRAWING INDEX	A
RRM7-GEDT-0537-RW-DRG-000003	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - GENERAL NOTES	A
RRM7-GEDT-0537-RW-DRG-000010	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - KEYPLAN	A
RRM7-GEDT-0537-RW-DRG-000051	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - TYPICAL SECTION	A
RRM7-GEDT-0537-RW-DRG-000052	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - TYPICAL SECTION	A
RRM7-GEDT-0537-RW-DRG-000053	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - TYPICAL SECTION	A
RRM7-GEDT-0537-RW-DRG-000054	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - TYPICAL SECTION	A
RRM7-GEDT-0537-RW-DRG-000055	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - TYPICAL SECTION	A
RRM7-GEDT-0537-RW-DRG-000056	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - TYPICAL SECTION	A
RRM7-GEDT-0537-RW-DRG-000101	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - ALIGNMENT PLAN	A
RRM7-GEDT-0537-RW-DRG-000102	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - ALIGNMENT PLAN	A
RRM7-GEDT-0537-RW-DRG-000103	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - ALIGNMENT PLAN	A
RRM7-GEDT-0537-RW-DRG-000111	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - GENERAL ARRANGEMENT PLAN	A
RRM7-GEDT-0537-RW-DRG-000112	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - GENERAL ARRANGEMENT PLAN	A
RRM7-GEDT-0537-RW-DRG-000113	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - GENERAL ARRANGEMENT PLAN	A
RRM7-GEDT-0537-RW-DRG-000201	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - LONGITUDINAL SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000202	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - LONGITUDINAL SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000206	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - LONGITUDINAL SECTION - MC20	A
RRM7-GEDT-0537-RW-DRG-000207	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - LONGITUDINAL SECTION - MC20	A
RRM7-GEDT-0537-RW-DRG-000211	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - LONGITUDINAL SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000212	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - LONGITUDINAL SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000216	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - LONGITUDINAL SECTION - MCA0	A
RRM7-GEDT-0537-RW-DRG-000221	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - LONGITUDINAL SECTION - MCB0	A

RRM7-GEDT-0537-RW-DRG-000226	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - LONGITUDINAL SECTION - MCC0	A
RRM7-GEDT-0537-RW-DRG-000231	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - LONGITUDINAL SECTION - MCD0	A
RRM7-GEDT-0537-RW-DRG-000301	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000302	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000303	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000304	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000305	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000306	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000307	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000308	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000309	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000310	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000311	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000312	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000313	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000314	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000315	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000316	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000317	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000318	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000319	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000320	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000321	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000322	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A

RRM7-GEDT-0537-RW-DRG-000323	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000324	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000325	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC10	A
RRM7-GEDT-0537-RW-DRG-000331	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000332	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000333	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000334	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000335	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000336	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000337	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000338	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000339	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000340	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000341	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000342	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000343	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000344	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000345	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000346	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000347	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000348	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000349	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MC70	A
RRM7-GEDT-0537-RW-DRG-000361	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MCB0	A
RRM7-GEDT-0537-RW-DRG-000362	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MCB0	A

RRM7-GEDT-0537-RW-DRG-000371	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MCC0	A
RRM7-GEDT-0537-RW-DRG-000372	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - ROADWORKS - CROSS SECTION - MCC0	A

Appendix B Consolidated Comments Register

Comments received on the design submissions till date (including designer responses) are provided in this Appendix.

APPENDIX NO.	APPENDIX DESCRIPTION
B.1	TfNSW comments register
B.2	IC comments register
B.3	Blacktown Council comments register

Appendix C
Safety in Design Register

PSRR – 3TP-SD-001/9.0

Scope of the Hazard Log	Detailed design decisions that impact residual risks in terms of constructability, operability & maintainability

Project Code:	RRM7	Project Name:	Richmond Road M7 Upgrade	Issue Date:		Name:		Insert Signature:		Rev. No (New revision of Log to be created at each Safety Hazard Analysis Workshop):	REV 1

Spreadsheet Notes: --> | Entries are limited to those contained in the Drop Down Menu | Entries are calculated by spreadsheet cell imbedded formula (need to ensure this exists and/or is correctly copied to other cells) | Entries in drop-down should be changed (in Drop Down Menu) as required

Work Breakdown Structure				Risk Identification					Risk Analysis			Risk Evaluation and Treatment (TfNSW Safety Risk Matrix)						Risk Analysis			Monitoring, Review and Continuous Improvement		Managing Residual Risk			Comments / Actions / Notes
[1] Hazard Ref.	[2] Hazard Source & Ref.	[3] Design / Work Package (As defined by the Project Scope)	[4] Delivery or Operational Risk	[5] Operating Mode	[6] Hazard Description (use appropriate identifier; see definition)	[7] Potential Cause(s) Description(s)	[8] Potential Consequence(s) Description(s)	[9] Safety Controls currently in place (which are considered when determining the residual current risk rating)	[10] Consequence	[11] Likelihood	[12] Risk rating (cell formula used)	[13] Current Proposed Mitigation Action to be Undertaken	[14] Mitigation Action Taken	[15] Safety Control Verification & Validation Evidence	[16] Responsibility for Task	[17] Assumptions, Dependencies & Constraints (ADC) References	[18] SFAIRP Statement / Justification	[19] Consequence	[20] Likelihood	[21] Risk rating (cell formula used)	[22] Hazard Status	[23] Accountability & Responsibilities (Control Owner)	[24] Consequence	[25] Likelihood	[26] Risk rating	[27] Comments
GEDT-014	HSiD Workshop 2026/02/03	RW01	Operational	Normal	Errant cyclist collides with motor vehicle using M7 southbound on-ramp from Richmond Rd	CA01 - Cyclist does not slow sufficiently when exiting the M7 to Richmond Road, mounts kerb and strikes or is struck motor vehicle using on-ramp	CO01 - Severe Injury / Fatality	Existing condition has signage and "passive" traffic calming barriers for cyclist exiting M7 to Richmond Road On-ramp has a signalised pedestrian crossing	Severe - C2	Unlikely - L4	B	D1 - Design of new pedestrian crossing is moving layback further to the south east, however, this will not address identified hazard / risk which currently exists	D1 - Existing condition for cycle path is out of scope, TfNSW Crash Data as at 20260209 does not show any crashes involving cyclist at this location	D1 - RAATM Reference number D2 - RAATM Reference number	Design	D1 - ADC Reference Number	The design of the Shared Path interaction with Richmond Rd and M7 is not within the project scope. TfNSW crash data not identify any incident involving cyclist at this location	Severe - C2	Very Unlikely - L5	C	SFAIRP	TfNSW				As per the instructions, Columns 24,25 and 26 are only to be used when transferring residual risks to an external agency that utilise a different Risk Matrix (e.g. Sydney Trains). The residual risks remain within the TfNSW organisation and therefore, these columns are not applicable for this risk
																N/A						<<Insert Initial & Organisation>>				
																N/A						<<Insert Initial & Organisation>>				
GEDT-045	HSiD Workshop 2026/02/03	RW01	Operational	Normal	Plant rollover when maintain batter slopes	CA01 - Batter slopes exceeding mobile grown maintenance plant safe operation parameters typical 15 degrees cross slope	CO01 - Major to Severe	The batter slopes are designed to be 4H:1V or flatter as much as reasonably practicable	Severe - C2	Likely - L3	B	D1 - Identify who is to maintain batter slopes and conult regarding acceptable batters slopes for mowing or low maintenance seeding D2 - Where "mowed" ensure 4:1 maximum and avoid 3:1 batters D3 - Where > 4:1, design as 2:1 with utlra low maintenance vegitiations which only requires rubbish picks and removal of self seeing plant / trees	D2 - 3:1 batters have been avoided in the design	D1 - RAATM Reference number D2 - RAATM Reference number	Design	D1 - ADC Reference Number	The design of the batter slopes is in accordance with good industry practice and is compliant with relevant standards	Severe - C2	Very Unlikely - L5	C	SFAIRP	TfNSW / Blacktown City Council				As per the instructions, Columns 24,25 and 26 are only to be used when transferring residual risks to an external agency that utilise a different Risk Matrix (e.g. Sydney Trains). The residual risks remain within the TfNSW organisation and therefore, these columns are not applicable for this risk
												C1 -	C1 -		Construction	N/A						<<Insert Initial & Organisation>>				
															Maintenance	N/A						<<Insert Initial & Organisation>>				

Appendix D
Durability Assessment

N/A for this design package

Appendix E
Geotechnical Input

N/A for this design package. The relevant interdisciplinary interfaces with engineering disciplines is documented in Section 2.4.2 of this report.

Appendix F
SWTC Compliance Register

Requirements Traceability Verification Matrix (RTVM)

DOORS ID	Source Document	Section	Preamble	Description	Relevant Design Packages	RW01	Compliance Evidence Reference
1204238	SWTC Main Body			(ii) all infrastructure and works required to integrate the Works into the existing Active Transport Corridor as described in Appendix B.11;	RW01	C	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1204240	SWTC Main Body			(iv) all provisions to allow pedestrians, pedal cyclists and disabled persons to use the surrounding road networks affected by the Contractor's Activities;	RW01	C	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1204902	SWTC Main Body	5.10.1	Retained Existing Assets	Retained Existing Assets	GN01, BR01, BR02, BR03, MS01, RW01	N/A	
1204904	SWTC Main Body			b) Existing Assets must be included in the independent road safety audits required by section 5.21 of this SWTC, including audit review and assessment of conformity with:	GN01, RW01	C	Refer section 4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1204905	SWTC Main Body			(i) horizontal and vertical design speed criteria;	GN01, RW01	C	Refer section 4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1204943	SWTC Main Body			a) The Project Works and Temporary Works must comply with the requirements of Appendix B.2.	RW01	TBD	
1204945	SWTC Main Body			a) The Contractor must arrange for independent road safety audits to be conducted in accordance with TfNSW Guidelines for Road Safety Audit Practices:	RW01	TBD	
1204946	SWTC Main Body			(i) during the design and construction of the Project Works and Temporary Works; and	RW01	TBD	
1204947	SWTC Main Body			(ii) immediately prior to opening any part of the Project Works or Temporary Works to traffic and where the Contractor's Activities has an impact on any Local Areas including physical alterations, change of use and/or introduction of new hazards.	RW01	TBD	
1204948	SWTC Main Body			b) Road safety audits must be carried out by a team consisting of a lead auditor and at least one other member who is experienced in traffic management. The lead auditor must be considered by the Institute of Public Works Engineering Australia Ltd (NSW Division) to be a Level 3 auditor.	RW01	TBD	
1204949	SWTC Main Body			c) The Principal must be invited to attend, to enable it to observe, all road safety audits undertaken by the Contractor during design and construction and immediately prior to and after opening any part of the Project Works or Temporary Works to traffic.	RW01	TBD	
1204950	SWTC Main Body			d) The Contractor must consider and respond to the issues identified by the independent road safety audits and to the issues identified by any safety audits that may be undertaken by the Principal.	RW01	TBD	
1204951	SWTC Main Body			e) Copies of all independent road safety audits must be issued within 20 Business Days of the audit report being completed to the Principal's Representative and the Independent Certifier.	RW01	TBD	
1204952	SWTC Main Body			f) Issues identified in road safety audits are non-conformities that must be addressed by the Contractor in accordance with the Quality Management Plan.	RW01	TBD	
1205039	SWTC Main Body	5.35	Future Integration with Castlereagh Connection (by others)	Future Integration with Castlereagh Connection (by others)	RW01	N/A	
1205040	SWTC Main Body			a) The Contractor must ensure the Project Works are designed and constructed to accommodate for the future Castlereagh connection (as per 'SKE-22_Indicative future intersection of RR and CC-20250204 .pdf') with minimal demolition or rework, including but not limited to:	RW01	TBD	
1205041	SWTC Main Body			(i) ensuring sufficient space is reserved in the median for potential signalised intersections, including:	RW01	TBD	
1205042	SWTC Main Body			A. provision for dual right-turn bays from Richmond Road southbound to the future Castlereagh connection on ramp, with median separation; and	RW01	TBD	
1205043	SWTC Main Body			B. providing suitable levels across the median to enable conversion with minimal adjustments for future pavements;	RW01	TBD	
1205044	SWTC Main Body			(ii) provision of compliant approach sight distance on all legs of the intersections;	RW01	TBD	
1205045	SWTC Main Body			(iii) conducting aquaplaning checks for all future intersections;	RW01	TBD	
1205050	SWTC Main Body			(viii) ensuring that future intersections do not adversely impact provision for pedestrian movements and the Active Transport strategy across the road network in the area.	RW01	TBD	
1205448	SWTC B.2 Geometric and Road Design	1	Definitions	Definitions	RW01	N/A	
1205449	SWTC B.2 Geometric and Road Design			a) For the purposes of this Appendix B.2:	RW01	N/A	
1205450	SWTC B.2 Geometric and Road Design			{TABLE id=_4}	RW01	N/A	
1205451	SWTC B.2 Geometric and Road Design	2	General	General	RW01	N/A	
1205452	SWTC B.2 Geometric and Road Design			a) For geometric and road design, the Contractor must satisfy requirements in the following order of precedence:	RW01	C	Refer section 2.3.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001).
1205453	SWTC B.2 Geometric and Road Design			(i) the SWTC, including this Appendix B.2;	RW01	N/A	
1205454	SWTC B.2 Geometric and Road Design			(ii) TfNSW Supplements (including, but not limited to, sight distance, curve widening, shyline, working widths); and	RW01	N/A	
1205455	SWTC B.2 Geometric and Road Design			(iii) relevant requirements of Austroads Guide to Road Design.	RW01	N/A	
1205456	SWTC B.2 Geometric and Road Design			b) The Contractor must provide comprehensive Design Documentation demonstrating compliance with the minimum geometric and road design requirements specified in the SWTC, including this Appendix B.2.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001).
1205457	SWTC B.2 Geometric and Road Design	2.1	Design Speeds and F	Design Speeds and Posted Speed Limits	RW01	N/A	

DOORS ID	Source Document	Section	Preamble	Description	Relevant Design Packages	RW01	Compliance Evidence Reference
1205458	SWTC B.2 Geometric and Road Design			a) The Carriageways must be designed and constructed for the posted speed limits and design speeds in Tables B.2-1A and B.2-1B.	RW01	N	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer to Section 3.4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001) for details of non-conformances Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205459	SWTC B.2 Geometric and Road Design			**Table B.2-1A Portion 1 Posted Speed Limits and Minimum Design Speeds**:	RW01	N/A	
1205460	SWTC B.2 Geometric and Road Design			{TABLE id=_89}	RW01	N/A	
1205461	SWTC B.2 Geometric and Road Design			Note *: LOW = Limit of Works	RW01	N/A	
1205462	SWTC B.2 Geometric and Road Design			**Table B.2-1B Portion 2 Posted Speed Limits and Minimum Design Speeds**:	RW01	N/A	
1205463	SWTC B.2 Geometric and Road Design			{TABLE id=_181}	RW01	N/A	
1205464	SWTC B.2 Geometric and Road Design			Note *: LOW = Limit of Works	RW01	N/A	
1205465	SWTC B.2 Geometric and Road Design			b) Merges and diverges must have a minimum design speed that are the same as the minimum design speed specified for the respective adjoining Carriageway.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205466	SWTC B.2 Geometric and Road Design	2.2	Design Vehicles	Design Vehicles	RW01	N/A	
1205467	SWTC B.2 Geometric and Road Design			a) All roads forming part of the Project Works must be designed and constructed for the design vehicles (as identified in Austroads) specified in Table B.2-2.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205468	SWTC B.2 Geometric and Road Design			**Table B.2-2 Design Vehicles:**	RW01	N/A	
1205469	SWTC B.2 Geometric and Road Design			{TABLE id=_311}	RW01	N/A	
1205470	SWTC B.2 Geometric and Road Design			b) For dual right turns, a combination of a 5.2m passenger car and the nominated design vehicles in table B.2-2 must be used. The 5.2m passenger car must turn from the right most Lane of the dual right turn.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205471	SWTC B.2 Geometric and Road Design	3	Cross Sections and C	Cross Sections and Clearances	RW01	N/A	
1205472	SWTC B.2 Geometric and Road Design	3.1	Design Requirements	Design Requirements	RW01	N/A	
1205473	SWTC B.2 Geometric and Road Design			a) The Carriageways must be designed and constructed so that:	RW01	N/A	
1205474	SWTC B.2 Geometric and Road Design			(i) infrastructure and equipment do not encroach into the Vehicle Envelope; and	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205475	SWTC B.2 Geometric and Road Design			(ii) Restricted Access Vehicles (as identified in Austroads) can safely use the Carriageway in accordance with section 4.1 of the SWTC.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205476	SWTC B.2 Geometric and Road Design			b) Unless specified in the SWTC, where a new Carriageway connects to an existing road, the cross section and clearances of the new Carriageway must transition safely into the cross section and clearances of the existing road.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205477	SWTC B.2 Geometric and Road Design			c) Where footpaths, bicycle paths or shared user paths are located on a bridge, they must be designed and constructed to:	RW01	N/A	
1205478	SWTC B.2 Geometric and Road Design			(i) match the existing facility (if it is modified or adjusted); or	RW01	N/A	
1205479	SWTC B.2 Geometric and Road Design			(ii) comply with section 8 of this Appendix B.2, Appendix B.11 and Austroads Guide to Road Design and TfNSW Supplements (if it is new or widened).	RW01	N/A	
1205480	SWTC B.2 Geometric and Road Design			d) All other footpaths, bicycle paths or shared user paths must be designed and constructed in accordance with section 8 of this Appendix B.2 and Appendix B.11.	RW01	C	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205481	SWTC B.2 Geometric and Road Design			e) Carriageways must be designed and constructed to:	RW01	N/A	

DOORS ID	Source Document	Section	Preamble	Description	Relevant Design Packages	RW01	Compliance Evidence Reference
1205482	SWTC B.2 Geometric and Road Design			(i) comply with the minimum design criteria in section 3.2 of this Appendix B.2;	RW01	N	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer to Section 3.4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001) for details of non-conformances Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205484	SWTC B.2 Geometric and Road Design			(iii) incorporate curve widening (where required in accordance with Austroads Guide to Road Design);	RW01	N	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer to Section 3.4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001) for details of non-conformances Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205485	SWTC B.2 Geometric and Road Design			(iv) incorporate widening to achieve sight distance (where required in accordance with Austroads Guide to Road Design); and	RW01	N	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer to Section 3.4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001) for details of non-conformances Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205486	SWTC B.2 Geometric and Road Design			(v) be consistent with and provide safe transitions between the cross sections at interfaces.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205487	SWTC B.2 Geometric and Road Design			f) The minimum horizontal clearance from toe of formation or top of cutting to the Site or Local Area Works Area boundary for the Main Carriageways and ramps must be 6.0 m.	RW01	N	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer to Section 3.4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001) for details of non-conformances Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205488	SWTC B.2 Geometric and Road Design	3.2	Minimum Design Cri	Minimum Design Criteria	RW01	N/A	
1205489	SWTC B.2 Geometric and Road Design			a) The minimum design criteria in Table B.2-3 must be adopted for the design of all Main Carriageways and ramps.	RW01	N	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer to Section 3.4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001) for details of non-conformances Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205490	SWTC B.2 Geometric and Road Design			**Table B.2-3 Minimum design criteria:**	RW01	N/A	
1205491	SWTC B.2 Geometric and Road Design			{TABLE id=_433}	RW01	N/A	
1205492	SWTC B.2 Geometric and Road Design			b) Vehicle Envelope height (this is to be clearly shown on structural drawings demonstrating compliance to requirements, the drawings shall include the allowances for all services, fitments or any other physical elements of the design that are to be fitted to the structures):	RW01	N/A	
1205493	SWTC B.2 Geometric and Road Design			(i) 5.5 m for tunnels and pedestrian bridges; and	RW01	N/A	
1205494	SWTC B.2 Geometric and Road Design			(ii) 5.4 m for road bridges and underpasses (an additional 1.5 m maintenance clearance is required for a steel structure).	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205496	SWTC B.2 Geometric and Road Design			d) Minimum Lane and shoulder widths specified in section 3.2 a) of this Appendix B.2:	RW01	N	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer to Section 3.4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001) for details of non-conformances Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).

DOORS ID	Source Document	Section	Preamble	Description	Relevant Design Packages	RW01	Compliance Evidence Reference
1205497	SWTC B.2 Geometric and Road Design			(i) must be measured to the centre of the Lane and edge lines; and	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205498	SWTC B.2 Geometric and Road Design			(ii) do not include allowances that will be necessary for curve widening and sight widening, or any other provisions required to comply with this Appendix B.2, which must be added to the specified minimum Lane and shoulder widths.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205499	SWTC B.2 Geometric and Road Design			e) The alignment must provide vertical clearances in accordance with Appendix B.4 and the following:	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205500	SWTC B.2 Geometric and Road Design			(i) new structures in accordance with Table B.2-4;	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205501	SWTC B.2 Geometric and Road Design			**Table B.2-4 Vertical clearances for new structures:**	RW01	N/A	
1205502	SWTC B.2 Geometric and Road Design			{TABLE id=_542}	RW01	N/A	
1205503	SWTC B.2 Geometric and Road Design			(ii) existing structures – no less than existing vertical clearance; and	RW01	N/A	
1205504	SWTC B.2 Geometric and Road Design			(ii) widening of roads at existing structures – no less than existing vertical clearance of the nearside edge of the adjacent existing trafficable Lane.	RW01	N/A	
1205505	SWTC B.2 Geometric and Road Design			f) Ramps and connections must provide climbing Lanes, merge/ diverge Lanes and stand-up Lanes as necessary to comply with the geometry, traffic demand and traffic performance requirements specified in the SWTC, including Appendix B.18.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205506	SWTC B.2 Geometric and Road Design			g) Where it is identified that a merge/diverge must occur from the right to achieve the minimum operational traffic performance, the design must include a risk assessment of each location where this merge occurs and incorporate appropriate measures to mitigate any risks identified at these locations.	RW01	N/A	
1205507	SWTC B.2 Geometric and Road Design			h) The minimum size and clearance criteria for maintenance, breakdown and incident response bays must be provided in addition to all required Lane and shoulder width requirements including any additional allowances identified to satisfy section 3.2 a) of this Appendix B.2.	RW01	TBD	
1205510	SWTC B.2 Geometric and Road Design			k) In addition to the requirements of this section 3.2, the Contractor must also comply with the minimum Carriageway design requirements set out in Tables B.2-5A and B.2-5B.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205511	SWTC B.2 Geometric and Road Design			**Table B.2-5A Portion 1 Minimum Carriageway Design Requirements:**	RW01	N/A	
1205512	SWTC B.2 Geometric and Road Design			{TABLE id=_571}	RW01	N/A	
1205513	SWTC B.2 Geometric and Road Design			**Table B.2-5B Portion 2 Minimum Carriageway Design Requirements:**	RW01	N/A	
1205514	SWTC B.2 Geometric and Road Design			{TABLE id=_637}	RW01	N/A	
1205515	SWTC B.2 Geometric and Road Design	4	Alignment and Cross	Alignment and Crossfall	RW01	N/A	
1205516	SWTC B.2 Geometric and Road Design	4.1	Horizontal Alignment	Horizontal Alignment	RW01	N/A	
1205517	SWTC B.2 Geometric and Road Design			a) The Austroads Guide to Road Design - Part 3: Geometric Design and TfNSW Supplement must be used to determine super-elevation values, lengths of transition curves, coordination of super-elevation transition with plan transition and minimum curve deflection angles for Carriageways.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer to Section 3.4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001) for details of non-conformances Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205518	SWTC B.2 Geometric and Road Design			b) The minimum horizontal curve radii for all Carriageways and local roads must be appropriate for the design speed in accordance with TfNSW Guidelines and friction demands.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer to Section 3.4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001) for details of non-conformances Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205519	SWTC B.2 Geometric and Road Design			c) Superelevation transitions must not overlap, causing 'gull wing' or 'butterfly pavements' where water can pond.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).

DOORS ID	Source Document	Section	Preamble	Description	Relevant Design Packages	RW01	Compliance Evidence Reference
1205520	SWTC B.2 Geometric and Road Design			d) Compound curves and broken back curves must be avoided where possible and if unavoidable must be approved by the Principal's Representative. Where compound curves are unavoidable, the ratio of the large radius to the small radius must be at least 1:0.75. Increasing radius compound curves on one-way Carriageways are acceptable.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205521	SWTC B.2 Geometric and Road Design			e) Sight distance to ramp noses must be in accordance with Austroads Guide to Road Design Part 4C: Interchanges and the TfNSW Supplement.	RW01	N	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer to Section 3.4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001) for details of non-conformances Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205522	SWTC B.2 Geometric and Road Design			f) Plan transitions are not required on curves with radius greater than or equal to 1200 m.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205523	SWTC B.2 Geometric and Road Design	4.2	Vertical Alignment	Vertical Alignment	RW01	N/A	
1205524	SWTC B.2 Geometric and Road Design			a) The vertical alignment gradients for the Carriageways must:	RW01	N/A	
1205525	SWTC B.2 Geometric and Road Design			(i) not exceed existing vertical grades for the Main Carriageways; and	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205526	SWTC B.2 Geometric and Road Design			(ii) be 5 percent or less for new ramp inclines (desirably 3 percent or less) and 6 percent or less for new ramp declines (desirably 5 per cent or less). Compliant with Austroads Guide to Road Design Part 4C: Interchanges (Clause 9.3.2).	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205527	SWTC B.2 Geometric and Road Design			b) If the Contractor adopts vertical grades that do not comply with section 4.2 a) of this Appendix B.2, Design Documentation must be submitted with an appropriate level of analysis, including risk assessment, and understanding of the relevant constraints, demonstrating that the design has been optimised to comply wherever reasonably possible with the relevant requirements.	RW01	N/A	
1205528	SWTC B.2 Geometric and Road Design			c) The Design Documentation referred to in section 4.2 b) of this Appendix B.2 must undergo a Road Safety Audit and be accepted with no further comment by the Principal's Representative.	RW01	TBD	
1205529	SWTC B.2 Geometric and Road Design	4.3	Auxiliary Lanes	Auxiliary Lanes	RW01	N/A	
1205530	SWTC B.2 Geometric and Road Design			a) Auxiliary Lanes for the carriageways and ramps must be in accordance with Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections, traffic modelling, and Austroads Guide to Road Design Part 4C: Interchanges.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205531	SWTC B.2 Geometric and Road Design	4.4	Stopping Sight Dista	Stopping Sight Distance	RW01	N/A	
1205532	SWTC B.2 Geometric and Road Design			a) Stopping sight distance for cars must be assessed in accordance with Austroads Guide to Road Design and TfNSW Supplements, and adopting the following parameters:	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205533	SWTC B.2 Geometric and Road Design			(i) a reaction time of 2.5 seconds for >= 110 km/hr, 2.0 seconds for = 100 km/hr, and 1.5 seconds for <= 90 km/hr;	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205534	SWTC B.2 Geometric and Road Design			(ii) a coefficient for deceleration of 0.36;	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205535	SWTC B.2 Geometric and Road Design			(iii) consideration of grade correction;	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).

DOORS ID	Source Document	Section	Preamble	Description	Relevant Design Packages	RW01	Compliance Evidence Reference
1205536	SWTC B.2 Geometric and Road Design			(iv) the design speed; and	RW01	N	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer to Section 3.4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001) for details of non-conformances Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205537	SWTC B.2 Geometric and Road Design			(v) be determined in accordance with the car/truck speed relationship rules provided in the Austroads Guide to Road Design.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205538	SWTC B.2 Geometric and Road Design			b) Where required by Austroads Guide to Road Design and TfNSW Supplements, stopping sight distance for trucks must be assessed, adopting the following parameters:	RW01	N/A	
1205539	SWTC B.2 Geometric and Road Design			(i) a reaction time specified in section 4.4 a) (i) of this Appendix B.2;	RW01	N/A	
1205540	SWTC B.2 Geometric and Road Design			(ii) a coefficient of deceleration of 0.29;	RW01	N/A	
1205541	SWTC B.2 Geometric and Road Design			(iii) consideration of grade correction; and	RW01	N/A	
1205542	SWTC B.2 Geometric and Road Design			(iv) the design speed in accordance with Austroads Guide to Roads Design Part 3, Table 3.5.	RW01	N/A	
1205543	SWTC B.2 Geometric and Road Design	4.5	Crossfall	Crossfall	RW01	N/A	
1205544	SWTC B.2 Geometric and Road Design			a) The crossfall for Carriageways must be:	RW01	N/A	
1205545	SWTC B.2 Geometric and Road Design			(i) for new Carriageways:	RW01	N/A	
1205546	SWTC B.2 Geometric and Road Design			A. a minimum of 3 percent fall towards the Nearside Shoulder; and	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205547	SWTC B.2 Geometric and Road Design			B. a maximum super-elevation on all Carriageways and Shoulders of 5 percent;	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205548	SWTC B.2 Geometric and Road Design			(ii) for existing Carriageways – no greater than the existing crossfall; and	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205549	SWTC B.2 Geometric and Road Design			(iii) for widenings of existing Carriageways – no greater than crossfall of the nearest existing trafficable Lane.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205550	SWTC B.2 Geometric and Road Design			b) The crossfall for ramps must be:	RW01	N/A	
1205551	SWTC B.2 Geometric and Road Design			(i) new ramps – no less than 3 percent; and	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205552	SWTC B.2 Geometric and Road Design			(ii) widened existing ramps – no greater than cross fall of the nearest existing trafficable Lane.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205553	SWTC B.2 Geometric and Road Design	4.6	Entry Ramps	Entry Ramps	RW01	N/A	
1205554	SWTC B.2 Geometric and Road Design			a) Entry ramps to the Main Carriageway must:	RW01	N/A	
1205555	SWTC B.2 Geometric and Road Design			(i) be designed in accordance with Austroads Guide to Road Design and TfNSW Supplements;	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205556	SWTC B.2 Geometric and Road Design			(ii) adopt an auxiliary Lane entry ramp arrangement in accordance with Austroads Guide to Road Design Part 4C section 11.3.3; and	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).

DOORS ID	Source Document	Section	Preamble	Description	Relevant Design Packages	RW01	Compliance Evidence Reference
1205557	SWTC B.2 Geometric and Road Design			(iii) adopt a minimum length of auxiliary Lane entry ramp at the locations identified in Table B.2-6. The travel time calculation must adopt an 80km/h design speed. Length to be calculated at a point where the entry ramp left-hand edge line meets the right-hand edge line of the through Carriageway.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205558	SWTC B.2 Geometric and Road Design			**Table B.2-6 Entry ramp parallel Lane length requirements:**	RW01	N/A	
1205559	SWTC B.2 Geometric and Road Design			{TABLE id=_757}	RW01	N/A	
1205560	SWTC B.2 Geometric and Road Design	4.7	Exit Ramps	Exit Ramps	RW01	N/A	
1205561	SWTC B.2 Geometric and Road Design			a) Exit ramps from the Main Carriageways must:	RW01	N/A	
1205562	SWTC B.2 Geometric and Road Design			(i) be designed in accordance with Austroads Guide to Road Design and TfNSW Supplements;	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205563	SWTC B.2 Geometric and Road Design			(ii) adopt an auxiliary Lane exit ramp arrangement in accordance with Austroads Guide to Road Design Part 4C section 11.2.1 for single Lane exits and 11.2.2 for two-Lane exits; and	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205564	SWTC B.2 Geometric and Road Design			(iii) adopt a minimum length of auxiliary Lane exit ramp at the locations identified in Table B.2-7. The travel time calculation must adopt an 80km/h design speed. Length to be calculated at a point where the exit ramp right-hand edge line meets the left-hand edge line of the through Carriageway.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205565	SWTC B.2 Geometric and Road Design			**Table B.2-7 Exit ramp parallel Lane length requirements:**	RW01	N/A	
1205566	SWTC B.2 Geometric and Road Design			{TABLE id=_772}	RW01	N/A	
1205567	SWTC B.2 Geometric and Road Design	5	Maintenance Provisi	Maintenance Provisions	RW01	N/A	
1205568	SWTC B.2 Geometric and Road Design	5.1	Maintenance Bays	Maintenance Bays	RW01	N/A	
1205569	SWTC B.2 Geometric and Road Design			a) The Contractor must provide maintenance bays adjacent to infrastructure that requires vehicular maintenance access (for inspection, maintenance, repairs, refurbishments and replacements), including but not limited to:	RW01	TBD	
1205570	SWTC B.2 Geometric and Road Design			(i) MCS or OMCS nodes;	RW01	TBD	
1205571	SWTC B.2 Geometric and Road Design			(ii) sumps and pump stations;	RW01	TBD	
1205572	SWTC B.2 Geometric and Road Design			(iii) new bridges / underpasses;	RW01	TBD	
1205573	SWTC B.2 Geometric and Road Design			(iv) water quality basins; and	RW01	TBD	
1205574	SWTC B.2 Geometric and Road Design			(v) VMS's.	RW01	TBD	
1205575	SWTC B.2 Geometric and Road Design			b) Maintenance bays must allow personnel to safely access the infrastructure to undertake maintenance activities.	RW01	TBD	
1205576	SWTC B.2 Geometric and Road Design			c) Maintenance bays must be designed and constructed to:	RW01	TBD	
1205577	SWTC B.2 Geometric and Road Design			(i) accommodate a 12.5 m rigid service vehicle design vehicle at a minimum;	RW01	TBD	
1205578	SWTC B.2 Geometric and Road Design			(ii) the nominated design speed in Table B.2-1 for the road that the maintenance bay is required; and	RW01	TBD	
1205579	SWTC B.2 Geometric and Road Design			(iii) other design vehicles required by Westlink M7.	RW01	TBD	
1205580	SWTC B.2 Geometric and Road Design			d) Maintenance bays must be clearly marked on the road works plans.	RW01	TBD	
1205581	SWTC B.2 Geometric and Road Design	6	Adjustment to Roads	Adjustment to Roads in Local Area Works Areas	RW01	N/A	
1205582	SWTC B.2 Geometric and Road Design	6.1	General	General	RW01	N/A	
1205583	SWTC B.2 Geometric and Road Design			a) The design of adjustments to roads in Local Area Works Areas must be developed in conjunction with Appendix B.11 to present an integrated design.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205584	SWTC B.2 Geometric and Road Design	6.2	Cross Section	Cross Section	RW01	N/A	
1205585	SWTC B.2 Geometric and Road Design			a) The design for Local Roads must be:	RW01	N/A	
1205586	SWTC B.2 Geometric and Road Design			(i) in accordance with the requirements set out in Table B.2-8;	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205587	SWTC B.2 Geometric and Road Design			(ii) selected such that buses can travel safely in the Left Most Lane of the Carriageway; and	RW01	N/A	
1205588	SWTC B.2 Geometric and Road Design			(iii) designed such that there are smooth transitions between sections with different lane widths.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205589	SWTC B.2 Geometric and Road Design			b) The width of Left Most Lanes and Right Most Lanes must be measured from the Face of Kerb or edge of shoulder where no kerb exists.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).

DOORS ID	Source Document	Section	Preamble	Description	Relevant Design Packages	RW01	Compliance Evidence Reference
1205590	SWTC B.2 Geometric and Road Design			c) The width of the shoulder must be measured from the centre of the Lane edge line to the face of kerb.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205591	SWTC B.2 Geometric and Road Design			**Table B.2-8 Local road minimum design requirements**	RW01	N/A	
1205592	SWTC B.2 Geometric and Road Design			{TABLE id=_807}	RW01	N/A	
1205593	SWTC B.2 Geometric and Road Design	6.3	Pavement Resurfacii	Pavement Resurfacing Extents	RW01	N/A	
1205600	SWTC B.2 Geometric and Road Design	6.6	Crossfall	Crossfall	RW01	N/A	
1205601	SWTC B.2 Geometric and Road Design			a) The minimum normal crossfall for new roads in Local Area Works Areas is 3 percent.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205602	SWTC B.2 Geometric and Road Design			b) The crossfall for existing roads must be no greater than the existing crossfall.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205603	SWTC B.2 Geometric and Road Design	7	Intersection and Con	Intersection and Connection Design Criteria	RW01	N/A	
1205604	SWTC B.2 Geometric and Road Design	7.1	Overall Requirement	Overall Requirements	RW01	N/A	
1205605	SWTC B.2 Geometric and Road Design			a) The design of adjacent intersections and Main Carriageway connections must comply with the relevant sections of this Appendix B.2 and the Codes and Standards listed in Appendix D.4.	RW01	C	Refer section 2.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205612	SWTC B.2 Geometric and Road Design	8	Active Transport Rec	Active Transport Requirements	RW01	N/A	
1205613	SWTC B.2 Geometric and Road Design	8.1	General	General	RW01	N/A	
1205614	SWTC B.2 Geometric and Road Design			a) Active transport facilities must be designed and constructed, in accordance with this Appendix B.2, Appendix B.11, the Environmental Documents and Austroads Guide to Road Design: Part 6A.	RW01	C	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205615	SWTC B.2 Geometric and Road Design	8.2	Main Carriageways &	Main Carriageways & Ramps	RW01	N/A	
1205616	SWTC B.2 Geometric and Road Design			a) Shared path facilities must be provided for all existing movements on the Main Carriageways, in accordance with the Environmental Documents and the following:	RW01	C	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205617	SWTC B.2 Geometric and Road Design			(i) the minimum width of the shared path south of the Richmond Road / Rooty Hill Road North intersection to the southern limit of works must be equal to or greater than 2.5m (both sides of the roads);	RW01	N	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer to Section 3.4.1 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001) for details of non-conformances Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205618	SWTC B.2 Geometric and Road Design			(ii) the minimum clear width of the shared path north of the Richmond Road / Rooty Hill Road North intersection for Portion 2 extents must be equal to, or greater than 4m (western side of the road);	RW01	C	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205620	SWTC B.2 Geometric and Road Design			(iv) 5% maximum longitudinal grade for shared paths, in general to match the longitudinal grades on the respective proposed main carriageway adjacent to the shared paths; and	RW01	C	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205621	SWTC B.2 Geometric and Road Design			(v) 2% nominal crossfall for shared paths.	RW01	C	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205622	SWTC B.2 Geometric and Road Design	8.3	Local Area Works Ar	Local Area Works Areas	RW01	N/A	
1205623	SWTC B.2 Geometric and Road Design			a) Active transport paths for pedestrian or cyclist use must be provided for Local Area Works Areas, in accordance with the Environmental Documents, at the following locations:	RW01	C	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).

DOORS ID	Source Document	Section	Preamble	Description	Relevant Design Packages	RW01	Compliance Evidence Reference
1205625	SWTC B.2 Geometric and Road Design			(ii) the minimum width of footway from Rooty Hill North Road eastern limit of works to Richmond Road / Rooty Hill North Road Intersection to be 2.5 m (northern side); and	RW01	N/A	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205627	SWTC B.2 Geometric and Road Design			b) Where the Contractor modifies a road in Local Area Works Areas, the Contractor must provide the following, while complying with the requirements of Appendix B.11:	RW01	N/A	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205628	SWTC B.2 Geometric and Road Design			(i) pedestrian facilities on all legs of affected signalised intersections with footpaths commensurate with use and not less than adjacent facilities, on all sides of widened and new roads; and	RW01	C	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205629	SWTC B.2 Geometric and Road Design			(ii) new footpaths in accordance with TfNSW Specifications along the entire length of the amended kerb, at locations where kerb lines are raised or lowered. Elsewhere, path integrity within the area affected by the modifications to roads in Local Area Works Areas, must be assessed by the Contractor, and sections with level changes exceeding 5 mm must be reconstructed over at least two 5 m panel lengths either side of the step.	RW01	C	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205630	SWTC B.2 Geometric and Road Design			c) Where new paths differ in width to existing paths, they must transition smoothly so as not to introduce abrupt changes in path width.	RW01	C	Refer section 3.1.7 of the Roadworks Portion 1 Report (RRM7-GEDT-0537-RW-RPT-010001). Refer Roadworks Portion 1 drawings (RRM7-GEDT-0537-RW-DRG-999999).
1205631	SWTC B.2 Geometric and Road Design	9	Annexure B.2-1: Veh	Annexure B.2-1: Vehicle Clearance Envelope	RW01	N/A	
1205445	SWTC B.2 Geometric and Road Design				RW01	N/A	
1205632	SWTC B.2 Geometric and Road Design			**Figure B.2-1.1: Vehicle Clearance Envelope (Not to scale)**	RW01	N/A	
1205633	SWTC B.2 Geometric and Road Design	10	Annexure B.2-2: Min	Annexure B.2-2: Minimum Dimensions of Stopping Bays	RW01	N/A	
1205446	SWTC B.2 Geometric and Road Design				RW01	N/A	
1205634	SWTC B.2 Geometric and Road Design			**Figure B.2-2.1: Minimum Dimensions of Breakdown Bays (Not to scale) (dimensions in metres)**	RW01	N/A	

Appendix G Environmental & Planning Approval Compliance Register

RRM7-GEDT-0537-PM-REG-000004 Environmental & Planning Approval Compliance Register						RW01	
No.	Impact	Environmental safeguards	Responsibility	Timing	Consultant	Compliant?	Notes
GEN4	General - design	During detailed design, further modelling and design review will be undertaken to determine if it is feasible to maintain the signalised pedestrian crossing on the northern side of the Richmond Road and Rooty Hill Road North intersection. This would include potentially removing the proposed new pedestrian crossing to provide access at the M7 Motorway southbound entry ramp if the existing crossing is reinstated.	Transport /Contractor	Detailed design	Aurecon	Yes	Refer to the alternative pedestrian crossing study technical memorandum (ref. RRM7-GEDT-0537-GN-MEM-000001) for the results of the traffic assessment. The RW package will be updated to reinstate the pedestrian crossing should TfNSW direct the GEA DTIJV to incorporate into the design
H12	Increased velocities	Scour protection measures at Bells Creek bridge that could withstand the calculated velocity would be provided during the detailed design documentation.	Contractor	Detailed design	Aurecon	N/A	This package does not involve works involving Bells Creek and associated flooding, flow velocities and scour considerations.
H13	Probable maximum precipitation	Flood characteristics generated during the Probable Maximum Precipitation (PMP) events in the vicinity of the works will be generated during the detailed design stage.	Contractor	Detailed design	Aurecon	N/A	This design package has no relevance to flood modelling
H14	Design changes	If the design and/or modelling is revised during detailed design, an additional environmental assessment would be required to evaluate any changes in impacts.	Contractor	Detailed design	Aurecon	Yes	No major design changes have occurred that require additional enviromental assessment.
B2	Removal of native vegetation	Native vegetation removal would be minimised through detailed design and during construction.	Transport /Contractor	Detailed design/Construction	GDJV, Aurecon	Yes	Works within project boundary. Clearing impacts assessed as part of DM01.
B9	Removal of threatened fauna habitat	Threatened fauna habitat removal would be minimised through detailed design and during construction.	Transport /Contractor	Detailed design/Construction	GDJV, Aurecon	Yes	Works within project boundary. Clearing impacts assessed as part of DM01.
B19	Aquatic impacts	Impacts to aquatic habitat would be minimised through detailed design and during construction. Any instream/flow structures (e.g. the proposed bridge structure) would be designed and installed in accordance with the Policy and Guidelines for Fish Friendly Waterway Crossings (DPI, 2013), Why do fish need to cross the road?: fish passage requirements for waterway crossings (Fairfull and Witheridge, 2003).	Contractor	Detailed design/Construction	Aurecon	N/A	This design package has no relevance to instream/flow structures.
B24	Groundwater dependent ecosystems	Interruptions to water flows associated with groundwater dependent ecosystems would be minimised through detailed design.	Contractor	Detailed design	Aurecon	N/A	The proposed works within this design package have no interface with groundwater dependent ecosystems.
B25	Changes to hydrology	Changes to existing surface water flows would be minimised through detailed design.	Contractor	Detailed design	Aurecon	N/A	The works within the scope of this design package have no impact or relevance to existing surface water flows.
CC1	Climate Change	A detailed climate change risk assessment would be carried out by reviewing and investigating the preliminary risks and adaptation options in accordance with latest Transport Climate Risk Assessment Guidelines (TfNSW, 2021) and other applicable NSW and national guidelines. This would include a sensitivity analysis check and consideration of climate change for flooding as per Australian Rainfall and Runoff V4.2 (Australian Government, 2019).	Contractor	Detailed design / Pre-Construction	Aurecon	Yes	The design interfaces with the flooding design package (SD01) and drainage design package (SD02) to satisfy the flood immunity requirements on the carriageways. The results of the climate change risk assessment is discussed separately in pacakge SD01

RRM7-GEDT-0537-PM-REG-000004 Environmental & Planning Approval Compliance Register						RW01	
No.	Impact	Environmental safeguards	Responsibility	Timing	Consultant	Compliant?	Notes
S1	Sustainability	Integrate sustainability requirements/ initiatives/ opportunities identified in the Sustainability Plan (Stantec, 2024b) into future design.	Contractor	Detailed design	GDJV, Aurecon	Yes	Extent of roadworks is minimised to meet the minimum requirements to ensure existing roadwork infrastructure is retained as much as possible and new additions/replacements are minimised.

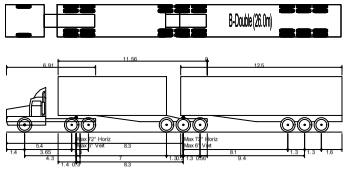
Appendix H
Design Calculations

APPENDIX NO.	APPENDIX DESCRIPTION
H.1	Turn paths - Design and Check vehicles
H.2	Sight distance checks
H.3	Bridge vertical clearance checks
H.4	Aquaplaning checks
H.5	Castlereagh Connection sketch
H.6	Maintenance access strategy

APPENDIX H.1

DESIGN VEHICLE TURNPATHS

DEFAULT SETTINGS



B-Double (26.0m)

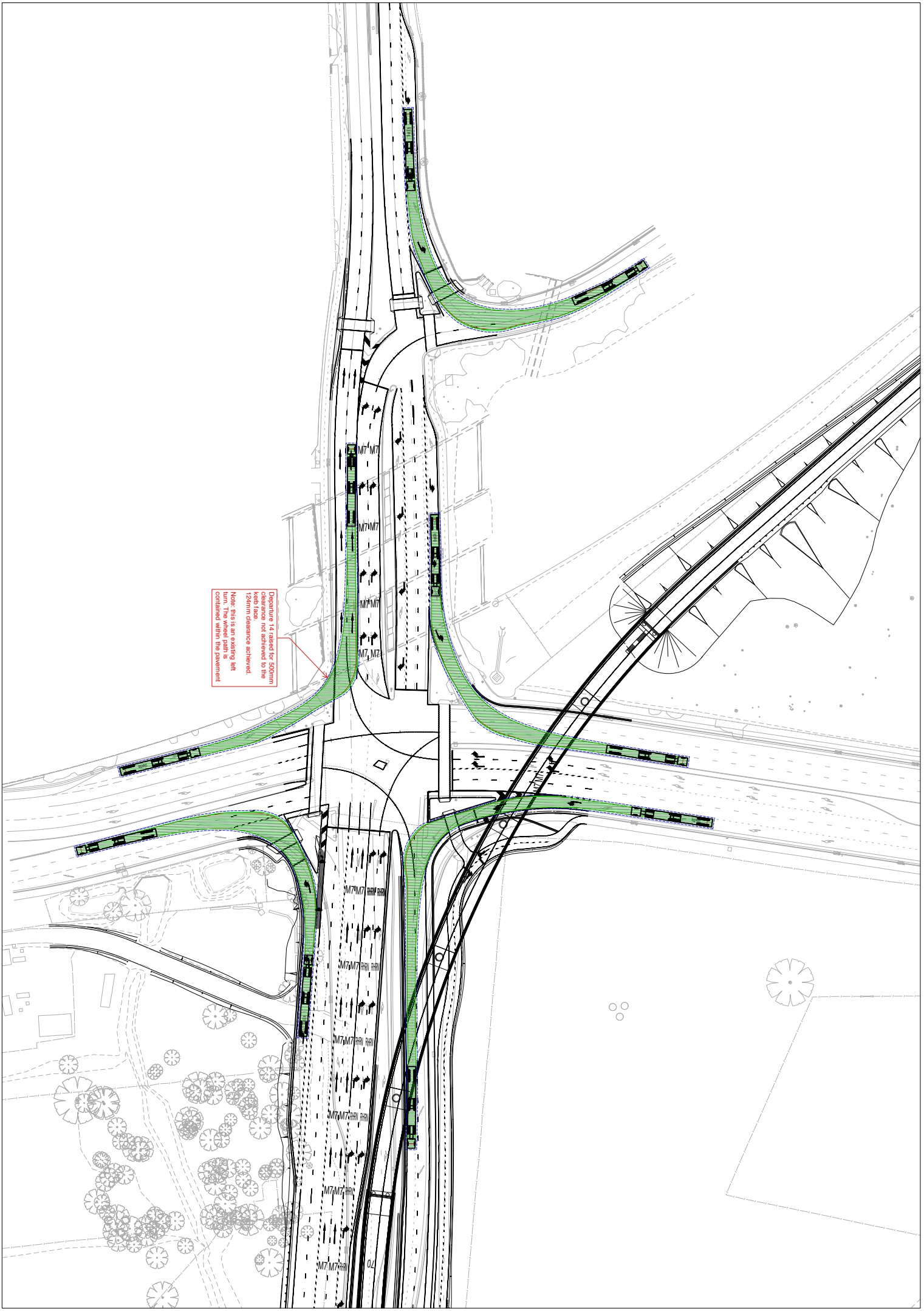
Overall Length	26.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Kerb to Kerb Turning Radius	15.000m

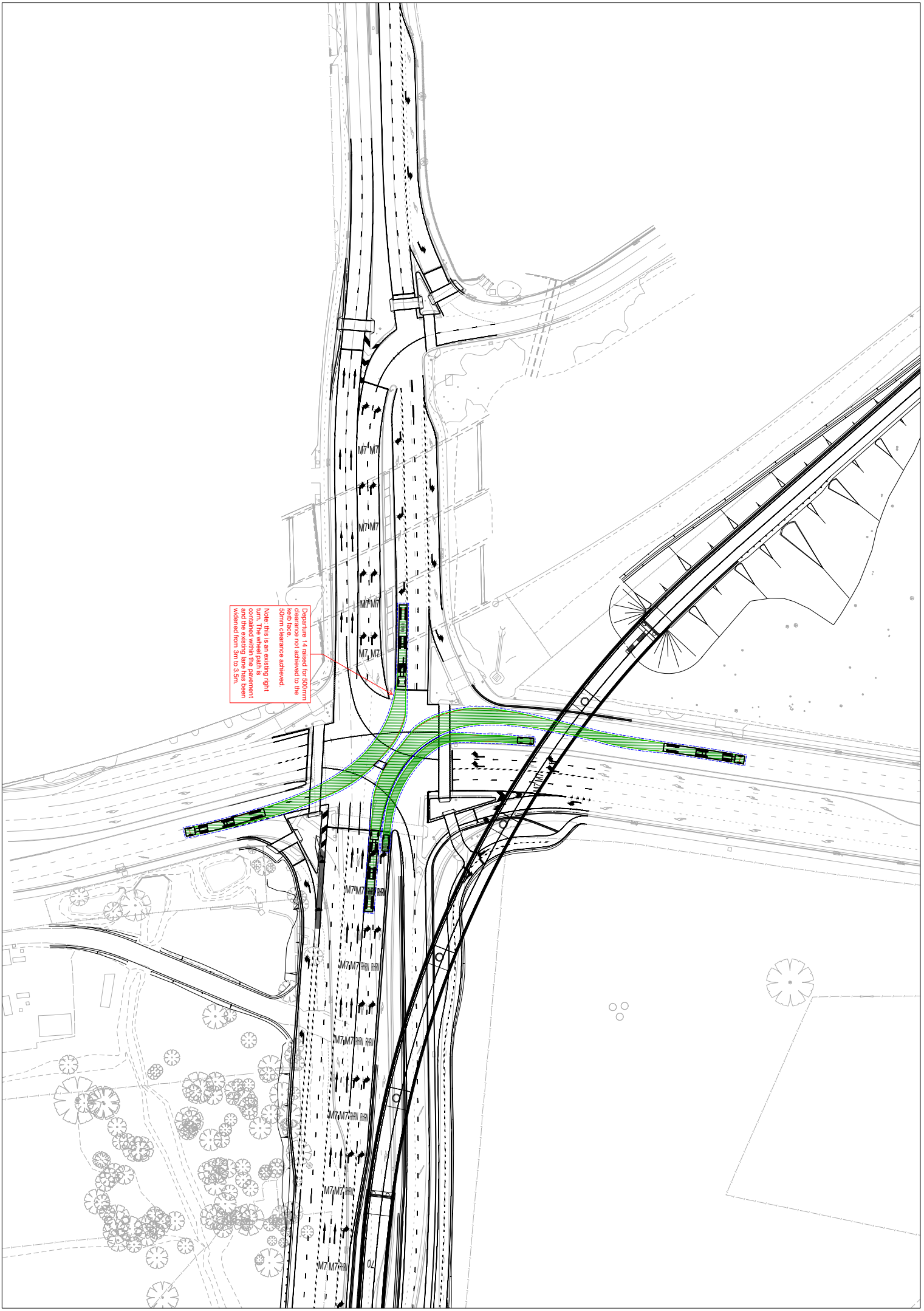
Passenger vehicle (5.2m)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.804m
Min Body Ground Clearance	0.295m
Track Width	1.840m
Lock-to-lock time	4.00s
Kerb to Kerb Turning Radius	6.300m

Key:

- Trailer overhang
- Wheelpath (chasis)
- 0.5m clearance envelope


Departure 14 raised for 500mm kerb face.
Note: this is an existing left turn. The wheel path is contained within the pavement


Departure 14 raised for 500mm clearance not achieved to the kerb face.
50mm clearance achieved.
Note: this is an existing right turn. The wheel path is contained within the pavement and the existing lane has been widened from 3m to 3.5m.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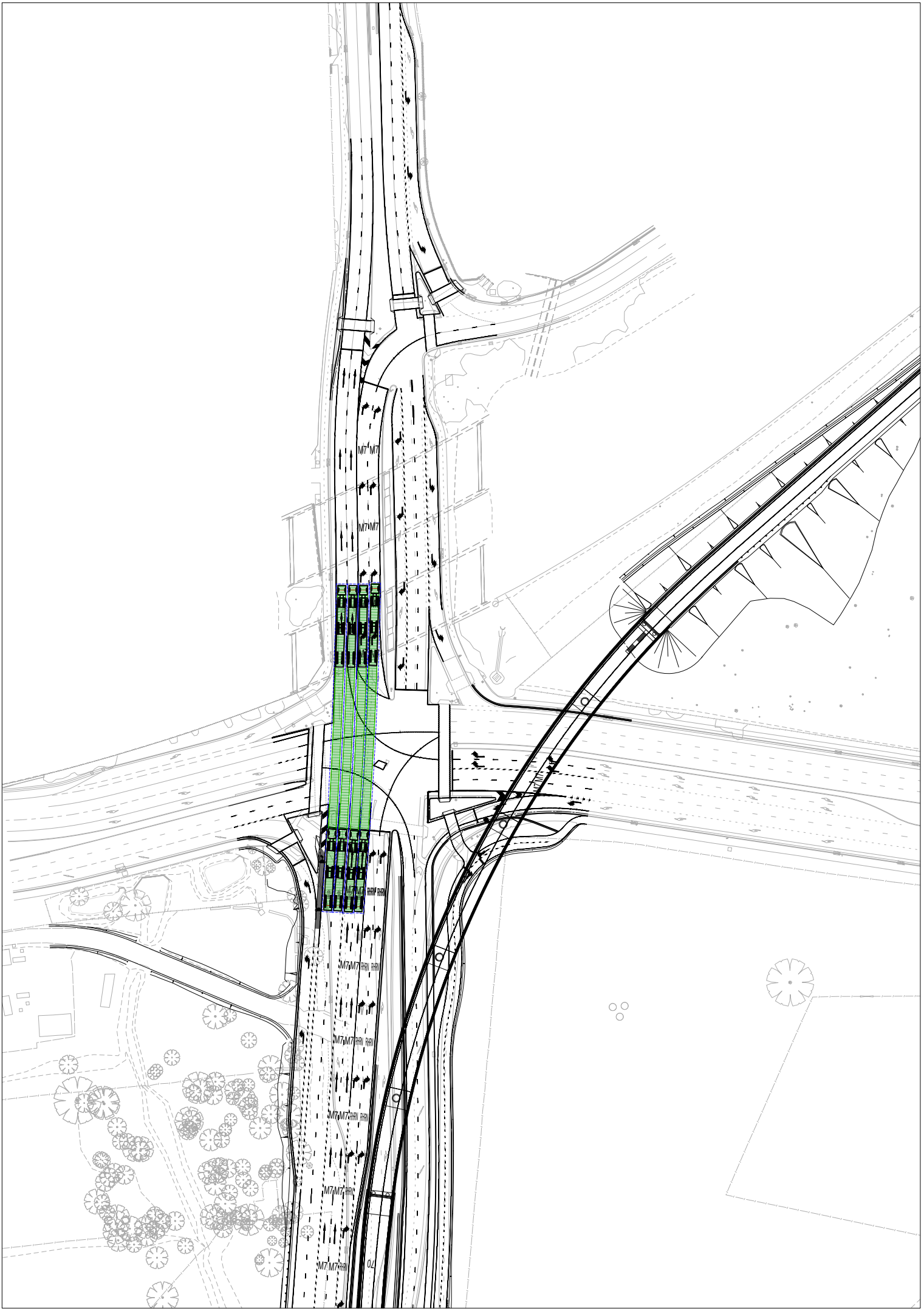
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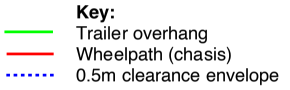
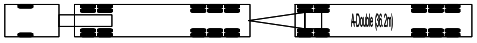
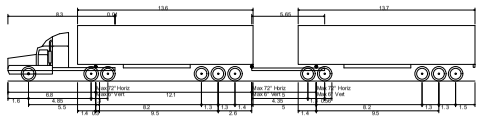
CHECK VEHICLE TURNPATHS



DEFAULT SETTINGS

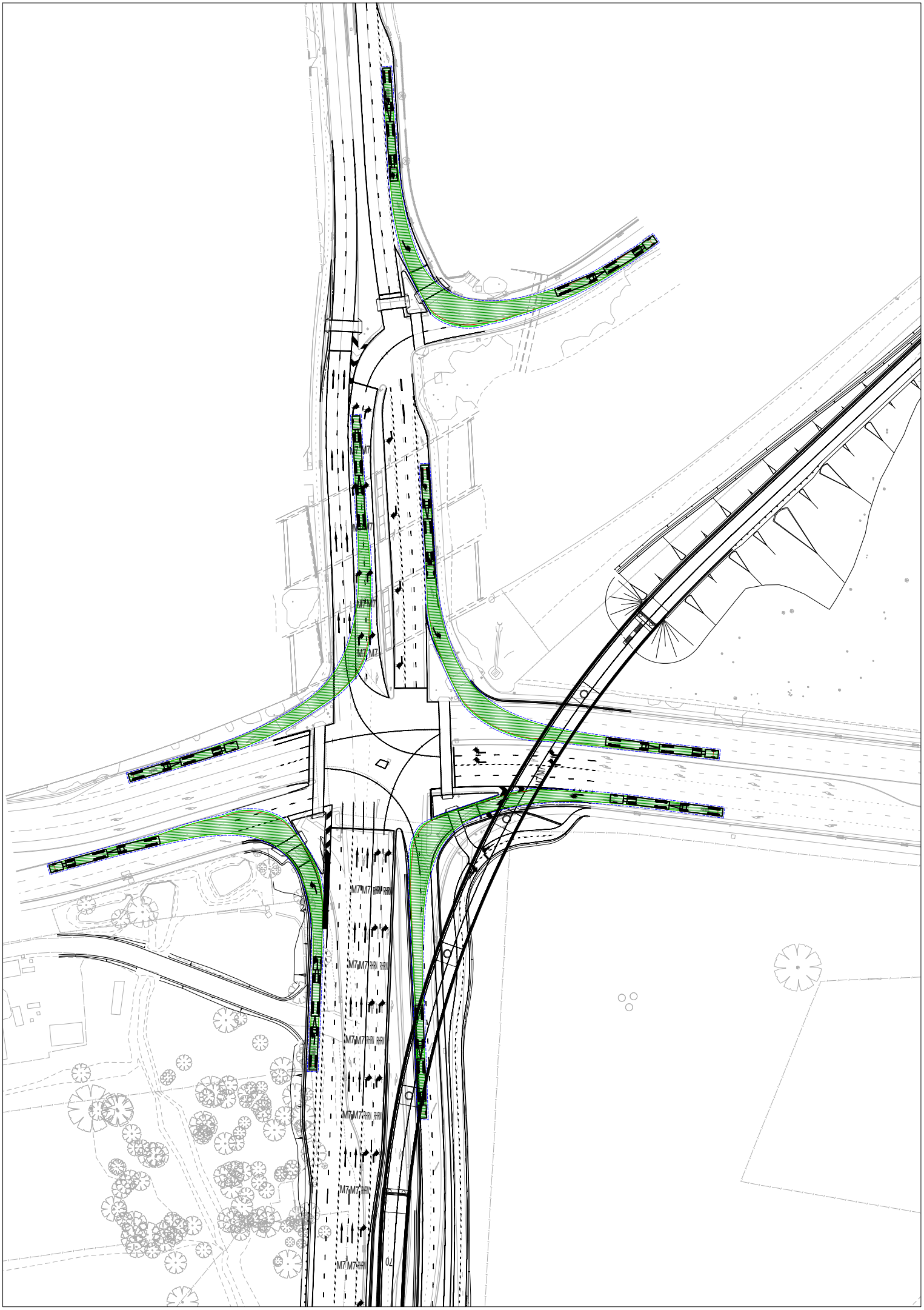


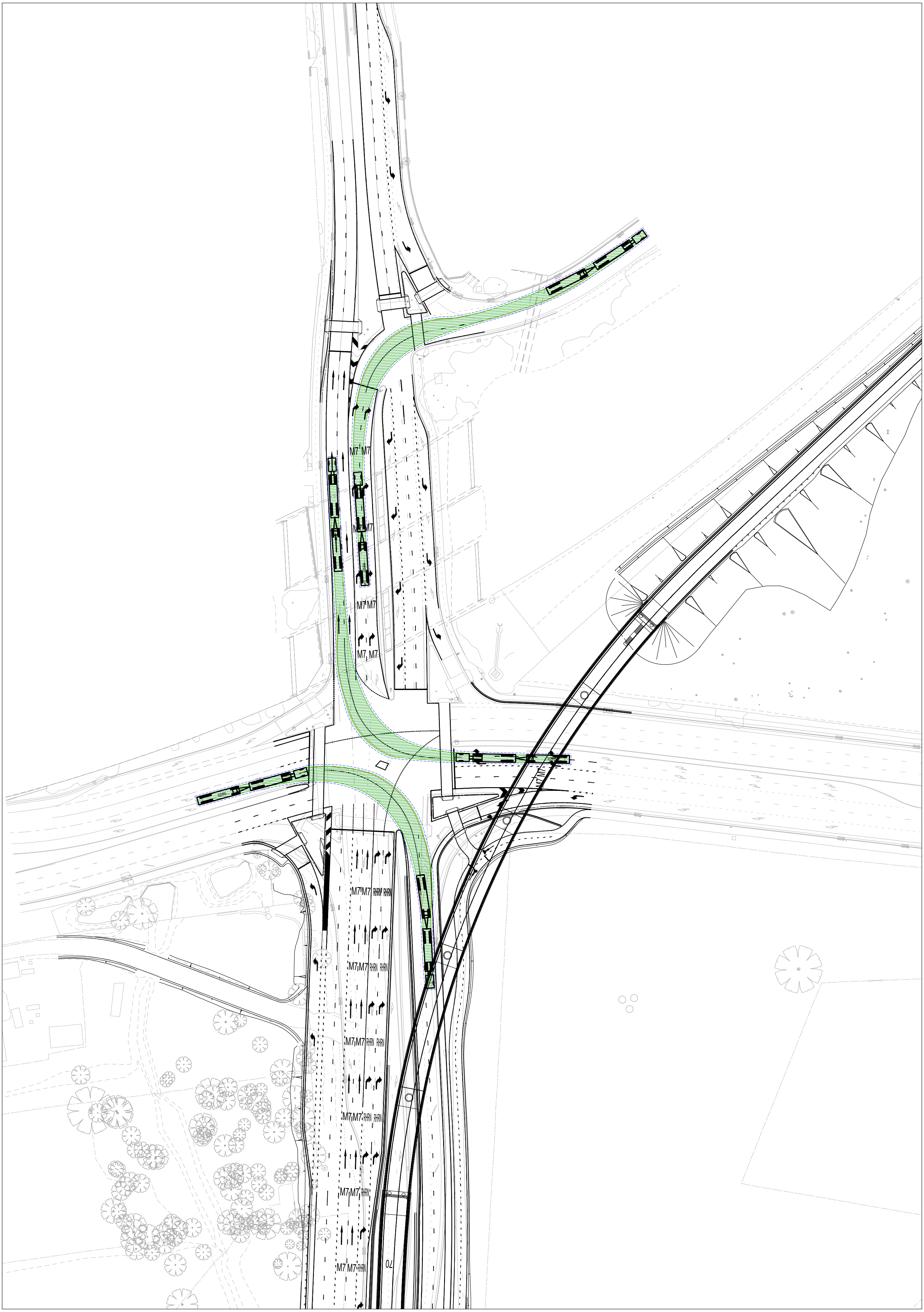


A-Double (36.2m)

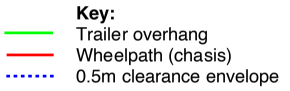
Overall Length	36.200m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Kerb to Kerb Turning Radius	15.000m

Key:
- Trailer overhang
- Wheelpath (chasis)
- 0.5m clearance envelope

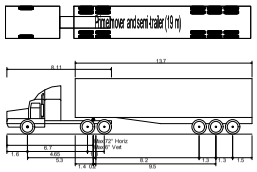



M7 M7
M7 M7
M7 M7
M7 M7
M7 M7 RHRN RHRN
M7 M7 RHRN
M7 M7 RHRN RHRN
M7 M7 RHRN RHRN
M7 M7 RHRN
M7 M7 RHRN

PROPERTY WORKS
DESIGN VEHICLE
TURNPATHS

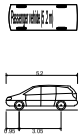


DEFAULT SETTINGS



Prime mover and semi-trailer (19 m)

Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

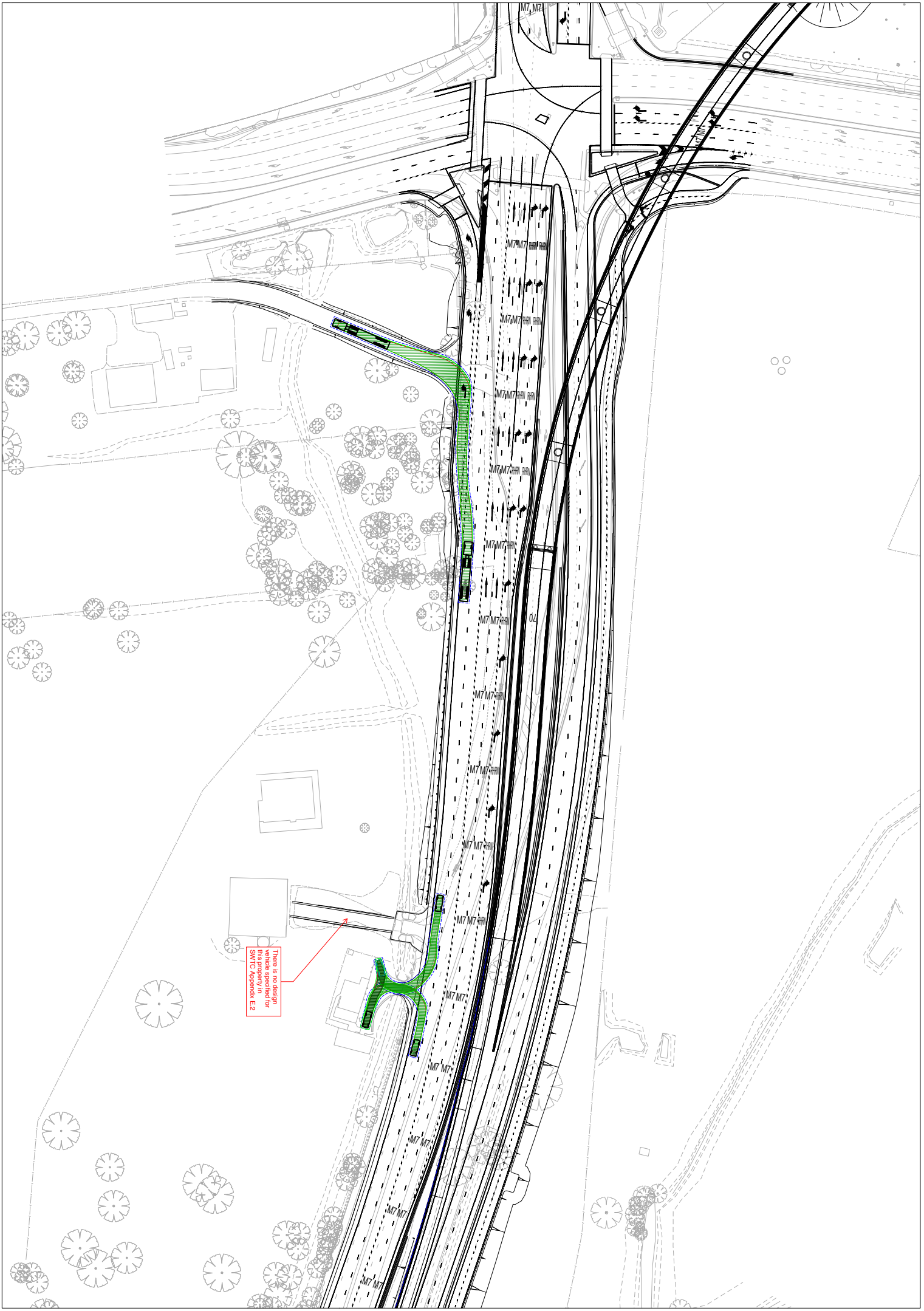


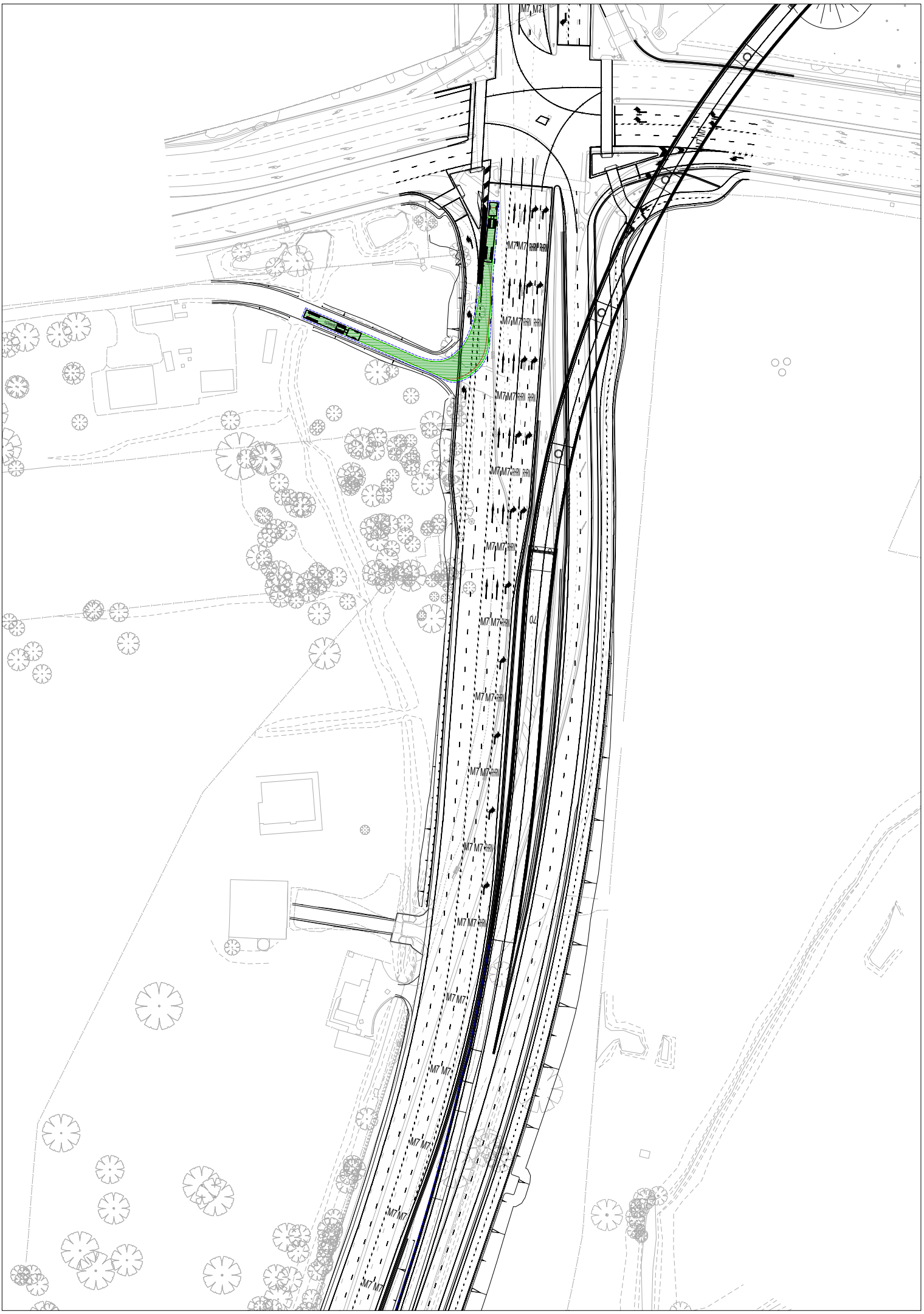
Passenger vehicle (5.2m)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.804m
Min Body Ground Clearance	0.295m
Track Width	1.840m
Lock-to-lock time	4.00s
Kerb to Kerb Turning Radius	6.300m

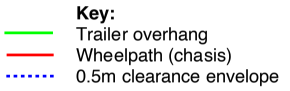
Key:

- Trailer overhang
- Wheelpath (chasis)
- 0.5m clearance envelope

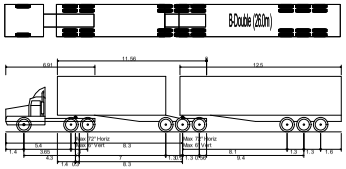

There is no design vehicle specified for this property in SWTC Appendix E.2



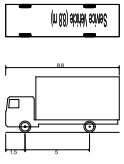
PROPERTY WORKS
CHECK VEHICLE
TURNPATHS



DEFAULT SETTINGS



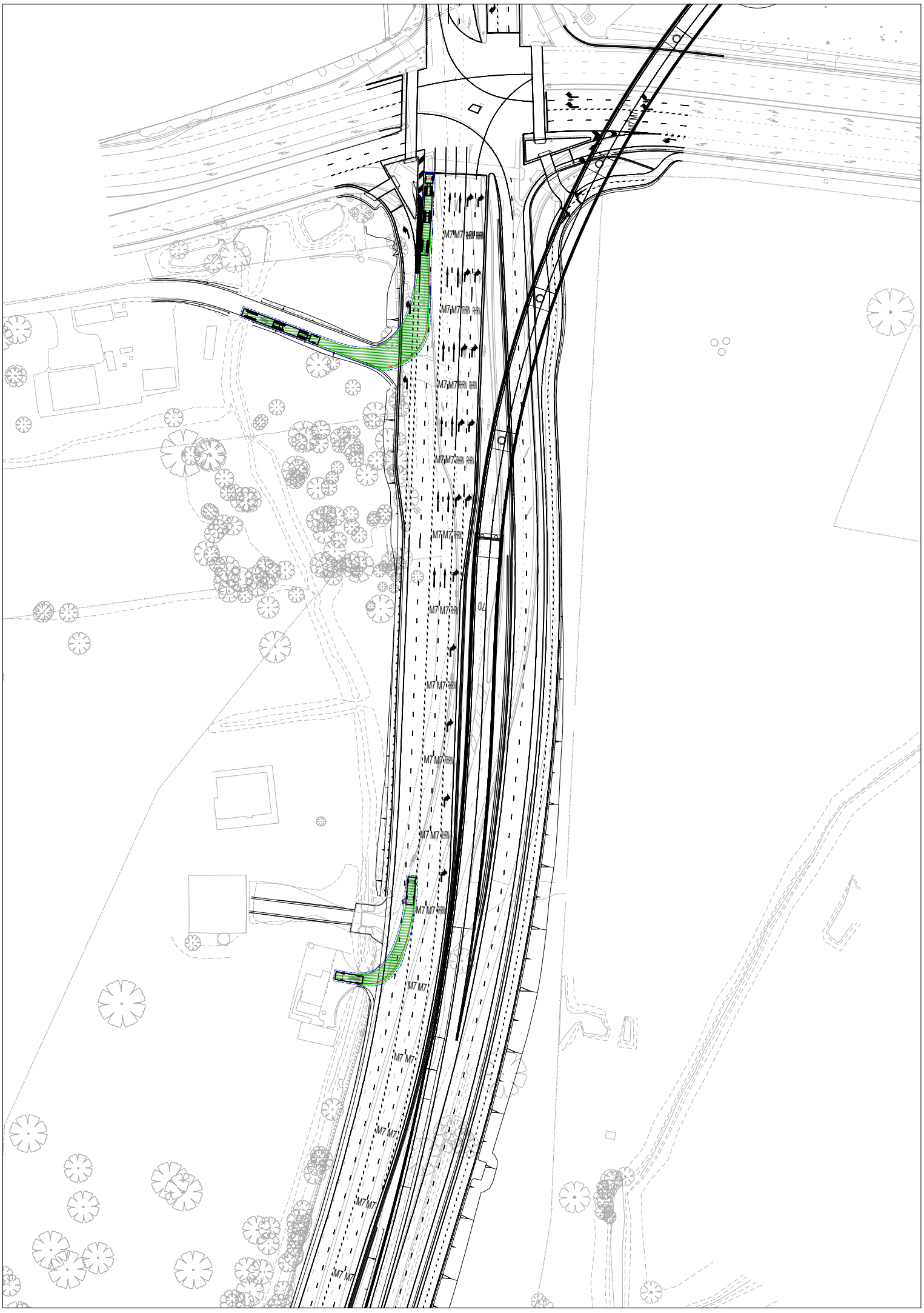
B-Double (26.0m)	
Overall Length	26.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Kerb to Kerb Turning Radius	15.000m



Service Vehicle (8.8 m)	
Overall Length	8.800m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.427m
Track Width	2.500m
Lock-to-lock time	4.00s
Kerb to Kerb Turning Radius	12.500m

Key:
Trailer overhang
Wheelpath (chasis)
0.5m clearance envelope


There is no check vehicle specified for this property in SWTC Appendix E.2



Appendix H.2 - Sight Distance Checks

Sight Visibility Report

Rooty Hill Road North Flyover MC70

Report Created: Tuesday, 20 January 2026
Time: 5:25:54 PM

Settings File:	c:\pw_work\aurecon-au-pw-13\dms43463\AustRoads 2016 Sight Visibility Equations and Tables.xml						
Equation Setting:	AustRoads 2016 CAR SSD RT=1.5s d=0.36						
Sight Visibility Section:	Sight Visibility			**Standard Variables**		**Method Variables**	
Calculation Method:	AustralianSSD					**Coefficient of Deceleration:**	0.36
Control Reference:	MC70_ALG	**Design Surface:**	MC70 SSD TERRAIN	**Reaction Time:**	1.5	**Max Coeff of Deceleration:**	0.46
		Existing Surface:		**Rounding Multiple:**	0		
		Move Target to Achieve:	Off				
Eye Reference:	OBJECT + EYE HEIGHT	**Object Reference:**	OBJECT + EYE HEIGHT				
Eye Interval:	5	**Object Interval:**	Not Used				
Eye Offset:	0	**Object Offset:**	0				
Eye Height:	1.1	**Object Height:**	0.2				

Eye Position	Actual End Position	Object Position	Eye Level	Actual End Level	Object Level	Design Speed	Instant Grade	Average Grade	Required Distance	Relaxed Distance	Achieved Distance	Achieved Chord Distance	Status	Surface Intersect
45	149.481	149.481	49.582	47.37	47.37	80	-2.22%	-0.75%	104.481	88.684	104.481	104.481	Achieved	None
50	154.059	154.059	49.477	47.411	47.411	80	-2.22%	-0.54%	104.059	88.428	104.059	104.059	Achieved	None
55	158.642	158.642	49.373	47.46	47.46	80	-2.22%	-0.33%	103.642	88.173	103.642	103.642	Achieved	None
60	163.23	163.23	49.262	47.517	47.517	80	-2.22%	-0.12%	103.23	87.922	103.23	103.23	Achieved	None
65	167.822	167.822	49.151	47.585	47.585	80	-2.22%	0.09%	102.822	87.672	102.822	102.822	Achieved	None
70	172.419	172.419	49.031	47.66	47.66	80	-2.22%	0.30%	102.419	87.425	102.419	102.419	Achieved	None
75	177.021	177.021	48.91	47.744	47.744	80	-2.22%	0.51%	102.021	87.18	102.021	102.021	Achieved	None
80	181.627	181.627	48.79	47.838	47.838	80	-2.13%	0.72%	101.627	86.937	101.627	101.627	Achieved	None
85	186.238	186.238	48.679	47.94	47.94	80	-1.92%	0.93%	101.238	86.696	101.238	101.238	Achieved	None
90	190.864	190.864	48.578	48.05	48.05	80	-1.71%	1.13%	100.864	86.464	100.864	100.864	Achieved	None
95	195.52	195.52	48.488	48.163	48.163	80	-1.51%	1.32%	100.52	86.251	100.52	100.52	Achieved	None
100	200.207	200.207	48.408	48.277	48.277	80	-1.30%	1.49%	100.207	86.055	100.207	100.207	Achieved	None
105	204.926	204.926	48.339	48.392	48.392	80	-1.09%	1.65%	99.926	85.88	99.926	99.926	Achieved	None
110	209.69	209.69	48.29	48.505	48.505	80	-0.88%	1.78%	99.69	85.733	99.69	99.69	Achieved	None
115	214.501	214.501	48.251	48.613	48.613	80	-0.67%	1.89%	99.501	85.615	99.501	99.501	Achieved	None
120	219.358	219.358	48.223	48.717	48.717	80	-0.46%	1.97%	99.358	85.525	99.358	99.358	Achieved	None
125	224.259	224.259	48.205	48.824	48.824	80	-0.25%	2.03%	99.259	85.463	99.259	99.259	Achieved	None
130	229.205	229.205	48.198	48.92	48.92	80	-0.04%	2.06%	99.205	85.429	99.205	99.205	Achieved	None
135	234.195	234.195	48.201	49.008	49.008	80	0.17%	2.07%	99.195	85.423	99.195	99.195	Achieved	None
140	239.229	239.229	48.215	49.085	49.085	80	0.38%	2.05%	99.229	85.444	99.229	99.242	Achieved	None
145	244.307	244.307	48.239	49.151	49.151	80	0.59%	2.00%	99.307	85.493	99.307	99.345	Achieved	None
150	249.431	249.431	48.274	49.21	49.21	80	0.80%	1.93%	99.431	85.571	99.431	99.492	Achieved	None
155	254.599	254.599	48.319	49.263	49.263	80	1.01%	1.83%	99.599	85.676	99.599	99.681	Achieved	None
160	259.807	259.807	48.375	49.308	49.308	80	1.22%	1.72%	99.807	85.806	99.807	99.907	Achieved	None
165	265.037	265.037	48.441	49.345	49.345	80	1.43%	1.59%	100.037	85.949	100.037	100.151	Achieved	None
170	270.287	270.287	48.518	49.374	49.374	80	1.64%	1.45%	100.287	86.105	100.287	100.411	Achieved	None
175	275.557	275.557	48.605	49.395	49.395	80	1.85%	1.30%	100.557	86.273	100.557	100.687	Achieved	None
180	280.832	280.832	48.703	49.407	49.407	80	2.06%	1.15%	100.832	86.444	100.832	100.963	Achieved	None
185	286.11	286.11	48.811	49.411	49.411	80	2.27%	0.99%	101.11	86.617	101.11	101.238	Achieved	None
190	291.39	291.39	48.929	49.406	49.406	80	2.43%	0.84%	101.39	86.79	101.39	101.512	Achieved	None
195	296.672	296.672	49.051	49.393	49.393	80	2.43%	0.69%	101.672	86.965	101.672	101.784	Achieved	None
200	301.957	301.957	49.172	49.371	49.371	80	2.43%	0.54%	101.957	87.14	101.957	102.057	Achieved	None
205	307.244	307.244	49.294	49.341	49.341	80	2.43%	0.39%	102.244	87.317	102.244	102.332	Achieved	None
210	312.533	312.533	49.413	49.303	49.303	80	2.30%	0.24%	102.533	87.495	102.533	102.609	Achieved	None
215	317.825	317.825	49.524	49.256	49.256	80	2.15%	0.09%	102.825	87.674	102.825	102.89	Achieved	None
220	323.12	323.12	49.633	49.2	49.2	80	1.99%	-0.07%	103.12	87.854	103.12	103.178	Achieved	None
225	328.416	328.416	49.738	49.136	49.136	80	1.84%	-0.22%	103.416	88.036	103.416	103.472	Achieved	None
230	333.716	333.716	49.834	49.064	49.064	80	1.69%	-0.37%	103.716	88.219	103.716	103.774	Achieved	None
235	339.018	339.018	49.921	48.982	48.982	80	1.54%	-0.52%	104.018	88.402	104.018	104.084	Achieved	None
240	344.322	344.322	49.995	48.893	48.893	80	1.39%	-0.67%	104.322	88.588	104.322	104.388	Achieved	None
245	349.629	349.629	50.059	48.794	48.794	80	1.24%	-0.82%	104.629	88.774	104.629	104.687	Achieved	None
250	354.939	354.939	50.117	48.687	48.687	80	1.09%	-0.98%	104.939	88.962	104.939	104.992	Achieved	None
255	360.251	360.251	50.167	48.572	48.572	80	0.93%	-1.13%	105.251	89.15	105.251	105.302	Achieved	None
260	365.567	365.567	50.21	48.448	48.448	80	0.78%	-1.28%	105.567	89.341	105.567	105.614	Achieved	None
265	370.885	370.885	50.245	48.315	48.315	80	0.63%	-1.43%	105.885	89.532	105.885	105.929	Achieved	None
270	376.205	376.205	50.273	48.174	48.174	80	0.48%	-1.58%	106.205	89.725	106.205	106.247	Achieved	None
275	381.529	381.529	50.293	48.024	48.024	80	0.33%	-1.73%	106.529	89.919	106.529	106.568	Achieved	None
280	386.855	386.855	50.306	47.865	47.865	80	0.18%	-1.88%	106.855	90.114	106.855	106.891	Achieved	None
285	392.185	392.185	50.311	47.697	47.697	80	0.03%	-2.04%	107.185	90.311	107.185	107.218	Achieved	None

290	397.517	397.517	50.308	47.521	47.521	80	-0.13%	-2.19%	107.517	90.509	107.517	107.547	Achieved	None
295	402.852	402.852	50.298	47.337	47.337	80	-0.28%	-2.34%	107.852	90.709	107.852	107.879	Achieved	None
300	408.191	408.191	50.281	47.143	47.143	80	-0.43%	-2.49%	108.191	90.91	108.191	108.214	Achieved	None
305	413.532	413.532	50.255	46.941	46.941	80	-0.58%	-2.64%	108.532	91.112	108.532	108.553	Achieved	None
310	418.877	418.877	50.222	46.73	46.73	80	-0.73%	-2.79%	108.877	91.316	108.877	108.894	Achieved	None
315	424.224	424.224	50.182	46.51	46.51	80	-0.88%	-2.94%	109.224	91.521	109.224	109.238	Achieved	None
320	429.575	429.575	50.134	46.281	46.281	80	-1.04%	-3.10%	109.575	91.727	109.575	109.586	Achieved	None
325	434.929	434.929	50.078	46.043	46.043	80	-1.19%	-3.25%	109.929	91.935	109.929	109.936	Achieved	None
330	440.287	440.287	50.015	45.797	45.797	80	-1.34%	-3.40%	110.287	92.145	110.287	110.29	Achieved	None
335	445.647	445.647	49.945	45.542	45.542	80	-1.49%	-3.55%	110.647	92.356	110.647	110.648	Achieved	None
340	451.012	451.012	49.866	45.278	45.278	80	-1.64%	-3.70%	111.012	92.569	111.012	111.008	Achieved	None
345	456.379	456.379	49.781	45.005	45.005	80	-1.79%	-3.85%	111.379	92.783	111.379	111.372	Achieved	None
350	461.75	461.75	49.687	44.723	44.723	80	-1.94%	-4.00%	111.75	92.998	111.75	111.739	Achieved	None
355	467.125	467.125	49.586	44.432	44.432	80	-2.10%	-4.16%	112.125	93.216	112.125	112.11	Achieved	None
360	472.503	472.503	49.478	44.132	44.132	80	-2.25%	-4.31%	112.503	93.434	112.503	112.484	Achieved	None
365	477.885	477.885	49.361	43.824	43.824	80	-2.40%	-4.46%	112.885	93.655	112.885	112.864	Achieved	None
370	483.27	483.27	49.238	43.509	43.509	80	-2.55%	-4.61%	113.27	93.877	113.27	113.252	Achieved	None
375	488.659	488.659	49.106	43.186	43.186	80	-2.70%	-4.76%	113.659	94.1	113.659	113.634	Achieved	None
380	494.052	494.052	48.968	42.854	42.854	80	-2.85%	-4.91%	114.052	94.325	114.052	114.014	Achieved	None
385	499.437	499.437	48.821	42.519	42.519	80	-3.00%	-5.06%	114.437	94.546	114.437	114.395	Achieved	None
390	504.798	504.798	48.667	42.19	42.19	80	-3.16%	-5.20%	114.798	94.751	114.798	114.758	Achieved	None
395	510.133	510.133	48.506	41.867	41.867	80	-3.31%	-5.32%	115.133	94.942	115.133	115.103	Achieved	None
400	515.442	515.442	48.336	41.548	41.548	80	-3.46%	-5.44%	115.442	95.117	115.442	115.428	Achieved	None
405	520.724	520.724	48.16	41.232	41.232	80	-3.61%	-5.54%	115.724	95.278	115.724	115.731	Achieved	None
410	525.979	525.979	47.975	40.917	40.917	80	-3.76%	-5.64%	115.979	95.422	115.979	116.004	Achieved	None
415	531.206	531.206	47.784	40.604	40.604	80	-3.91%	-5.72%	116.206	95.551	116.206	116.243	Achieved	None
420	536.405	536.405	47.584	40.292	40.292	80	-4.07%	-5.79%	116.405	95.663	116.405	116.453	Achieved	None
425	541.576	541.576	47.377	39.985	39.985	80	-4.22%	-5.85%	116.576	95.759	116.576	116.633	Achieved	None
430	546.717	546.717	47.162	39.69	39.69	80	-4.37%	-5.90%	116.717	95.839	116.717	116.78	Achieved	None
435	551.83	551.83	46.94	39.409	39.409	80	-4.52%	-5.94%	116.83	95.902	116.83	116.893	Achieved	None
440	556.89	556.89	46.711	39.144	39.144	80	-4.67%	-5.96%	116.89	95.936	116.89	116.948	Achieved	None
445	561.873	561.873	46.473	38.894	38.894	80	-4.82%	-5.96%	116.873	95.926	116.873	116.92	Achieved	None
450	566.779	566.779	46.228	38.661	38.661	80	-4.97%	-5.93%	116.779	95.874	116.779	116.808	Achieved	None
455	571.616	571.616	45.976	38.442	38.442	80	-5.13%	-5.87%	116.616	95.782	116.616	116.621	Achieved	None
460	576.406	576.406	45.716	38.236	38.236	80	-5.28%	-5.79%	116.406	95.663	116.406	116.38	Achieved	None
465	581.15	581.15	45.448	38.044	38.044	80	-5.43%	-5.70%	116.15	95.519	116.15	116.089	Achieved	None
470	585.85	585.85	45.173	37.863	37.863	80	-5.58%	-5.59%	115.85	95.349	115.85	115.748	Achieved	None
475	590.506	590.506	44.89	37.695	37.695	80	-5.73%	-5.46%	115.506	95.154	115.506	115.36	Achieved	None
480	595.119	595.119	44.601	37.538	37.538	80	-5.88%	-5.32%	115.119	94.934	115.119	114.929	Achieved	None
485	599.691	599.691	44.306	37.393	37.393	80	-6.00%	-5.16%	114.691	94.691	114.691	114.454	Achieved	None
490	604.224	604.224	44.001	37.26	37.26	80	-6.00%	-4.98%	114.224	94.423	114.224	113.96	Achieved	None
495	608.717	608.717	43.694	37.137	37.137	80	-6.00%	-4.78%	113.717	94.133	113.717	113.434	Achieved	None
500	613.174	613.174	43.386	37.026	37.026	80	-6.00%	-4.57%	113.174	93.821	113.174	112.873	Achieved	None
505	617.595	617.595	43.077	36.923	36.923	80	-6.00%	-4.34%	112.595	93.487	112.595	112.278	Achieved	None
510	621.995	621.995	42.775	36.831	36.831	80	-6.00%	-4.10%	111.995	93.14	111.995	111.663	Achieved	None
515	626.403	626.403	42.475	36.749	36.749	80	-6.00%	-3.86%	111.403	92.796	111.403	111.057	Achieved	None
520	630.819	630.819	42.175	36.675	36.675	80	-6.00%	-3.62%	110.819	92.456	110.819	110.461	Achieved	None
525	635.245	635.245	41.876	36.61	36.61	80	-6.00%	-3.38%	110.245	92.12	110.245	109.877	Achieved	None
530	639.678	639.678	41.576	36.553	36.553	80	-6.00%	-3.14%	109.678	91.788	109.678	109.312	Achieved	None
535	644.125	644.125	41.276	36.503	36.503	80	-6.00%	-2.90%	109.125	91.462	109.125	108.761	Achieved	None
540	648.59	648.59	40.977	36.46	36.46	80	-5.93%	-2.67%	108.59	91.146	108.59	108.228	Achieved	None
545	653.073	653.073	40.686	36.424	36.424	80	-5.69%	-2.44%	108.073	90.84	108.073	107.714	Achieved	None
550	657.573	657.573	40.407	36.394	36.394	80	-5.45%	-2.21%	107.573	90.542	107.573	107.216	Achieved	None
555	662.089	662.089	40.141	36.371	36.371	80	-5.21%	-1.99%	107.089	90.254	107.089	106.736	Achieved	None
560	666.622	666.622	39.886	36.356	36.356	80	-4.97%	-1.78%	106.622	89.975	106.622	106.271	Achieved	None
565	671.171	671.171	39.644	36.346	36.346	80	-4.73%	-1.56%	106.171	89.704	106.171	105.822	Achieved	None
570	675.735	675.735	39.413	36.346	36.346	80	-4.49%	-1.36%	105.735	89.442	105.735	105.388	Achieved	None
575	680.314	680.314	39.195	36.351	36.351	80	-4.25%	-1.16%	105.314	89.188	105.314	104.969	Achieved	None
580	684.907	684.907	38.989	36.365	36.365	80	-4.01%	-0.96%	104.907	88.942	104.907	104.564	Achieved	None
585	689.514	689.514	38.794	36.386	36.386	80	-3.77%	-0.77%	104.514	88.704	104.514	104.173	Achieved	None
590	694.135	694.135	38.612	36.414	36.414	80	-3.53%	-0.58%	104.135	88.474	104.135	103.796	Achieved	None
595	698.778	698.778	38.442	36.446	36.446	80	-3.28%	-0.40%	103.778	88.257	103.778	103.442	Achieved	None
600	703.459	703.459	38.284	36.478	36.478	80	-3.04%	-0.24%	103.459	88.062	103.459	103.126	Achieved	None
605	708.173	708.173	38.137	36.511	36.511	80	-2.80%	-0.09%	103.173	87.887	103.173	102.854	Achieved	None
610	712.914	712.914	38.003	36.543	36.543	80	-2.56%	0.04%	102.914	87.728	102.914	102.611	Achieved	None
615	717.683	717.683	37.881	36.575	36.575	80	-2.32%	0.16%	102.683	87.587	102.683	102.397	Achieved	None
620	722.496	722.496	37.771	36.602	36.602	80	-2.08%	0.26%	102.496	87.472	102.496	102.226	Achieved	None
625	727.352	727.352	37.673	36.623	36.623	80	-1.84%	0.33%	102.352	87.383	102.352	102.101	Achieved	None
630	732.251	732.251	37.587	36.637	36.637	80	-1.60%	0.39%	102.251	87.321	102.251	102.019	Achieved	None
635	737.193	737.193	37.514	36.645	36.645	80	-1.37%	0.42%	102.193	87.286	102.193	101.98	Achieved	None
640	742.178	742.178	37.449	36.645	36.645	80	-1.20%	0.42%	102.178	87.276	102.178	101.984	Achieved	None
645	747.205	747.205	37.394	36.638	36.638	80	-1.02%	0.41%	102.205	87.293	102.205	102.03	Achieved	None
650	752.275	752.275	37.347	36.624	36.624	80	-0.85%	0.37%	102.275	87.336	102.275	102.118	Achieved	None
655	757.389	757.389	37.309	36.601	36.601	80	-0.67%	0.31%	102.389	87.406	102.389	102.249	Achieved	None
660	762.545	762.545	37.28	36.572	36.572	80	-0.50%	0.23%	102.545	87.502	102.545	102.423	Achieved	None

Sight Visibility Report
Richmond Road Southbound MC20

Report Created: Tuesday, 20 January 2026
Time: 6:55:48 PM

Settings File:	c:\pw_work\aurecon-au-pw-13\dms43463\AustRoads 2016 Sight Visibility Equations and Tables.xml				
Equation Setting:	AustRoads 2016 CAR SSD RT=1.5s d=0.36				
Sight Visibility Section:	Sight Visibility	**Standard Variables**		**Method Variables**	
Calculation Method:	AustralianSSD			**Coefficient of Deceleration:**	0.36
Control Reference:	MC20_ALG	**Design Surface:**	MC20 SSD TERRAIN	**Reaction Time:**	1.5
				Max Coeff of Deceleration:	0.46
		Existing Surface:		**Rounding Multiple:**	0
		Move Target to Achieve:	Off		
Eye Reference:	OBJECT + EYE HEIGHT	**Object Reference:**	OBJECT + EYE HEIGHT		
Eye Interval:	5	**Object Interval:**	Not Used		
Eye Offset:	0	**Object Offset:**	0		
Eye Height:	1.1	**Object Height:**	0.2		

Eye Position	Actual End Position	Object Position	Eye Level	Actual End Level	Object Level	Design Speed	Instant Grade	Average Grade	Required Distance	Relaxed Distance	Achieved Distance	Achieved Chord Distance	Status	Surface Intersect
1167.64	1065.271	1065.271	40.243	40.067	40.067	80	1.96%	0.32%	102.369	87.394	102.369	101.71	Achieved	None
1162.64	1060.041	1060.041	40.318	40.035	40.035	80	1.84%	0.20%	102.599	87.535	102.599	101.868	Achieved	None
1157.64	1054.809	1054.809	40.406	39.996	39.996	80	1.72%	0.08%	102.83	87.677	102.83	102.026	Achieved	None
1152.64	1049.576	1049.576	40.489	39.95	39.95	80	1.60%	-0.04%	103.063	87.82	103.063	102.186	Achieved	None
1147.64	1044.342	1044.342	40.566	39.898	39.898	80	1.48%	-0.16%	103.298	87.964	103.298	102.348	Achieved	None
1142.64	1039.105	1039.105	40.636	39.839	39.839	80	1.36%	-0.28%	103.534	88.108	103.534	102.512	Achieved	None
1137.64	1033.867	1033.867	40.701	39.776	39.776	80	1.24%	-0.40%	103.772	88.253	103.772	102.684	Achieved	None
1132.64	1028.628	1028.628	40.76	39.706	39.706	80	1.12%	-0.52%	104.012	88.399	104.012	102.865	Achieved	None
1127.64	1023.387	1023.387	40.813	39.631	39.631	80	1.00%	-0.64%	104.253	88.545	104.253	103.05	Achieved	None
1122.64	1018.144	1018.144	40.86	39.548	39.548	80	0.88%	-0.76%	104.496	88.693	104.496	103.271	Achieved	None
1117.64	1012.9	1012.9	40.9	39.459	39.459	80	0.76%	-0.88%	104.74	88.841	104.74	103.512	Achieved	None
1112.64	1007.654	1007.654	40.935	39.364	39.364	80	0.64%	-1.00%	104.986	88.99	104.986	103.754	Achieved	None
1107.64	1002.406	1002.406	40.964	39.262	39.262	80	0.52%	-1.12%	105.234	89.14	105.234	103.998	Achieved	None
1102.64	997.156	997.156	40.987	39.153	39.153	80	0.40%	-1.24%	105.483	89.29	105.483	104.244	Achieved	None
1097.64	991.905	991.905	41.003	39.037	39.037	80	0.28%	-1.36%	105.734	89.442	105.734	104.492	Achieved	None
1092.64	986.652	986.652	41.014	38.915	38.915	80	0.16%	-1.48%	105.987	89.594	105.987	104.741	Achieved	None
1087.64	981.398	981.398	41.019	38.786	38.786	80	0.04%	-1.60%	106.242	89.747	106.242	104.992	Achieved	None
1082.64	976.141	976.141	41.018	38.65	38.65	80	-0.09%	-1.72%	106.499	89.901	106.499	105.244	Achieved	None
1077.64	970.883	970.883	41.01	38.508	38.508	80	-0.21%	-1.84%	106.757	90.056	106.757	105.499	Achieved	None
1072.64	965.623	965.623	40.997	38.359	38.359	80	-0.33%	-1.96%	107.017	90.211	107.017	105.755	Achieved	None
1067.64	960.361	960.361	40.978	38.204	38.204	80	-0.45%	-2.08%	107.279	90.367	107.279	106.013	Achieved	None
1062.64	955.097	955.097	40.951	38.042	38.042	80	-0.57%	-2.20%	107.543	90.525	107.543	106.268	Achieved	None
1057.64	949.831	949.831	40.917	37.872	37.872	80	-0.69%	-2.32%	107.809	90.683	107.809	106.521	Achieved	None
1052.64	944.563	944.563	40.877	37.697	37.697	80	-0.81%	-2.44%	108.076	90.842	108.076	106.775	Achieved	None
1047.64	939.295	939.295	40.831	37.519	37.519	80	-0.93%	-2.56%	108.345	91.001	108.345	107.03	Achieved	None
1042.64	934.04	934.04	40.78	37.342	37.342	80	-1.05%	-2.67%	108.6	91.152	108.6	107.272	Achieved	None
1037.64	928.802	928.802	40.722	37.166	37.166	80	-1.17%	-2.78%	108.837	91.293	108.837	107.497	Achieved	None
1032.64	923.583	923.583	40.66	36.99	36.99	80	-1.29%	-2.87%	109.057	91.422	109.057	107.713	Achieved	None
1027.64	918.381	918.381	40.593	36.815	36.815	80	-1.41%	-2.96%	109.259	91.541	109.259	107.911	Achieved	None
1022.64	913.198	913.198	40.519	36.642	36.642	80	-1.53%	-3.04%	109.441	91.649	109.441	108.091	Achieved	None
1017.64	908.037	908.037	40.44	36.476	36.476	80	-1.65%	-3.11%	109.603	91.744	109.603	108.25	Achieved	None
1012.64	902.913	902.913	40.355	36.318	36.318	80	-1.77%	-3.16%	109.727	91.817	109.727	108.372	Achieved	None
1007.64	897.829	897.829	40.264	36.169	36.169	80	-1.89%	-3.20%	109.811	91.866	109.811	108.454	Achieved	None
1002.64	892.787	892.787	40.166	36.026	36.026	80	-2.01%	-3.21%	109.853	91.891	109.853	108.497	Achieved	None
997.64	887.785	887.785	40.063	35.895	35.895	80	-2.13%	-3.22%	109.854	91.892	109.854	108.507	Achieved	None
992.64	882.825	882.825	39.954	35.77	35.77	80	-2.25%	-3.20%	109.815	91.868	109.815	108.477	Achieved	None
987.64	877.906	877.906	39.838	35.653	35.653	80	-2.37%	-3.16%	109.734	91.821	109.734	108.418	Achieved	None
982.64	873.027	873.027	39.717	35.543	35.543	80	-2.49%	-3.11%	109.613	91.75	109.613	108.359	Achieved	None
977.64	868.188	868.188	39.589	35.44	35.44	80	-2.61%	-3.04%	109.451	91.655	109.451	108.263	Achieved	None
972.64	863.377	863.377	39.456	35.342	35.342	80	-2.73%	-2.96%	109.262	91.543	109.262	108.138	Achieved	None
967.64	858.586	858.586	39.317	35.25	35.25	80	-2.85%	-2.87%	109.054	91.42	109.054	107.991	Achieved	None
962.64	853.814	853.814	39.172	35.163	35.163	80	-2.97%	-2.77%	108.825	91.285	108.825	107.826	Achieved	None
957.64	849.062	849.062	39.02	35.083	35.083	80	-3.09%	-2.66%	108.578	91.139	108.578	107.643	Achieved	None
952.64	844.328	844.328	38.863	35.008	35.008	80	-3.21%	-2.54%	108.312	90.981	108.312	107.441	Achieved	None
947.64	839.612	839.612	38.7	34.94	34.94	80	-3.33%	-2.42%	108.027	90.813	108.027	107.222	Achieved	None
942.64	834.899	834.899	38.533	34.878	34.878	80	-3.37%	-2.29%	107.74	90.642	107.74	107.001	Achieved	None
937.64	830.184	830.184	38.364	34.821	34.821	80	-3.37%	-2.16%	107.456	90.473	107.456	106.78	Achieved	None

932.64	825.467	825.467	38.195	34.77	34.77	80	-3.37%	-2.03%	107.173	90.304	107.173	106.561	Achieved	None
927.64	820.747	820.747	38.027	34.725	34.725	80	-3.37%	-1.90%	106.893	90.137	106.893	106.344	Achieved	None
922.64	816.026	816.026	37.858	34.686	34.686	80	-3.37%	-1.77%	106.614	89.97	106.614	106.127	Achieved	None
917.64	811.302	811.302	37.69	34.652	34.652	80	-3.37%	-1.64%	106.338	89.804	106.338	105.916	Achieved	None
912.64	806.576	806.576	37.524	34.624	34.624	80	-3.27%	-1.51%	106.064	89.64	106.064	105.716	Achieved	None
907.64	801.848	801.848	37.364	34.602	34.602	80	-3.14%	-1.39%	105.792	89.476	105.792	105.516	Achieved	None
902.64	797.118	797.118	37.21	34.585	34.585	80	-3.01%	-1.26%	105.521	89.313	105.521	105.317	Achieved	None
897.64	792.387	792.387	37.064	34.575	34.575	80	-2.88%	-1.13%	105.253	89.151	105.253	105.119	Achieved	None
892.64	787.653	787.653	36.922	34.57	34.57	80	-2.75%	-1.00%	104.987	88.991	104.987	104.922	Achieved	None
887.64	782.917	782.917	36.791	34.57	34.57	80	-2.62%	-0.87%	104.723	88.831	104.723	104.726	Achieved	None
882.64	778.179	778.179	36.666	34.577	34.577	80	-2.49%	-0.74%	104.461	88.672	104.461	104.531	Achieved	None
877.64	773.44	773.44	36.546	34.589	34.589	80	-2.37%	-0.61%	104.2	88.513	104.2	104.321	Achieved	None
872.64	768.698	768.698	36.434	34.607	34.607	80	-2.24%	-0.48%	103.942	88.356	103.942	104.076	Achieved	None
867.64	763.953	763.953	36.329	34.63	34.63	80	-2.11%	-0.35%	103.687	88.201	103.687	103.834	Achieved	None
862.64	759.19	759.19	36.228	34.654	34.654	80	-1.98%	-0.23%	103.45	88.056	103.45	103.61	Achieved	None
857.64	754.408	754.408	36.132	34.678	34.678	80	-1.85%	-0.12%	103.232	87.923	103.232	103.406	Achieved	None
852.64	749.606	749.606	36.043	34.702	34.702	80	-1.72%	-0.02%	103.033	87.802	103.033	103.221	Achieved	None
847.64	744.786	744.786	35.96	34.725	34.725	80	-1.59%	0.07%	102.854	87.691	102.854	103.055	Achieved	None
842.64	739.937	739.937	35.884	34.747	34.747	80	-1.46%	0.15%	102.702	87.599	102.702	102.917	Achieved	None
837.64	735.056	735.056	35.814	34.763	34.763	80	-1.33%	0.21%	102.584	87.526	102.584	102.812	Achieved	None
832.64	730.143	730.143	35.75	34.774	34.774	80	-1.20%	0.26%	102.497	87.472	102.497	102.739	Achieved	None
827.64	725.198	725.198	35.693	34.781	34.781	80	-1.08%	0.29%	102.442	87.439	102.442	102.698	Achieved	None
822.64	720.222	720.222	35.643	34.782	34.782	80	-0.95%	0.30%	102.418	87.424	102.418	102.689	Achieved	None
817.64	715.214	715.214	35.599	34.778	34.778	80	-0.82%	0.29%	102.426	87.429	102.426	102.712	Achieved	None
812.64	710.174	710.174	35.56	34.769	34.769	80	-0.69%	0.27%	102.466	87.453	102.466	102.766	Achieved	None
807.64	705.103	705.103	35.53	34.754	34.754	80	-0.56%	0.24%	102.537	87.497	102.537	102.837	Achieved	None
802.64	700	700	35.505	34.734	34.734	80	-0.43%	0.18%	102.64	87.56	102.64	102.94	Achieved	None
797.64	694.866	694.866	35.487	34.708	34.708	80	-0.30%	0.11%	102.774	87.642	102.774	103.075	Achieved	None
792.64	689.723	689.723	35.475	34.679	34.679	80	-0.17%	0.04%	102.917	87.73	102.917	103.218	Achieved	None
787.64	684.579	684.579	35.47	34.651	34.651	80	-0.04%	-0.04%	103.061	87.818	103.061	103.362	Achieved	None
782.64	679.435	679.435	35.471	34.623	34.623	80	0.09%	-0.11%	103.205	87.906	103.205	103.507	Achieved	None
777.64	674.29	674.29	35.478	34.594	34.594	80	0.21%	-0.18%	103.35	87.995	103.35	103.652	Achieved	None
772.64	669.152	669.152	35.492	34.566	34.566	80	0.34%	-0.25%	103.487	88.079	103.487	103.781	Achieved	None
767.64	664.03	664.03	35.512	34.539	34.539	80	0.47%	-0.32%	103.609	88.154	103.609	103.888	Achieved	None
762.64	658.934	658.934	35.536	34.516	34.516	80	0.50%	-0.36%	103.705	88.212	103.705	103.97	Achieved	None
757.64	653.866	653.866	35.561	34.498	34.498	80	0.50%	-0.40%	103.774	88.254	103.774	104.024	Achieved	None
752.64	648.826	648.826	35.586	34.485	34.485	80	0.50%	-0.42%	103.814	88.278	103.814	104.05	Achieved	None
747.64	643.813	643.813	35.611	34.477	34.477	80	0.50%	-0.43%	103.827	88.286	103.827	104.048	Achieved	None
742.64	638.829	638.829	35.635	34.473	34.473	80	0.44%	-0.42%	103.811	88.277	103.811	104.019	Achieved	None
737.64	633.872	633.872	35.654	34.474	34.474	80	0.34%	-0.40%	103.768	88.25	103.768	103.961	Achieved	None
732.64	628.944	628.944	35.669	34.48	34.48	80	0.23%	-0.36%	103.696	88.207	103.696	103.876	Achieved	None
727.64	624.043	624.043	35.678	34.49	34.49	80	0.13%	-0.31%	103.597	88.146	103.597	103.762	Achieved	None
722.64	619.162	619.162	35.681	34.505	34.505	80	0.02%	-0.25%	103.478	88.074	103.478	103.629	Achieved	None
717.64	614.292	614.292	35.68	34.524	34.524	80	-0.08%	-0.18%	103.348	87.994	103.348	103.485	Achieved	None
712.64	609.423	609.423	35.673	34.539	34.539	80	-0.19%	-0.12%	103.217	87.914	103.217	103.34	Achieved	None
707.64	604.553	604.553	35.661	34.555	34.555	80	-0.29%	-0.05%	103.087	87.834	103.087	103.196	Achieved	None
702.64	599.683	599.683	35.644	34.571	34.571	80	-0.40%	0.02%	102.956	87.754	102.956	103.039	Achieved	None
697.64	594.813	594.813	35.622	34.587	34.587	80	-0.50%	0.09%	102.827	87.675	102.827	102.825	Achieved	None
692.64	589.931	589.931	35.595	34.603	34.603	80	-0.55%	0.15%	102.708	87.602	102.708	102.618	Achieved	None
687.64	585.037	585.037	35.568	34.62	34.62	80	-0.55%	0.20%	102.603	87.537	102.603	102.422	Achieved	None
682.64	580.13	580.13	35.54	34.639	34.639	80	-0.55%	0.25%	102.51	87.481	102.51	102.238	Achieved	None
677.64	575.209	575.209	35.513	34.659	34.659	80	-0.55%	0.29%	102.431	87.432	102.431	102.066	Achieved	None
672.64	570.276	570.276	35.485	34.679	34.679	80	-0.55%	0.33%	102.364	87.391	102.364	101.904	Achieved	None
667.64	565.329	565.329	35.458	34.699	34.699	80	-0.55%	0.35%	102.31	87.358	102.31	101.766	Achieved	None
662.64	560.37	560.37	35.432	34.718	34.718	80	-0.48%	0.38%	102.269	87.333	102.269	101.641	Achieved	None
657.64	555.398	555.398	35.411	34.738	34.738	80	-0.38%	0.39%	102.241	87.315	102.241	101.526	Achieved	None
652.64	550.414	550.414	35.394	34.758	34.758	80	-0.29%	0.40%	102.226	87.306	102.226	101.422	Achieved	None
647.64	545.417	545.417	35.383	34.778	34.778	80	-0.19%	0.40%	102.223	87.304	102.223	101.328	Achieved	None
642.64	540.417	540.417	35.376	34.798	34.798	80	-0.10%	0.40%	102.223	87.304	102.223	101.237	Achieved	None
637.64	535.417	535.417	35.373	34.818	34.818	80	0.00%	0.40%	102.223	87.304	102.223	101.144	Achieved	None
632.64	530.417	530.417	35.376	34.838	34.838	80	0.10%	0.40%	102.223	87.304	102.223	101.052	Achieved	None
627.64	525.417	525.417	35.383	34.858	34.858	80	0.19%	0.40%	102.223	87.304	102.223	100.96	Achieved	None
622.64	520.417	520.417	35.395	34.878	34.878	80	0.29%	0.40%	102.223	87.304	102.223	100.87	Achieved	None
617.64	515.417	515.417	35.411	34.898	34.898	80	0.38%	0.40%	102.223	87.304	102.223	100.782	Achieved	None
612.64	510.417	510.417	35.429	34.918	34.918	80	0.40%	0.40%	102.223	87.304	102.223	100.694	Achieved	None
607.64	505.417	505.417	35.445	34.939	34.939	80	0.40%	0.40%	102.223	87.304	102.223	100.605	Achieved	None
602.64	500.417	500.417	35.461	34.962	34.962	80	0.40%	0.40%	102.223	87.304	102.223	100.527	Achieved	None
597.64	495.417	495.417	35.478	34.985	34.985	80	0.40%	0.40%	102.223	87.304	102.223	100.493	Achieved	None
592.64	490.418	490.418	35.494	35.008	35.008	80	0.40%	0.40%	102.222	87.303	102.222	100.532	Achieved	None
587.64	485.428	485.428	35.51	35.033	35.033	80	0.40%	0.41%	102.212	87.297	102.212	100.595	Achieved	None
582.64	480.448	480.448	35.529	35.062	35.062	80	0.40%	0.42%	102.192	87.285	102.192	100.664	Achieved	None
577.64	475.477	475.477	35.549	35.095	35.095	80	0.40%	0.43%	102.162	87.267	102.162	100.729	Achieved	None
572.64	470.517	470.517	35.569	35.131	35.131	80	0.40%	0.45%	102.123	87.243	102.123	100.787	Achieved	None
567.64	465.565	465.565	35.589	35.168	35.168	80	0.40%	0.48%	102.074	87.213	102.074	100.829	Achieved	None
562.64	460.624	460.624	35.609	35.209	35.209	80	0.40%	0.51%	102.016	87.176	102.016	100.863	Achieved	None
557.64	455.692	455.692	35.629	35.253	35.253	80	0.40%	0.55%	101.947	87.134	101.947	100.887	Achieved	None
552.64	450.77	450.77	35.649	35.3	35.3	80	0.40%	0.59%	101.87	87.086	101.87	100.902	Achieved	None
547.64	445.857	445.857	35.669	35.351	35.351	80	0.40%	0.63%	101.782	87.033	101.782	100.906	Achieved	None
542.64	440.954	440.954	35.689	35.405	35.405	80	0.40%	0.68%	101.686	86.973	101.686	100.9	Achieved	None
537.64	436.06	436.06	35.709	35.463	35.463	80	0.40%	0.74%	101.58	86.907	101.58	100.882	Achieved	None
532.64	431.175	431.175	35.729	35.524	35.524	80	0.40%	0.80%	101.464	86.836	101.464	100.853	Achieved	None
527.64	426.3	426.3	35.749	35.588	35.588	80	0.40%	0.87%	101.34	86.759	101.34	100.814	Achieved	None
522.64	421.433	421.433	35.769	35.656	35.656	80	0.40%	0.94%	101.207	86.677	101.207	100.763	Achieved	None
517.64	416.568	416.568	35.789	35.727	35.727	80	0.40%	1.02%	101.072	86.593	101.072	100.708	Achieved	None
512.64	411.702	411.702	35.809	35.802	35.802	80	0.40%	1.09%	100.938	86.51	100.938	100.652	Achieved	None
507.64	406.836	406.836	35.829	35.88	35.88	80	0.40%	1.16%	100.804	86.427	100.804	100.595	Achieved	None
502.64	401.969	401.969	35.852	35.962	35.962	80	0.40%	1.23%	100.671	86.344	100.671	100.539	Achieved	None
497.64	397.102	397.102	35.875	36.047	36.047	80	0.40%	1.31%	100.538	86.262	100.538	100.48	Achieved	None
492.64	392.234	392.234	35.897	36.135	36.135	80	0.40%	1.38%	100.406	86.18	100.406	100.407	Achieved	None

487.64	387.365	387.365	35.922	36.227	36.227	80	0.46%	1.45%	100.274	86.098	100.274	100.275	Achieved	None
482.64	382.496	382.496	35.949	36.323	36.323	80	0.53%	1.53%	100.143	86.016	100.143	100.144	Achieved	None
477.64	377.627	377.627	35.98	36.421	36.421	80	0.61%	1.60%	100.013	85.934	100.013	100.013	Achieved	None
472.64	372.757	372.757	36.015	36.524	36.524	80	0.68%	1.67%	99.883	85.853	99.883	99.883	Achieved	None
467.64	367.887	367.887	36.053	36.63	36.63	80	0.75%	1.75%	99.753	85.772	99.753	99.753	Achieved	None
462.64	363.016	363.016	36.092	36.74	36.74	80	0.83%	1.82%	99.624	85.692	99.624	99.624	Achieved	None
457.64	358.144	358.144	36.135	36.853	36.853	80	0.90%	1.89%	99.495	85.611	99.495	99.495	Achieved	None
452.64	353.272	353.272	36.182	36.969	36.969	80	0.97%	1.97%	99.367	85.531	99.367	99.367	Achieved	None
447.64	348.4	348.4	36.232	37.089	37.089	80	1.04%	2.04%	99.24	85.451	99.24	99.24	Achieved	None
442.64	343.526	343.526	36.286	37.212	37.212	80	1.12%	2.11%	99.114	85.372	99.114	99.114	Achieved	None
437.64	338.643	338.643	36.344	37.338	37.338	80	1.19%	2.18%	98.996	85.298	98.996	98.996	Achieved	None
432.64	333.752	333.752	36.405	37.465	37.465	80	1.26%	2.24%	98.888	85.23	98.888	98.888	Achieved	None
427.64	328.851	328.851	36.47	37.592	37.592	80	1.34%	2.30%	98.789	85.168	98.789	98.789	Achieved	None
422.64	323.941	323.941	36.539	37.719	37.719	80	1.41%	2.35%	98.699	85.111	98.699	98.699	Achieved	None
417.64	319.022	319.022	36.611	37.847	37.847	80	1.48%	2.40%	98.618	85.06	98.618	98.618	Achieved	None
412.64	314.094	314.094	36.687	37.975	37.975	80	1.56%	2.44%	98.546	85.015	98.546	98.546	Achieved	None
407.64	309.157	309.157	36.767	38.103	38.103	80	1.63%	2.48%	98.483	84.975	98.483	98.483	Achieved	None
402.64	304.211	304.211	36.85	38.231	38.231	80	1.70%	2.51%	98.429	84.941	98.429	98.429	Achieved	None
397.64	299.256	299.256	36.937	38.36	38.36	80	1.78%	2.54%	98.383	84.913	98.383	98.383	Achieved	None
392.64	294.293	294.293	37.027	38.488	38.488	80	1.85%	2.56%	98.347	84.89	98.347	98.347	Achieved	None
387.64	289.321	289.321	37.122	38.617	38.617	80	1.92%	2.58%	98.319	84.872	98.319	98.319	Achieved	None
382.64	284.34	284.34	37.22	38.762	38.762	80	2.00%	2.59%	98.3	84.86	98.3	98.3	Achieved	None
377.64	279.35	279.35	37.321	38.907	38.907	80	2.07%	2.59%	98.29	84.854	98.29	98.29	Achieved	None
372.64	274.352	274.352	37.426	39.016	39.016	80	2.14%	2.59%	98.288	84.852	98.288	98.288	Achieved	None
367.64	269.352	269.352	37.535	39.144	39.144	80	2.21%	2.59%	98.288	84.852	98.288	98.265	Achieved	None
362.64	264.349	264.349	37.648	39.273	39.273	80	2.29%	2.59%	98.29	84.854	98.29	98.243	Achieved	None
357.64	259.339	259.339	37.765	39.407	39.407	80	2.36%	2.59%	98.301	84.86	98.301	98.228	Achieved	None
352.64	254.322	254.322	37.884	39.533	39.533	80	2.43%	2.58%	98.318	84.871	98.318	98.22	Achieved	None
347.64	249.296	249.296	38.008	39.649	39.649	80	2.51%	2.56%	98.343	84.887	98.343	98.22	Achieved	None
342.64	244.264	244.264	38.135	39.766	39.766	80	2.58%	2.54%	98.376	84.908	98.376	98.226	Achieved	None
337.64	239.223	239.223	38.264	39.873	39.873	80	2.59%	2.52%	98.416	84.933	98.416	98.24	Achieved	None
332.64	234.175	234.175	38.394	39.97	39.97	80	2.59%	2.49%	98.464	84.964	98.464	98.261	Achieved	None
327.64	229.12	229.12	38.524	40.076	40.076	80	2.59%	2.46%	98.52	84.999	98.52	98.29	Achieved	None
322.64	224.057	224.057	38.653	40.189	40.189	80	2.59%	2.42%	98.583	85.038	98.583	98.325	Achieved	None
317.64	218.986	218.986	38.783	40.299	40.299	80	2.59%	2.38%	98.654	85.083	98.654	98.368	Achieved	None
312.64	213.907	213.907	38.913	40.403	40.403	80	2.59%	2.33%	98.733	85.133	98.733	98.419	Achieved	None
307.64	208.82	208.82	39.042	40.507	40.507	80	2.59%	2.28%	98.819	85.187	98.819	98.477	Achieved	None
302.64	203.726	203.726	39.172	40.604	40.604	80	2.59%	2.23%	98.914	85.246	98.914	98.544	Achieved	None
297.64	198.623	198.623	39.302	40.696	40.696	80	2.59%	2.17%	99.016	85.311	99.016	98.618	Achieved	None
292.64	193.514	193.514	39.431	40.782	40.782	80	2.59%	2.11%	99.125	85.379	99.125	98.698	Achieved	None
287.64	188.405	188.405	39.564	40.865	40.865	80	2.59%	2.04%	99.235	85.448	99.235	98.78	Achieved	None
282.64	183.295	183.295	39.714	40.937	40.937	80	2.59%	1.98%	99.345	85.517	99.345	98.863	Achieved	None
277.64	178.184	178.184	39.852	41.008	41.008	80	2.59%	1.92%	99.456	85.586	99.456	98.947	Achieved	None
272.64	173.073	173.073	39.961	41.076	41.076	80	2.59%	1.85%	99.566	85.656	99.566	99.04	Achieved	None
267.64	167.962	167.962	40.088	41.141	41.141	80	2.59%	1.79%	99.678	85.725	99.678	99.174	Achieved	None
262.64	162.851	162.851	40.219	41.201	41.201	80	2.58%	1.73%	99.789	85.795	99.789	99.363	Achieved	None
257.64	157.739	157.739	40.351	41.26	41.26	80	2.52%	1.66%	99.901	85.865	99.901	99.589	Achieved	None
252.64	152.626	152.626	40.472	41.324	41.324	80	2.46%	1.60%	100.013	85.935	100.013	99.816	Achieved	None
247.64	147.514	147.514	40.587	41.375	41.375	80	2.40%	1.54%	100.126	86.005	100.126	100.041	Achieved	None
242.64	142.4	142.4	40.701	41.421	41.421	80	2.33%	1.47%	100.239	86.076	100.239	100.264	Achieved	None
237.64	137.287	137.287	40.804	41.476	41.476	80	2.27%	1.41%	100.353	86.146	100.353	100.483	Achieved	None
232.64	132.173	132.173	40.9	41.531	41.531	80	2.21%	1.35%	100.467	86.217	100.467	100.698	Achieved	None
227.64	127.059	127.059	41.01	41.578	41.578	80	2.14%	1.28%	100.581	86.288	100.581	100.906	Achieved	None
222.64	121.944	121.944	41.12	41.611	41.611	80	2.08%	1.22%	100.695	86.36	100.695	101.072	Achieved	None
217.64	116.829	116.829	41.227	41.666	41.666	80	2.02%	1.16%	100.81	86.431	100.81	101.192	Achieved	None
212.64	111.714	111.714	41.33	41.713	41.713	80	1.95%	1.10%	100.926	86.503	100.926	101.286	Achieved	None
207.64	106.598	106.598	41.43	41.749	41.749	80	1.89%	1.03%	101.042	86.574	101.042	101.342	Achieved	None
202.64	101.482	101.482	41.524	41.783	41.783	80	1.83%	0.97%	101.158	86.646	101.158	101.406	Achieved	None
197.64	96.365	96.365	41.612	41.82	41.82	80	1.76%	0.91%	101.274	86.719	101.274	101.474	Achieved	None
192.64	91.248	91.248	41.698	41.854	41.854	80	1.70%	0.84%	101.391	86.791	101.391	101.546	Achieved	None
187.64	86.131	86.131	41.775	41.883	41.883	80	1.64%	0.78%	101.509	86.864	101.509	101.621	Achieved	None
182.64	81.013	81.013	41.847	41.907	41.907	80	1.57%	0.72%	101.627	86.936	101.627	101.697	Achieved	None
177.64	75.9	75.9	41.915	41.921	41.921	80	1.51%	0.66%	101.74	87.006	101.74	101.769	Achieved	None
172.64	70.794	70.794	41.982	41.934	41.934	80	1.45%	0.60%	101.846	87.072	101.846	101.831	Achieved	None
167.64	65.696	65.696	42.045	41.948	41.948	80	1.39%	0.55%	101.943	87.132	101.943	101.865	Achieved	None
162.64	60.607	60.607	42.103	41.965	41.965	80	1.32%	0.50%	102.033	87.187	102.033	101.835	Achieved	None
157.64	55.526	55.526	42.161	41.987	41.987	80	1.26%	0.46%	102.114	87.237	102.114	101.813	Achieved	None

Sight Visibility Report
Richmond Road Northbound MC10

Report Created: Tuesday, 20 January 2026
Time: 6:36:57 PM

Settings File: c:\pw_work\aurecon-au-pw-13\dms43463\AustRoads 2016 Sight Visibility Equations and Tables.xml
Equation Setting: AustRoads 2016 CAR SSD RT=1.5s d=0.36
Sight Visibility Section: Sight Visibility
Calculation Method: AustralianSSD

Standard Variables

Control Reference: MC10_ALG
Design Surface: MC10 SSD TERRAIN
Existing Surface:
Reaction Time: 1.5
Rounding Multiple: 0
Move Target to Achieve: Off
Eye Reference: OBJECT + EYE HEIGHT
Object Reference: OBJECT + EYE HEIGHT
Eye Interval: 5
Object Interval: Not Used
Eye Offset: 0
Object Offset: 0
Eye Height: 1.1
Object Height: 0.2

Method Variables

Coefficient of Deceleration: 0.36
Max Coeff of Deceleration: 0.46

Eye Position	Actual End Position	Object Position	Eye Level	Actual End Level	Object Level	Design Speed	Instant Grade	Average Grade	Required Distance	Relaxed Distance	Achieved Distance	Achieved Chord Distance	Status	Surface Intersect
15	118.893	118.893	43.065	41.76	41.76	80	-0.33%	-0.46%	103.893	88.327	103.893	103.711	Achieved	None
20	123.918	123.918	43.047	41.745	41.745	80	-0.33%	-0.47%	103.918	88.342	103.918	103.755	Achieved	None
25	128.94	128.94	43.032	41.698	41.698	80	-0.33%	-0.48%	103.94	88.355	103.94	103.8	Achieved	None
30	133.96	133.96	43.012	41.667	41.667	80	-0.33%	-0.49%	103.96	88.367	103.96	103.843	Achieved	None
35	138.978	138.978	42.989	41.637	41.637	80	-0.33%	-0.50%	103.978	88.379	103.978	103.885	Achieved	None
40	143.994	143.994	42.967	41.6	41.6	80	-0.33%	-0.51%	103.994	88.388	103.994	103.924	Achieved	None
45	149.008	149.008	42.955	41.555	41.555	80	-0.35%	-0.52%	104.008	88.397	104.008	103.959	Achieved	None
50	154.028	154.028	42.937	41.524	41.524	80	-0.36%	-0.53%	104.028	88.408	104.028	103.981	Achieved	None
55	159.058	159.058	42.912	41.492	41.492	80	-0.38%	-0.54%	104.058	88.427	104.058	104.011	Achieved	None
60	164.1	164.1	42.894	41.463	41.463	80	-0.39%	-0.56%	104.1	88.452	104.1	104.056	Achieved	None
65	169.153	169.153	42.874	41.428	41.428	80	-0.41%	-0.59%	104.153	88.485	104.153	104.125	Achieved	None
70	174.217	174.217	42.856	41.379	41.379	80	-0.42%	-0.62%	104.217	88.524	104.217	104.204	Achieved	None
75	179.293	179.293	42.838	41.333	41.333	80	-0.44%	-0.66%	104.293	88.57	104.293	104.294	Achieved	None
80	184.381	184.381	42.815	41.282	41.282	80	-0.45%	-0.70%	104.381	88.623	104.381	104.396	Achieved	None
85	189.483	189.483	42.789	41.223	41.223	80	-0.47%	-0.75%	104.483	88.685	104.483	104.512	Achieved	None
90	194.598	194.598	42.756	41.154	41.154	80	-0.48%	-0.81%	104.598	88.755	104.598	104.651	Achieved	None
95	199.728	199.728	42.738	41.082	41.082	80	-0.50%	-0.87%	104.728	88.834	104.728	104.814	Achieved	None
100	204.872	204.872	42.71	41.003	41.003	80	-0.51%	-0.94%	104.872	88.921	104.872	104.992	Achieved	None
105	210.03	210.03	42.68	40.933	40.933	80	-0.53%	-1.02%	105.03	89.016	105.03	105.18	Achieved	None
110	215.202	215.202	42.667	40.848	40.848	80	-0.54%	-1.10%	105.202	89.121	105.202	105.374	Achieved	None
115	220.389	220.389	42.665	40.755	40.755	80	-0.54%	-1.19%	105.389	89.234	105.389	105.564	Achieved	None
120	225.586	225.586	42.65	40.663	40.663	80	-0.54%	-1.29%	105.586	89.352	105.586	105.747	Achieved	None
125	230.784	230.784	42.64	40.56	40.56	80	-0.54%	-1.38%	105.784	89.472	105.784	105.93	Achieved	None
130	235.984	235.984	42.589	40.461	40.461	80	-0.54%	-1.48%	105.984	89.592	105.984	106.114	Achieved	None
135	241.184	241.184	42.558	40.344	40.344	80	-0.54%	-1.57%	106.184	89.712	106.184	106.297	Achieved	None
140	246.385	246.385	42.53	40.224	40.224	80	-0.54%	-1.67%	106.385	89.833	106.385	106.48	Achieved	None
145	251.577	251.577	42.494	40.104	40.104	80	-0.54%	-1.75%	106.577	89.948	106.577	106.653	Achieved	None
150	256.756	256.756	42.448	39.984	39.984	80	-0.57%	-1.84%	106.756	90.055	106.756	106.814	Achieved	None
155	261.92	261.92	42.417	39.865	39.865	80	-0.66%	-1.91%	106.92	90.153	106.92	106.971	Achieved	None
160	267.072	267.072	42.388	39.746	39.746	80	-0.76%	-1.98%	107.072	90.244	107.072	107.115	Achieved	None
165	272.209	272.209	42.357	39.627	39.627	80	-0.85%	-2.05%	107.209	90.326	107.209	107.245	Achieved	None
170	277.332	277.332	42.32	39.509	39.509	80	-0.95%	-2.10%	107.332	90.399	107.332	107.361	Achieved	None
175	282.441	282.441	42.272	39.396	39.396	80	-1.04%	-2.15%	107.441	90.464	107.441	107.464	Achieved	None
180	287.508	287.508	42.227	39.296	39.296	80	-1.14%	-2.18%	107.508	90.504	107.508	107.525	Achieved	None
185	292.534	292.534	42.175	39.197	39.197	80	-1.23%	-2.19%	107.534	90.519	107.534	107.543	Achieved	None
190	297.545	297.545	42.117	39.105	39.105	80	-1.33%	-2.20%	107.545	90.526	107.545	107.553	Achieved	None
195	302.544	302.544	42.049	39.006	39.006	80	-1.42%	-2.20%	107.544	90.525	107.544	107.544	Achieved	None
200	307.546	307.546	41.978	38.911	38.911	80	-1.51%	-2.20%	107.546	90.526	107.546	107.53	Achieved	None
205	312.541	312.541	41.901	38.811	38.811	80	-1.61%	-2.20%	107.541	90.524	107.541	107.508	Achieved	None
210	317.523	317.523	41.834	38.704	38.704	80	-1.70%	-2.19%	107.523	90.513	107.523	107.471	Achieved	None
215	322.497	322.497	41.752	38.597	38.597	80	-1.80%	-2.18%	107.497	90.497	107.497	107.428	Achieved	None
220	327.472	327.472	41.661	38.49	38.49	80	-1.89%	-2.17%	107.472	90.482	107.472	107.394	Achieved	None
225	332.446	332.446	41.574	38.383	38.383	80	-1.99%	-2.15%	107.446	90.467	107.446	107.369	Achieved	None
230	337.421	337.421	41.476	38.276	38.276	80	-2.08%	-2.14%	107.421	90.452	107.421	107.344	Achieved	None
235	342.396	342.396	41.383	38.169	38.169	80	-2.18%	-2.13%	107.396	90.437	107.396	107.319	Achieved	None
240	347.37	347.37	41.271	38.062	38.062	80	-2.27%	-2.12%	107.37	90.422	107.37	107.295	Achieved	None
245	352.345	352.345	41.156	37.956	37.956	80	-2.31%	-2.11%	107.345	90.407	107.345	107.271	Achieved	None
250	357.338	357.338	41.041	37.848	37.848	80	-2.31%	-2.11%	107.338	90.402	107.338	107.265	Achieved	None
255	362.365	362.365	40.925	37.74	37.74	80	-2.31%	-2.12%	107.365	90.418	107.365	107.294	Achieved	None
260	367.394	367.394	40.809	37.631	37.631	80	-2.31%	-2.13%	107.394	90.436	107.394	107.329	Achieved	None
265	372.421	372.421	40.694	37.522	37.522	80	-2.31%	-2.14%	107.421	90.452	107.421	107.371	Achieved	None
270	377.434	377.434	40.578	37.414	37.414	80	-2.31%	-2.15%	107.434	90.46	107.434	107.406	Achieved	None
275	382.434	382.434	40.463	37.306	37.306	80	-2.31%	-2.15%	107.434	90.46	107.434	107.427	Achieved	None
280	387.434	387.434	40.348	37.198	37.198	80	-2.20%	-2.15%	107.434	90.46	107.434	107.448	Achieved	None
285	392.434	392.434	40.245	37.09	37.09	80	-1.96%	-2.15%	107.434	90.46	107.434	107.467	Achieved	None
290	397.434	397.434	40.147	36.984	36.984	80	-1.96%	-2.15%	107.434	90.46	107.434	107.486	Achieved	None
295	402.427	402.427	40.049	36.889	36.889	80	-1.96%	-2.15%	107.427	90.455	107.427	107.494	Achieved	None

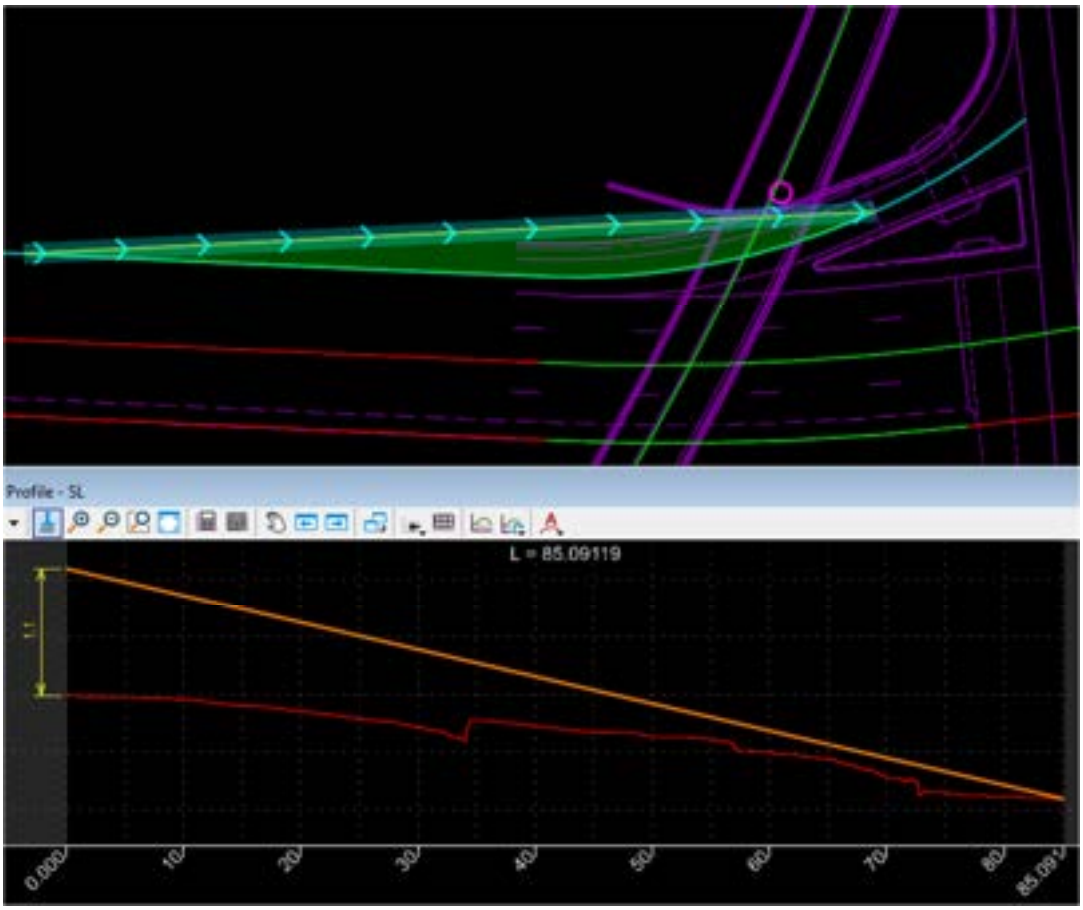
300	407.381	407.381	39.956	36.809	36.809	80	-2.07%	-2.12%	107.381	90.428	107.381	107.456	Achieved	None
305	412.292	412.292	39.858	36.74	36.74	80	-2.15%	-2.08%	107.292	90.375	107.292	107.375	Achieved	None
310	417.162	417.162	39.758	36.688	36.688	80	-2.15%	-2.03%	107.162	90.298	107.162	107.251	Achieved	None
315	421.991	421.991	39.658	36.647	36.647	80	-2.15%	-1.95%	106.991	90.195	106.991	107.084	Achieved	None
320	426.778	426.778	39.551	36.62	36.62	80	-2.15%	-1.85%	106.778	90.068	106.778	106.876	Achieved	None
325	431.526	431.526	39.443	36.604	36.604	80	-2.15%	-1.73%	106.526	89.917	106.526	106.628	Achieved	None
330	436.234	436.234	39.336	36.602	36.602	80	-2.15%	-1.59%	106.234	89.742	106.234	106.339	Achieved	None
335	440.904	440.904	39.228	36.611	36.611	80	-2.15%	-1.44%	105.904	89.544	105.904	106.013	Achieved	None
340	445.537	445.537	39.121	36.633	36.633	80	-2.15%	-1.26%	105.537	89.323	105.537	105.649	Achieved	None
345	450.134	450.134	39.013	36.665	36.665	80	-2.15%	-1.07%	105.134	89.079	105.134	105.25	Achieved	None
350	454.696	454.696	38.906	36.701	36.701	80	-2.15%	-0.86%	104.696	88.814	104.696	104.816	Achieved	None
355	459.231	459.231	38.798	36.742	36.742	80	-2.15%	-0.63%	104.231	88.532	104.231	104.357	Achieved	None
360	463.769	463.769	38.691	36.788	36.788	80	-2.15%	-0.40%	103.769	88.251	103.769	103.901	Achieved	None
365	468.316	468.316	38.583	36.831	36.831	80	-2.15%	-0.17%	103.316	87.974	103.316	103.455	Achieved	None
370	472.9	472.9	38.474	36.875	36.875	80	-2.15%	0.05%	102.9	87.72	102.9	103.049	Achieved	None
375	477.548	477.548	38.366	36.912	36.912	80	-2.15%	0.23%	102.548	87.504	102.548	102.698	Achieved	None
380	482.264	482.264	38.258	36.943	36.943	80	-2.15%	0.38%	102.264	87.329	102.264	102.412	Achieved	None
385	487.046	487.046	38.15	36.962	36.962	80	-2.15%	0.49%	102.046	87.195	102.046	102.191	Achieved	None
390	491.892	491.892	38.043	36.969	36.969	80	-2.15%	0.57%	101.892	87.1	101.892	102.038	Achieved	None
395	496.802	496.802	37.935	36.974	36.974	80	-2.15%	0.62%	101.802	87.045	101.802	101.948	Achieved	None
400	501.775	501.775	37.833	36.969	36.969	80	-1.91%	0.64%	101.775	87.028	101.775	101.921	Achieved	None
405	506.812	506.812	37.745	36.959	36.959	80	-1.63%	0.62%	101.812	87.051	101.812	101.957	Achieved	None
410	511.911	511.911	37.67	36.937	36.937	80	-1.36%	0.56%	101.911	87.112	101.911	102.057	Achieved	None
415	517.075	517.075	37.609	36.906	36.906	80	-1.09%	0.48%	102.075	87.213	102.075	102.221	Achieved	None
420	522.303	522.303	37.562	36.862	36.862	80	-0.81%	0.36%	102.303	87.354	102.303	102.449	Achieved	None
425	527.595	527.595	37.528	36.808	36.808	80	-0.54%	0.21%	102.595	87.533	102.595	102.74	Achieved	None
430	532.922	532.922	37.508	36.742	36.742	80	-0.27%	0.04%	102.922	87.734	102.922	103.067	Achieved	None
435	538.259	538.259	37.501	36.671	36.671	80	0.01%	-0.14%	103.259	87.939	103.259	103.403	Achieved	None
440	543.598	543.598	37.508	36.601	36.601	80	0.28%	-0.31%	103.598	88.146	103.598	103.742	Achieved	None
445	548.922	548.922	37.529	36.531	36.531	80	0.56%	-0.47%	103.922	88.344	103.922	104.066	Achieved	None
450	554.22	554.22	37.564	36.461	36.461	80	0.83%	-0.62%	104.22	88.525	104.22	104.364	Achieved	None
455	559.491	559.491	37.603	36.392	36.392	80	1.10%	-0.76%	104.491	88.69	104.491	104.634	Achieved	None
460	564.716	564.716	37.651	36.332	36.332	80	1.13%	-0.87%	104.716	88.827	104.716	104.86	Achieved	None
465	569.889	569.889	37.699	36.282	36.282	80	1.13%	-0.95%	104.889	88.931	104.889	105.033	Achieved	None
470	575.008	575.008	37.746	36.241	36.241	80	1.13%	-1.01%	105.008	89.003	105.008	105.151	Achieved	None
475	580.072	580.072	37.792	36.21	36.21	80	1.00%	-1.04%	105.072	89.042	105.072	105.216	Achieved	None
480	585.082	585.082	37.828	36.188	36.188	80	0.79%	-1.04%	105.082	89.048	105.082	105.226	Achieved	None
485	590.038	590.038	37.854	36.173	36.173	80	0.59%	-1.02%	105.038	89.021	105.038	105.183	Achieved	None
490	594.939	594.939	37.869	36.167	36.167	80	0.39%	-0.98%	104.939	88.961	104.939	105.086	Achieved	None
495	599.786	599.786	37.875	36.17	36.17	80	0.18%	-0.90%	104.786	88.869	104.786	104.934	Achieved	None
500	604.58	604.58	37.87	36.18	36.18	80	-0.02%	-0.80%	104.58	88.744	104.58	104.72	Achieved	None
505	609.34	609.34	37.864	36.199	36.199	80	-0.23%	-0.68%	104.34	88.598	104.34	104.473	Achieved	None
510	614.077	614.077	37.847	36.224	36.224	80	-0.43%	-0.55%	104.077	88.439	104.077	104.205	Achieved	None
515	618.793	618.793	37.821	36.258	36.258	80	-0.64%	-0.41%	103.793	88.266	103.793	103.915	Achieved	None
520	623.504	623.504	37.784	36.293	36.293	80	-0.84%	-0.26%	103.504	88.09	103.504	103.622	Achieved	None
525	628.218	628.218	37.737	36.329	36.329	80	-1.04%	-0.12%	103.218	87.915	103.218	103.332	Achieved	None
530	632.947	632.947	37.68	36.364	36.364	80	-1.25%	0.02%	102.947	87.749	102.947	103.057	Achieved	None
535	637.701	637.701	37.614	36.4	36.4	80	-1.32%	0.15%	102.701	87.598	102.701	102.808	Achieved	None
540	642.481	642.481	37.548	36.436	36.436	80	-1.32%	0.26%	102.481	87.463	102.481	102.584	Achieved	None
545	647.3	647.3	37.482	36.468	36.468	80	-1.32%	0.36%	102.3	87.352	102.3	102.399	Achieved	None
550	652.163	652.163	37.417	36.494	36.494	80	-1.32%	0.43%	102.163	87.267	102.163	102.256	Achieved	None
555	657.068	657.068	37.351	36.513	36.513	80	-1.32%	0.48%	102.068	87.209	102.068	102.156	Achieved	None
560	662.016	662.016	37.286	36.524	36.524	80	-1.22%	0.51%	102.016	87.177	102.016	102.097	Achieved	None
565	667.007	667.007	37.229	36.529	36.529	80	-1.05%	0.51%	102.007	87.171	102.007	102.08	Achieved	None
570	672.04	672.04	37.181	36.527	36.527	80	-0.88%	0.50%	102.04	87.191	102.04	102.104	Achieved	None
575	677.115	677.115	37.141	36.517	36.517	80	-0.71%	0.46%	102.115	87.238	102.115	102.17	Achieved	None
580	682.233	682.233	37.11	36.5	36.5	80	-0.53%	0.39%	102.233	87.31	102.233	102.278	Achieved	None
585	687.394	687.394	37.088	36.474	36.474	80	-0.36%	0.31%	102.394	87.41	102.394	102.428	Achieved	None
590	692.587	692.587	37.073	36.44	36.44	80	-0.19%	0.21%	102.587	87.528	102.587	102.609	Achieved	None
595	697.8	697.8	37.067	36.398	36.398	80	-0.02%	0.10%	102.8	87.659	102.8	102.811	Achieved	None
600	703.034	703.034	37.07	36.35	36.35	80	0.16%	-0.02%	103.034	87.802	103.034	103.034	Achieved	None
605	708.275	708.275	37.081	36.298	36.298	80	0.33%	-0.15%	103.275	87.949	103.275	103.275	Achieved	None
610	713.517	713.517	37.101	36.245	36.245	80	0.50%	-0.27%	103.517	88.097	103.517	103.517	Achieved	None
615	718.749	718.749	37.13	36.193	36.193	80	0.67%	-0.39%	103.749	88.239	103.749	103.749	Achieved	None
620	723.962	723.962	37.167	36.141	36.141	80	0.75%	-0.49%	103.962	88.369	103.962	103.962	Achieved	None
625	729.156	729.156	37.204	36.089	36.089	80	0.75%	-0.59%	104.156	88.487	104.156	104.156	Achieved	None
630	734.331	734.331	37.242	36.037	36.037	80	0.75%	-0.68%	104.331	88.593	104.331	104.331	Achieved	None
635	739.485	739.485	37.28	35.986	35.986	80	0.75%	-0.75%	104.485	88.686	104.485	104.481	Achieved	None
640	744.619	744.619	37.317	35.935	35.935	80	0.75%	-0.82%	104.619	88.768	104.619	104.609	Achieved	None
645	749.733	749.733	37.353	35.884	35.884	80	0.67%	-0.87%	104.733	88.837	104.733	104.716	Achieved	None
650	754.826	754.826	37.383	35.833	35.833	80	0.52%	-0.92%	104.826	88.893	104.826	104.803	Achieved	None
655	759.898	759.898	37.406	35.782	35.782	80	0.38%	-0.96%	104.898	88.937	104.898	104.868	Achieved	None
660	764.949	764.949	37.421	35.732	35.732	80	0.23%	-0.98%	104.949	88.967	104.949	104.913	Achieved	None
665	769.979	769.979	37.429	35.681	35.681	80	0.08%	-0.99%	104.979	88.986	104.979	104.936	Achieved	None
670	774.988	774.988	37.429	35.631	35.631	80	-0.06%	-1.00%	104.988	88.991	104.988	104.938	Achieved	None
675	779.988	779.988	37.422	35.581	35.581	80	-0.21%	-1.00%	104.988	88.991	104.988	104.931	Achieved	None
680	784.988	784.988	37.408	35.532	35.532	80	-0.35%	-1.00%	104.988	88.991	104.988	104.923	Achieved	None
685	789.988	789.988	37.387	35.482	35.482	80	-0.50%	-1.00%	104.988	88.991	104.988	104.916	Achieved	None
690	794.988	794.988	37.359	35.432	35.432	80	-0.65%	-1.00%	104.988	88.991	104.988	104.908	Achieved	None
695	799.979	799.979	37.323	35.388	35.388	80	-0.79%	-0.99%	104.979	88.986	104.979	104.891	Achieved	None
700	804.941	804.941	37.279	35.354	35.354	80	-0.94%	-0.98%	104.941	88.963	104.941	104.845	Achieved	None
705	809.872	809.872	37.23	35.332	35.332	80	-1.00%	-0.94%	104.872	88.921	104.872	104.768	Achieved	None
710	814.772	814.772	37.18	35.319	35.319	80	-1.00%	-0.89%	104.772	88.86	104.772	104.661	Achieved	None
715	819.642	819.642	37.13	35.317	35.317	80	-1.00%	-0.83%	104.642	88.782	104.642	104.523	Achieved	None
720	824.482	824.482	37.08	35.325	35.325	80	-1.00%	-0.75%	104.482	88.685	104.482	104.356	Achieved	None
725	829.293	829.293	37.031	35.343	35.343	80	-1.00%	-0.66%	104.293	88.57	104.293	104.16	Achieved	None
730	834.075	834.075	36.981	35.371	35.371	80	-1.00%	-0.55%	104.075	88.437	104.075	103.935	Achieved	None
735	838.829	838.829	36.931	35.408	35.408	80	-1.00%	-0.43%	103.829	88.287	103.829	103.683	Achieved	None
740	843.554	843.554	36.881	35.453	35.453	80	-1.00%	-0.29%	103.554	88.12	103.554	103.408	Achieved	None
745	848.253	848.253	36.831	35.509	35.509	80	-1.00%	-0.13%	103.253	87.936	103.253	103.113	Achieved	None
750	852.925	852.925	36.781	35.581	35.581	80	-1.00%	0.03%	102.925	87.735	102.925	102.792	Achieved	None
755	857.571	857.571	36.731	35.657	35.657	80	-1.00%	0.22%	102.571	87.518	102.571	102.446	Achieved	None
760	862.192	862.192	36.681	35.748	35.748	80	-1.00%	0.42%	102.192	87.285	102.192	102.075	Achieved	None
765	866.794	866.794	36.631	35.85	35.85	80	-1.00%	0.63%	101.794	87.04	101.794	101.684	Achieved	None
770	871.397	871.397	36.581	35.956	35.956	80	-1.00%	0.84%	101.397	86.795	101.397	101.295	Achieved	None
775	876.005	876.005	36.531	36.076	36.076	80	-1.00%	1.05%	101.005	86.552	101.005	100.911	Achieved	None
780	880.618	880.618	36.481	36.203	36.203	80	-1.00%	1.26%	100.618	86.311	100.618	100.532	Achieved	None

785	885.235	885.235	36.431	36.336	36.336	80	-1.00%	1.48%	100.235	86.073	100.235	100.156	Achieved	None
790	889.856	889.856	36.382	36.482	36.482	80	-1.00%	1.69%	99.856	85.837	99.856	99.785	Achieved	None
795	894.481	894.481	36.332	36.636	36.636	80	-0.99%	1.90%	99.481	85.602	99.481	99.418	Achieved	None
800	899.111	899.111	36.288	36.799	36.799	80	-0.78%	2.11%	99.111	85.37	99.111	99.056	Achieved	None
805	903.752	903.752	36.254	36.97	36.97	80	-0.56%	2.32%	98.752	85.145	98.752	98.704	Achieved	None
810	908.421	908.421	36.231	37.14	37.14	80	-0.35%	2.52%	98.421	84.937	98.421	98.391	Achieved	None
815	913.119	913.119	36.219	37.311	37.311	80	-0.14%	2.69%	98.119	84.746	98.119	98.11	Achieved	None
820	917.845	917.845	36.218	37.483	37.483	80	0.08%	2.86%	97.845	84.573	97.845	97.856	Achieved	None
825	922.598	922.598	36.227	37.657	37.657	80	0.29%	3.01%	97.598	84.416	97.598	97.628	Achieved	None
830	927.377	927.377	36.246	37.833	37.833	80	0.50%	3.14%	97.377	84.276	97.377	97.425	Achieved	None
835	932.182	932.182	36.276	38.009	38.009	80	0.71%	3.26%	97.182	84.152	97.182	97.247	Achieved	None
840	937.013	937.013	36.317	38.187	38.187	80	0.92%	3.36%	97.013	84.045	97.013	97.093	Achieved	None
845	941.881	941.881	36.369	38.366	38.366	80	1.14%	3.44%	96.881	83.961	96.881	96.972	Achieved	None
850	946.79	946.79	36.431	38.543	38.543	80	1.35%	3.50%	96.79	83.903	96.79	96.887	Achieved	None
855	951.738	951.738	36.513	38.714	38.714	80	1.56%	3.53%	96.738	83.87	96.738	96.84	Achieved	None
860	956.725	956.725	36.606	38.881	38.881	80	1.77%	3.54%	96.725	83.862	96.725	96.831	Achieved	None
865	961.753	961.753	36.709	39.042	39.042	80	1.99%	3.52%	96.753	83.879	96.753	96.861	Achieved	None
870	966.819	966.819	36.823	39.198	39.198	80	2.20%	3.48%	96.819	83.922	96.819	96.93	Achieved	None
875	971.922	971.922	36.948	39.347	39.347	80	2.41%	3.42%	96.922	83.987	96.922	97.035	Achieved	None
880	977.044	977.044	37.083	39.49	39.49	80	2.62%	3.34%	97.044	84.065	97.044	97.158	Achieved	None
885	982.181	982.181	37.229	39.626	39.626	80	2.84%	3.26%	97.181	84.152	97.181	97.299	Achieved	None
890	987.335	987.335	37.386	39.756	39.756	80	3.05%	3.17%	97.335	84.25	97.335	97.457	Achieved	None
895	992.505	992.505	37.552	39.878	39.878	80	3.26%	3.06%	97.505	84.358	97.505	97.632	Achieved	None
900	997.693	997.693	37.729	39.994	39.994	80	3.47%	2.95%	97.693	84.476	97.693	97.824	Achieved	None
905	1002.897	1002.897	37.915	40.102	40.102	80	3.67%	2.83%	97.897	84.605	97.897	98.037	Achieved	None
910	1008.119	1008.119	38.098	40.204	40.204	80	3.67%	2.69%	98.119	84.745	98.119	98.254	Achieved	None
915	1013.348	1013.348	38.28	40.298	40.298	80	3.67%	2.56%	98.348	84.89	98.348	98.477	Achieved	None
920	1018.58	1018.58	38.462	40.385	40.385	80	3.67%	2.42%	98.58	85.036	98.58	98.703	Achieved	None
925	1047.161	1047.161	38.646	40.729	40.729	90	3.67%	1.89%	122.161	104.588	122.161	122.193	Achieved	None
930	1052.464	1052.464	38.829	40.768	40.768	90	3.67%	1.76%	122.464	104.777	122.464	122.495	Achieved	None
935	1057.769	1057.769	39.013	40.799	40.799	90	3.67%	1.62%	122.769	104.968	122.769	122.798	Achieved	None
940	1063.077	1063.077	39.197	40.823	40.823	90	3.67%	1.48%	123.077	105.16	123.077	123.104	Achieved	None
945	1068.387	1068.387	39.379	40.84	40.84	90	3.59%	1.35%	123.387	105.353	123.387	123.412	Achieved	None
950	1073.699	1073.699	39.555	40.848	40.848	90	3.46%	1.21%	123.699	105.547	123.699	123.723	Achieved	None
955	1079.013	1079.013	39.725	40.849	40.849	90	3.32%	1.08%	124.013	105.742	124.013	124.035	Achieved	None
960	1084.33	1084.33	39.887	40.843	40.843	90	3.18%	0.94%	124.33	105.938	124.33	124.35	Achieved	None
965	1089.649	1089.649	40.043	40.828	40.828	90	3.05%	0.80%	124.649	106.136	124.649	124.667	Achieved	None
970	1094.97	1094.97	40.192	40.806	40.806	90	2.91%	0.67%	124.97	106.334	124.97	124.987	Achieved	None
975	1100.294	1100.294	40.334	40.776	40.776	90	2.78%	0.53%	125.294	106.534	125.294	125.309	Achieved	None
980	1105.62	1105.62	40.469	40.739	40.739	90	2.64%	0.40%	125.62	106.735	125.62	125.633	Achieved	None
985	1110.949	1110.949	40.598	40.695	40.695	90	2.50%	0.26%	125.949	106.937	125.949	125.966	Achieved	None
990	1116.28	1116.28	40.72	40.643	40.643	90	2.37%	0.12%	126.28	107.14	126.28	126.302	Achieved	None
995	1121.614	1121.614	40.835	40.584	40.584	90	2.23%	-0.01%	126.614	107.345	126.614	126.637	Achieved	None
1000	1126.95	1126.95	40.943	40.517	40.517	90	2.10%	-0.15%	126.95	107.55	126.95	126.966	Achieved	None
1005	1132.289	1132.289	41.044	40.443	40.443	90	1.96%	-0.29%	127.289	107.757	127.289	127.303	Achieved	None
1010	1137.63	1137.63	41.139	40.359	40.359	90	1.82%	-0.42%	127.63	107.965	127.63	127.644	Achieved	None
1015	1142.974	1142.974	41.227	40.267	40.267	90	1.69%	-0.56%	127.974	108.175	127.974	127.989	Achieved	None
1020	1148.32	1148.32	41.308	40.168	40.168	90	1.55%	-0.69%	128.32	108.385	128.32	128.34	Achieved	None
1025	1153.658	1153.658	41.382	40.067	40.067	90	1.42%	-0.82%	128.658	108.59	128.658	128.684	Achieved	None
1030	1158.979	1158.979	41.449	39.965	39.965	90	1.28%	-0.95%	128.979	108.784	128.979	129.013	Achieved	None
1035	1164.282	1164.282	41.51	39.864	39.864	90	1.14%	-1.06%	129.282	108.968	129.282	129.326	Achieved	None
1040	1169.567	1169.567	41.563	39.761	39.761	90	1.01%	-1.17%	129.567	109.14	129.567	129.621	Achieved	None
1045	1174.834	1174.834	41.61	39.652	39.652	90	0.87%	-1.27%	129.834	109.301	129.834	129.898	Achieved	None
1050	1180.082	1180.082	41.651	39.544	39.544	90	0.74%	-1.37%	130.082	109.451	130.082	130.155	Achieved	None

Approach Sight Distance (ASD)

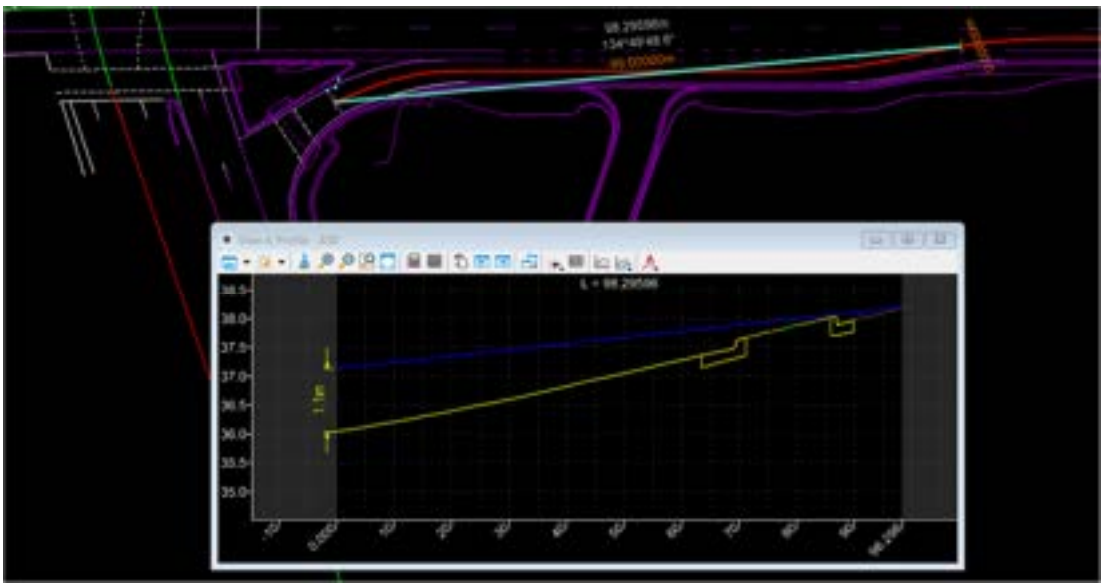
Rooty Hill Road North NB left turn – MCC0

- Eye height (1.1m) to object height (0m)
- Reaction time: 1.5 sec
- Coefficient of deceleration: 0.36
- a = -1.8%
- 70 km/h= 86m
- Sight achieved



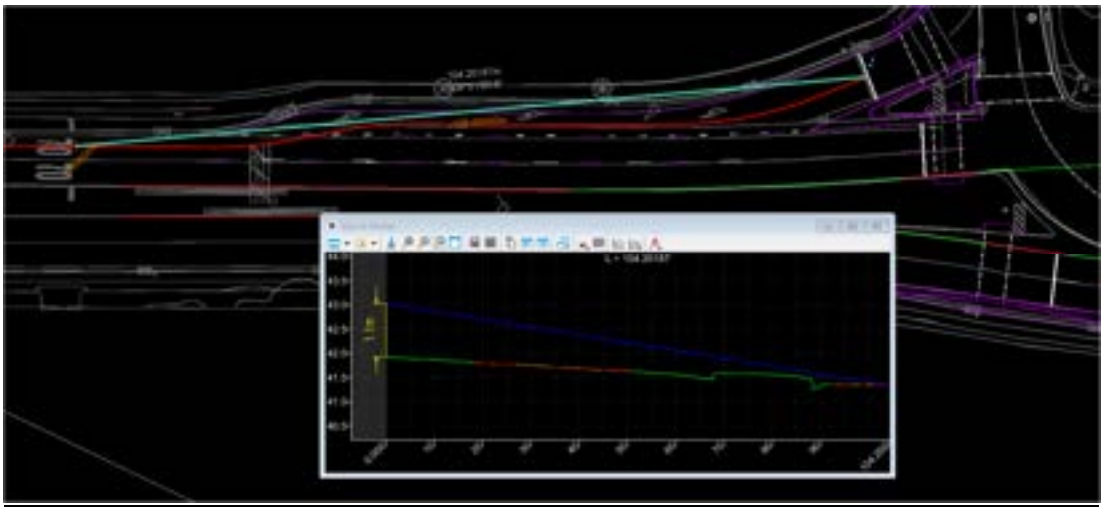
Richmond Road EB left turn - MC20

- Eye height (1.1m) to object height (0m)
- Reaction time: 1.5 sec
- Coefficient of deceleration: 0.36
- a = 2.7%
- 80 km/h= 99m
- Sight achieved



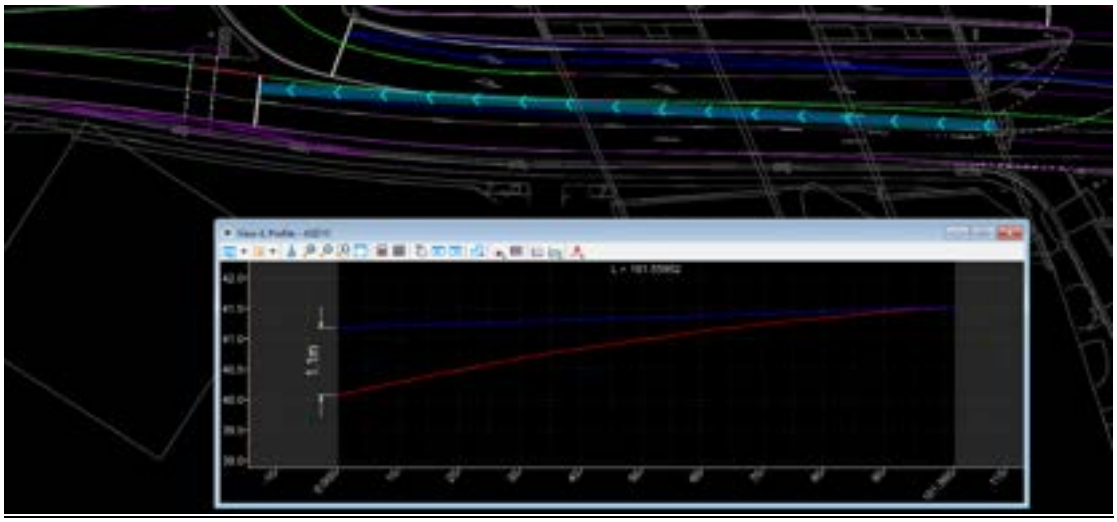
Richmond Road WB left turn - MC10

- Eye height (1.1m) to object height (0m)
- Reaction time: 1.5 sec
- Coefficient of deceleration: 0.36
- a = -0.42%
- 80 km/h= 105m
- Sight achieved



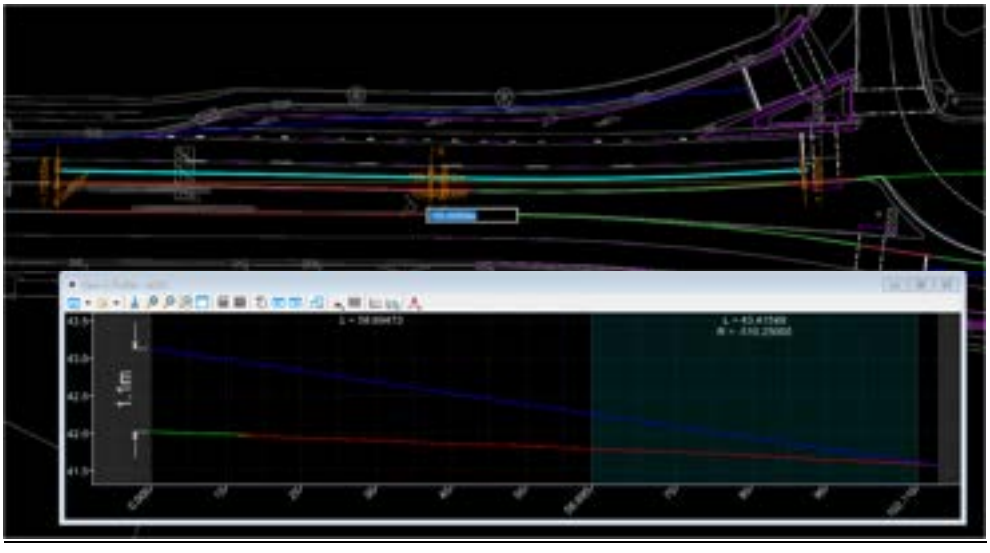
Richmond Road SB – MC20

- Eye height (1.1m) to object height (0m)
- Reaction time: 1.5 sec
- Coefficient of deceleration: 0.36
- a = 1.22%
- 80 km/h= 102m
- Sight achieved



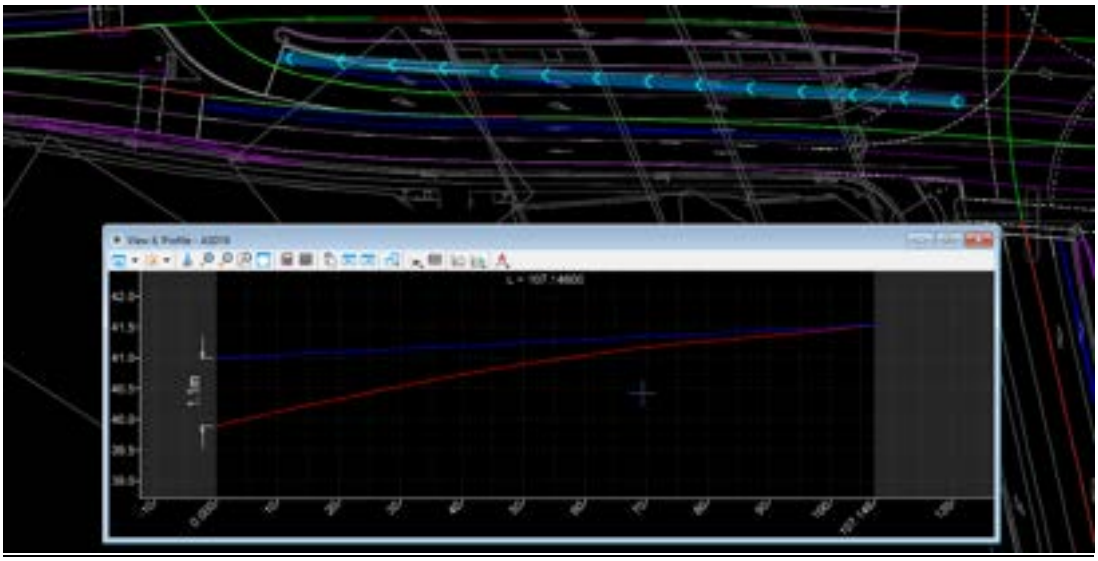
Richmond Road NB – MC10

- Eye height (1.1m) to object height (0m)
- Reaction time: 1.5 sec
- Coefficient of deceleration: 0.36
- a = -0.45%
- 80 km/h= 105m
- Sight achieved



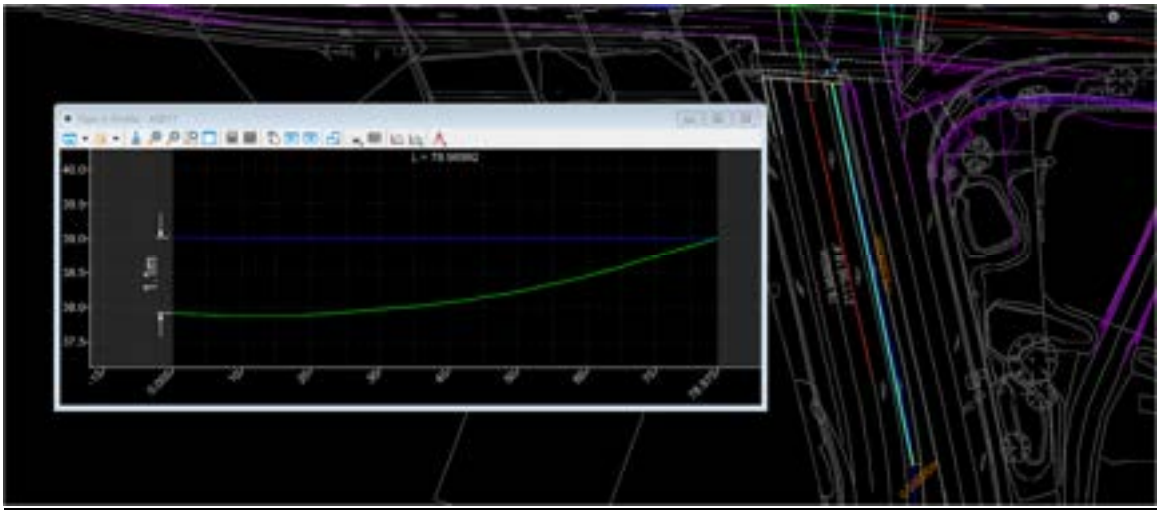
Richmond Road SB Entry Lane to M7 – MC20

- Eye height (1.1m) to object height (0m)
- Reaction time: 1.5 sec
- Coefficient of deceleration: 0.36
- a = -1.95%
- 80 km/h= 108m
- Sight achieved



Rooty Hill Road North WB – MCA0

- Eye height (1.1m) to object height (0m)
- Reaction time: 1.5 sec
- Coefficient of deceleration: 0.36
- a = 3%
- 70 km/h= 79m
- Sight achieved



Transport for New South Wales

Richmond Road Upgrade (M7 to Townson Road)

Contract number: 24.0000139271.1049

RW01 – Roadworks - Portion 2 (Southern Section) - Design Report

Design Stage: Developed Concept Design

Table of Contents

DOCUMENT CONTROL

Project Authorisation

REPORT DETAILS						
Report title	RW01 – Roadworks - Portion 2 (Southern Section) - Design Report					
Document number	RRM7-GEDT-0537-RW-RPT-010001					
Status	Developed Concept Design	**Client**	Transport for NSW			
REV	**DATE**	**REVISION DETAILS**	**AUTHOR**	**REVIEWER**	**VERIFIER**	**APPROVER**
A	13/02/2026	Developed Concept Design	Charlotte Cartwright	James Abraham	Chloe Williams (Civil Verifier) Vanessa Van Itallie (Geometric Design Verifier)	James Abraham
CURRENT REVISION	A	**LAST ISSUE DATE**				13 February 2026

APPROVAL			
Name	Charlotte Cartwright	**Name**	James Abraham
Title	Package Lead	**Title**	Design Manager

Control and records

This document will be signed and made available for all Project Personnel on the appropriate Electronic Document Management System.

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ABBREVIATIONS / DEFINITIONS

TERM	DESCRIPTION
ACC	Autodesk Construction Cloud
AEP	Annual Exceedance Probability
AGRD	Austroads Guide to Road Design
AGTM	Austroads Guide to Traffic Management
AHD	Australian Height Datum
AREF	Addendum REF
AS/NZS	Australian and New Zealand Standard
BNI	Blacktown Native Institute
BSR	Baseline Sustainability Requirements
CADD	Computer Aided Design and Drafting
CDR	Cross Discipline Review
Ch.	Chainage
CoA	Conditions for Approval
Competent	Competent means that a person has been deemed to meet the combination of licenses, qualifications, training and instruction as defined by the Company or by legal requirements for an activity or works
Concept Design	GEA DTI JV Concept Design developed during the RFT phase
Contractor	A person or business which provides goods or services to the Company under terms specified in a contract. GEA DTI JV is the Contractor for the WUC
Correspondence	Correspondence documents refer to letters sent to or received from other entities.
Council	Blacktown Council
Design Team	Aurecon
DCD	Developed Concept Design Stage
D&C	Design and Construct
DE	Digital Engineering
EDMS	Electronic Document Management System
Environmental documents	The documents set out in Schedule 28 of the Head Contract, which are the SWTC Appendix 4 and the Planning Approval
ER	Environmental Representative
FDD	Final Design Documentation
GEA DTI JV	Joint Venture between Gamuda Engineering Australia (GEA) and DT Infrastructure
Head Contract	Contract between Transport for New South Wales and GEA DTI JV for the Richmond Road Upgrade project.
IC	Independent Certifier
IFC	Issue for Construction
ITP	Inspection and Test Plan
ITS	Intelligent Transport System
LGA	Local Government Authority (Blacktown Council)
LiDAR	Light Detection and Ranging

TERM	DESCRIPTION
MASH	Manual for Assessing Safety Hardware
M7 Motorway	Westlink M7
NB	Northbound
NCR	Non-Conformance
NWGA	North West Growth Area
OH	Overhead
O&M	Operations and Maintenance
PDCS	Project Document Control System
PDG	Project Design Group
PE	Proof Engineer
PM	Project Manager
PMP	Project Management Plan
Principal	Transport for NSW (ABN 18 804 236 602)
Project	This Project, Richmond Road upgrade between M7 Motorway and Townson Road, Marsden Park
REF	Review of Environmental Factors
RFI	Request for Information
RFT	Request for Tender
RL	Reduced Level
RRM7	Richmond Road Upgrade (M7 to Townson Road)
RSA	Road Safety Audit
RSW	Reinforced Soil Wall
SB	Southbound
SDD	Substantial Detailed Design
Service	Any service or item of infrastructure, including water, electricity, gas, fuel, telephone, existing drainage, sewerage, railway, airport, stormwater, irrigation, street lighting, CCTV, industrial waste disposal and electronic communications service
SiD	Safety in Design
SME	Subject Matter Expert
SUP	Shared User Path
SWTC	Scope of Works and Technical Criteria (contained in Head Contract Exhibit A)
TCS	Traffic Control Signals
TfNSW	Transport for NSW, The Principal
TL	Test Level
Temporary Works	Any temporary physical structure, appliance or thing used or works done in the carrying out of the Contractor's Activities, but which does not form part of the Project Works or in-service loading. Design for Temporary Works includes design for construction configurations whether the design results in additional works being specified.
VE	Value Engineering
WAE	Works-as-Executed (also referred to as ‘As-Builts’)
WBS	Work Breakdown Structure

TERM	DESCRIPTION
WOL	Whole of Life
Workflow	Sequence of tasks or activities
WSO Co	Westlink M7 Operator
WUC	Works Under Contract

1 INTRODUCTION

1.1 Project description

The Richmond Road Upgrade (M7 to Townson Road) (RRM7 or the Project) is a critical infrastructure initiative designed to support the rapid growth of Sydney's North West Growth Area (NWGA). The NWGA is a planned development encompassing approximately 10,000 hectares and projected to house 250,000 people across 90,000 homes. This growth necessitates significant upgrades to the existing road network to accommodate increased traffic and freight demands.

Richmond Road serves as a vital arterial route connecting Blacktown through Marsden Park Industrial Precincts within the NWGA towards Windsor. While previous stages of the Richmond Road upgrade have been completed, further improvements are essential to address growing congestion and ensure future capacity.

The NSW Government, recognising the need for enhanced connectivity and improved traffic flow, has prioritised this project to achieve several key objectives:

- Easing congestion and improving travel times
- Enhancing traffic flow through key intersections
- Bolstering safety for all road users
- Improving connectivity between residential, commercial, and employment hubs
- Supporting pedestrian and cyclist safety through new shared paths.

These improvements will contribute to greater freight efficiency and support economic growth in the region. Key upgrades include modifications to the M7 Motorway ramp, additional lanes on Richmond Road, and intersection upgrades at various locations, including Rooty Hill Road North.

The project is divided into two separable portions:

- Portion 1 (Northern Section): This section extends from just North of the Townson Road junction to south of the intersection with Alderton and Langford Drives. It includes widening Richmond Road from four to six lanes. Construction will commence in October 2025 and will be complete by December 2026
- Portion 2 (Southern Section): This section will focus on the construction of a flyover exit ramp from the M7 which crosses over Rooty Hill Road North, the construction of a new road/ pedestrian and bikeway bridge over Bells Creek and the widening of Richmond Road from four to six lanes. It will incorporate additional turning lanes at the Rooty Hill Road junction and will join the southern point of Portion 1. Construction is expected to begin mid-2026 and will be complete before the end of 2028.

In February 2025 TfNSW released a RFT for the Design and Construction of the Project. Gamuda Engineering Australia DT Infrastructure Joint Venture (GEA DTI JV) and Aurecon were the successful parties, and TfNSW executed the contract with GEA DTI JV on 23 October 2025.

An overview of the Project is provided in Figure 1-1.

Figure 1-1: Project site overview

The Project comprises approximately 2.2 km of Main Carriageway between M7 Motorway and Towson Road in Marsden Park. The cross section consists of a six lane carriageway with three lanes in each direction excluding any auxiliary lanes.

The key features of the project include the following:

- Upgrade of Richmond Road between the M7 Motorway and Townson Road to six lanes (three lanes in each direction). This would include:
  - Road widening between the M7 Motorway and the Alderton Drive / Langford Drive intersection including a new bridge structure over Bells Creek
  - Widening into the median from the Alderton Drive / Langford Drive intersection to about 250 metres north of the Hollinsworth Road / Townson Road intersection
- Building a new flyover bridge from the M7 Motorway Rooty Hill Road North exit ramp to Richmond Road northbound to allow road users to bypass two sets of traffic lights, reducing congestion and queuing onto the motorway allowing uninterrupted flow of traffic
- Upgrades to the intersection of Richmond Road, Hollinsworth Road and Townson Road including:
  - Additional northbound through lane along Richmond Road (providing three through lanes towards Richmond)
  - Additional dedicated right turn lane from Richmond Road southbound onto Hollinsworth Road
  - New left turn slip lane from Hollinsworth Road onto Richmond Road including a pedestrian island and crossing
  - Staged pedestrian crossings across Richmond Road on the north and south sides of the intersection, with a pedestrian refuge in the median.
- Upgrades to the intersection of Richmond Road, Langford Drive and Alderton Drive including:
  - Additional northbound and southbound through lanes along Richmond Road (providing three through lanes in both directions)
  - Staged pedestrian crossings across Richmond Road on the north and south sides of the intersection, with a pedestrian refuge in the median.
- Upgrades to the intersection of Richmond Road, Rooty Hill Road North and the M7 Motorway ramps including:
  - Two dedicated lanes on Richmond Road heading onto the M7 Motorway (southbound entry ramp)
  - Two dedicated southbound through lanes on Richmond Road (towards Blacktown)
  - Additional right turn lane from Richmond Road southbound onto Rooty Hill Road North (providing two dedicated right turn lanes onto Rooty Hill Road North)
  - Relocation of the existing pedestrian crossing on Richmond Road approximately 160 metres south. This would be a new staged pedestrian crossing across Richmond Road, with a pedestrian refuge in the median at the intersection of Richmond Road and the M7 Motorway southbound entry ramp.
- Building a new concrete bridge structure over Bells Creek for the northbound carriageway. This would include:
  - Three northbound travel lanes
  - A shared pedestrian and bike path on the western side, which replaces the existing boardwalk bridge next to the northbound Richmond Road carriageway
- Upgrade works on the existing Bells Creek Bridge which becomes the southbound carriageway of Richmond Road

- Shifting the existing pedestrian and bike path on the western side of Richmond Road to be further west
- Continuing to improve public transport by maintaining the dedicated bus lanes at the intersections.
- Drainage and water quality structures including:
  - Adjustments to the pits and pipes of the existing stormwater network
  - New water quality basin on the east side of Richmond Road
  - Open flooding channel on the eastern side of Richmond Road roughly between the M7 Motorway northbound on-ramp and Bells Creek for flood mitigation purposes.
- Roadside furniture including safety barriers, signage, line marking, lighting and fencing.
- Earthwork cutting, embankments and retaining walls to accommodate the widened road alignment, flyover bridge and open flooding channel.
- Modified formal access to properties along the upgraded sections of Richmond Road.
- Property acquisition including full acquisition of one property and partial acquisition of two properties.
- Rehabilitation of disturbed areas and landscaping.
- Establishment and use of three temporary ancillary facilities during construction.

The project alignment generally runs from south to north and consequently the carriageways are identified as northbound and southbound carriageways. For consistency across the Project, a convention has been adopted to name features on the nearside shoulder of the northbound carriageway as being on the western side of the alignment. Similarly, features on the nearside shoulder of the southbound carriageway are referred to as being on the eastern side of the alignment.

1.2 Description of design package

The purpose of this report is to document the Developed Concept Design (DCD) for Roadworks - Portion 2 (Southern Section), RRM7-GEDT-0537-RW-RPT-010001.

This package includes the following information, specific to the elements of construction:

- Road Geometry and Alignment
- Earthworks design
- Provide background information to support the development of the civil design for the Project

1.3 Scope of design package

The report demonstrates how the requirements of the Head Contract and the Scope of Works and Technical Criteria (SWTC) have been met for this design package. Specifically, this design report provides the following information in relation to this design package:

- Basis of design
- Design details
- Safety-in-design
- Constructability considerations
- Operation and maintenance considerations
- Durability requirements
- Compliance
- Environment

- Sustainability
- Items for resolution.

1.4 Design submission stage

This report identifies certain aspects of the design development at each submission stage as required by SWTC Appendix C.2, Clause 2.2 (d).

The submission stages are as follows:

- Developed Concept Design (DCD)
  - The Developed Concept Design Stage is the developed Design Documentation for any discrete element or part thereof and is the stage at which the Concept Design has been developed to fully define the project systems, ensure integration with adjoining design elements, adjacent infrastructure interfaces and between associated design disciplines. The Developed Concept Design Stage is the stage at which design will not materially change in relation to the concept and general details that have been developed since the Concept Design
- Substantial Detailed Design (SDD)
  - The Substantial Detailed Design Stage is the fully developed design including proprietary engineering or systems solutions, which includes all the design standards, design reports, specifications, models, calculations and drawings for each design element of the relevant Design Package, and is the stage at which the final design analysis, design details and drawings demonstrate compliance with and satisfaction of all the requirements of the Contract as well as draft O&M requirements for each design element of the relevant Design Package
- Final Design Documentation (FDD)
  - The Final Design Documentation Stage is the final completed integrated and verified design including proprietary engineering solutions, which includes all the design standards and completed design reports including proof engineer's report, specifications, models and calculations, design drawings, Inspection and Test Plans and Verification Checklists and final O&M requirements for each design element of the relevant Design Package.
- Issued for Construction (IFC)
  - The Issued for Construction Design Documentation is the design which the Contractor is entitled to use for construction purposes and incorporates minor amendments to the Final Design Documentation, verified by the Independent Certifier (IC), to address any comments of conditions noted in the IC's signed document

The design is currently at the Developed Concept Design (DCD) stage. Future submissions will include:

- Substantial Detailed Design (SDD)
- Final Design Documentation (FDD)
- Issued for Construction (IFC)

1.5 Design submission stage

The deliverables of this package include the following:

- Design Report (this report)
- Drawings as listed in Appendix A

This report should be read in conjunction with the deliverables and drawings listed Appendix A

2 DESIGN DEVELOPMENT

2.1 Design criteria

The DCD submission of the Roadworks - Portion 2 (Southern Section) (RRM7-GEDT-0537-RW-RPT-010001) meets the requirements of the Head Contract, Scope of Works & Technical Criteria (SWTC) and associated documents, except as noted in section 3.4.

2.1.1 Function and performance criteria

The following connectivity and intersection and interchange performance requirements must be met for the Project, in accordance with SWTC Appendix B.2 Table B.2-5B.

Table 2-1: Minimum connectivity and intersection and interchange performance requirements

LOCATION	MINIMUM CONNECTIVITY REQUIREMENTS
Richmond Road Northbound MC10	▪ Adjust and upgrade the left turn slip Lanes from Richmond Road into Westlink M7 Southbound On-Ramp and Rooty Hill Road North and the right turn Lane from Richmond Road into Westlink M7 Northbound On-Ramp to accommodate Richmond Road and ramps modifications ▪ Two (2) through Lanes from the southern limit of works Chainage (Ch) 0 to Ch 700 ▪ Three (3) through Lanes from Ch 700 where the Rooty Hill Road North flyover joins the Main Carriageway, to Ch 1182 (start of Portion 1).
Richmond Road Southbound MC20	▪ Two (2) through Lanes from southern limit of works to Ch 230 ▪ Two (2) right turn Lanes, departure side of the intersection with Rooty Hill Road North ▪ Four (4) through Lanes from Ch 280 to Ch 900 ▪ Two (2) right turn Lanes, approach side of the intersection with Rooty Hill Road North ▪ A single left slip turn Lane, approach side of the intersection with M7 Northbound On-Ramp ▪ Three through Lanes from Ch 900 to Ch 1182 (Start of Portion 1)
Rooty Hill Road North Flyover MC70	A single Lane including the diverge from Westlink M7 off Ramp to the proposed single Lane Flyover, and the merge with Richmond Road Northbound MC10 around Ch 700
Westlink M7 Northbound Off-Ramp MCB0	Existing turning Lane arrangements maintained. Augmented to accommodate proposed ramp modifications
Westlink M7 Southbound On-Ramp MCD0	Existing turning Lane arrangements maintained. Augmented to accommodate proposed ramp modifications
Westlink M7 Northbound On-Ramp MCC0	Existing turning Lane arrangements maintained. Augmented to accommodate proposed ramp modifications
Westlink M7 Southbound Off-Ramp MCA0	Existing turning Lane arrangements maintained. Augmented to accommodate proposed ramp modifications
Rooty Hill Road North MCC0	Existing through Lane arrangements maintained. Augmented to accommodate proposed ramp modifications. Lane, shoulder and median widths to be as per existing conditions.

2.1.2 Design vehicles

The following design and check vehicles have been adopted for the Project in accordance with SWTC Appendix B.2 Table B.2-2.

Table 2-2: Design and Check Vehicles

LOCATION	DESIGN VEHICLE	CHECK VEHICLE
Main Carriageway and Ramps ▪ **Intersection of Richmond Road and Rooty Hill Road North** ▪ **Intersection of Richmond Road and M7 Motorway On Ramps** ▪ **Intersection of Richmond Road and M7 Motorway Exit Ramp** ▪ **Intersection of Westlink M7 off ramp and Rooty Hill North**	Level 2 PBS = 26.0m B-Double vehicle	Level 3 PBS = Austroads 36.2m A-Double (Type 1)
Main Carriageway and Intersections ▪ **Intersection of Richmond Road with Rooty Hill Road North**	Level 2 PBS = 26.0m B-Double vehicle	Level 3 PBS = Austroads 36.2m A-Double (Type 1)
Colebee Yard access	Level 1 PBS = 19m Prime mover and semi-trailer	Level 2 PBS = 26.0m B-Double vehicle

The turn paths on intersections are to cater for the movements of the design and check vehicles nominated in above.

For dual right turns, a combination of a 5.2m passenger car and the nominated design vehicles in table B.2-2 must be used. The 5.2m passenger car must turn from the right most Lane of the dual right turn, in accordance with SWTC Appendix B.2 Clause 2.2 (b).

Refer Appendix H for turn paths.

2.1.3 Design speeds and posted speeds

The following design and posted speeds were adopted for the Project in accordance with SWTC Appendix B.2 Table B.2-1B

Table 2-3: Design and posted speeds

LOCATION	POSTED SPEED (KM/H)	DESIGN SPEED (KM/H)
Main Carriageway		
▪ **Richmond Road Northbound MC10 CH000 to CH1182**	70	80 (CH0 to CH925) 90 (CH925 to CH0 of MC10 Portion 1)
▪ **Richmond Road Southbound MC20 CH000 to CH1167**		
Main Carriageway Ramps and Local Roads		
▪ **Rooty Hill Road North Flyover MC70 CH000 to CH490**	60	80
▪ **Rooty Hill Road North Flyover MC70 CH490 onwards**	70	80
▪ **Westlink M7 off Ramp to Rooty Hill Road North MCB0**	60	70
▪ **Westlink M7 Southbound On-Ramp MCD0**	70	80
▪ **Westlink M7 Northbound On-Ramp**	60	70
▪ **Westlink M7 Southbound Off-Ramp**	60	70
▪ **Rooty Hill Road North**	60	70

Merges and diverges must have a minimum design speed that are the same as the minimum design speed specified for the respective adjoining Carriageway, in accordance with SWTC Appendix B.2 Clause 2.1 (b).

2.1.4 Horizontal and vertical geometry

The following design criteria have been adopted in accordance with the SWTC Appendix B.2 and AGRD Part 3 (2021) (excluding geometry of existing roads which will be maintained, as far as reasonably practicable).

Table 2-4: Horizontal and vertical geometry

DESIGN ELEMENT	MAIN CARRIAGEWAY	RAMPS	DESIGN REFERENCE
Minimum horizontal curve radius (3% superelevation)	R266m (V80km/h) R399m (V90km/h)	R266m (V80km/h)	AGRD Part 3 (2021) Section 7.4.1
Minimum horizontal adverse curve radius (3% crossfall)	R660m (V80km/h) R1150m (V90km/h)	R660m (V80km/h)	AGRD Part 3 (2021) Table 7.12
Minimum horizontal curve length	R180m (V80km/h) R230m (V90km/h)	R180m (V80km/h)	AGRD Part 3 (2021) Table 7.7
Compound curves	1:0.75 Ratio of large radius to small radius (at locations where approved by the Principal) Increasing radius compound curves on one-way carriageways are acceptable		SWTC Appendix B.2 Clause 4.1 (d)
Reverse curves	Tangent length between curves to be: Desirable minimum: V m Absolute minimum: 0.7V m		AGRD Part 3 (2021) Section 7.5.3
Broken back curves	Tangent length between curves to be: Minimum: V m		AGRD Part 3 (2021) Section 7.5.2
Clearance to Site Boundary	The minimum horizontal clearance from toe of formation or top of cutting to the Site or Local Area Works Area boundary for the Main Carriageways and ramps must be 3.0 m, with the exception of the locations noted below: ■ northbound Main Carriageway adjacent to BNI site: 1m (MC10 360 to 520); ■ northbound Main Carriageway at northern tie-in to Portion 1: 2.5m (CH 1040 to 1182 MC10) [1]; and ■ southbound Main Carriageway at northern tie-in to Portion 1: CH 960 to 1050 MC20 [1].		SWTC Appendix B.2 Section 3.1 f) SWTC Appendix B.1 Table B.1-1 Item A.34
Minimum vertical clearance	5.4m for road bridges		SWTC Appendix B.2 Clause 3.2 b) (ii) SWTC Appendix B.2 Table B.2-4
Driver reaction time	2.0 (s), for design speed = V100 km/h 1.5 (s), for design speed ≤ 90 km/h		SWTC Appendix B.2 Clause 4.4 (a)
Minimum Crest "K" value [2]	K= 23.9 (V80 km/h) K= 35.5 (V90 km/h)	K= 23.9 (V80 km/h)	AGRD Part 3 (2021) Table 8.7
Minimum length of crest "K" curves	L=60m (V80 km/h) L=80m (V90 km/h)	L=60m (V80 km/h)	AGRD Part 3 (2021) Table 8.6
Minimum Sag "K" Value	K= 10 (V80 km/h, with streetlighting) K= 13 (V90 km/h, with streetlighting)	K= 10 (V80 km/h, with streetlighting) K= 17 (V80 km/h, without streetlighting)	AGRD Part 3 (2021) Figure 8.9
Minimum length of sag "K" curves	L=60m (V80 km/h) L=70m (V90 km/h)	L=60m (V80 km/h)	AGRD Part 3 (2021) Table 8.10

DESIGN ELEMENT	MAIN CARRIAGEWAY	RAMPS	DESIGN REFERENCE
Maximum longitudinal grade	6% (V80 km/h) 6% (V90 km/h)	6% (downhill) 5% (uphill)	AGRD Part 3 (2021) Table 8.3 SWTC Appendix B.2 Clause 4.2 (a) (ii)
Minimum longitudinal grade	Roads with kerb and channel: ▪ Desirable minimum: 1.0% ▪ Absolute minimum: 0.5% Roads in cut: ▪ Unlined drains: 0.5% ▪ Lined drains: 0.3% Roads without kerb and channel and not in cut: ▪ Absolute minimum: 0%		AGRD Part 3 (2021) Table 8.5
Radial acceleration	Sum of the radial accelerations at the common tangent point does not exceed the tolerable allowance for riding comfort, a < 0.05 g m/sec^2		AGRD Part 3 (2021) Clause 8.6.6

Notes:

[1] 'Portion 1' has been corrected from 'Portion 2' in SWTC Appendix B.1 Table B.1-1 Item A.34

[2] Minimum values do not consider impacts of grade correction

2.1.5 Cross section development

2.1.5.1 Main Carriageway

The following minimum design criteria have been adopted for the Main Carriageway in accordance with SWTC Appendix B.2 Table B.2-3.

Table 2-5: Main Carriageway minimum design criteria

	MINIMUM DIMENSION
Lane width [1]	3.5 m
▪ **Right turn auxiliary Lane width (median side)** ▪ **Right turn auxiliary Lane width (next to through Lane)**	3.3 m
Left turn auxiliary Lane width	3.5 m
Shoulder width - Nearside	2.0 m
Shoulder width - Offside	0.5 m
Verge width - Nearside adjacent to 4H:1V or flatter batters	1.0 m
Verge width - Nearside adjacent to Type F barrier	1.0 m
Verge width - Nearside adjacent to wire rope safety barrier or W Beam barrier	1.5 m
Verge width - Offside adjacent 4H:1V or flatter batters	1.0 m
Verge width - Offside adjacent to barriers	1.5 m
Median width	1.8 m minimum adjacent to right turn Lanes
Median width for staged pedestrian crossings	3.6 m desired (3.0 m minimum)
Shoulder width adjacent to safety barrier- Nearside [2]	3.0 m
Shoulder width adjacent to safety barrier - Offside [3]	1.0 m

Notes:

[1] Lane widths listed above are exclusive of curve widening requirements for design vehicles on horizontal curves. All shoulder dimensions above are exclusive of widening requirements for stopping sight distance. Refer to 2.1.5.4 for curve widening requirements

[2] 2m nearside shoulder adjacent to a safety barrier has been provided along the northbound carriageway MC10 CH280 to CH335 and MC10 CH685 to CH745 in accordance with SWTC Appendix B.1 Conditionally Agreed Exception Item C.1.

[3] 0.5m offside shoulder adjacent to a safety barrier has been provided along the northbound carriageway MC10 CH285 to CH700 and southbound carriageway MC20 CH285 to CH700 in accordance with SWTC Appendix B.1 Conditionally Agreed Exception Item C.2.

2.1.5.2 Ramps

The following minimum design criteria have been adopted for the Ramps in accordance with SWTC Appendix B.2 Table B.2-3.

Table 2-6: Ramps minimum design criteria

	MINIMUM DIMENSION
Lane width [1]	3.5 m
Shoulder width - Nearside	2.5 m
Shoulder width – Offside [2]	1 m
Shoulder width adjacent to safety barrier- Nearside	3.0 m
Shoulder width adjacent to safety barrier - Offside [2]	1.0 m

Notes:

[1] Lane widths listed above are exclusive of curve widening requirements for design vehicles on horizontal curves. All shoulder dimensions above are exclusive of widening requirements for stopping sight distance. Refer to 2.1.5.4 for curve widening requirements.

[2] 0.5m offside shoulder adjacent to a safety barrier has been provided along Rooty Hill Road Flyover (MC70) in accordance with SWTC Appendix B.1 Conditionally Agreed Exception Item C.2.

2.1.5.3 Local road - Rooty Hill Road North MCC0

The following minimum design criteria have been adopted for the local road (Rooty Hill Road North MCC0) in accordance with SWTC Appendix B.2 Table B.2-8.

Table 2-7: Local road minimum design criteria

	MINIMUM DIMENSION
No. of Lanes	▪ Maintain existing conditions ▪ Adjust and upgrade the Left turn slip Lanes to and from Richmond Road to accommodate modifications to Richmond Road and Ramp ▪ Eastbound: Two through Lanes, two right turn Lanes and one left slip turn Lane
Lane width	As existing
Shoulder width - Nearside	As existing
Shoulder width - Offside	As existing

2.1.5.4 Curve widening

Where applicable, lane widening has been provided in accordance with AGRD Part 3 Section 7.9 as required by SWTC Appendix B.2 Clause 3.1 (e) (iii) and 3.2 (d) (ii).

Curve widening has been applied using the specified design vehicles in Table B.2-2, refer to Table 2-2 above.

2.1.5.5 Crossfall

The following nominal crossfall values were adopted for the Project in accordance with SWTC Appendix B.2 Clause 4.5 and 6.6.

Table 2-8: Nominal crossfall

LOCATION	CROSSFALL
New Carriageways	▪ Minimum of three (3) percent fall towards the Nearside Shoulder ▪ Maximum super-elevation on all Carriageways and Shoulders of five (5) percent
Existing Carriageways	No greater than the existing crossfall
Widening of existing Carriageways	No greater than crossfall of the nearest existing trafficable Lane.
Ramps	▪ new ramps – no less than 3 percent [1] ▪ widened existing ramps – no greater than cross fall of the nearest existing trafficable Lane.
Local roads	▪ The minimum normal crossfall for new roads in Local Area Works Areas is 3 percent. ▪ The crossfall for existing roads must be no greater than the existing crossfall.

Notes:

[1] 5% crossfall has been adopted on the Flyover to achieve compliant flow widths, refer to 3.1.4 for details.

The horizontal geometry (later detailed in section 3.1) allows for adverse crossfall to be adopted at certain locations. The calculated minimum horizontal radius with adverse crossfall is R660m (3%) for a V80 km/h design speed and has been adopted where required at the locations below:

- R660m, Richmond Road northbound MC10 CH 467 to CH 600 (approximately)
- R1705m, Richmond Road southbound MC20 CH 672 to CH 813 (approximately) for the two nearside lanes
- R740m, Rooty Hill Road Flyover MC70, CH 524 to CH 703 (approximately)

2.1.5.6 Vehicle envelope

The vehicle envelope (shown in Figure 2-1) has been developed in accordance with the requirements of SWTC Appendix B.2 Clause 3.2 (c) and Figure B.2-1.1; and AGRD Part 6 (2010) (SWTC Appendix B.1 Item A.32). The cross section has been developed to provide vehicle roll allowance for a 4.6m high rigid or articulated truck at a nominal 3% crossfall in accordance with AGRD Part 6 Table 6.8 (2010). Refer Table 2-9 below.

Table 2-9: Vehicle roll allowance

DESIGN SPEED [1]	VEHICLE ROLL ALLOWANCE AT 4.6M HEIGHT ABOVE PAVEMENT	
	-3% CROSSFALL (TOWARDS BARRIER)	3% CROSSFALL (AWAY FROM BARRIER)
V90 km/h	0.86 m	0.64 m
V80 km/h	0.75 m	0.53 m
V70 km/h	0.70 m	0.53 m

Notes:

[1] Refer to Table 2-3 for applicable locations on the Project.

Figure 2-1: Vehicle roll allowance

2.1.6 Ramp design

The following design criteria in Table 2-10 have been considered for the interchange ramp design in accordance with AGRD Part 4C (2023).

Table 2-10: Ramp design criteria

DESIGN ELEMENT	ENTRY RAMPS	EXIT RAMPS	DESIGN REFERENCE
Maximum superelevation	6%		Section 8.3.2 AGRD Part 4C (2023)
Merge / diverge taper lengths and angles at 'soft' nose	150m (90m at 1:50) [1]	1:15 [2]	Figure 11.1 and 11.7 AGRD Part 4C (2023)
Minimum parallel lane length	90m (Rooty Hill Road North Flyover)	N/A	SWTC Appendix B.2 Table B.2-6 and Table B.2-7

Notes:

[1] 60m is achieved on the flyover entry ramp (MC70 CH700) taper, refer to SWTC Appendix B.1 Agreed Exception Item A10

[2] 1 in 6m is achieved on the flyover (MC70 CH0), refer to SWTC Appendix B.1 Agreed Exception Item A11

2.1.7 Environmental criteria

Refer to section 4.11 and 4.12 for the environmental and sustainability criteria and the outcomes achieved in the design to satisfy these requirements.

2.2 Design inputs

Please refer to Table 2-11 for list of contributors to this design package.

Table 2-11: List of package contributors

ENGINEERS	DESIGNER	REVIEWERS	VERIFIERS
Charlotte Cartwright (Package, Roads and Civil Lead)	Vivian Hoang (Geometric Design Lead)	James Abraham (Design Manager)	Chloe Williams (Civil Verifier) Vanessa Van Itallie (Geometric Design Verifier)

The specific inputs required to develop this design package are described in the following sections.

2.2.1 Survey

The design has been developed using a combination of topographical survey and existing utilities survey provided by TfNSW or captured on site by the project team.

2.2.2 Traffic

A traffic assessment has been undertaken for the Project to demonstrate compliance with traffic performance requirements specified in the Environmental Documents and sections 2.1, 3.3 and 3.4 of SWTC Appendix B.18, refer to TP01 for further details.

2.2.3 Flooding

The flood levels indicated by the Project TUFLOW hydraulic model is a key input to the geometric design (in particular the vertical alignment) of the Main Carriageway to demonstrate the required flood immunity is achieved for the carriageway.

Refer to the Permanent Works Flood Modelling and Assessment Package (SD01) for further details on the hydraulic modelling and flooding assessments undertaken for the Project.

2.2.4 Pavements

Where Richmond Road where widening is occurring, the vertical alignment has been optimised to minimise overlay and avoid any cutting of the existing pavement.

2.2.5 Key constraints

The key constraints considered in the development of the design are summarised in Table 2-12 below.

Table 2-12: Key constraints

KEY CONSTRAINT	DESCRIPTION	DESIGN IMPACT
Site Boundary	The Site Boundary indicates the new area of land to be owned by TfNSW to accommodate the works of the Project. The Site Boundary is defined in Info Doc 07.03.16.01.18.03 RRM7Y2T-STANA-0537-PP-M2D-000010.dwg Per SWTC Appendix B.1 Table B.1-1 Item A.34 The minimum horizontal clearance from toe of formation or top of cutting to the Site or Local Area Works Area boundary for the Main Carriageways and ramps must be 3.0 m, with the exception of the locations noted below: ■ northbound Main Carriageway adjacent to BNI site: 1m (MC10 360 to 520); ■ northbound Main Carriageway at northern tie-in to Portion 1: 2.5m (CH 1040 to 1182 MC10) [1]; and ■ southbound Main Carriageway at northern tie-in to Portion 1: CH 960 to 1050 MC20 [1].	Road alignment and batter slopes are designed to contain the earthworks footprint within the Site Boundary with a 3m clearance with the exception of the locations noted below as per SWTC Appendix B.1 Table B.1-1 Item A.34: ■ northbound Main Carriageway adjacent to BNI site: 1m (MC10 360 to 520); ■ northbound Main Carriageway at northern tie-in to Portion 1: 2.5m (CH 1040 to 1182 MC10); and ■ southbound Main Carriageway at northern tie-in to Portion 1: CH 960 to 1050 MC20. In some isolated instances, the proposed works encroach into the 3m clearance. Refer Section 3.1.10 for details.
Vertical clearances to bridges	Per SWTC Appendix B.2 Clause 3.2 b) (ii) and Table B.2-4, the minimum vertical clearances need to be achieved.	The design achieves the minimum vertical clearances required by the SWTC and clearance envelopes. This includes additional temporary works clearance at Pier 1 for construction staging.
Flyover bridge span length	Per SWTC Appendix B.4 Clause 10.2 (a) the Rooty Hilly Road Flyover but have a clear span over Rooty Hill Road North including no pier(s) in the traffic island between the left turn slip lane and though lanes on Rooty Hill Road North earthbound	The Rooty Hilly Road Flyover horizontal alignment achieves a clear span over Rooty Hill Road North required by the SWTC.
Future Castlereagh Connection	Per SWTC Clause 2.1 (c) xiv) the Project Works are to ensure future integration with Castlereagh Connection (by others) is achievable with minimal requirements for demolition or reworks Minimum requirements in SWTC Clause 5.35 are to be achieved.	The design achieved the minimum requirements for the future Castlereagh Connection as required by the SWTC.
Portion 1	The northern limit of works is required to tie into Portion 1 Project Works defined in Info Doc 07.03.26, designed by others.	The design ties into Portion 1 Project Works, designed by others.
Flood immunity levels	Flood immunity to be provided in accordance with SWTC Appendix B.7 Table B.7-2	The vertical geometry is designed to achieve the flood immunity criteria nominated in SWTC Appendix B.7 Table B.7-2.
Existing services	Consider the location and type of existing services within the Site Boundary	The existing services have been considered in the design. Refer to the UT01 for details.

KEY CONSTRAINT	DESCRIPTION	DESIGN IMPACT
Constructability and staging	Consider constructability and operation of the existing road network (construction sequencing and traffic staging)	The design considers the features of the existing ground levels and the existing road carriageway to facilitate constructability and traffic staging sequence as detailed in the Traffic Management and Safety Plan.

Notes:

[1] 'Portion 1' has been corrected from 'Portion 2' in SWTC Appendix B.1 Table B.1-1 Item A.34

2.2.6 Relevant RFIs

Refer to Table 2-13 below for a summary of relevant RFIs for this design package. For further details refer to the appropriate Teambinder RFI and response.

Table 2-13: Relevant RFIs

TFNSW TRANSMITTAL	SUMMARY OF REQUEST	SUMMARY OF RESPONSE	ACTION
Nil.			

2.3 Standards and specifications

2.3.1 Order of precedence

Design requirements are to be in accordance with the SWTC. Unless otherwise expressly stated in the deed and SWTC, in the event of any inconsistency the following order of precedence must apply:

- The SWTC
- Other Appendices excluding:
  - The Codes and Standards in Appendix D.4; and
  - Appendices E.2 to E.11
- The Codes and Standards in Appendix D.4:
  - Section 2 – TfNSW Technical Directions;
  - Section 3 – TfNSW Specifications;
  - Section 4 – TfNSW Codes, Standards, Guidelines and Policies;
  - Section 5 – Austroads Guidelines and Transport Reference Documents;
  - Section 6 – Other Australian, NSW and Industry Documents;
  - Section 7 – Australian and International Codes, Standards and Guidelines; and
  - Section 8 – Other Reference Documents, Codes, Standards and Guidelines
- Appendix E.3 and Appendix E.4;
- Appendix E.2, Appendix E.5 to Appendix E.11; and
- Other agreed reference documents and standards.

For the avoidance of doubt, the requirements of the SWTC must always have a higher order of precedence over any elements of the Contractor's Concept Design or Contractor Specifications, including any qualifying statements or comments contained within the Contractor's Concept Design or Contractor Specifications unless:

- The agreed exceptions in SWTC Appendix B.1 permit and exception; or
- Otherwise approved by the Principal's Representative in writing.

The above is in accordance with the standards listed in the SWTC Main Body, Clause 1.6 (b).

2.3.2 Codes, Standards and Specifications

The following standards and specifications are applicable to this design package.

Table 2-14: Additional Codes, Standards, Technical Publications and Guidelines

REFERENCE	DOCUMENT TITLE
SWTC	Main Body Appendix A.1 Project Location Appendix B.02 Geometric and Road Design Requirements Appendix B.04 Bridges and Structures Appendix B.05 Geotechnical Performance and Design Requirements Appendix B.06 Pavements Appendix B.07 Drainage Appendix B.08 Signposting, Delineation and Roadside Features Appendix B.09 Traffic Control System Appendix B.11 Urban Design Appendix B.12 Intelligent Transport Systems Appendix B.17 Lighting Appendix B.18 Traffic and Transport Performance Requirements Appendix D.04 Codes and Standards Appendix E.2 Property Adjustments
TfNSW Supplements to Austroads Guide to Road Design	TfNSW Supplement to Austroads Guides (TS 02642:1.0)
Austroads Guide to Road Design (AGRD)	Part 3: Geometric Design (2021) Part 4: Intersection and Crossings – General (2023) Part 4A: Unsignalised and Signalised Intersections (2023) Part 4C: Interchanges (2023) Part 6: Roadside Design, Safety and Barriers (2024) [1] Part 6A: Paths for Walking and Cycling (2021) Part 6B: Roadside Environment (2021)
Austroads Guide to Traffic Management (AGTM)	Part 6: Intersection, Interchanges and Crossings Management (2020)
Turning Path Templates Guide	Austroads Design Vehicle and Turning Path Templates Guide (2023)

Notes:

[1] With the exception of the working width, which is to be in accordance with SWTC Appendix B.2 Annexure B.2-1 (AGRD Part 6 2010), SWTC Appendix B.1 Table B.1-1 Item A.32

2.4 Interface requirements

The following section details interfaces to the design package.

2.4.1 Related design packages

This report describes the design of , the following design lot(s) are relevant to this design report but are covered under a separate design package as follows:

Table 2-15: Related Design Packages

DESIGN PACKAGE / DESIGN LOT	DESCRIPTION	DESIGNED BY AURECON OR OTHER CONSULTANT
BR01	BR01 - Bridge Over Rooty Hill Road North (Flyover Bridge) and Retaining Wall	Aurecon
BR02	BR02 - Bridge Over Bells Creek on Richmond Rd Northbound	Aurecon
BR03	BR03 - Upgrade of Existing Bridge Over Bells Creek	Aurecon
DM01	Site Clearing	Aurecon
DU01	Urban Design and Landscape Plan	DesignInc
DY01	Durability Report	Aurecon
FN01	Road Furniture - Portion 2 (Southern Section)	Aurecon
GE01	Geotechnical Investigation Plan	Aurecon
GE03	Geotechnical Interpretative Report	Aurecon
GE04	Geotechnical Design - Portion 2 (Southern Section)	Aurecon
GN01	Retained Existing Assets	Aurecon
GN02	Safety In Design Report	Aurecon
LA01	Landscape Design	DesignInc
LV01	Street Lighting - Portion 2 (Southern Section)	Aurecon
MS01	Misc Structures - Signs, Culverts	Aurecon
NV01	Operational Noise and Vibration Report	GEA DTI JV
PJ01	Property Adjustments - Portion 2 (Southern Section)	Aurecon
PV01	Pavements And Subsurface Drainage - Portion 2 (Southern Section)	Aurecon
SD01	Flooding And Hydrology - Portion 2 (Southern Section)	Aurecon
SD02	Drainage Transverse and Longitudinal - Portion 2 (Southern Section)	Aurecon
TP01	Traffic Modelling	Aurecon
TT01	Intelligent Transport Systems	Aurecon
TT02	Traffic Control Signals	Aurecon
TW01	Traffic Staging (CAT1)	GEA DTI JV
TW02	BR01 - Flyover Temporary Girder Support (CAT1)	GEA DTI JV
UT01	Utility Coordination Plan	GEA DTI JV

2.4.2 Key interdisciplinary interfaces

The design has been developed to provide a coordinated, integrated, economic, safe and constructible solution. The key internal interfaces within this design package are summarised in Table 2-16.

Table 2-16: Key internal interfaces

DISCPLINE / INTERFACE ITEM	CONTROLS IDENTIFIED
Flooding	The road alignment has been developed to ensure 0.2% AEP flood immunity is achieved on the Main Carriageway edge line. The following features have also been provided in the design: ■ 10% AEP flood immunity on Rooty Hill Road North to the edge line ■ Flood hazard during a 10% AEP flood event as defined in Australian Rainfall and Runoff (ARR) 2019 limited to low hazard as defined in ARR 1987 ■ 10% AEP flood immunity crossing of proposed swale for TfNSW/Colbee Yard property access in accordance with SWTC Appendix E.2. Refer to Property Works Package PJ01 for details on the property access. ■ 1% AEP flood immunity with 0.3m freeboard to the underside of Bridge 02 (Bells Creek Bridge) [1]
Road Furniture and Linemarking	The road alignment and earthworks design has been developed to determine the following features: ■ The location and need for safety barriers along the road corridor in line with the SWTC requirements and AGRD Part 6 (2024) [2] ■ Verge widths to suit the requirements for safety barriers, guideposts and signage structures (refer section 2.1.5) ■ Safety barrier transitions and overlap details ■ Linemarking types to suit the road alignment and lane allocation along the Project. Refer to the road furniture and linemarking package (FN01) for further details.
Drainage and Water Quality	The pavement drainage networks have been designed to collect pavement run-off from the road surface and convey it to various discharge locations such as existing waterways. The alignment and earthworks design integrates the pavement drainage and stormwater drainage to ensure a sustainable and holistic solution is provided with a low maintenance regime. Cross drainage levels have been specified to tie-in to existing outlet levels and to ensure sufficient cover to the road pavements. Similarly, the pit and pipe network has been designed to ensure sufficient cover is provided over the road pavement. Other key integration points include: ■ Road surface drainage flow paths, shoulder widths and flow widths ■ Aquaplaning and surface flow depths which are related to longitudinal gradients and crossfall ■ Overland flow paths and coordination with major culverts ■ Provision of various barrier or kerb types with corresponding influences on surface drainage
Pavements	Key interfaces with pavements include: ■ Maximise the reuse of existing pavement to simplify the construction sequence and traffic staging at the tie-in locations (where practical)

DISCPLINE / INTERFACE ITEM	CONTROLS IDENTIFIED
	■ Where possible, the road alignment has been designed to minimise the volume of asphalt overlay over the existing pavement surface. ■ Provide a minimum clearance of 300mm from top of pipe culverts and box culverts to the underside of the Selected Material Zone (SMZ) to ensure sufficient compaction, design life and pavement performance is achieved in accordance with SWTC Appendix B.7 Clause 4 a) (vi) and b) (vi).
Bridges and other structures	The horizontal and vertical road geometry is integrated with the bridge design with consideration given to clearance envelopes, shoulder widening for SSD, maximum girder span lengths, pier configurations, abutment arrangements and provisions for safety, maintenance and access. A summary is provided below: ■ BR01: The road geometry is governed by the SSD requirements, minimum vertical clearance to Rooty Hill Road North and Richmond Road northbound, minimum temporary vertical clearance to Rooty Hill Road North at Pier 1, working width clearance to the bridge piers, achieving a clear span across Rooty Hill Road North, clearance to existing gas main on the south of Rooty Hill Road North and TCS visibility. ■ BR02: The road geometry is governed by the 1% AEP flood immunity levels with 0.3m freeboard on Bells Creeks [1]
Roadway Lighting	Roadway Lighting for the Project is provided in accordance with SWTC Appendix B.17. Refer to the Roadway Lighting Package (LV01) for additional details. A summary of the key interfaces with road design include: ■ Where possible, light poles have been located outside of the clearzone. Where this is not possible frangible light poles have been utilised to reduce the consequence of a vehicle impact on the poles or the light poles have been shielded by a suitable safety barrier,
Utilities	The design considers the relocation strategy of existing utilities across the Project Corridor. Where existing utilities are to be retained, the clearance and cover requirements have been maintained to the roadworks, in accordance with the relevant Utility Authority standards. Refer to the Utilities Package (UT01) for further details.
Traffic Control Signals (TCS)	The Richmond Road / Rooty Hill Road Intersection and Richmond Road / M7 southbound on-ramp Intersection are existing signalised intersections. The intersections are to be modified to suit the Project Works. Refer to TCS Package (TT02) for details. A summary of the key interfaces with road design include: ■ Where possible, minimise impact to the existing traffic signals and TCS assets ■ Median widths and traffic islands are spaceproofed to accommodate, pedestrian crossings, kerb ramps, directional signage, TCS assets and clearances to vehicle turn paths and kerbs.
Durability	The minimum design life of assets for this package is in accordance with SWTC Appendix B.13 Table B.13-1. Refer to the Durability Report (RRM7-GEDT-0537-DY-RPT-010001) for any non-conformances identified for the Project.
Landscaping	The landscaping design will be developed to not obstruct sight lines within the verge. Refer to Landscaping Package (LA01) for details.
Future Castlereagh Connection	The design has been developed in consideration that the future Castlereagh Connection (by others) is achievable with minimal requirements for demolition or reworks, in accordance with SWTC Clause 2.1 (c) xiv). The future widening interfaces for this design package are discussed in Section 4.8.

DISCPLINE / INTERFACE ITEM	CONTROLS IDENTIFIED
Maintenance access	The design has been developed in consideration of maintenance access requirements to key infrastructure elements and utility assets. For details of formal maintenance access and other maintenance provisions, refer to Section 4.6

Notes:

[1] Agreed Exception SWTC Appendix B.1 Table B.1-1 Item A.35

[2] With the exception of the working width, which is to be in accordance with SWTC Appendix B.2 Annexure B.2-1 (AGRD Part 6 2010), SWTC Appendix B.1 Table B.1-1 Item A.32

2.5 Design changes

This section summarises the alterations made to this design package due to variations and evolution of the design during design development.

2.5.1 Concept design to Developed Concept Design (DCD)

Key design changes between the Concept Design and DCD are listed in Table 2-17.

Table 2-17: Differences from Concept Design

KEY CHANGE	DISCUSSION	SUMMARY OF IMPACT ON DURABILITY, PERFORMANCE CRITERIA, DESIGN LOADS, STANDARDS OR MINIMUM OPERATING CONDITIONS
Richmond Road northbound vertical alignment	Richmond Road northbound vertical alignment has been lowered between MC10 CH 390 to CH 700 to increase the clearance from the toe of batter to the BNI site. An additional crest and sag have been introduced prior to Bells Creek Bridge.	Nil adverse impact. The following improvements have been identified: ■ Positive outcome for the BNI site with increased the clearance from the toe of batter to the BNI site ■ Reduction in afflux and overall flood impact ■ Reduction in retaining wall height
Bells Creek Bridge (BR02) vertical alignment	Bells Creek bridge vertical has been lifted approximately 40mm with minor vertical adjustments to the north.	Nil adverse impact. The following improvements have been identified: ■ Improved flood conveyance
Richmond Road northbound horizontal alignment	Minor adjustment to Richmond Road northbound horizontal alignment between MC10 CH 740 and northern limit of works to tie into Portion 1 IFC model.	Nil adverse impact.
Rooty Hill Road Flyover horizontal alignment	Flyover horizontal alignment has been optimised between MC70 CH 80 to CH 510 ■ Following the 1:15 taper exit from Westlink M7 northbound off ramp (MCB0) the R10000m curve was removed at approximately MC70 CH65 ■ Flyover radius reduced to R320m (previously R350m)	Nil adverse impact. The following improvements have been identified: ■ Positive sustainability outcome with a reduction in concrete quantity with the removal of a bridge pier
Rooty Hill Road Flyover vertical alignment	Flyover vertical alignment has been optimised from MC70 CH 80 onwards. ■ Lowered to reduce structure and RSW heights whilst achieving the vertical	Nil adverse impact. The following improvements have been identified:

KEY CHANGE	DISCUSSION	SUMMARY OF IMPACT ON DURABILITY, PERFORMANCE CRITERIA, DESIGN LOADS, STANDARDS OR MINIMUM OPERATING CONDITIONS
	clearance including temporary works clearance at pier 1 ■ K value = 33 on the bridge ■ 6% downgrade after the crest, compliant with SWTC Appendix B.2 Clause 4.2 a) (ii)	■ Positive sustainability outcome with a reduction in concrete quantity with a lower bridge structure and reduced RSW height ■ Positive sustainability outcome with a reduction in earthworks quantities
Rooty Hill Road Flyover Abutment locations	The Flyover bridge length has been reduced by approximately 7m with new abutment locations	Nil adverse impact. The following improvements have been identified: ■ Positive sustainability outcome with a reduction in concrete quantity with reduced bridge structure length ■ Improved earthwork cut/fill balance.
Rooty Hill Road Flyover embankment	The Western embankment along MC70 between CH 80 to CH 220 has been flattened from 2H:1V to 6H:1V. Barriers were removed along the 6H:1V slope as they are considered a recoverable in accordance with AGRD Part 6 Section 3.4.2 (2024). Where barriers were removed, the shoulder was reduced from 3m to 2.5m in accordance with SWTC Appendix B.2 Table B.2-3	Nil adverse impact. The following improvements have been identified: ■ Positive sustainability outcome with a reduction in pavement and barrier quantities ■ Improved earthwork cut/fill balance.
Richmond Road northbound super flip location	The super flip at MC10 MC470 has been shifted 5m to the north to resolve an aquaplaning failure.	Nil adverse impact.
Rooty Hill Road Flyover retaining wall	The retaining wall at MC70 CH 100 has been removed with a 2H:1V cut batter provided adjacent to the M7 embankment.	Nil adverse impact. The following improvements have been identified: ■ Positive sustainability outcome with a reduction in concrete quantity
Richmond Road southbound vertical alignment	Minor adjustments to the vertical alignment on MC20 from CH340 to CH1180 with varying crossfall across the lanes, match the existing surface better and avoiding undercutting.	Nil adverse impact. The following improvements have been identified: ■ Positive sustainability outcome with a reduction in pavement overlay
Left turn onto Westlink M7 southbound on ramp turning line	Currently there are two left turn lanes onto the Westlink M7 southbound on ramp. The revised intersection reduces the left turn to one lane but retained the existing turn line. The limit of works on M7 southbound on ramp has been extended to remove the existing turning line with mill and resheet.	Nil adverse impact. The following improvements have been identified: ■ Positive community impact, reducing confusion at the intersection
Site boundary	Site boundary updated from the REF boundary	3 additional locations identified where 3m clearance to boundary is not achieved. Refer to Section 3.1.10 for details.

KEY CHANGE	DISCUSSION	SUMMARY OF IMPACT ON DURABILITY, PERFORMANCE CRITERIA, DESIGN LOADS, STANDARDS OR MINIMUM OPERATING CONDITIONS
Endeavour Energy Substation	A substation verge build out has been added at MC10 CH595 for the Endeavour Substation	Nil adverse impact.
Control line	Control lines MCA0, MCB0 and MCC0 and have shortened to reflect the proposed design.	Nil adverse impact.

2.5.2 Developed Concept Design to Substantial Detailed Design (SDD)

Key design changes between the DCD and SDD will be listed in Table 2-18.

Table 2-18: Differences from Developed Concept Design

KEY CHANGE	DISCUSSION	SUMMARY OF IMPACT ON DURABILITY, PERFORMANCE CRITERIA, DESIGN LOADS, STANDARDS OR MINIMUM OPERATING CONDITIONS
N/A at DCD		

2.5.3 Substantial Detailed Design to Final Design Documentation (FDD)

Key design changes between SDD and FDD will be listed in Table 2-19.

Table 2-19: Differences from Substantial Detailed Design

KEY CHANGE	DISCUSSION	SUMMARY OF IMPACT ON DURABILITY, PERFORMANCE CRITERIA, DESIGN LOADS, STANDARDS OR MINIMUM OPERATING CONDITIONS
N/A at DCD		

2.6 Design methodology

The DCD submission of the Roadworks - Portion 2 (Southern Section) Package (RRM7-GEDT-0537-RW-RPT-010001) focuses on providing a solution that delivers a safe, constructible and maintainable outcome that supports the Project and the delivery objectives.

The geometric design methodology and outcomes are as follows:

- Compliant with the SWTC and applicable design standards (Austroads and TfNSW supplements, where available); refer section 2.1
- Consistent with other similar road projects in the Hunter region
- Is holistic and integrated between design disciplines including but not limited to drainage, structures, constructability / staging, urban design and environmental constraints to provide a robust solution ready for delivery.
- Considers the various project and site constraints and stakeholder requirements
- Develop a solution which incorporates Health Safety in Design (HSiD) principles and is safe to construct, operate and maintain.

2.6.1 Design objectives

The Roadworks - Portion 2 (Southern Section) Package has been developed based on the following design objectives:

- ease congestion and improve the travel times for all road users
- improve traffic flow through the intersections
- improve safety for all road users
- improve connectivity for the communities in the north-west
- improve pedestrian safety with a new staged crossing making it easier for pedestrians and bike riders to move safely in and around the area.

2.6.2 Delivery objectives

The Roadworks - Portion 2 (Southern Section) Package meets the delivery objectives for the Project as noted in Table 2-20.

Table 2-20: Delivery objectives

DELVIERY OBJECTIVE	DESIGN FEATURES	BENEFIT TO THE PROJECT
Safety to public	▪ Road alignment optimised to provide a safer user experience	▪ Improved road safety across the Project corridor
Timely and effective delivery **Minimal impacts on environment** **Minimal disruption to public** **Value for money outcome** **Whole of life**	▪ Optimisation of road geometry to maximum reuse of material, tie into existing surface levels and minimise imported fill ▪ Optimised number of temporary work stages to reduce impact to community ▪ Reuse or integration of existing pavement where appropriate ▪ Minimise bridge structures where possible across the Project and the resulting lower maintenance and WOL costs for the Project ▪ Minimise total paved surface area across the Project to reduce maintenance costs and the built environment features	▪ Environmental benefits, reduced import with reduction in fuel consumption and reduced impact to surrounding road network during construction. ▪ Better value for money solution that optimises the network, reduces future maintenance and simplifies the Project corridor.
Seamless/minimal third-party interface	▪ Optimised road geometry design by reducing median width and steepening batters to increase the construction footprint to BNI site ▪ Optimised alignment of embankment diverging from the M7 minimising impact to M7 footprint, with consideration of future maintenance access provisions. ▪ Road alignment design future proofing for Castlereagh Connection	▪ Increase boundary clearance to BNI ▪ Maximising material-reuse (earthworks). ▪ Minimised demolition required for construction of the Castlereagh Connection

3 DESIGN OUTCOMES

The following section provides a description of the design solution for the assets, systems and equipment covered by this design package. The design has been developed in accordance with the design criteria nominated in section 2.1. Design calculations for this design package are included in Appendix H.

3.1 Design details

3.1.1 Control line naming

Table 3-1 below lists and describes the various control line used for the Project.

Table 3-1: Control line details

DESIGN ELEMENT	CONTROL LINE REFERENCE	LOCATION OF CONTROL LINE
Main Carriageway		
Richmond Road northbound	MC10	Offside edge of travel lane
Richmond Road southbound	MC20	Centreline
Ramps		
Rooty Hill Road North Flyover	MC70	Nearside edge of travel lane
Westlink M7 Southbound Off-Ramp	MCA0	Centreline
Westlink M7 Northbound Off-Ramp	MCB0	Nearside edge of travel lane
Westlink M7 Northbound On-Ramp	MCC0	Offside edge of travel lane
Westlink M7 Southbound On-Ramp	MCD0	Centreline
Local Roads		
Rooty Hill Road North	MCC0	Offside edge of travel lane

3.1.2 Richmond Road northbound (MC10)

3.1.2.1 Horizontal alignment

The existing horizontal alignment along Richmond Road northbound from the southern limit of works to the south of Rooty Hill Road North intersection is retained. The existing kerb lines and crossfall have been retained through this area. The on-road cycle lanes have been removed, as the space constraints of the upgraded Richmond Road / Rooty Hill Road North intersection does not allow for continuous cyclist lanes throughout the intersection. Cyclists are required to utilise the existing off-road shared user path. Removal of the on road cyclist lanes allowed for the existing 3.2m lanes to be widened to 3.5m in accordance with SWTC Appendix B.2 Table B.2-3.

It is noted that the below departures are present in this area, refer to Section 3.4.1 for further details:

- The existing shared path on the western side between MC10 CH 20 to 100 does not achieve the minimum 2.5m wide shared path requirement in SWTC Appendix B.2 Clause 8.2 (a) (i)
- The legacy geometric design departures listed below are retained as-is and are not required to be addressed as part of the Works in accordance with SWTC Appendix B.1 Item C8 (Conditionally agreed exception)
  - Horizontal curve insufficient for adverse crossfall for 80km/h (R440).
  - Crossfall < 1%.
  - Both (2 no.) left turn lane lengths and tapers are insufficient (96m compared to 82m, 32m compared to 12m, respectively).
  - No curve widening applied on any lane widths; and

- No minimum curve lengths applied.

On the departure side of Rooty Hill Road intersection, the alignment is designed to maximise the horizontal clearance to the BNI site. A 660m curve is utilised with the existing crossfall of 2.5%. Part way through the horizontal curve 3% adverse crossfall is applied to facilitate the tie in with the Rooty Hill Road North Flyover (MC70). Where the carriageway passes under the Rooty Hill Road Flyover MASH TL5 barriers have been provided in accordance with SWTC Appendix B.8 Clause 6.2 f) (iv) A. with working width provided to the structure in accordance with AGRD Part 6 (2010) and SWTC Appendix B.1 Item A32.

It is noted that the below departures are present in this area, refer to Section 3.4.1 for further details:

- SWTC Appendix B.2 Table B.2-3 Shoulder width adjacent to safety barrier - Nearside= 3.0m, with the exceptions of the following location, in accordance with SWTC Appendix B.1 Item C1 (Conditionally agreed exception):
  - MC10 northbound carriageway CH 280 to 335 and 685 to 745, where a minimum nearside shoulder width of 2.0m is to be provided
- SWTC Appendix B.2 Table B.2-3 Shoulder width adjacent to safety barrier - Offside = 1.0m, with the exception of the following location:
  - northbound carriageway MC10 CH 285 to 700; where a 0.5m offside shoulder width is to be provided.
- Arc length of 180 m is required for 80 km/hr speed (AGRD Part 3 Table 7.7 (2021)), expect for the following locations as captured in design departure No.17
  - MC10 CH 217 (curve radius 1000 m) achieves 36 m
  - MC10 CH 736 (curve radius 1450 m) achieves 106 m
- MC10 CH 906 (curve radius 740 m) achieves 214 m, Arc length of 230 m is required for 90 km/hr speed (AGRD Part 3 Table 7.7 (2021)), Design departure No. 17
- The roadside areas must comply with the requirements of the Austroads Guide to Road Design - Part 6 (2024) and the TfNSW Supplement to the Austroads Guide to Road Design Part 6 (2023) TS 02642:1.00, with the exception of the working width, which is to be in accordance with SWTC Appendix B.2 Annexure B.2-1 (AGRD Part 6 2010) (SWTC Appendix B.1 Agreed exception Item A32)

Bells Creek Bridge (BR02) is on a straight bearing parallel to the existing Bells Creek Bridge (BR03) with 4.7m separation between the bridge structures (back of barrier to back of barrier).

It is noted that the below departures are present in this area, refer to Section 3.4.1 for further details:

- SWTC Appendix B.2 Table B.2-3 Shoulder width adjacent to safety barrier - Nearside= 3.0m, with the exceptions of the following locations, in accordance with SWTC Appendix B.1 Item C1 (Conditionally agreed exception):
  - MC10 northbound carriageway CH 280 to 335 and 685 to 745, where a minimum nearside shoulder width of 2.0m is to be provided

The horizontal alignment and crossfall ties into Potion 1 Project Works defined in Info Doc 07.03.26, designed by others. The crossfall ties into Portion 1 and is part of the super transition occurring in Portion 1 just north of Portion 2 limit of works

3.1.2.2 Vertical alignment

Along Richmond Road northbound from the southern limit of works to MC10 CH 395 the existing vertical alignment is retained maximising the reuse of pavement and increasing the horizontal clearance to the BNI site. Minimum vertical clearance of 5.4m is achieved to the Rooty Hill Road Flyover where the carriageway passes underneath.

On approach to Bells Creek Bridge (BR02) the vertical alignment is as low as possible whilst achieved 0.2% AEP flood immunity to the edge line of the carriageway maximising the horizontal clearance to the BNI site. BR02 has 1% longitudinal grade achieving 0.3m freeboard to the 1% AEP flood level (SWTC Appendix B.1 Table B.1-1 Item A.35).

On the departure side of BR02 the vertical alignment is as low as possible whilst achieving 0.2% AEP flood immunity to the edge line of the carriageway.

The vertical alignment ties into Potion 1 Project Works defined in Info Doc 07.03.26, designed by others.

It is noted that the below departures are present in this area, refer to Section 3.4.1 for further details:

- Richmond Road at MC10 CH50 to CH110 achieves a longitudinal grade of 0.4%, minimum longitudinal grade 0.5% is required (AGRD Part 3 Table 5.8 (2021)), SWTC Appendix B.1 Table B.1-1 Agreed exception Item A6
- The Annual Exceedance Probability (AEP) for flood immunity and Serviceability Limit State (SLS) must be 1% for road bridges, with an additional 0.5 metres freeboard to the underside of structures, with the exception of Bells Creek Bridge which must have an additional, 0.3m freeboard, SWTC Appendix B.1 Table B.1-1 Agreed exception Item A35

3.1.3 Richmond Road southbound (MC20)

3.1.3.1 Horizontal alignment

Along Richmond Road southbound from the southern limit of works to the southern of Rooty Hill Road North intersection has minor horizontal realignment of the existing arrangement because of the changed lane configurations on the northern side of the Rooty Hill Road North intersection. The existing kerb lines and crossfall have been retained through this area with the exception of a localised kerb build out on the eastern side to retain a minimum 2.5m shared path at MC20 CH 110.

It is noted that the below departures are present in this area, refer to Section 3.4.1 for further details:

- MC20 CH 172 (curve radius 1065 m) achieves 101 m, Arc length of 180 m is required for 80 km/hr speed (AGRD Part 3 Table 7.7 (2021)), Design departure No. 17
- The legacy geometric design departures listed below are retained as-is and are not required to be addressed as part of the Works in accordance with SWTC Appendix B.1 Item C8 (Conditionally agreed exception)
  - Horizontal curve insufficient for adverse crossfall for 80km/h (R315)
  - No curve widening applied on any lane widths; and
  - No minimum curve lengths applied.

On the approach side of Rooty Hill Road intersection, the alignment is designed to maximise the reuse of existing pavement whilst providing compliant working width to the Flyover retaining walls and not infringing into the Sydney Water Pump Station property boundary. Where the carriageway is adjacent to the Rooty Hill Road Flyover and retaining structure, MASH TL5 barriers have been provided in accordance with SWTC Appendix B.8 Clause 6.2 f) (iv) A. with working width provided to the structure in accordance with AGRD Part 6 (2010) and SWTC Appendix B.1 Item A32.

It is noted that the below departures are present in this area, refer to Section 3.4.1 for further details:

- Arc length of 180 m is required for 80 km/hr speed (AGRD Part 3 Table 7.7 (2021)), expect for the following locations as captured in design departure No.17
  - MC20 CH 493 (curve radius 400 m) achieves 107 m

  - MC20 CH 671 (curve radius 1705 m) achieves 141 m
- SWTC Appendix B.2 Table B.2-3 Shoulder width - Nearside= 2.0m, with the exceptions of the following location, in accordance with SWTC Appendix B.1 Item A44:
  - MC20 CH 275 to 410 where a 0.5 m nearside shoulder width adjacent to auxiliary lane is permitted.
- SWTC Appendix B.2 Table B.2-3 Shoulder width adjacent to safety barrier - Offside = 1.0m, with the exception of the following location:
  - southbound carriageway MC20 CH 275 to 700, where a 0.5m offside shoulder width is to be provided.
- SWTC Appendix B.2 Table B.2-3 Main Carriageways | Right turn auxiliary lane width (next to through lane) | 3.5m, with the exceptions of the following locations, in accordance with SWTC Appendix B.1 Item C3 (Conditionally agreed exception):
  - Richmond Road southbound (MC20) CH 275 to 410 where the right turn lane width of 3.3 metres is to be provided.
- The roadside areas must comply with the requirements of the Austroads Guide to Road Design - Part 6 (2024) and the TfNSW Supplement to the Austroads Guide to Road Design Part 6 (2023) TS 02642:1.00, with the exception of the working width, which is to be in accordance with SWTC Appendix B.2 Annexure B.2-1 (AGRD Part 6 2010) (SWTC Appendix B.1 Agreed exception Item A32)

From MC20 CH 600 to the northern limit of works, the horizontal alignment aims to retain as much of the existing pavement and infrastructure as possible. This includes the existing Bells Creek Bridge (BR03) which is relinemarked and the nearside road furniture (kerbs and barriers) is retained.

The horizontal alignment ties into Potion 1 Project Works defined in Info Doc 07.03.26, designed by others.

3.1.3.2 Vertical alignment

Along Richmond Road southbound from the southern limit of works to MC20 CH 340 and MC20 CH 695 to the northern limit of work the existing vertical alignment is retained maximising the reuse of pavement.

The vertical alignment achieves 0.2% AEP flood immunity to the edge line of the carriageway through to provision of a flood relief channel along the eastern side, refer to SD01 and SD02 for further details.

The vertical alignment ties into Potion 1 Project Works defined in Info Doc 07.03.26, designed by others.

3.1.4 Rooty Hill Road North Flyover (MC70)

3.1.4.1 Horizontal alignment

The Flyover departs form the Westlink M7 northbound off ramp on a straight bearing with a taper angle of 1 in 6 (SWTC Appendix B.1 Table B.1-1 Item A.11). A R320m curve is adopted on the Flyover Bridge (BR01) that has a clear span over Rooty Hill Road north and Richmond Road northbound. A 5% crossfall has been provided on BR01 to achieved compliant flow widths (refer to SD02 for further details). A 2% rotation of crossfall from 5% to 3% occurs on an approximately 38m straight prior to the adverse R740m curve, refer to Section 3.4.1 for further details on this concession. MC70 has a 60m 1:50 taper to join the Richmond Road northbound carriageway (MC10) prior to Bells Creek Bridge (BR02), (SWTC Appendix B.1 Table B.1-1 Item A.10).

The cross section along MC70 including BR02 is as below, achieving V80km/h SSD:

- 2.5m nearside shoulder transition to 3m where a barrier is introduced
- 3.5m travel lane, with 0.3m of curve widening applied on the R320m curve across BR01
- 0.5m offside shoulder / clearance to barrier (SWTC Appendix B.1 Table B.1-2 Item C2, conditionally agreed exception)

It is noted that the below departures are present in this area, refer to Section 3.4.1 for further details:

- 60 m is only achieved on the flyover single entry ramp (MC70 CH700) taper, taper length for a single-lane entry ramp to be 90m (for 1:50 taper) required (AGRD Part 4c Figure 11.7 (2023)), SWTC Appendix B.1 Table B.1-1 Agreed exception Item A10
- Flyover Bridge 1 in 6 is achieved on the flyover bridge (MC70 CH0), Taper angle of 1 in 15 required (AGRD Part 4c Figure 11 (2023)), SWTC Appendix B.1 Table B.1-1 Agreed exception Item A11
- SWTC Appendix B.2 Table B.2-3 Shoulder width adjacent to safety barrier - Offside = 1.0m, with the exception of the following location:
  - Rooty Hill Road Flyover MC70 all chainages, where a 0.5m offside shoulder width is to be provided
- MC70 CH 524 (curve radius 740 m) achieves 178 m, Arc length of 180 m is required for 80 km/hr speed (AGRD Part 3 Table 7.7 (2021)), Design departure No. 17

1.1m clearance has been provided between the pile of Pier 1 and the centreline of the gas main located under the footpath in front of Pier 1. A minimum 3.5m clearance has been provided between the toe of the Rooty Hill Road Flyover embankment and toe of the M7 embankment.

3.1.4.2 Vertical alignment

Along the Flyover the existing vertical alignment is retained from the MC70 CH 0 to CH 60, matching the vertical alignment of MCB0. The vertical alignment is as low as possible reducing visual impacts to the BNI site, until tying into MC10 at CH 625. A minimum 5.4m vertical clearance is achieved over Rooty Hill Road North and Richmond Road northbound.

At Pier 1 an additional vertical clearance of 0.8m has been provided to the lowest point of the integral headstock. This allows all existing Rooty Hill Road North traffic lanes to remain operational during curing.

3.1.5 Westlink M7 southbound off ramp (MCA0)

The existing horizontal and vertical alignment of the existing Westlink M7 southbound off ramp is retained. The below existing departures are retained in the design:

- MCA0 CH 108.5 (curve radius 266m) achieves 42 m and MCA0 CH 64 (curve radius 97m) achieves 24 m; Arc length of 140 m is required for 70 km/hr speed (AGRD Part 3 Table 7.7 (2021)), SWTC Appendix B.1 Table B.1-1 Agreed exception Item A3
  - Note: The chainage in SWTC Appendix B.1 is based on the TfNSW reference design chainage system (by others) and therefore does not match the chainage system used in the detailed design. However, the curve is located at the same plan position and therefore has no impact on the intent of this agreed concession.
- MCA0 has a radius of 100 m with no transition, Curves require transitions for radii less than 220 m in roads with a speed of 70 km/hr, (AGRD Part 3 Table 7.3 (2021)). Refer to departure no. 16 in Table 3-7 for further details

3.1.6 Westlink M7 northbound off ramp (MCB0)

The existing horizontal and vertical alignment of the existing Westlink M7 northbound off ramp is retained. In the existing condition there is no curve widening applied on traffic lanes and SSD on the turning lane does not achieve a 70km/h design speed due to the existing noise wall. SWTC Appendix B.1 Table B.1-2 Item A40 accepts these legacy geometric design departures are to be retained as-is and are not required to be addressed as part of the Works.

3.1.7 Rooty Hill Road North / Westlink M7 northbound on ramp (MCC0)

The existing horizontal and vertical alignment of the existing Westlink M7 southbound off ramp is retained.

3.1.8 Westlink M7 southbound on ramp (MCD0)

The existing horizontal and vertical alignment of the existing Westlink M7 southbound on ramp is retained. This on ramp generally meets V60km/h geometry instead of the required V80km/h. SWTC Appendix B.1 Table B.1-2 Item C8 conditionally excepts these legacy geometric design departures are to be retained as-is and are not required to be addressed as part of the Works.

3.1.9 Property Accesses

The property accesses along the Project corridor are designed in accordance with SWTC Appendix E.2 and is documented separately in the Property Adjustment - Portion 1 (Southern Section) Package (PJ01). However, locations with a key interface with the RW01 package are discussed below.

3.1.9.1 Colebee Yard

The property access connection point has been retained and modified to suit the widened carriageway on Richmond Road southbound. The design vehicle is a 19m semi-trailer and 26m B-double as the check vehicle.

Sight distance checks have been undertaken in accordance with AGRD Part 4A (2023) and is documented in Appendix H.

3.1.9.2 717 Richmond Road

The property access connection point has been retained and modified to suit the widened carriageway on Richmond Road southbound. Sight distance checks have been undertaken in accordance with AGRD Part 4A (2023) and is documented in Appendix H.

3.1.9.3 Sydney Water Pump Station

The property access connection point has been retained and modified to suit the widened carriageway on Richmond Road southbound. Sight distance checks have been undertaken in accordance with AGRD Part 4A (2023) and is documented in Appendix H.

3.1.10 Land Use

The Site boundary for the Project defines the allowable extents of the earthworks. The earthworks bench requirements on embankment and cuttings are summarised in Table 3-2 below, in accordance with SWTC Appendix B.5.Table B.5-2, Table B.5-3 and Section 3.2.

Table 3-2: Bench requirements on embankment and cutting

EARTHWORKS	BATTER SLOPE	VERTICAL HEIGHT OF BATTER SLOPE	BENCH WIDTH
Cutting	2H:1V or flatter	Maximum 10 m	Minimum 4.5 m
	Steeper than 2H:1V	Maximum 7 m	Minimum 4.5 m
Embankment (Other than rock fill)	Steeper than 2H:1V	Maximum 7 m	Minimum 4 m
	2H:1V or flatter	Maximum 10 m	Minimum 4 m
Rock fill embankment	N/A	Maximum 12 m	Not required
	N/A	Greater than 12 m	Minimum 4 m

In accordance with SWTC Appendix B.2 Clause 3.1 (f) and SWTC Appendix B.1 Table B.1-1 Item A.34 the minimum horizontal clearance from toe of formation or top of cutting to the Site or Local Area Works Area boundary for the Main Carriageways and ramps must be 3.0 m, with the exception of the locations noted below:

- northbound Main Carriageway adjacent to BNI site: 1m (MC10 360 to 520);
- northbound Main Carriageway at northern tie-in to Portion 1: 2.5m (CH 1040 to 1182 MC10) [1]; and
- southbound Main Carriageway at northern tie-in to Portion 1: CH 960 to 1050 MC20 [1].

Note:

[1] 'Portion 1' has been corrected from 'Portion 2' in SWTC Appendix B.1 Table B.1-1 Item A.34

In addition to SWTC Appendix B.1 Table B.1-1 Item A.34 the following locations do not achieve 3.0m form the toe of formation or top of cutting to the Site or Local Area Works Area boundary for the Main Carriageways and ramps:

- southbound Main Carriageway adjacent to AMPLITEL: CH 340 to 400 MC10
- southbound Main Carriageway adjacent to Sydney Water Pump Station: CH 530 to 545 MC10, where the existing offset from the edge of shoulder to Sydney Water Pump Station is retained
- southbound Main Carriageway at northern tie-in to Portion 1: CH 810 to 960 MC20, where the existing kerb and verge is retained

Refer to Section 3.4.1 for further details.

3.1.11 Pedestrian and Cycleway connections

3.1.11.1 Off road shared user path and connections

The following off road pedestrian path and shared user path crossing facilities have been provided in the design in accordance with SWTC Appendix B.2 Clause 8:

- 2.5m shared path south of the Richmond Road / Rooty Hill Road North intersection to the southern limit of works (both sides of the roads), expect for:
  - MC10 CH 20 to Ch75 (western side) where the shared path width varies between 2m and 2.5m, with 2.5m path with obstructions MC10 CH 75 to Ch100 (western side). Refer to 3.4.1 for further details.
- 4m shared path north of the Richmond Road / Rooty Hill Road North intersection (western side of the road)
- 5% maximum longitudinal grade for shared paths, in general to match the longitudinal grades on the respective proposed main carriageway adjacent to the shared paths
- 2% nominal crossfall
- 2.5m pedestrian footpath connection from Rooty Hill North Road eastern limit of works to Richmond Road / Rooty Hill North Road Intersection

Shared path crossings are provided Richmond Road / Rooty Hill Road North intersection as follows:

- Provided along the western and eastern legs, refer to SWTC Appendix B.1 Conditional Agreed Exception C9
- Not provided along the northern and southern legs, refer to SWTC Appendix B.1 Agreed Exception A1

Shared paths crossings are provided Richmond Road / M7 southbound entry ramp intersection as follows:

- Crossings along Richmond Road northbound western side of the road
- Introduction of staggered crossings across Richmond Road western and eastern side of the road to replace the northern leg crossing of Richmond Road / Rooty Hill Road North intersection
  - Localised kerb build out occurs on the eastern side to retain a minimum 2.5m shared path

Refer to TT02 for further details on signalised pedestrian crossings.

3.1.11.2 On road cycle lane and connections

Sealed shoulder has been provided on the main carriageway, ramps and local roads, in accordance with SWTC Appendix B.2 Table B.2-3 and Table B.2-8 for on road cycle lane provision.

The existing shoulder width on Rooty Hill Road North left turn lane onto Richmond Road northbound is retained for on road cyclists to join the shared path or turn left onto Richmond Road northbound, refer to Figure 3-1.

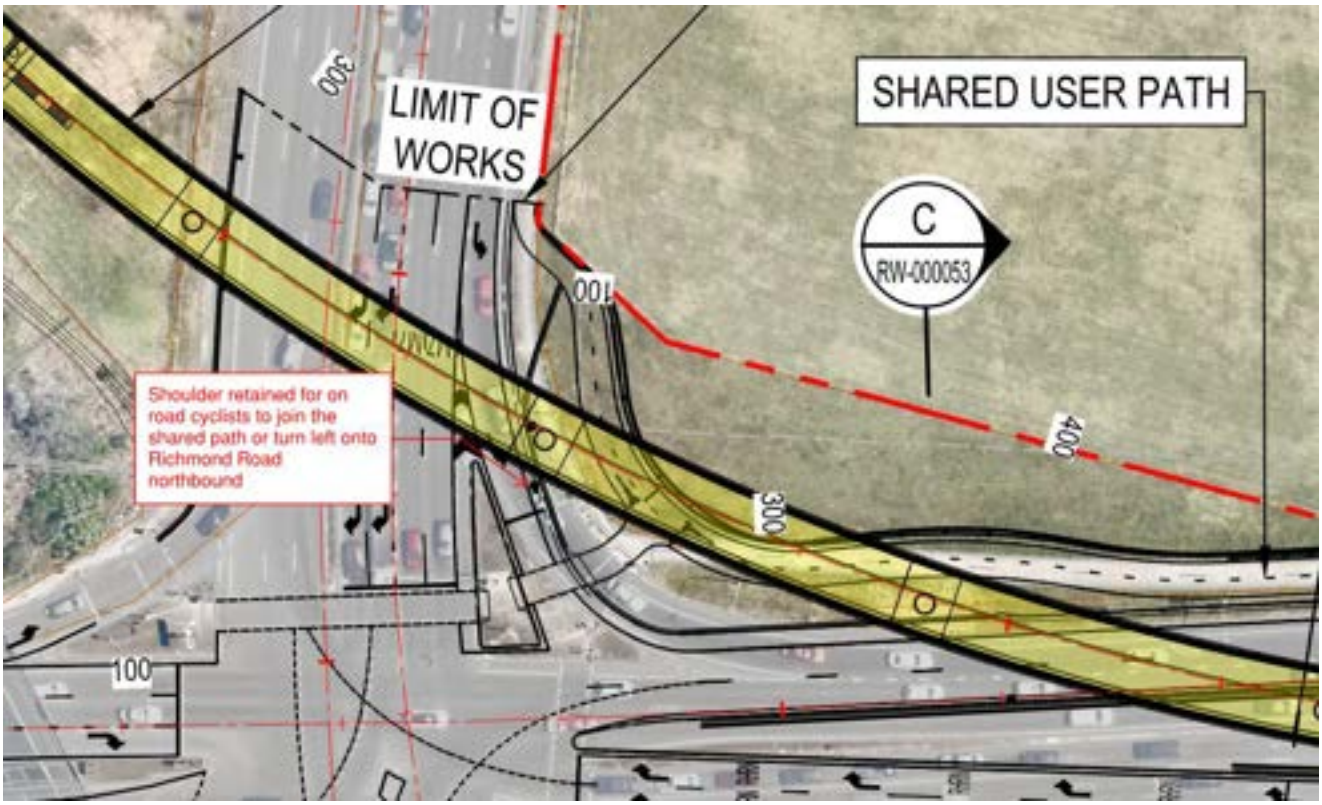

Figure 3-1: Cyclists on Rooty Hill Road North left turn lane shoulder

3.2 Analysis results

3.2.1 Vertical clearances at bridges

The design provides the minimum vertical clearances to bridge structures, in accordance with SWTC Appendix B.2 Clause 3.2 b) (ii) and Table B.2-4. No bridge clearance non-conformances have been identified and clearances are compliant with the SWTC requirements.

The vertical clearances achieved at overpass and underpass structures are summarised in Table 3-3 and Appendix H.

Table 3-3: Bridge vertical clearances

BRIDGE NO.	REQUIRED CLEARANCE	ACHIEVED CLEARANCE	DESIGN COMMENT
BR01 - Pier 1	6.2m	6.47m	Additional 0.8m vertical clearance required for temporary works
BR01 - Rooty Hill Road North Median	5.4m	6.24m	The vertical clearance is constrained by Pier 1, Pier 4, achieving V80km/h SSD, overdrive on the bridge and tying into Richmond Road northbound prior to Bells Creek Bridge. Reducing the clearance at this location is not possible without raising the vertical at Pier 1 and Pier 4
BR01 - Pier 2	5.4m	6.72m	
BR01 - Pier 3	5.4m	6.51m	
BR01 - Pier 4	5.4m	5.65m	-
BR02 - Bells Creek	1% AEP flood immunity and SLS, with an additional 0.3m freeboard to underside of structure	1% AEP flood immunity and SLS, with an additional 0.3m freeboard to underside of structure	SWTC Appendix B.1 Table B.1-1 Item A.35

3.2.2 Sight Distance checks

Sight distance checks that have been undertaken to verify the road geometry are listed below:

- Stopping sight distance (SSD), approach sight distance (ASD), safe intersection sight distance (SISD) and minimum gap sight distance (MGSD) checks
  - Driver reaction time as per SWTC Appendix B.2 Clause 4.4 a)
  - Coefficient of deceleration; 0.36
- Entry / exit ramp sight distance checks (refer Section 3.2.2.1)

All checks (including diagrams) can be referred to Appendix H.

3.2.2.1 Entry / Exit ramps sight distance checks

Sight distance checks were undertaken in accordance with AGRD Part 4C (2023)

At entry ramp merges, the following visibilities are required:

- Drivers on each carriageway to identify a pending lane add (approach to nose)
- Drivers ability to see where the lane add occurs (terminal visibility)

These requirements are satisfied by achieving the criteria summarised in Table 3-4 below.

Table 3-4: Visibility requirements at entry ramp merges

PARAMETER LIMIT	APPROACH TO NOSE	TERMINAL VISIBILITY
Desirable minimum	6 s of travel 1.1 m eye height to 0.1 m object height	6 sec of travel time 1.1 m eye height to 0.0 m object height (linemarking)

PARAMETER LIMIT	APPROACH TO NOSE	TERMINAL VISIBILITY
Absolute minimum	4 s of travel 1.1 m eye height to 0.1 m object height	6 sec of travel time 1.1 m eye height to 0.0 m object height (linemarking)

3.2.2.2 Sight distance checks at property entrances

Sight distance checks at property entrances has been undertaken in accordance with AGRD Part 4A (2023) and are documented in the Appendix H. Refer to Property Adjustments - Portion 2 (Southern Section) Package (PJ01) for further details on Property Adjustments.

3.2.3 Aquaplaning checks

Aquaplaning checks have been undertaken at key locations along the Project corridor (i.e. areas with superelevation transitions or long surface flow paths). As per SWTC Appendix B.7 Clause 6 f) the following conditions have been checked for aquaplaning for a storm event of 50mm per hour intensity, macrotexture depth of 0.5mm, except spray sealed surface where a greater texture depth may be used only for investigation of existing pavements:

- Travel lanes with maximum water depth not greater than 4mm
- Travel lanes with maximum change in the depth of flow across the pavement must not exceed 4mm over 10m; and
- The aquaplaning assessment considers the effects of any predicted future pavement settlement.

Refer to Appendix H for aquaplaning checks.

Note: The surface flows on all constructed pavements through each superelevation transition must be checked using the as-constructed surface levels to verify compliance with the requirements of SWTC Appendix B.7 Clause 6 f).

3.2.4 Intersection turn paths

Turn paths for design vehicles and check vehicles are provided in Appendix H.

For the purposes of this assessment, the following input parameters were defined to ensure the pavement extents are suitable for the turning paths of the design and check vehicles:

- Minimum radius to suit a turning speed of 5 km/h, in accordance with Austroads Design Vehicles and Turning Path Templates Guide (2023)
- 500mm clearance from the vehicle envelope to face of kerb, safety barrier, centerline or other physical obstructions for design vehicles with the exception of the below:
  - Left turn from M7 southbound exit ramp onto Richmond Rd southbound, 124mm achieved
  - Right turn from Richmond Rd northbound to M7 northbound entry ramp, 50mm achieved

For two existing (and retained) design vehicle turn paths, the 500mm clearance envelope is encroached into by existing kerbs to be retained. The wheel path is contained within the pavement, and the clearance envelope does not encroach onto any physical obstructions such at TCS pole or signage. Departure 14 has been raised, refer to Section 3.4.1 for details.

3.3 Review and verification

This submission has been subject to the following internal design verification and reviews:

- Internal verification
- Cross discipline review
- Contractor review
- Proof engineering / independent checking (optional)

Comments from external reviewers are included in Table 3-5 (IC, TfNSW and other stakeholders), together with the designer responses.

Table 3-5: Design review and verification summary

ITEM	DESIGN STAGE	REVIEWER	STATUS OF APPROVAL
Internal Verification	DCD	Chloe Williams - Aurecon	Confirmed
Cross Disciplinary Review	DCD	Aurecon and GEA DTI JV	Confirmed
External Review	DCD	TfNSW, IC and other stakeholders	Pending

Comments from external reviewers are included in Appendix B (PV, TfNSW and other stakeholders), together with the designer responses.

3.3.1 Proof Engineering / Independent Checking Engineering Assessment

This section is not applicable for this design package.

3.4 Compliance

A compliance tracking process has been developed and implemented to ensure ongoing compliance with the design requirements stipulated in the project SWTC and Environmental Documents as defined in the Head Contract. This process is embedded within the design development process and workflow, with an SWTC and Environmental and Sustainability compliance register established to ensure the design is consistent with the approved project.

The registers are periodically reviewed and subject to amendments in accordance with developments in the detailed design process, design inputs, project criteria and interface requirements.

3.4.1 Scope of Works and Technical Criteria

This design package is compliant to the SWTC and Head Contract requirements, except as noted in Table 3-6. Potential non-compliances are noted in Table 3-7 and will be resolved prior to the Final Design Documentation submission. Table 3-8 summarises previously agreed and conditionally agreed exceptions that are currently not required in the design.

Design Compliance to the SWTC clauses relevant to this design package are provided in Appendix F.

Table 3-6: Agreed non-conformances

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION
TfNSW Technical Direction TS 02670 Section 2 **Required Value:** ▪ **Pedestrian crossing required at all legs of a signalised intersection.** **Departure Value Adopted:**	In the TfNSW Reference Design the northern crossing was removed for the traffic performance of the intersection. An alternate stages pedestrian crossing is proposed approximately 100m south of the existing intersection. Note that there is also no current pedestrian	Nil.

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION
▪ **Traffic control signals pedestrian crossings not provided at Richmond Road and Rooty Hill Road North intersection on the northern and southern legs.** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A1)**	crossing at the southern leg of this intersection	
Austroads Guide to Road Design Part 3 Table 7.7 (2021) **Required Value:** ▪ **Arc length of 140 m is required for 70 km/hr speed.** **Departure Value Adopted:** **Rooty Hill Road North at:** ▪ **MCA0 CH 108.5 (curve radius 266m) achieves 42 m** ▪ **MCA0 CH 64 (curve radius 97m) achieves 24 m** **Note: The chainage in SWTC Appendix B.1 is based on the TfNSW reference design chainage system (by others) and therefore does not match the chainage system used in the detailed design. However, the curve is located at the same plan position and therefore has no impact on the intent of this agreed concession.** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A3)**	Existing Rooty Hill Road North horizontal alignment is retained.	Nil.
Austroads Guide to Road Design Part 3 Table 8.5 (2021) **Required Value:** ▪ **Minimum longitudinal grade 0.5%.** **Departure Value Adopted:** ▪ **Richmond Road at MC10 CH50 to CH110 achieves a longitudinal grade of 0.4%.** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A6)**	Flat grades are required to match the existing levels at the Richmond Road / Rooty Hill Road / M7 intersection. Note that existing crossfall has been retained.	Nil.
Austroads Guide to Road Design Part 5A Section 4 (2021) **Required Value:** ▪ **Maximum water depth of 4mm.** **Departure Value Adopted:** ▪ **Flow depths exceeding 4mm at Richmond Road and Rooty Hill Road North intersection.** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.9)**	This is an existing issue at locations which are unable to be fixed.	Nil.
Austroads Guide to Road Design Part 4C Figure 11.7 (2023) **Required Value:**	This taper has been shortened to allow for the curve at MC70 CH520 to be accommodated without impacts to the Blacktown Native Institute or Sydney Water Pump Station.	Nil.

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION
▪ **Taper length for a single-lane entry ramp to be 90m (for 1:50 taper).** **Departure Value Adopted:** ▪ **60 m is only achieved on the flyover single entry ramp (MC70 CH700) taper.** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.10)**		
Austroads Guide to Road Design Part 4C Figure 11.1 (2023) **Required Value:** ▪ **Taper angle of 1 in 15 required.** **Departure Value Adopted:** ▪ **Flyover Bridge 1 in 6 is achieved on the flyover bridge (MC70 CH0).** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.11)**	A taper of 1:15 could not be accommodated without impacts to the Blacktown Native Institute or Sydney Water Pump Station.	Nil.
SWTC Appendix B.8 Section 6.1 a) **Required Value:** ▪ **The roadside areas must comply with the requirements of the Austroads Guide to Road Design - Part 6 (2024) and the TfNSW Supplement to the Austroads Guide to Road Design Part 6 (2023) TS 02642:1.00** **Departure Value Adopted:** ▪ **The roadside areas must comply with the requirements of the Austroads Guide to Road Design - Part 6 (2024) and the TfNSW Supplement to the Austroads Guide to Road Design Part 6 (2023) TS 02642:1.00, with the exception of the working width, which is to be in accordance with SWTC Appendix B.2 Annexure B.2-1 (AGRD Part 6 2010)** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.32)**	Replication of the MASH TL5 test conditions (and hence a heavy vehicle rolling on the barrier to a width of 2m) is highly unlikely, noting the following: road is posted 70km/h in this area, straight horizontal alignment and relatively narrow shoulder meaning a high angle of impact is low on the off side of the road. Furthermore, adoption of working width as per AGRD Part 6 2010 is consistent with TfNSW's Reference Design and is the basis for the project boundary, clearing footprint and environmental impacts. Providing additional space within the available project boundary would encroach closer to the sensitive BNI site and likely require the introduction of retaining walls which is a negative impact compared to the REF.	Nil.
SWTC Appendix B.2 Section 3.1 f) **Required Value:** **f) The minimum horizontal clearance from toe of formation or top of cutting to the Site or Local Area Works Area boundary for the Main Carriageways and ramps must be 6.0m.** **Departure Value Adopted:** **f) The minimum horizontal clearance from toe of formation or top of cutting to the Site or Local Area Works Area boundary for the**	It is noted that TfNSW's Reference Design did not achieve 3.0m in numerous locations; hence this departure is critical as it is the basis for the project boundary, clearing footprint and environmental impacts. Adoption of > 3m clearance to the boundary will result in a significant increase in retaining structures across the project which is a negative impact compared to the REF with no net benefit to TfNSW.	Nil.

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION
Main Carriageways and ramps must be 3.0 m, with the exception of the locations noted below: **(i) northbound Main Carriageway adjacent to BNI site: 1m (MC10 360 to 520);** **(ii) northbound Main Carriageway at northern tie-in to Portion 1: 2.5m (CH 1040 to 1182 MC10); and** **(iii) southbound Main Carriageway at northern tie-in to Portion 1: CH 960 to 1050 MC20.** **Note: 'Portion 1' has been corrected from 'Portion 2'** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.34)**		
SWTC Appendix B.4 Section 3.1.15 a) **Required Value:** **a) The Annual Exceedance Probability (AEP) for flood immunity and Serviceability Limit State (SLS) must be 1% for road bridges, with an additional 0.5 metres freeboard to the underside of structures.** **Departure Value Adopted:** **a) The Annual Exceedance Probability (AEP) for flood immunity and Serviceability Limit State (SLS) must be 1% for road bridges, with an additional 0.5 metres freeboard to the underside of structures, with the exception of Bells Creek Bridge which must have an additional, 0.3m freeboard.** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.35)**	- A lesser freeboard will all the earthworks and impact to the BNI site to be reduced. This may also reduce the span length of the new Bells Creek N/B Bridge. - A 300mm freeboard is in excess of the existing Bells Creek Bridge (future SB Main Carriageway) which is downstream and submerged in the 1% AEP (as noted on the bridge WAE drawings). - For the avoidance of doubt, the proposed design will meet the 0.2% AEP flood evacuation requirements.	Nil.
SWTC Appendix B.7 Section 5 m) **Required Value:** **m) The unnamed drainage channel from northbound M7 Motorway access ramp to Bells Creek is to be located to receive stormwater runoff from the M7 to discharge into Bells Creek. This drainage channel is to be trapezoidal in shape with a minimum 10m wide base width and capacity to convey up to the 0.2% AEP event flows.** **Departure Value Adopted:** **m) The unnamed drainage channel from northbound M7 Motorway access ramp to Bells Creek is to be located to receive stormwater runoff from the M7 to discharge into Bells Creek. This drainage channel is to be trapezoidal in shape with capacity to convey bank full flows up to the 1% AEP event flows and to ensure flood immunity for the adjacent portion of Richmond Road for storms up to the 0.2% AEP event.** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.36)**	The flooding performance and drainage water quality requirements are achieved with a smaller capacity and there are significant environmental, traffic and cost benefits in reducing the amount of potentially contaminated excavated material being removed, hauled and disposed off site with a slight improvement in ongoing maintenance burden for the asset maintainer. The flood model has demonstrated that the swale width can be reduced to < 10m and > 5m, whilst still maintaining Richmond Road's flood immunity in the 0.2% AEP. The proposed tender swale design contains the 1% AEP flow.	Nil.
SWTC Appendix B.2 Section 5.1 a)	No dedicated maintenance bay has been proposed for the (existing or new) VMS, noting that provision of	Nil.

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION
Required Value: **a) The Contractor must provide maintenance bays adjacent to infrastructure that requires vehicular maintenance access (for inspection, maintenance, repairs, refurbishments and replacements), including but not limited to:** **(i) MCS or OMCS nodes;** **(ii) sumps and pump stations;** **(iii) new bridges / underpasses;** **(iv) water quality basins; and** **(v) VMS's** **Departure Value Adopted:** **a) The Contractor must provide maintenance bays, or a suitable alternative provision for maintenance, adjacent to infrastructure that requires vehicular maintenance access (for inspection, maintenance, repairs, refurbishments and replacements), including but not limited to:** **(i) MCS or OMCS nodes;** **(ii) sumps and pump stations;** **(iii) new bridges / underpasses;** **(iv) water quality basins; and** **(v) VMS's** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.39)**	no maintenance bay is consistent with the current maintenance arrangement. The proposed 4 SB lanes adjacent to the VMS is considered an improved arrangement compared to the existing arrangement, whereby the nearside lane can be closed for maintenance parking and VMS access via elevated working platform. This is also consistent with the current maintenance arrangement and reference design. Furthermore, if road widening were proposed to accommodate a bay then this would be inconsistent with TfNSW's Reference Design and the basis for the project boundary, clearing footprint and environmental impacts. The basin will be accessed via vehicular access off Colebee driveway.	
SWTC Appendix B.2 various **The legacy geometric design departures listed below are retained as-is and are not required to be addressed as part of the Works:** **MCB0 - M7 off ramp to Rooty Hill Road:** ▪ **No curve widening applied on traffic lanes.** ▪ **SSD on turning lane does not achieve a 70km/h design speed due to the existing noise wall.** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.40)**	The works on the M7 Off Ramp to Rooty Hill are limited to diverge works for the Rooty Hill Flyover. GEA DTI JV have endeavoured to address these departures where feasible however amendments to rectify these departures would require major works which would extend beyond the scope and boundary of this project. The solution adopted is in line with the REF and is considered a reasonably practical and value-for-money approach.	Nil.
SWTC Appendix B.2 Table B.2-3 **Required Value:** Ramps: Minimum Dimension Lane width: 3.5 m Shoulder width - Nearside: 2.5 m Shoulder width - Offside: 1.0 m Shoulder width adjacent to safety barrier Nearside: 3.0 m Shoulder width adjacent to safety barrier Offside: 1.0 m	Provision of a reduced shoulder width adjacent to a turning auxiliary lane provides a value-for-money solution whilst minimising project footprint and property impacts, as long as drainage flow widths are achieved within the proposed shoulder. Cyclists continue straight to the intersection via a cycle lane. This location is adjacent to the Colebee property and adoption of a 0.5m shoulder is consistent with the project's Environmental Assessment.	Nil.

<table>
<tr><th>DETAILS OF NON-CONFORMANCE</th><th>REASON FOR NON-CONFORMANCE</th><th>PROPOSED ACTION</th></tr>
<tr><td>Departure Value Adopted:
<table>
<tr><th>Ramps</th><th>Minimum Dimension</th></tr>
<tr><td>Lane width</td><td>3.5 m</td></tr>
<tr><td>Shoulder width - Nearside</td><td>2.0 m, except at MC20 CH 275 to 410 where 0.5m adjacent to auxiliary lane is permitted.</td></tr>
<tr><td>Shoulder width - Offside</td><td>1.0 m</td></tr>
<tr><td>Shoulder width adjacent to safety barrier Nearside</td><td>3.0 m</td></tr>
<tr><td>Shoulder width adjacent to safety barrier Offside</td><td>1.0 m</td></tr>
</table>
Shoulder width - nearside | 2.0m, except at MC20 CH 275 to 410 where a 0.5 m nearside shoulder width adjacent to auxiliary lane is permitted.

Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.44)</td><td></td><td></td></tr>
</table>

Table 3-7: Potential non-conformances (to be confirmed at FDD)

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION	STATUS
SWTC Appendix B.2 Table B.2-3 **Table B.2-3 Shoulder width adjacent to safety barrier - Nearside= 3.0m, with the exceptions of the following locations:** **- MC10 northbound carriageway CH 280 to 335 and 685 to 745, where a minimum nearside shoulder width of 2.0m is to be provided** **Reference: Conditionally agreed exception (SWTC Appendix B.1 Table B.1-2 Item C1)**	2.0m nearside shoulder adjacent to barrier adopted from CH 280.00 to 335.00on MC10, in the vicinity of the bridge pier for the Rooty Hill flyover ramp. Adoption of a 2.0m nearside shoulder in this location allows bridge span widths to be optimised. No technical / functional aspects of the shoulder are compromised by this proposal. The barrier will transition to a kerb immediately downstream of the bridge pier, whereby the 2.0m nearside shoulder will be maintained adjacent to a kerb. 2.0m nearside shoulder adjacent to barrier adopted from CH 685.00 to 745.00 on MC10, on the Bells Creek Bridge. Continuation of a 2.0m nearside shoulder over the bridge has the advantage of maintaining a constant shoulder width and cross section on the Northbound Carriageway. The horizontal alignment in this area is straight with a nominal 1% constant vertical grade.	TfNSW to accept the non-conformance in recognition of the constraints imposed by the design requirements and the adjacent BNI property boundary.	Conditionally agreed
SWTC Appendix B.2 Table B.2-3 **Table B.2-3 Shoulder width adjacent to safety barrier - Offside = 1.0m, with the exception of the following locations:**	Providing additional space within the available project boundary would encroach closer to the sensitive BNI site and likely require the introduction of	TfNSW to accept the non-conformance in recognition of the constraints	Conditionally agreed

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION	STATUS
▪ **northbound carriageway MC10 CH 285 to 700;** ▪ **southbound carriageway MC20 CH 275 to 700; and** ▪ **Rooty Hill Road Flyover MC70 all chainages,** **where a 0.5m offside shoulder width is to be provided.** **Reference: Conditionally agreed exception (SWTC Appendix B.1 Table B.1-2 Item C2)**	retaining walls which is a negative impact compared to the REF. 0.5m offside shoulder adjacent to barrier adopted from CH 285.00 to 700.00 on MC10, in the vicinity of the bridge pier for the Rooty Hill flyover ramp. Adoption of a 0.5m offside shoulder in this location allows bridge span widths to be optimised. No technical / functional aspects of the shoulder are compromised by this proposal. The shoulder will increase to a 1.0m wide shoulder downstream of the bridge pier, whereby a 1.0m offside shoulder will be maintained adjacent to a barrier and the flyover retaining walls. A minimum 0.5m offside shoulder is adopted adjacent to barrier adopted from CH 700 to 280 on MC20, adjacent to the Rooty Hill Flyover and bridge piers. Adoption of a minimum 0.5m offside shoulder in this location allows the horizontal alignment of the SB carriageway and appropriate lane and nearside shoulder widths to be accommodated. No technical / functional aspects of the shoulder are compromised by this proposal. The shoulder will increase to a 1.0m wide offside shoulder north of the flyover structure. A 3.0m nearside shoulder and a 0.5m offside shoulder are provided along the Flyover Ramp. This configuration does not compromise the structural bridge design whilst maximising the achieved stopping sight distance along the ramp. The extents of these shoulder widths have been minimised as much as possible. Elsewhere, compliant shoulder widths have been provided (i.e. 3.0m nearside and 1.0m offside adjacent to barriers, or 2.0m nearside and 0.5m offside adjacent to kerbs).	imposed by the design requirements and the adjacent BNI property boundary.	
SWTC Appendix B.2 Table B.2-3 **Main Carriageways | Right turn auxiliary lane width (next to through lane) | 3.5m, with the exception of Richmond Road southbound (MC20) CH 275 to 410 where the right turn lane width of 3.3 metres is to be provided.**	No longer required as the SWTC Appendix B.2 Table B.2-3 was updated to 3.3m	TfNSW to accept the non-conformance in recognition of the constraints imposed by the design requirements and the adjacent BNI property boundary.	Conditionally agreed

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION	STATUS
Reference: Conditionally agreed exception (SWTC Appendix B.1 Table B.1-2 Item C3)			
SWTC Appendix B.2 **The legacy geometric design departures listed below are retained as-is and are not required to be addressed as part of the Works:** **Richmond Road northbound (MC10) south of intersection with Rooty Hill Road North:** ■ **Horizontal curve insufficient for adverse crossfall for 80km/h (R440).** ■ **Crossfall < 1%.** ■ **Both (2 no.) left turn lane lengths and tapers are insufficient (96m compared to 82m, 32m compared to 12m, respectively).** **Richmond Road southbound (MC20) south of intersection with Rooty Hill Road North:** ■ **Horizontal curve insufficient for adverse crossfall for 80km/h (R315).** **Richmond Road south of Rooty Hill Road intersection, southbound (MC20) and northbound (MC10) carriageways;** ■ **No curve widening applied on any lane widths; and** ■ **No minimum curve lengths applied.** **Westlink M7 on ramp (MCD0):** ■ **Geometry generally meets 60km/h instead of 80km/h.** **Reference: Conditionally agreed exception (SWTC Appendix B.1 Table B.1-2 Item C8)**	In this area, it is proposed to undertaken some kerb adjustment and linemarking works to ensure that a minimum 2.5m wide path is achieved adjacent to both the SB and NB carriageways as per the SWTC Appendix B.2 Section 8.2 a) i), and that the lane width requirements in the SWTC Appendix B.2 Table B.2-3 are achieved. GEA DTI JV have endeavoured to address these departures where feasible however amendments to rectify these departures would require major works which would extend beyond the scope and boundary of this project. The solution adopted is in line with the REF and is considered a reasonably practical and value-for-money approach.	TfNSW to accept the non-conformance in recognition of the constraints imposed by existing M7 infrastructure. This is consistent with the Tender Concept Design.	Conditionally agreed
SWTC Appendix B.9 Section 1.4 b) & TS 02670.8 Section 8.7 **However, where the length of the crossing is more than 25 m a median post must be provided and a secondary pedestrian lantern must be placed on the median post with accompanying pedestrian push buttons, except for at the existing approximately 27m wide pedestrian crossing of the Rooty Hill Road North eastern leg, which is to be retained as-is, with provision of a new**	At the Rooty Hill Road North eastbound approach, the existing pedestrian crossing measures approximately 27m as per survey. There are no median posts with associated lanterns and pushbutton in the existing situation. A new median post equipped with standard pushbutton is proposed in the existing approximately 1.8m wide median, in accordance with TfNSW TSD standards, to enable a stranded pedestrian to promptly request the next pedestrian crossing phase.	TfNSW to accept the non-conformance in recognition that this is the existing condition. This is consistent with the Tender Concept Design.	Conditionally agreed

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION	STATUS
median post with a standard pushbutton in the existing raised median. **Reference: Conditionally agreed exception (SWTC Appendix B.1 Table B.1-2 Item C9)**	GEA DTI JV have endeavoured to address these departures where feasible however amendments to rectify these departures would require major works which would extend beyond the scope of this project as addressing this departure would require a 2 stage crossing with wide median noting that would introduce traffic impacts such as removal of a travel lane or widening of the entire Rooty Hill Rd at the intersection. The solution adopted is in line with the REF and is considered a reasonably practical and value-for-money approach.		
Shared path width varying between 2m and 2.5m MC10 CH 20 to Ch75 (western side), and a 2.5m path with obstructions MC10 CH 75 to Ch100 (western side). **Requirements: minimum 2.5m, SWTC Appendix B.2 Clause 8.2 a) (i)** **Reference: Design departure No. 12**	Existing kerb line is retained south of the Richmond Road / Rooty Hill Road intersection. If the kerb line was to be extended to accommodate a 2.5m wide sure user path, there would still be existing obstacles such as street lighting and TCS poles. The existing condition is proposed to be retained for this shared path.	TfNSW to accept the non-conformance in recognition that this is the existing condition. This is consistent with the Tender Concept Design.	Open
Separating tangent length between reverse curves on MC70 **Requirement: 56 m AGRD Part 3 (2021) Section 7.5.3** **Achieved: 38 m, MC70 CH 486** **Reference: Design departure No. 13**	North of abutment B of the Rooty Hill Road Flyover Bridge MC70 alignment is constrained by MC10 and MC20 carriageways along with achieving a 1:50 taper with MC10. Between the R320m with 5% crossfall on the flyover and R740m adverse curve as 38m separating tangent is provided. This length has been maximised to be as long as possible. It is noted that a full rotation of crossfall is not occurring on the straight, only a 2% rotation.	TfNSW to accept the non-conformance in recognition that there is no full rotation of crossfall occurring along the straight, only a 2% rotation. The length of the straight is improved (from 26m in Tender Concept Design).	Open
Requirement: 500mm clearance from the design vehicle envelope to face of kerb, safety barrier, centerline or other physical obstructions for design (Austroads Design Vehicles and Turning Path Templates Guide (2023)) **Departure:** ▪ **Left turn from M7 southbound exit ramp onto Richmond Rd southbound, 124mm achieved**	For two existing (and retained) design vehicle turn paths, the 500mm clearance envelope is encroached into by existing kerbs to be retained. The wheel path is contained within the pavement and the clearance envelope does not encroach onto any physical obstructions such at TCS pole or signage.	TfNSW to accept the non-conformance in recognition that this is the existing condition. This is consistent with the Tender Concept Design	Open

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION	STATUS
▪ **Right turn from Richmond Rd northbound to M7 northbound entry ramp, 50mm achieved** **Reference: Design departure No. 14**			
In addition to SWTC Appendix B.1 Table B.1-1 Item A.34 the following locations do not achieve 3.0m form the toe of formation or top of cutting to the Site or Local Area Works Area boundary for the Main Carriageways and ramps: ▪ **southbound Main Carriageway adjacent to AMPLITEL: CH 340 to 400 MC10** ▪ **southbound Main Carriageway adjacent to Sydney Water Pump Station: CH 530 to 545 MC10, where the existing offset from the edge of shoulder to Sydney Water Pump Station is retained** ▪ **southbound Main Carriageway at northern tie-in to Portion 1: CH 810 to 960 MC20, where the existing kerb and verge is retained** **Reference: Design departure No. 15**	The site boundary was updated from the REF boundary which was used on the plans shown in the both the TfNSW Reference Design and the Tender Concept Design. The toe of the embankment has not increased since the Tender Concept Design.	TfNSW to accept the non-conformance in recognition that the clearance to boundary has been maximised. This is consistent with the Tender Concept Design	Open
Austroads Guide to Road Design Part 3 Table 7.3 (2021) **Required Value:** ▪ **Curves require transitions for radii less than 220 m in roads with a speed of 70 km/hr.** **Departure Value Adopted:** **Rooty Hill Road North at:** ▪ **MCA0 has a radius of 100 m with no transition** **Reference: Design departure No. 16**	The existing alignment of Rooty Hill Road North is retained. It is noted that the posted speed for Rooty Hill Road North is V60km/h, which does not required spirals to be adopted.	TfNSW to accept the non-conformance in recognition that this is the existing condition. This is consistent with the Tender Concept Design	Open
Lengths of horizontal curves **Austroads Guide to Road Design Part 3 Table 7.7 (2021)** **Required Value:** ▪ **Arc length of 180 m is required for 80 km/hr speed.**	Short lengths of curves are required to match into the existing Richmond Road. Road widening is not possible due to the retention of the existing Bells Creek Bridge, existing road alignment and property constraints. The horizontal alignment has been optimised requiring the adjustments to the size of horizontal curves and	TfNSW to accept the non-conformance in recognition that the design has been optimised to provide the best alignment. This is consistent with	Open

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION	STATUS
Departure Value Adopted: **Richmond Road at:** ▪ **MC10 CH 217 (curve radius 1000 m) achieves 36 m** ▪ **MC10 CH 736 (curve radius 1450 m) achieves 106 m** ▪ **MC20 CH 172 (curve radius 1065 m) achieves 101 m** ▪ **MC20 CH 493 (curve radius 400 m) achieves 107 m** ▪ **MC20 CH 671 (curve radius 1705 m) achieves 141 m** **Rooty Hill Road Flyover:** ▪ **MC70 CH 524 (curve radius 740 m) achieves 178 m** **Required Value:** ▪ **Arc length of 230 m is required for 90 km/hr speed.** **Departure Value Adopted:** **Richmond Road at:** ▪ **MC10 CH 906 (curve radius 470 m) achieves 214 m** **Reference: Design departure No. 17**	lengths. Design departure No. 17 captures these revised curve radius and lengths. SWTC Appendix B.1 Table B.1-1 Item A2 has been removed from the design	the Tender Concept Design	

Table 3-8: Agreed and conditionally agreed non-conformances no longer required (to be confirmed at FDD)

DETAILS OF NON-CONFORMANCE	REASON FOR REMOVAL
Austroads Guide to Road Design Part 3 Table 7.7 (2021) **Required Value:** ▪ **Arc length of 180 m is required for 80 km/hr speed.** **Departure Value Adopted:** **Richmond Road at:** ▪ **MC20 CH 175 (curve radius 1720 m) achieves 153 m** ▪ **MC20 CH 495 (curve radius 400 m) achieves 107 m** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A2)**	The horizontal alignment has been optimised requiring the adjustments to the size of horizontal curves and lengths. Design departure No. 17 captures these revised curve radius and lengths.
Austroads Guide to Road Design Part 3 Table 7.3 (2021) **Required Value:**	The design speed of Rooty Hill Road North is V70km/h. Design departure No. 16 has been submitted in lieu of SWTC Appendix B.1 Table B.1-1 Item A4 capturing

DETAILS OF NON-CONFORMANCE	REASON FOR REMOVAL
▪ **Curves require transitions for radii less than 300 m in roads with a speed of 80 km/hr.** **Departure Value Adopted:** **Rooty Hill Road North at:** ▪ **MCA0 has a radius of 220 m with no transition** ▪ **MCC0 has a radius of 220 m with no transition** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A4)**	the correct design speed and radius present in the design.
Austroads Guide to Road Design Part 3 Table 8.5 (2021) **Required Value:** ▪ **Minimum longitudinal grade 0.5%.** **Departure Value Adopted:** ▪ **Richmond Road at MC20 CH680 to CH730 achieves longitudinal grades between 0 - 0.1%.** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.7)**	Vertical geometry has been refined to remove the flat grades.
Austroads Guide to Road Design Part 3 Table 8.10 (2021) **Required Value:** ▪ **Arc length of 60 m is required for 80 km/hr speed.** **Departure Value Adopted:** ▪ **Richmond Road at MC20 CH670 to CH704 vertical curve and MC20 CH722 to CH757 vertical curve achieves arc length of 35 m.** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.8)**	Vertical geometry has been refined to remove the short lengths of curves.
AS5100.1 Section 13.5 **Required Value:** ▪ **1.2 m nearside shoulder based on the AADT > 5000.** **Departure Value Adopted:** ▪ **1.0 m nearside shoulder has been adopted along the flyover bridge.** **Reference: Agreed exception (SWTC Appendix B.1 Table B.1-1 Item A.12)**	A 2.5m shoulder is provided where there is not a barrier present, and a 3.0m shoulder has been provided where a barrier is present in accordance with SWTC Appendix B.2 Table B.2-3.
SWTC B.2 Section 4.4 a) (iv) **a) Stopping sight distance for cars must be assessed in accordance with Austroads Guide to Road Design and TfNSW Supplements, and adopting the following parameters:** **(iv) the design speed; with the exception of the Rooty Hill Road North Flyover (MC70) CH 240 to 375m where a reduced design speed of 70km/hr is acceptable.** **Reference: Conditionally agreed exception (SWTC Appendix B.1 Table B.1-2 Item C4)**	SSD for V80km/h has been achieved throughout MC70 with the provision of a 3m nearside shoulder and 0.5m offside shoulder. Note the removal of this approved conditionally agreed exception is reliant on the approval of SWTC Appendix B.1 Table B.1-2 Item C2.

3.4.2 Environmental & Planning Approval Compliance

The Environmental compliance register in Appendix G is provided in accordance with the compliance assessment criteria as listed in Table 3-9.

Table 3-9: Key Compliance Design Criteria

STATUS	DESCRIPTION
Compliant	The intent and all specific requirements of the consent condition have been met.
Non-compliant	The intent of one or more specific requirements of the consent condition or management measure has not been met.
TBD	Conformance with a condition of the consent is not yet determined, with compliance to be confirmed at a subsequent design submission stage.

3.4.3 Model Verification

Model verification has been undertaken in accordance with the Digital Engineering Management Plan (RRM7-GEDT-NWW-DN-PLN-000001) for the Project. Ongoing verification and checks will be undertaken throughout the design development process to ensure a 3d model is developed that is consistent with SWTC and Head Contract requirements.

4 DESIGN CONSIDERATIONS

4.1 Safety in Design

The Safety in Design (SiD) process is required to satisfy relevant WHS Legislation and Head Contract requirements (including Clause 5.2 of the SWTC).

The SiD workshop was held in-person on 04/02/2026 and was attended by TfNSW, GEA DTI JV and Aurecon to identify the relevant risks in the Project. The SiD register is presented in Appendix C of this design report.

Table 4-1 below will provide a summary of the key risks identified in the SiD workshop that are relevant to this package of Works.

Table 4-1: Key SiD Hazards and Controls

RISK ID NUMBER [1]	HAZARD DESCRIPTION	CAUSE	CONTROLS IDENTIFIED
GEDT-014	Errant cyclist collides with motor vehicle using M7 southbound on-ramp from Richmond Rd	CA01 - Cyclist does not slow sufficiently when exiting the M7 to Richmond Road, mounts kerb and strikes or is struck motor vehicle using on-ramp	Existing condition has signage and "passive" traffic calming barriers for cyclist exiting M7 to Richmond Road On-ramp has a signalised pedestrian crossing
GEDT-045	Plant rollover when maintain batter slopes	CA01 - Batter slopes exceeding mobile grown maintenance plant safe operation parameters typical 15 degrees cross slope	The batter slopes are designed to be 4H:1V or flatter as much as reasonably practicable

Notes:

[1] The Risk ID number corresponds to the findings highlighted in the SiD register. Refer to Appendix C for details.

4.2 Road Safety Audits

In addition to the SiD workshops, two Road Safety Audits will be carried out on the design at Developed Concept Design and Substantial Detailed Design.

The road safety audit raised 16 findings on the DCD and SDD submissions as follows:

1 finding with High level of risk

5 findings with Medium level of risk

1 finding with Low level of risk

1 note

Refer to Appendix I for the Corrective Action Responses (CAR) to the findings of the road safety audit along with the road safety audit. A summary of the findings with High level of risk and the corresponding CAR is provided in provided in Table 4-2.

Table 4-2: Road safety audit findings

RSA ID	DESCRIPTION OF RISK	PROPOSED CORRECTIVE ACTION RESPONSE (CAR)	STATUS
DEVELOPED CONCEPT DESIGN (DCD)			
1	Previous Stantec RSA Finding #1 Previous finding reported that there is an existing concrete shared path on the eastern side of Richmond Road, which is to be retained as part of the proposed upgrade. The shared path ends at approx. Ch 1150 with no connection to other paths. Pedestrians and/or cyclists may use the existing path to its end not knowing that there is no connection beyond	Portion 1 IFT drawings were updated to remove the shared path south of the entry to Greenways Village. ACTION: Note to be added to the plans to indicate that this section of path has been removed by Portion 1 Works.	Open

RSA ID	DESCRIPTION OF RISK	PROPOSED CORRECTIVE ACTION RESPONSE (CAR)	STATUS
	and then could attempt to cross six travel lanes to the western side of Richmond Rd to connect to bi-directional shared path. As a result, there is increased risk of a pedestrian or cyclist being struck by a vehicle in a 70 km/h speed zone. The frequency of an incident is decreased due to there being minimal reason for pedestrians/cyclists on the eastern side of Richmond Rd in this area.		

4.3 Constructability

During development of the design, the Construction teams have been fully involved in the design review process. A constructability review of this package has been undertaken for the design and the outcomes are summarised below.

Table 4-3: Summary of outcomes

ITEM	DESIGN STAGE IDENTIFIED	CONSTRUCTION ISSUE	DESIGN RESOLUTION
Temporary vertical works clearance at BR01 Pier 1	DCD	Vertical clearance of 5.4m is required from Rooty Hill Road to the temporary works structure around Pier 1. 0.8m additional vertical clearance to the lowest point of the integral headstock has been provided. This allows all existing Rooty Hill Road North traffic lanes to remain operational during curing	Resolved in DCD
Clearance to gas main at BR01 Pier 1	DCD	Achieving sufficient clearance between Pier 1 of the Flyover and the existing high pressure gas pipe	Resolved in DCD. Rooty Hill Road Flyover alignment adjusted to achieve approximately 1.1m clearance from face of pier to the high pressure gas pipe. To be revisited in SDD to confirm clearance is retained.
Cut / Fill parity for the Project	DCD	Strive for a cut / fill balance for the Project and reduce export of excess material	Resolved in DCD Additionally, the western embankment along MC70 approx. CH 80 to CH 220 flattened form 2H:1V to 6H:1V to reduce excess fill.
Clearance to BNI	DCD	Strive to maximise the clearance to the BNI site	Resolved in DCD. MC10 south of Bells Creek Bridge approx. CH 395 to CH 700 has been lowered to increase the clearance to BNI.

4.4 Asset management

Asset Documentation is provided for SDD submissions, the GEA DTI JV Digital Execution Plan (DEXP – RRM7-GEDT-NWW-DN-PLN-000001) and the Aurecon Digital Engineering Management Plan (DEMP – RRM7-GEDT-NWW-DN-PLN-000002). Refer to relevant asset data deliverables for this package. These comprise the digital

models, the asset tagging register and clash detection report. These are submitted one week after the submission of the design report and drawings.

4.5 Design optimisation / Whole of Life

The design has been optimised and coordinated with various engineering disciplines to ensure an integrated, economic, safe and constructible solution is achieved.

A summary of the key outcomes in the design to reduce the whole of life costs of the Project are noted below, as follows:

- Strive for a cut / fill parity for the Project and overall reduction in haulage of earthworks between work zones
- Replace bridge structures with earthworks embankment
- Reduction in quantities of concrete, pavements and stormwater infrastructure
- Co-locate maintenance parking bays and access provisions to provide access to multiple items of infrastructure
- Where possible, minimise clearing of areas within the Site boundary
- Where possible retain existing infrastructure

4.6 Operations and maintenance

The operations, maintenance, and decommissioning requirements have been considered in the development of this design package and are outlined in the following sections. The outcomes presented here to demonstrate the design complies with the Head Contract O&M requirements, will be incorporated into the O&M Manuals which will be provided separately from the Design Documentation.

Refer to Appendix H for a preliminary maintenance plan. The DCD documents the intended access strategy and maintenance provisions to a conceptual / schematic level only. The maintenance provisions and parking bay infrastructure will be further developed and incorporated into the design during the SDD phase based on TfNSW feedback and other relevant parties.

4.6.1 Bridge structures

The following maintenance provisions are provided for bridge structures, in accordance with SWTC Appendix B.4 Clause 3.1.18 and 3.4.5:

- The minimum vertical clearance from the soffit of the superstructure to the finished ground level must be not less than 1.5 m.
- A minimum clear gap of 3 m between adjacent bridges for safety and maintenance access

4.6.2 Drainage assets

The following maintenance provisions are provided for drainage assets, in accordance with SWTC B.7 Clause 7 (g)(iv) and SWTC B.4 clause 5.8 (g):

- Water quality control basins and structures are designed and constructed with safe and efficient access for maintenance and emergency response purposes

4.6.3 Utilities assets

Vehicular access is provided to the AMPLITEL tower from the Colebee property driveway.

Access to the Sydney Water pump station is retained with a new property driveway from Richmond Road southbound.

The Endeavour Energy substation on the west of Richmond Road is accessible via the shared path.

4.6.4 ITS and TCS infrastructure

TCS infrastructure at the Richmond Road / Rooty Hill Road North intersection and Richmond Road / Westlink M7 southbound entry ramp intersection can retain the existing maintenance strategy for these intersections.

CCTV poles will be maintained from the shared path with the VMS continue to be maintained as present with maintenance vehicles parking in the shoulder adjacent to the VMS.

4.6.5 Streetlights

Where possible streetlights will be maintained from the shared path. Along the eastern side Richmond Road southbound, the existing streetlights are proposed to be maintained from the verge.

4.7 Disaster recovery

Richmond Road is a designated regional flood evacuation route in the Hawkesbury Nepean Flood Plan (NSW State Emergency Service (NSW SES), 2015). The Project Works are designed such that Richmond Road is free from flooding up to the 0.2% AEP storm event, in accordance with SWTC Appendix B.7 Clause 2.2 (c).

It is noted that the flood immunity is provided to the edge line of the carriageway in accordance with SWTC Appendix B.7 Table B.7-2.

Refer to the Flooding and Hydrology - Portion 2 (Southern Section) Package (SD01) for further details on the flood assessments and hydraulic modelling undertaken for the Project.

4.8 Future proofing

As per SWTC Clause 2.1 (c) xiv) the Project Works are to ensure future integration with Castlereagh Connection as per 'SKE-22_Indicative future intersection of RR and CC-20250204 .pdf' (by others) is achievable with minimal requirements for demolition or reworks.

The following minimum requirements as listed in SWTC Clause 5.35 are to be achieved:

- sufficient space is reserved in the median for potential signalised intersections, including:
  - provision for dual right-turn bays from Richmond Road southbound to the future Castlereagh connection on ramp, with median separation; and
  - providing suitable levels across the median to enable conversion with minimal adjustments for future pavements;
- provision of compliant approach sight distance on all legs of the intersections;
- conducting aquaplaning checks for all future intersections;
- avoiding drainage pits or manholes in future intersections (i.e. no pits or access points in future Carriageways);
- ensuring all Utility Service Works avoid the need for any future relocation work;
- ensuring that streetlighting is adequately spaced to avoid potential clashes with Castlereagh Interchange structures;

- avoiding any new trees, large sign structures or infrastructure being positioned such that they clash with the future works resulting in removal/relocation, (refer to Option 2 of 'Richmond Road Flyover Ramp - Options Report 2'); and
- ensuring that future intersections do not adversely impact provision for pedestrian movements and the Active Transport strategy across the road network in the area.

A preliminary sketch has been completed as part of DCD demonstrating sufficient space is reserved in the median for future integration with Castlereagh Connection (by others), refer to Appendix H for further details. Detailed checks will be provided in SDD.

4.9 Durability

The minimum design life of assets for this package is in accordance with SWTC Appendix B.13 Table B.13-1. Refer to the Durability Report (RRM7-GEDT-0537-DY-RPT-010001) for any non-conformances identified for the Project.

4.10 Design Life

This section is not applicable for this design package.

4.11 Environment

A summary of compliance with the environmental requirements applicable for this package as set out in the project's Environmental Documents is provided below. A complete overview of applicable conditions and evidence of compliance is included in Appendix G.

4.11.1 Cultural heritage impacts

The design has been developed to ensure that the activities of the Contractor have a minimal impact on the existing cultural and aboriginal heritage sites, in compliance with the Aboriginal Heritage Impact Permit (AHIP) specific to the area.

Refer to the Site Clearing Package (DM01) for further details on the extents of clearing for the Project and subsequent impacts (if any) on cultural heritage assets.

4.11.2 Biodiversity

Refer to the Site Clearing Package (DM01) for further details on the extents of clearing for the Project and subsequent impacts (if any) on biodiversity.

4.11.3 Waterways

The design has been developed to minimise the impact on aquatic habitats and riparian zones. Any clearing activities near the waterways areas is in accordance with TfNSW D&C G38 Clause 3.7.

Refer to the Site Clearing Package (DM01) for further details on the extents of clearing for the Project and subsequent impacts (if any) on waterways.

4.12 Sustainability

4.12.1 Energy and greenhouse

A summary of the key outcomes in the design to reduce the energy and greenhouse of the Project are noted below, as follows:

- Strive for a cut / fill parity for the Project and overall reduction in haulage of earthworks between work zones
- Replace bridge structures with earthworks embankment
- Reduction in quantities of concrete, pavements and stormwater infrastructure
- Co-locate maintenance parking bays and access provisions to provide access to multiple items of infrastructure
- Where possible, minimise clearing of areas within the Site boundary
- Where possible retain existing infrastructure

4.12.2 Materials and waste

The design has achieved the following:

- Overall reduction in earthworks quantities and strive for a cut/fill parity for the Project.
- Minimise earthworks operations and clearing within the Project Corridor. Refer Site Clearing Package (DM01) for further details.
- Where possible, reuse existing pavement and minimise pavement overlay at tie-in locations.
- Minimise volume of concrete structures for the Project such as bridges and culvert.

4.12.3 Biodiversity

Refer to the Site Clearing Package (DM01) for further details on the extents of clearing for the Project and subsequent impacts (if any) on biodiversity.

4.12.4 Climate Resilience

The road alignment has been designed to provide a 0.2% AEP flood immunity on Richmond Road, as per Table B.7-2 SWTC Appendix B.7.

A climate change risk assessment in accordance with Clause 2.1 a) Appendix D.5 will be undertaken by GEA DTI JV (by others). The associated mitigation measures (if any) will be incorporated into the design.

4.13 Predicted Effects

4.13.1 Ground settlement

This section is not applicable for this design package.

4.13.2 Noise and vibration

This section is not applicable for this design package.

4.13.3 Instrumentation and monitoring

This section is not applicable for this design package.

4.13.4 Decommissioning

This section is not applicable for this design package.