

4 AUDIT METHODOLOGY

4.1 AUDIT PROCESS

This RSA was conducted in accordance with relevant Austroads guides to road safety, including, but not limited to, AGRS06-22 *Austroads Guide to Road Safety Part 6: Road Safety Audits 2022*.

The risk assessment framework used in this report is based on *TfNSW Enterprise Risk Management (TERM) Standard*. The risk matrix is described in Section. 0 Of this report.

Austroads Guide to Road Safety Part 6 provides primary considerations for identifying the likelihood, consequences, and resulting crash severity ratings.

The RSA process was generally carried out with *the TfNSW Guidelines for Road Safety Audit Practices*.

The following steps were taken:

- Gather any additional information/material necessary for the RSA;
- Hold a commencement meeting to set the context for the RSA, discuss the scope, project constraints, and required information to clarify the understandings and expectations of all parties.
- Request further information/material from SMEC as required;
- Create an RSA report and rate each identified safety deficiency based on crash likelihood and crash consequence to determine a risk level for each road safety risk and hazard;
- Hold a completion meeting to discuss the RSA report and audit findings; and
- Register RSA details on the *TfNSW Register for Road Safety Auditors* once finalised.

4.2 RISKS ASSOCIATED WITH THE APPLICATION OF ACCEPTED DESIGN SOLUTIONS

Risks associated with the application of accepted design solutions are generally excluded from the scope of this RSA.

For example, the RSA does not include risks like running red lights at signalised intersections. The audit identifies risks associated with reduced sight stopping distance at signalised intersections if the minimum requirements are not met.

4.3 SAFE SYSTEM APPROACH

This report considers a Safe System approach to road user safety and has been undertaken based on the following primary considerations:

1. The NSW Government has committed to achieving zero fatalities and serious injuries (Towards Zero) on our road network by 2056, with an interim target to halve deaths and reduce serious injuries by 30% by 2030.
2. The Safe System approach underpins Towards Zero. It is formally adopted in NSW as the primary enabler for achieving zero deaths and injuries on our roads (*Transport for NSW, 2026 Road Safety Action Plan*).

This RSA considers a safe systems approach to road user safety and has been undertaken based on the impact energy on the human body for different crash types, as displayed in Figure 4 and 5 below.



Figure 4 – Survival threshold for different crash types

The risk matrix was used with the below Severity guidance sheet (Figure 10.3 AGRS06-22), reproduced as Figure 5. The severity guidance sheet provides an indication of crash severity outcomes for a range of crash types and crash speeds. Professional engineering judgement is required to confirm the severity outcomes indicated by the guidance sheet, as research into Safe System tolerance speeds continues to evolve.

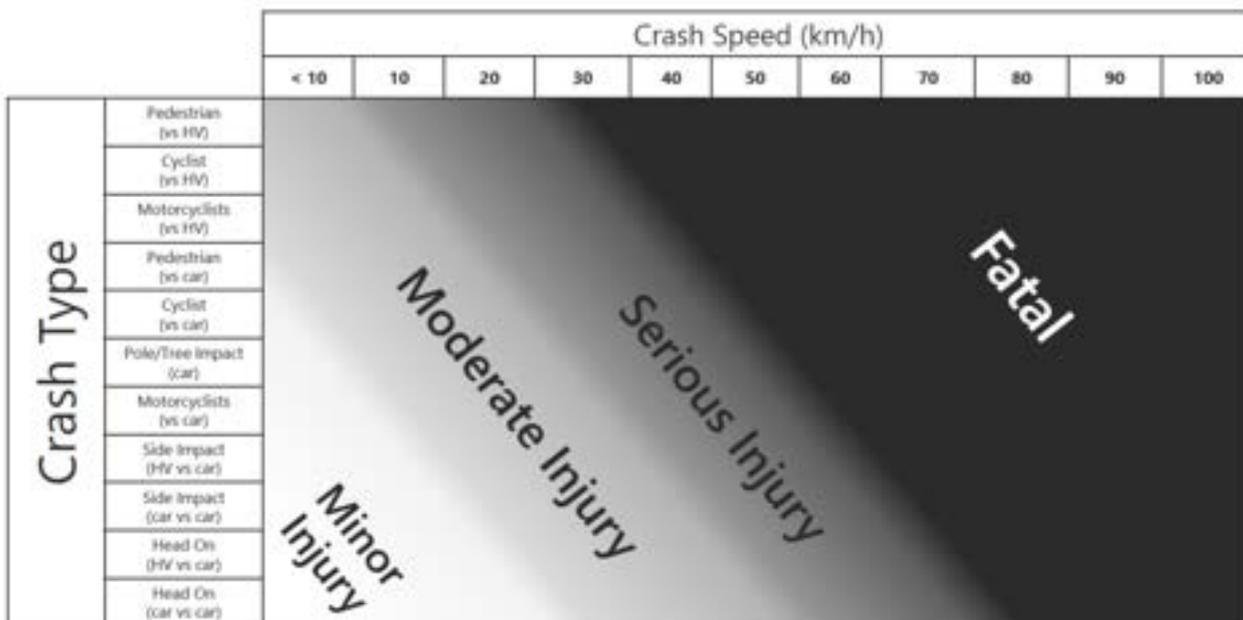


Figure 5 – Severity guidance sheet

4.4 RISK ASSESSMENT

The level of risk is estimated from the risk matrix in Table 5, which is based on the *TfNSW Enterprise Risk Management (TERM) Standard, CPSt20000.1*. The level of risk is the likelihood of experiencing a particular consequence.

Table 3 is used to classify the consequences of a risk and Table 4 To classify the likelihood. See Table 6 to understand the risk ratings shown in Table 5.

Table 3 – Risk consequence

Rating	Description	Safety consequence (customer and community member)
C6	Insignificant	An injury/illness where first aid treatment is administered to a customer/community member at the incident scene/location
C5	Minor	An injury/illness treated by a qualified medical practitioner, resulting in a customer/community member not requiring hospitalisation.
C4	Moderate	An injury/illness treated by a qualified medical practitioner, resulting in a customer/community member requiring local area hospitalisation.
C3	Major	An injury/illness resulting in a customer/community member requiring a high degree of care in a hospital (e.g. ICU) or resulting in a permanent disability
C2	Severe	A single fatality of a customer/community member 10–20 customer injuries/illnesses requiring a high degree of care in a hospital (e.g. ICU) or resulting in a permanent disability
C1	Catastrophic	Multiple customer/community member fatalities in a single event > 20 customer injuries/illnesses (single event or over a period)

Table 4 – Risk likelihood

Rating	Description	Frequency	Probability
L6	Almost unprecedented	Consequences will occur once every 50 years	< 10% chance of occurring Not expected ever to occur
L5	Very unlikely	Consequences will occur at least once every 25 years	10% to 25% chance of occurring Not expected to occur
L4	Unlikely	Consequences will occur at least once every 10 years	>25% to 50% chance of occurring More likely not to occur than to occur
L3	Likely	Consequences will occur once a year	>50% to 75% chance of occurring More likely to occur than not occur
L2	Very likely	Consequences will occur between 2 and 10 times per year	>75% to 90% chance of occurring Expected to occur occasionally
L1	Almost certain	Consequences will occur more than 10 times per year	>90% chance of occurring Expected to occur frequently

Table 5 – TERM risk matrix: 'likelihood' vs 'consequence'

Description	Insignificant C6	Minor C5	Moderate C4	Major C3	Severe C2	Catastrophic C1
Almost certain – L1	D	C	B	A	A	A
Very likely – L2	D	C	B	B	A	A
Likely – L3	D	C	C	B	B	A
Unlikely – L4	D	D	C	C	B	B
Very unlikely – L5	D	D	D	C	C	B
Almost unprecedented – L6	D	D	D	D	C	C

4.5 RISK ACCEPTANCE

The level of risk is estimated from Table 6, which is based on the *TfNSW Enterprise Risk Management (TERM) Standard*, CPSt20000.1. The level of risk is the likelihood of experiencing a particular consequence.

Table 6 – Risk responses

Risk rating	Response
Very High 'A'	<ul style="list-style-type: none"> Generally intolerable Avoid, except in extraordinary circumstances Find an alternative solution Reduce the level of risk as a priority
High 'B'	<ul style="list-style-type: none"> Almost unacceptable Undesirable Reduce level of risk as a priority Tolerate only if not reasonably practicable to reduce risk level
Medium 'C'	<ul style="list-style-type: none"> Generally tolerable if not reasonably practicable to reduce risk level Seek additional treatment measures unless the cost exceeds the benefit and/or the measure is not recognised as good practice
Low 'D'	<ul style="list-style-type: none"> Broadly acceptable Consider reducing risk level if options exist and costs are proportionate to benefits

For road safety on designs for new or improved infrastructure, a concession is required for the acceptance of all risks identified as 'medium' or higher, when the risk relates to requirements outlined in the TfNSW standards not being met. The concessions process is outlined in TS 00003 *Concessions to Transport Standards*.

4.6 RECOMMENDATIONS

In accordance with *TfNSW Guidelines for Road Safety Audit Practices*, recommendations are not provided in this RSA report. However, mitigation options may be discussed between the audit team and the project sponsor/client during the close-out meeting to assist the project manager in taking further action and conducting investigations to eliminate or mitigate the hazards where feasible.

Discussions during the close-out meeting regarding mitigation measures for the audit findings are intended as a guide only, based on the audit team's relevant experience and limited knowledge of the project, and do not constitute a formal corrective action response. Ultimately, it is the project managers' responsibility to manage and implement corrective actions based on the audit findings.

5 AUDIT INFORMATION

5.1 AUDIT SCHEDULE

Table 7 – Audit schedule

Activity	Date
Commencement meeting	20 January 2026
Day and night site inspection	4 February 2026
Draft report issued	9 February 2026
Completion meeting	11 February 2026
Final report issued	11 February 2026

5.2 COMMENCEMENT MEETING

A commencement meeting was held on Thursday 4th January 2026 and was attended by Rob Ferguson, Charlotte Cartwright and James Abraham from Aurecon and Steven Yarnold, Michael Stevenson and Graeme Robinson from CCD. The status of the developed concept design documentation, RSA requirements and limits of the audit were discussed.

5.3 INFORMATION SUPPLIED

Information supplied by Aurecon that was reviewed as part of the RSA are as follows:

Table 8 – Information supplied

Documentation	Date supplied	Document No	Revision
Drawings	20/01/2026	MR537 Richmond Road – Richmond Road Upgrade M7 to Townson Road Roadworks – Portion 2 (Southern Section) Detailed Design	A01.0
Drawings	20/01/2026	MR537 Richmond Road – Richmond Road Upgrade M7 to Townson Road Roadworks – Portion 2 (Southern Section) Detailed Design – Traffic Control Signals	A01.0
Concept Design Report - Aurecon	23/01/2026	Richmond Road Upgrade (M7 to Townson Road RW01 – Roadworks – Portion 2 (Southern Section) – Design Report Design Stage: Developed Concept Design	A
Concept Design Report - Stantec	20/01/2026	Stantec – Concept Design Report Richmond Road Widening between M7 and Townson Road Design and Review of Environmental Factors (REF)	D 14/3/25
Traffic and Transport Report	20/01/2026	Stantec – Richmond Road Upgrade between M7 Motorway and Townson Road Marsden Park Addendum Traffic and Transport Impact Assessment Report	2 18/3/25
Drawings	20/01/2026	MR537 Richmond Road – Richmond Road Upgrade M7 to Townson Road Road Furniture and Directional Signage (For Tender)	A 20/6/25

Documentation	Date supplied	Document No	Revision
Drawings	20/01/2026	MR537 Richmond Road – Richmond Road Upgrade M7 to Townson Road Concept Design – B2.7 Pavement Design (For Tender)	A 20/6/25
Drawings	20/01/2026	MR537 Richmond Road – Richmond Road Upgrade M7 to Townson Road Concept Design – B2.4 Drainage and Flooding Design (For Tender)	A 20/6/25
Drawing	20/01/2026	MR537 Richmond Road – Richmond Road Upgrade M7 to Townson Road General Arrangement – Key Features Plan (For Tender)	A 20/6/25
Technical Criteria Report	20/01/2026	RRM7 – Scope of Works and Technical Criteria Exhibit A Contract: 24.0000139271.1049 (February 2025)	-
Technical Criteria Report	20/01/2026	RRM7 – Scope of Works and Technical Criteria Appendix B.2 (Geometric and Road Design) Contract: 24.0000139271.1049 (February 2025)	-
Technical Criteria Report	20/01/2026	RRM7 – Scope of Works and Technical Criteria Appendix B.8 (Signposting, Delineation and Roadside Features) Contract: 24.0000139271.1049 (February 2025)	-
Technical Criteria Report	20/01/2026	RRM7 – Scope of Works and Technical Criteria Appendix B.1 (Agreed Exceptions) Contract: 24.0000139271.1049 (February 2025)	-

5.4 SITE INSPECTION

A daytime site inspection and audit was undertaken on Wednesday 4th February 2026 between 12 noon and 2pm by the CCD Audit Team, Steven Yarnold and Graeme Robinson. Weather at the time of the site visit was sunny and dry.

Traffic at the time of the site visit was heavy in all directions with a notable presence of heavy vehicles up to B-Double in size. Commuter buses were observed on all legs of the intersections. Cyclists were also observed using the shared path along the westside of Richmond Road.

Although long queues were forming at the signalised intersections, traffic behaviour was observed to be very good with no incident being observed.

5.5 PREVIOUS RSA REPORT

A previous RSA has been undertaken by Stantec for the 80% Concept Design – Refer Appendix included in the RSA Report has been undertaken by Stantec.

A total of 26 road safety findings were presented in the RSA Report. These findings have been reviewed by the CCD Audit team, and 3 findings are considered to remain open at the time of this RSA that relate to the project area. These have been included in Section 6 of this report as Previous Findings #1, 15 and 17.

5.6 SITE PHOTOS



View to the west along the shared path adjacent to Richmond Rd and future alignment of the NB carriageway



View to the west along the off-load ramp from the M7 and the signalised 'T' intersection with Rooty Hill Rd North



View to the east along Richmond Rd and the signalised 'T' intersection with the M7 SB on-load ramp



View to the north of the signalised intersection between Richmond Rd, Rooty Hill Rd North and M7 on-load and off-load ramp, with the M7 overbridge on the eastside of the intersection

5.7 COMPLETION MEETING

A completion meeting was on the Wednesday 11 February 2026 and was attended by Rob Ferguson, Charlotte Cartwright and James Abraham from Aurecon and Steven Yarnold and Graeme Robinson from CCD.

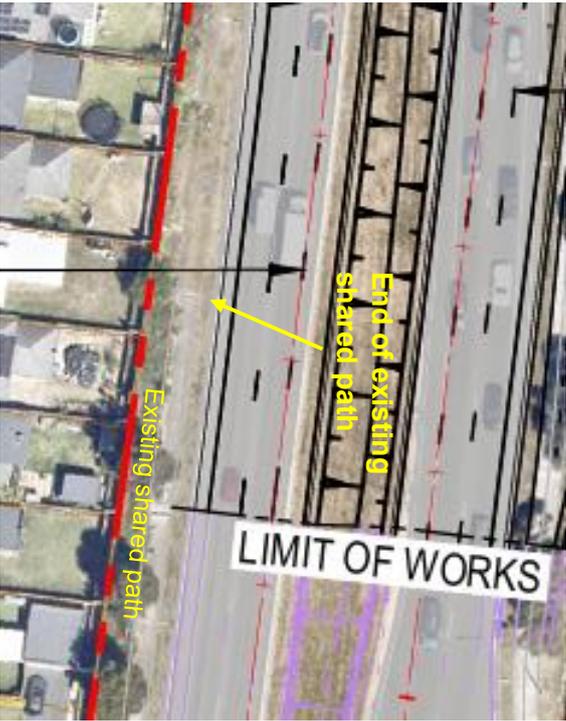
RSA findings contained in the report were discussed along with Aurecon's responses. Approval was given by Aurecon to finalise the RSA report with agreed amendments.

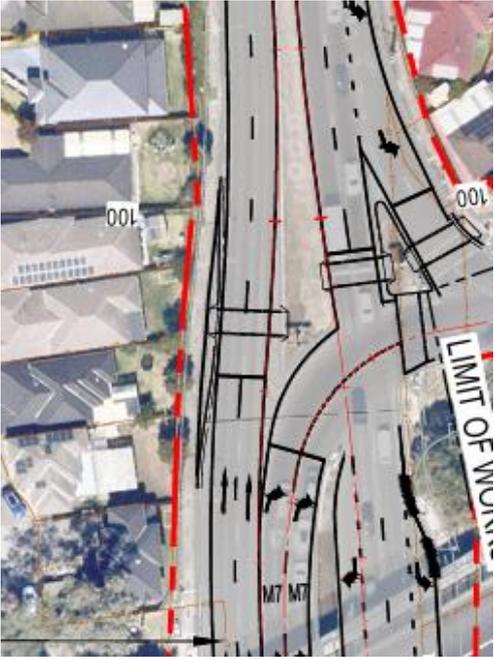
6 ROAD SAFETY FINDINGS

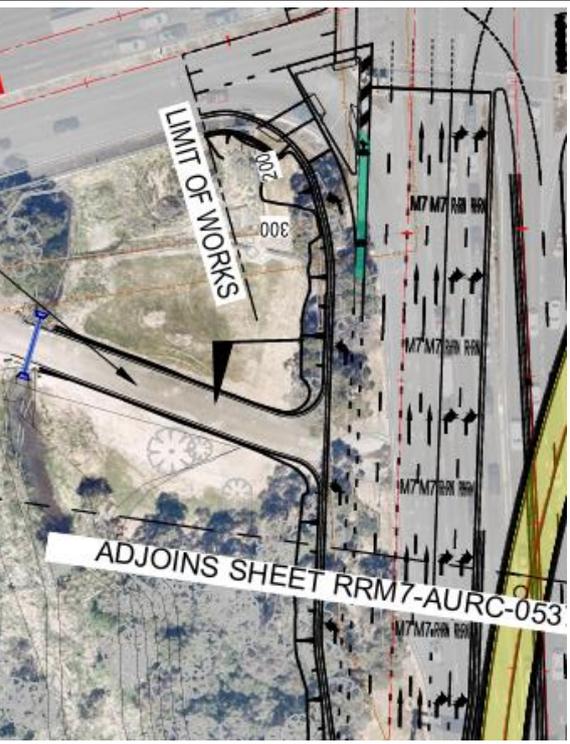
The RSA findings are documented in this section, where the table below provides details of the risks to road safety identified by the audit team in relation to the supplied auditable material, in conjunction with the site inspection, if applicable.

The identified risks are assigned to road safety categories to assist the project manager (also known as the project sponsor) in managing corrective actions. Each risk is assessed with a rating as high, medium or low, derived as a function of likelihood and consequence, as outlined in the previous section.

Table 9 – Road safety audit findings

Ref	Photos/site description/safety issue	Description of risk to road safety (reasons why this is a safety issue)	Road safety audit category	Likelihood	Consequence	Risk rating
1	 <p>Plan view of the existing shared path on the eastern side of Richmond Rd. Path ends with no connection to any other path.</p>	<p>Previous Stantec RSA Finding #1</p> <p>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 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.</p> <p>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.</p>	Pedestrian infrastructure	Unlikely	Severe	HIGH

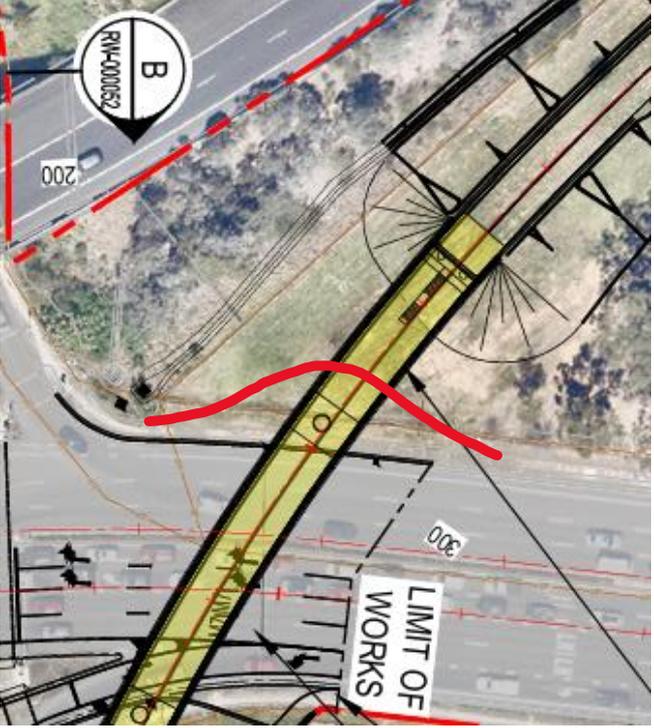
Ref	Photos/site description/safety issue	Description of risk to road safety (reasons why this is a safety issue)	Road safety audit category	Likelihood	Consequence	Risk rating
2	 <p>Plan view of the kerb realignment, proposed kerb ramp on the eastside of Richmond Rd at approx. Ch 115 – non-compliant holding area for pedestrians and cyclists</p>	<p>Previous Stantec RSA Finding #15</p> <p>Previous finding reported a non-compliant width at the back of the kerb ramp on the eastside of Richmond Rd at approx. Ch 115 – signalised ‘T’ intersection for the M7 on-load ramp. It is noted that there is a realignment of the kerb alignment to allow the provision of the kerb ramp at the pedestrian/cyclist crossing in the developed concept design.</p> <p>The existing shared path is 2.5m wide and positioned at the rear of the proposed ramp at this location, which is insufficient width for pedestrians (able and disabled) and cyclists to stand without impeding through cyclists along the shared path. Although an unlikely likelihood, there is increased risk of a cyclist collision with a pedestrian or another cyclist, which may cause minor injuries.</p> <p>It was also noted that the provision of holding rails was to be investigated for kerb ramps that will be used by cyclists.</p>	Pedestrian infrastructure	Unlikely	Minor	LOW

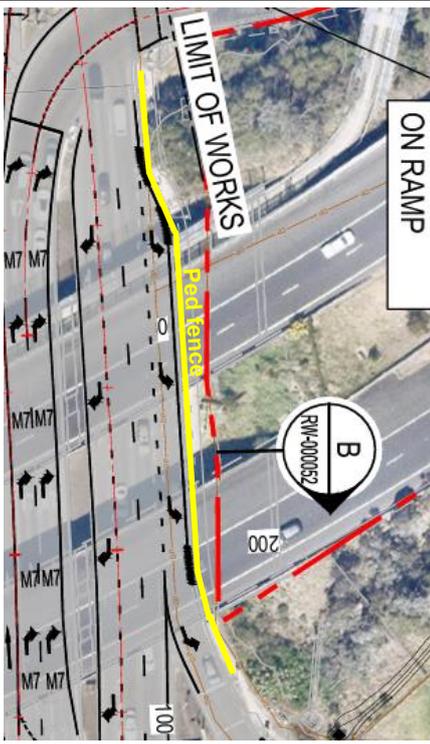
Ref	Photos/site description/safety issue	Description of risk to road safety (reasons why this is a safety issue)	Road safety audit category	Likelihood	Consequence	Risk rating
3	 <p>Plan view of an existing 2-way private access on the eastside of Richmond Rd at approx. Ch 335. Vehicles exiting the access could cross multiple lanes to access through lanes or the right-turn lanes to Rooty Hill Rd North.</p>	<p>Previous Stantec RSA Finding #17</p> <p>Previous finding reported that the existing private access to Colebee Yard on the eastside of Richmond Rd at Ch 335 is only offset approx. 50m from the TCS hold line for the signalised intersection.</p> <p>There is a risk of a side swipe or side impact crash occurring in a scenario where an exiting vehicle attempts to access the right-turn lanes to Rooty Hill Rd or even the through lanes to the M7 on-load ramp. Vehicles need to cross multiple lanes to attempt this turn.</p> <p>The sign posted speed zone along Richmond Rd is 70 km/h and although the speed environment is lowered by the TCS operation and high traffic volumes, a vehicle collision could still be severe at speeds of 40 to 50 km/h.</p>	Access impacts	Very unlikely	Major	MEDIUM

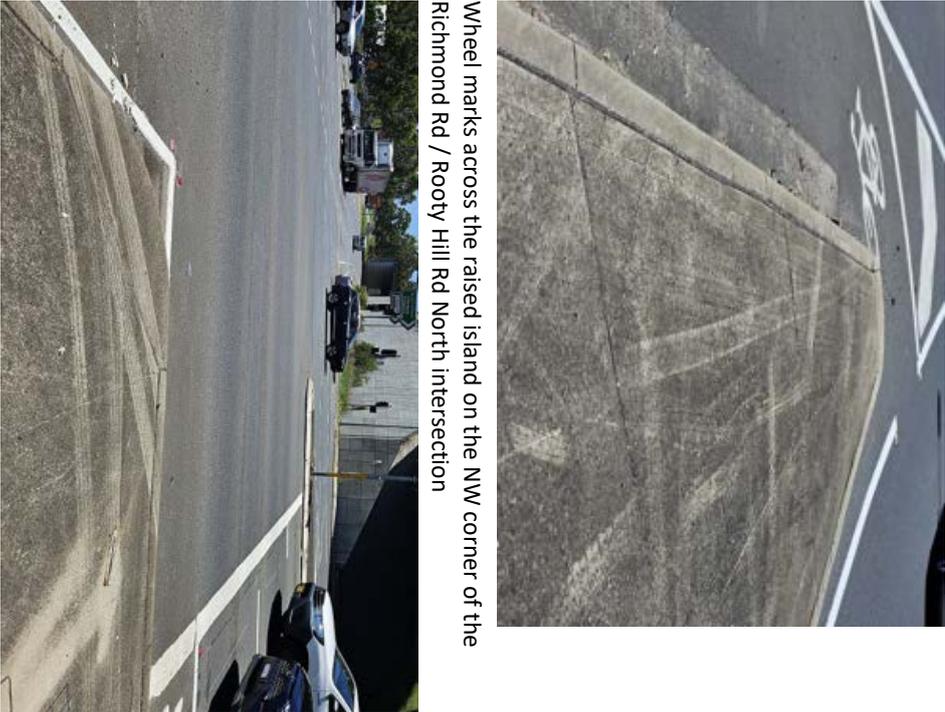
Ref	Photos/site description/safety issue	Description of risk to road safety (reasons why this is a safety issue)	Road safety audit category	Likelihood	Consequence	Risk rating
4	 <p>View to the east along Rooty Hill Rd North to Richmond Rd Intersection and possible location for an off-road cyclist ramp</p>	<p>Provision of off-road cycle ramps:</p> <p>As well as the proposed provision and retention of existing off-road shared path throughout the project, on-road provision for cyclists is still maintained on Richmond Rd and Rooty Hill Rd North.</p> <p>It is noted that the developed concept design does not provide off-load kerb ramps for cyclists to leave the road shoulder to access the shared path to cross safely at signalised intersections. Some examples (but not limited to) are as follows:</p> <ul style="list-style-type: none"> • LHS at Ch 00 Richmond Rd – NB off-road access to kerbside shared path before TCS crossing on left-turn lane. • RHS at Ch 130 Richmond Rd – SB off-road access to kerbside shared path before TCS crossing on through lanes. • LHS at Ch 90 Rooty Hill Rd North – EB off-road access to kerbside shared path before signalised crossing. <p>In some instances, a cyclist kerb ramp could be provided for cyclists to rejoin the road shoulder.</p> <p>It is also noted that a number of existing kerb ramps for shared paths require replacement to current standards (width and lipless).</p> <p>Not providing adequate and safe cyclist infrastructure such as off and on-load ramps increases the likelihood of cyclists being struck by a vehicle, which could result in a severe injury in 60 or 70 km/h speed zone environment.</p>	Cyclist infrastructure	Unlikely	Major	MEDIUM

Ref	Photos/site description/safety issue	Description of risk to road safety (reasons why this is a safety issue)	Road safety audit category	Likelihood	Consequence	Risk rating
	 <p>View to the north along Richmond Rd and possible location for an off-road cyclist ramp at Ch 00 before the left-turn lane to the M7</p>					

Ref	Photos/site description/safety issue	Description of risk to road safety (reasons why this is a safety issue)	Road safety audit category	Likelihood	Consequence	Risk rating
5	 <p>View to the north at the SW corner of the Richmond Rd / Rooty Hill Rd North intersection and restricted shared path width due to vegetation and signage. Note cyclists are riding around the TCS post near the kerb and roadside travel lane</p>	<p>Inadequate shared path width:</p> <p>Whilst onsite it was noticed that existing shared paths were restricted in width due to existing vegetation, signage and debris encroaching onto the path. In particular, at the 2 areas depicted in the photos and the shared path between these 2 corners.</p> <p>Not providing sufficient and safe width between hazards increases the likelihood of a cyclist colliding with the hazards, which could result in an injury.</p>  <p>View of shared path width at the NW corner of the intersection of Richmond Rd and the M7 SB on-load ramp.</p>	Cyclist infrastructure	Unlikely	Moderate	MEDIUM

Ref	Photos/site description/safety issue	Description of risk to road safety (reasons why this is a safety issue)	Road safety audit category	Likelihood	Consequence	Risk rating
6	 <p>Plan view of the proposed bridge pier located on the existing shared path along Rooty Hill Rd North. The path provides access to an existing bus stop to the west of the proposed pier location</p>	<p>Impact of bridge pier on shared path:</p> <p>The developed concept design indicates a bridge pier positioned on or adjacent to the existing concrete path along the southside of Rooty Hill Rd North. The path services a bus stop to the west beyond the Rooty Hill Rd North/M7 off-ramp signalised intersection.</p> <p>The provision of a safety barrier and the size of the bridge pier will most likely impact the width of the existing path and could render it unsuitable for pedestrian movements in both directions.</p> <p>Pedestrians attempting to pass around the introduced hazards may be at risk of slips and/or falls resulting in an injury.</p>  <p>View to the west of the existing path along Rooty Hill Rd North</p>	Pedestrian infrastructure	Unlikely	Moderate	MEDIUM

Ref	Photos/site description/safety issue	Description of risk to road safety (reasons why this is a safety issue)	Road safety audit category	Likelihood	Consequence	Risk rating
7	 <p>Plan view of the travel lane and left turn lane and adjacent shared path that has no pedestrian fence provided to separate pedestrians and cyclists from vehicles in the kerbside lane</p>	<p>Provision of pedestrian fencing:</p> <p>Whilst carrying out the onsite audit it was noted that the existing shared path on the westside of Richmond Rd between the M7 on-load ramp and Rooty Hill Rd North is positioned at the back of kerb adjacent to kerbside traffic.</p> <p>It is noted in the developed concept design that no pedestrian fencing is proposed to separate pedestrians and cyclists from kerbside traffic. It is also noted that the existing on-road cyclist lane is not retained in the proposed design.</p> <p>There is increased risk for pedestrians and/or cyclists to be struck by a vehicle when not separated or protected from kerbside traffic.</p> <p>In the unlikely event of a pedestrian or cyclist being struck by a vehicle at these locations the speed environment would result in a severe injury, particularly when a heavy vehicle is involved.</p>	Pedestrian infrastructure	Unlikely	Major	MEDIUM

Ref	Photos/site description/safety issue	Description of risk to road safety (reasons why this is a safety issue)	Road safety audit category	Likelihood	Consequence	Risk rating
8	 <p>Wheel marks across the raised island on the NW corner of the Richmond Rd / Rooty Hill Rd North intersection</p> <p>Wheel marks across the raised island on the SW corner of the Richmond Rd / Rooty Hill Rd North intersection</p>	<p>Vehicles travelling onto and across raised islands:</p> <p>At the time of the site visit it was noted that the raised concrete islands on the NW and SW corners of the Richmond Rd / Rooty Hill Rd North intersection had wheel marks (tracks) across the islands as indicated in the provided photos.</p> <p>On the NW corner the tracks could be the result of too much speed on approach to the left turn or evasive action to miss a queued vehicle at the pedestrian crossing.</p> <p>At the SW corner it would appear heavy vehicles are turning left into Rooty Hill Rd North from the through lane instead of using the dedicated left turn lane.</p>				NOTE ONLY

4 COMPLETING THE ROAD SAFETY AUDIT

The project manager/sponsor is recommended to take the following steps to complete the road safety audit process:

- Attend the completion meeting;
- Review the report;
- Accept the RSA report;
- Produce a corrective action program if required;
- Implement corrective actions; and
- Close the corrective action program.

Further details are available in the guidelines identified in Section 3.4 of this report.

5 CONFIDENTIALITY AND COPYRIGHT

The information in this RSA report is confidential and copyrighted. This document does not form part of a contract.

APPENDIX A – ROAD SAFETY AUDIT CATEGORIES

<h1 style="margin: 0;">Road safety audit practices</h1>	
INFORMATION SHEET:	NO: L5

Road safety audit categories

Categories have been set up to assist in the management of corrective actions, and monitoring of trends in identified risks in road safety.

Category	Examples
Access impacts	Property, developments, traffic generators, rest areas, emergency vehicles, service vehicles, maintenance, vehicle breakdowns, etc.
Auxiliary lanes	Overtaking lanes, passing lanes, tapers, merges, etc.
Bridge structures	Road bridge, pedestrian bridge, rail bridge, etc.
Bus infrastructure	Bus lanes, bus facilities, bus stops, etc.
Cyclist infrastructure	Cycleways, on-road facilities, off-road cycle facilities, cycle routes, etc.
Delineation	Guide posts, pavement markings, reflectors, warning signs, etc.
Drainage	Ponding, aquaplaning, etc.
Heavy vehicle infrastructure	Inspection bays, facilities, provisions, routes, etc.
Intersections	Roundabouts, cross intersections, T-junctions, etc.
Landscaping	Shrubs, trees, etc.
Lighting	Street lighting, tunnel lighting, etc.
Miscellaneous	Matters not covered by categories listed.
Network effects	Road function, traffic composition, traffic volume, traffic characteristics, route choice, impact of continuity with the existing network, etc.
Special road users infrastructure	Trains, ferries, trams, equestrian, stock, etc.

Category	Examples
Pedestrian infrastructure	Pathways, pedestrian crossings, pedestrian fencing, etc.
Road alignment and cross section	Sight distance, visibility, readability by drivers, glare, widths, shoulders, crossfalls, batter slopes, drains, etc.
Road pavement	Pavement defects, skid resistance, ponding, loose stones/material, etc.
Road users	Behaviour, practices, travel patterns, interaction between different road users, etc.
Roadside activities	Roadside advertising, roadside designs, vending, etc.
Roadside hazards	Clear zones, utility poles, culverts, bridge structures, trees, etc.
Safety barriers	Concrete, guardrail, wire rope safety barriers, crash cushions, etc.
Speed zoning	Speed limits, speed zones, design speed, school zones, etc.
Traffic management and operations	Staging of works, temporary traffic control, detours, peak tidal flows, clearways, parking, etc.
Traffic management devices	Threshold treatments, road humps, kerb extensions, slow points, etc.
Traffic signals	Signal phasing, bus signals, bicycle signals, pedestrian signals, etc.
Traffic signs	Regulatory signs, warning signs, guide signs, etc.
Tunnel structures	Road tunnels, pedestrian tunnels, cycle tunnels, etc.

Appendix J

Authority Approvals

N/A for this design package.

Appendix K Proof Engineering Review

N/A for this design package.

Aquaplaning Report

Report Created: Thursday, 22 January 2026
 Time: 5:15:14 PM

Note: All units in this report are in meters unless specified otherwise.

Rainfall Intensity: 50.000 mm/hour

Texture: 0.500 mm

Depth:

Formula: Gallaway

Using: TRUE

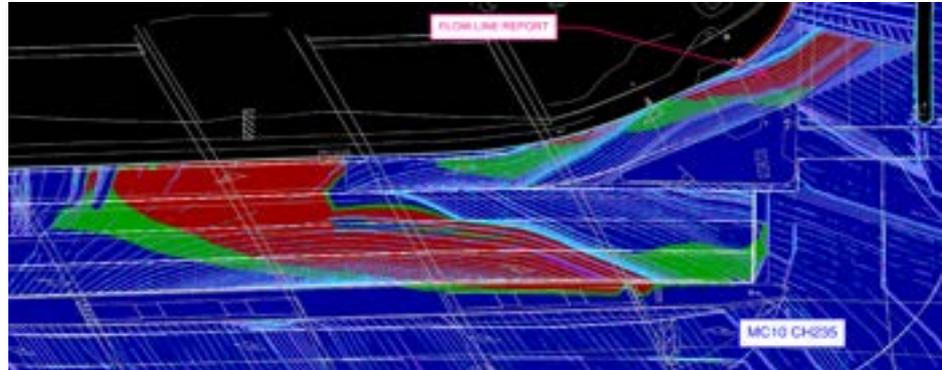
Equal:

Area:

Slope?

Surface: Design-Contours

Name:



----- Flowline Points -----										
Gallaway		Film			Area Under Profile	X	Y	Z (original surface)		
Film Depth (mm)	RRL Film Depth (mm)	Depth Difference (mm)	Slope (%)	Distance Along						
0	0	0	0.00%	0	0	300719.5	6265322	40.759		
0	0.084	0.084	1.729:1	0.013	0	300719.5	6265322	40.759		
0	0.094	0.094	1.608:1	0.016	0	300719.5	6265322	40.759		
0	0.322	0.322	1.760:1	0.195	0	300719.3	6265322	40.756		
0.102	0.559	0.457	1.761:1	0.587	0.003	300718.9	6265322	40.749		
0.114	0.573	0.458	1.762:1	0.616	0.003	300718.9	6265322	40.748		
0.141	0.601	0.461	1.762:1	0.679	0.004	300718.9	6265322	40.747		
0.145	0.606	0.461	1.762:1	0.689	0.004	300718.8	6265322	40.747		
0.162	0.621	0.459	1.727:1	0.718	0.004	300718.8	6265322	40.747		
0.561	1.063	0.502	1.662:1	2.074	0.036	300717.5	6265323	40.724		
0.663	1.171	0.508	1.604:1	2.48	0.049	300717.1	6265323	40.718		
0.666	1.174	0.508	1.605:1	2.496	0.05	300717.1	6265323	40.718		
0.71	1.227	0.517	1.608:1	2.725	0.06	300716.9	6265323	40.714		
0.716	1.234	0.518	1.608:1	2.758	0.061	300716.9	6265323	40.714		
0.832	1.373	0.541	1.614:1	3.42	0.094	300716.2	6265323	40.703		
0.84	1.382	0.541	1.608:1	3.457	0.096	300716.2	6265323	40.702		
0.89	1.442	0.552	1.610:1	3.769	0.114	300715.9	6265323	40.697		
0.894	1.447	0.554	1.614:1	3.8	0.117	300715.9	6265323	40.697		
0.911	1.473	0.562	1.631:1	3.955	0.128	300715.7	6265323	40.694		
0.918	1.483	0.565	1.637:1	4.013	0.132	300715.7	6265323	40.693		
0.927	1.495	0.568	1.643:1	4.085	0.137	300715.6	6265323	40.692		
0.94	1.514	0.574	1.651:1	4.197	0.145	300715.5	6265323	40.69		
1.07	1.646	0.576	1.560:1	4.849	0.183	300714.9	6265324	40.681		
1.566	2.118	0.552	1.234:1	7.31	0.33	300712.5	6265324	40.657		
1.551	2.119	0.569	1.276:1	7.417	0.351	300712.4	6265324	40.654		
1.58	2.156	0.576	1.279:1	7.687	0.378	300712.1	6265324	40.651		
1.53	2.14	0.61	1.374:1	7.79	0.417	300712	6265324	40.646		
1.601	2.222	0.621	1.363:1	8.37	0.478	300711.4	6265324	40.638		
1.657	2.272	0.616	1.325:1	8.658	0.497	300711.2	6265324	40.636		
1.723	2.35	0.627	1.318:1	9.241	0.563	300710.6	6265324	40.628		
1.889	2.504	0.615	1.228:1	10.195	0.638	300709.6	6265324	40.621		
1.926	2.552	0.626	1.234:1	10.615	0.695	300709.2	6265325	40.615		
1.948	2.583	0.635	1.241:1	10.899	0.737	300708.9	6265325	40.611		
2.02	2.696	0.676	1.280:1	12.02	0.925	300707.8	6265325	40.595		
2.03	2.711	0.681	1.285:1	12.168	0.951	300707.7	6265325	40.593		
2.091	2.795	0.704	1.297:1	12.984	1.093	300706.9	6265325	40.581		
2.195	2.94	0.745	1.319:1	14.461	1.379	300705.4	6265325	40.56		
2.197	2.943	0.747	1.321:1	14.504	1.389	300705.4	6265325	40.56		

2.227	2.976	0.749	1.311:1	14.787	1.434	300705.1	6265325	40.557
2.254	3.022	0.768	1.329:1	15.324	1.56	300704.5	6265325	40.548
2.405	3.179	0.774	1.278:1	16.703	1.783	300703.2	6265325	40.534
2.407	3.183	0.776	1.280:1	16.756	1.797	300703.1	6265325	40.533
2.481	3.261	0.78	1.258:1	17.463	1.918	300702.5	6265326	40.526
2.486	3.281	0.794	1.275:1	17.769	2.013	300702.2	6265326	40.521
2.589	3.39	0.801	1.247:1	18.801	2.204	300701.3	6265326	40.51
2.619	3.434	0.815	1.254:1	19.342	2.346	300700.8	6265326	40.503
2.621	3.443	0.822	1.262:1	19.494	2.398	300700.7	6265326	40.5
2.594	3.457	0.863	1.325:1	20.035	2.66	300700.2	6265327	40.487
2.584	3.464	0.88	1.353:1	20.285	2.783	300699.9	6265327	40.481
2.598	3.48	0.882	1.349:1	20.441	2.818	300699.8	6265327	40.479
2.6	3.488	0.889	1.358:1	20.601	2.881	300699.6	6265327	40.476
2.718	3.631	0.913	1.341:1	22.211	3.308	300698.2	6265328	40.456
2.722	3.653	0.93	1.362:1	22.617	3.483	300697.8	6265328	40.448
2.731	3.665	0.934	1.362:1	22.768	3.531	300697.7	6265328	40.446
2.767	3.713	0.946	1.363:1	23.382	3.727	300697.2	6265328	40.437
2.783	3.729	0.947	1.358:1	23.547	3.764	300697	6265328	40.435
2.808	3.772	0.964	1.369:1	24.165	3.997	300696.5	6265329	40.426
2.818	3.782	0.964	1.365:1	24.265	4.02	300696.4	6265329	40.425
2.834	3.818	0.984	1.384:1	24.865	4.278	300695.9	6265329	40.414
2.897	3.88	0.983	1.357:1	25.483	4.406	300695.3	6265329	40.409
2.919	3.924	1.005	1.375:1	26.192	4.715	300694.6	6265329	40.397
2.894	3.913	1.019	1.403:1	26.262	4.837	300694.6	6265329	40.392
2.9	3.918	1.018	1.399:1	26.305	4.841	300694.6	6265329	40.392
2.928	3.942	1.015	1.383:1	26.507	4.859	300694.4	6265330	40.391
2.935	3.949	1.014	1.379:1	26.568	4.868	300694.4	6265330	40.391
2.965	3.975	1.01	1.362:1	26.778	4.883	300694.2	6265330	40.39
3.022	4.044	1.022	1.354:1	27.647	5.173	300693.4	6265330	40.379
3.024	4.046	1.022	1.353:1	27.679	5.184	300693.4	6265330	40.379
3.041	4.067	1.026	1.351:1	27.947	5.275	300693.1	6265330	40.376
3.04	4.068	1.028	1.353:1	27.981	5.299	300693.1	6265330	40.375
3.081	4.108	1.027	1.337:1	28.395	5.391	300692.7	6265330	40.372
3.077	4.107	1.03	1.343:1	28.43	5.427	300692.6	6265330	40.37
3.062	4.117	1.056	1.377:1	28.866	5.739	300692.2	6265330	40.359
3.056	4.116	1.06	1.384:1	28.901	5.781	300692.2	6265330	40.358
3.056	4.121	1.064	1.390:1	29.015	5.849	300692.1	6265330	40.355
3.057	4.132	1.075	1.401:1	29.271	6.004	300691.9	6265331	40.35
3.05	4.129	1.079	1.410:1	29.302	6.052	300691.8	6265331	40.348
3.454	4.563	1.109	1.292:1	34.552	7.709	300686.6	6265331	40.296
3.523	4.634	1.111	1.270:1	35.406	7.963	300685.8	6265332	40.288

Aquaplaning Report

Report Created: Thursday, 22 January 2026
 Time: 12:00:49 PM

Note: All units in this report are in meters unless specified otherwise.

Rainfall Intensity: 50.000 mm/hour

Texture: 0.500 mm

Depth:

Formula: Gallaway

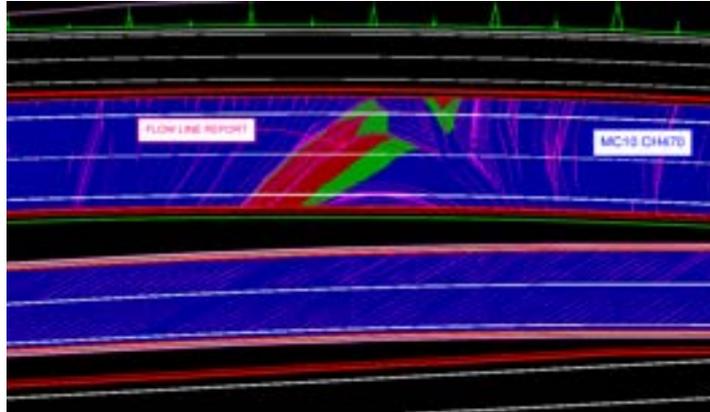
Using: TRUE

Equal:

Area:

Slope?

Surface Name: Design-Contours



----- Flowline Points -----

Gallaway	Film	RRL Film	Film	Depth	Area	Z			
Depth	Depth	Depth	Differenc	Slope (%)	Distance	Under	X	Y	(original
(mm)	(mm)	(mm)	e (mm)		Along	Profile			surface)
0	0	0	0	0.00%	0	0	300541.9	6265527	36.763
0.072	0.495	0.423	1.415:1	0.422	0.001	300541.8	6265527	36.757	
0.519	0.912	0.393	1.150:1	1.318	0.01	300541.6	6265526	36.747	
0.652	1.048	0.397	1.137:1	1.732	0.017	300541.5	6265526	36.742	
0.746	1.151	0.405	1.145:1	2.094	0.025	300541.4	6265525	36.738	
0.783	1.184	0.401	1.122:1	2.198	0.027	300541.4	6265525	36.737	
1.111	1.558	0.446	1.160:1	3.857	0.086	300541.2	6265524	36.718	
1.605	1.985	0.38	91.46%	5.693	0.148	300540.7	6265522	36.705	
1.729	2.103	0.375	88.83%	6.32	0.177	300540.7	6265521	36.7	
2.171	2.495	0.324	77.40%	8.418	0.274	300541	6265519	36.687	
2.204	2.52	0.316	76.24%	8.536	0.278	300541	6265519	36.686	
2.238	2.553	0.314	75.76%	8.734	0.289	300541	6265519	36.685	
2.392	2.706	0.314	74.41%	9.747	0.353	300541.3	6265518	36.678	
2.584	2.846	0.262	68.39%	10.422	0.371	300541.5	6265517	36.676	
2.692	2.926	0.234	65.57%	10.836	0.385	300541.7	6265517	36.675	
2.741	2.981	0.24	65.78%	11.26	0.417	300541.9	6265516	36.672	
2.841	3.057	0.216	63.49%	11.673	0.433	300542.2	6265516	36.67	
2.883	3.11	0.227	64.08%	12.126	0.471	300542.5	6265516	36.667	
2.953	3.2	0.246	65.09%	12.914	0.543	300543.1	6265515	36.661	
3.093	3.314	0.221	62.64%	13.641	0.583	300543.8	6265515	36.658	
3.119	3.335	0.216	62.19%	13.78	0.59	300543.9	6265515	36.657	
3.141	3.366	0.225	62.68%	14.077	0.621	300544.1	6265515	36.655	
3.227	3.437	0.21	61.34%	14.557	0.65	300544.6	6265515	36.652	
3.272	3.53	0.258	64.11%	15.626	0.783	300545.6	6265514	36.643	
3.337	3.61	0.273	64.68%	16.402	0.87	300546.3	6265514	36.636	
3.331	3.62	0.288	65.67%	16.588	0.903	300546.4	6265514	36.634	
3.321	3.643	0.322	67.89%	17.029	0.984	300546.8	6265514	36.628	
3.422	3.888	0.465	76.51%	20.341	1.583	300550.1	6265513	36.591	
3.424	3.904	0.48	77.48%	20.614	1.646	300550.4	6265513	36.587	
3.427	3.908	0.481	77.54%	20.662	1.655	300550.4	6265513	36.587	
3.438	3.924	0.486	77.79%	20.861	1.693	300550.6	6265513	36.585	
3.433	3.944	0.51	79.49%	21.252	1.795	300551	6265513	36.579	
3.431	3.991	0.56	83.04%	22.148	2.037	300551.9	6265513	36.565	
3.439	4.032	0.593	85.36%	22.861	2.231	300552.6	6265513	36.554	

Aquaplaning Report

Report Created: Thursday, 22 January 2026

Time: 12:08:27 PM

Note: All units in this report are in meters unless specified otherwise.

Rainfall 50.000 mm/hour

Intensity:

Texture 0.500 mm

Depth:

Formula: Gallaway

Using TRUE

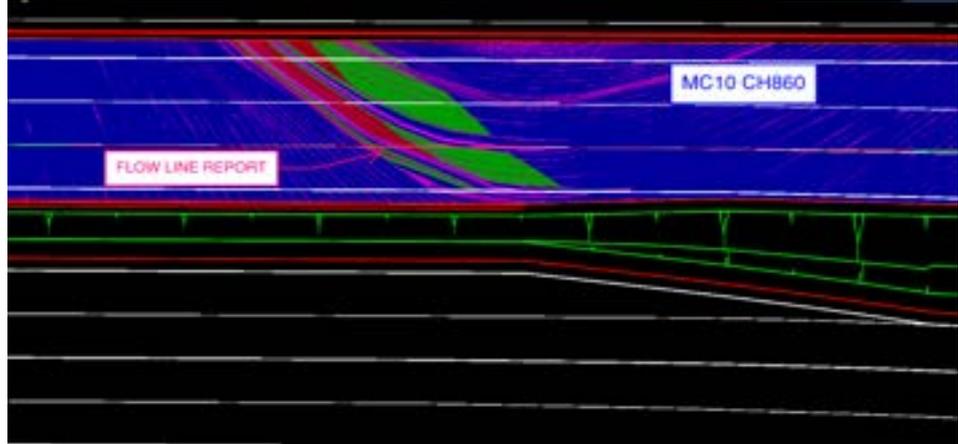
Equal

Area

Slope?

Surface Design-Contours

Name:



----- Flowline Points -----

Gallaway	Film	RRL Film	Film	Area	Z			Z
Film	Depth	Depth	Depth	Under	(original	X	Y	surface)
Depth	Differenc	Slope (%)	Distance	Profile	Along			
(mm)	(mm)	(mm)	(%)	(mm)	(%)			
0	0	0	0.00%	0	0	300335.4	6265898	37.073
0	0.36	0.36	4.693:1	0.361	0.003	300335.7	6265898	37.056
0	0.466	0.466	4.697:1	0.604	0.009	300336	6265898	37.045
0.063	0.686	0.623	4.695:1	1.309	0.04	300336.6	6265897	37.012
0.075	0.704	0.629	4.699:1	1.377	0.045	300336.7	6265897	37.009
0.083	0.716	0.632	4.702:1	1.425	0.048	300336.7	6265897	37.006
0.098	0.743	0.644	4.825:1	1.55	0.058	300336.8	6265897	36.999
0.129	0.793	0.664	4.951:1	1.788	0.079	300337.1	6265897	36.987
0.138	0.808	0.67	4.991:1	1.861	0.086	300337.1	6265897	36.983
0.169	0.857	0.688	5.062:1	2.106	0.112	300337.3	6265897	36.97
0.216	0.93	0.715	5.118:1	2.49	0.159	300337.7	6265897	36.949
0.535	1.426	0.891	5.082:1	5.837	0.866	300340.6	6265895	36.779
0.544	1.439	0.895	5.068:1	5.941	0.894	300340.7	6265895	36.775
0.553	1.453	0.9	5.065:1	6.048	0.926	300340.8	6265895	36.769
0.642	1.586	0.944	4.944:1	7.139	1.26	300341.7	6265895	36.719
0.677	1.642	0.965	4.938:1	7.655	1.447	300342.2	6265894	36.693
0.801	1.828	1.027	4.785:1	9.359	2.096	300343.7	6265894	36.617
0.95	2.051	1.101	4.610:1	11.614	3.109	300345.6	6265892	36.52
0.957	2.062	1.104	4.596:1	11.722	3.158	300345.7	6265892	36.516
0.97	2.081	1.111	4.583:1	11.931	3.262	300345.9	6265892	36.507
1.02	2.152	1.132	4.501:1	12.659	3.606	300346.5	6265892	36.479
1.066	2.221	1.155	4.457:1	13.434	4.021	300347.2	6265891	36.447
1.241	2.473	1.232	4.213:1	16.285	5.587	300349.6	6265890	36.342
1.295	2.549	1.254	4.143:1	17.188	6.12	300350.4	6265890	36.31
1.321	2.586	1.265	4.109:1	17.63	6.385	300350.7	6265889	36.295
1.327	2.594	1.267	4.098:1	17.722	6.436	300350.8	6265889	36.292
1.34	2.613	1.273	4.081:1	17.953	6.577	300351	6265889	36.284
1.344	2.619	1.274	4.074:1	18.016	6.612	300351.1	6265889	36.282
1.363	2.644	1.28	4.042:1	18.304	6.771	300351.3	6265889	36.273
1.409	2.708	1.299	3.984:1	19.1	7.268	300351.9	6265888	36.246
1.512	2.853	1.341	3.860:1	20.933	8.458	300353.4	6265887	36.187
1.654	3.038	1.385	3.650:1	23.213	9.835	300355.1	6265886	36.124

1.663	3.051	1.388	3.641:1	23.38	9.951	300355.2	6265886	36.119
1.702	3.102	1.4	3.586:1	24.028	10.353	300355.7	6265885	36.102
1.713	3.116	1.403	3.572:1	24.205	10.463	300355.9	6265885	36.098
1.714	3.118	1.404	3.570:1	24.231	10.482	300355.9	6265885	36.097
1.726	3.134	1.407	3.554:1	24.429	10.606	300356	6265885	36.092
1.728	3.135	1.408	3.553:1	24.454	10.623	300356	6265885	36.091
1.75	3.165	1.416	3.530:1	24.857	10.905	300356.3	6265885	36.08
1.914	3.374	1.459	3.312:1	27.527	12.547	300357.9	6265883	36.017
1.949	3.42	1.47	3.274:1	28.151	12.972	300358.3	6265882	36.001
2.03	3.522	1.492	3.182:1	29.523	13.865	300359.1	6265881	35.97
2.105	3.616	1.511	3.099:1	30.802	14.701	300359.9	6265880	35.942
2.194	3.726	1.532	3.005:1	32.297	15.671	300360.6	6265879	35.911
2.208	3.744	1.536	2.990:1	32.55	15.842	300360.7	6265878	35.905
2.22	3.759	1.539	2.978:1	32.747	15.968	300360.8	6265878	35.901
2.221	3.759	1.539	2.978:1	32.758	15.976	300360.8	6265878	35.901
2.221	3.76	1.539	2.977:1	32.761	15.978	300360.8	6265878	35.901
2.221	3.76	1.539	2.977:1	32.768	15.982	300360.8	6265878	35.901
2.221	3.76	1.539	2.977:1	32.77	15.984	300360.8	6265878	35.901
2.222	3.762	1.539	2.976:1	32.788	15.996	300360.8	6265878	35.901
2.223	3.763	1.539	2.975:1	32.8	16.004	300360.8	6265878	35.9
2.287	3.842	1.555	2.913:1	33.923	16.763	300361.3	6265877	35.877
2.323	3.887	1.563	2.879:1	34.541	17.173	300361.5	6265877	35.865
2.417	4.002	1.585	2.792:1	36.18	18.275	300362.1	6265875	35.833
2.604	4.243	1.638	2.660:1	39.878	21.15	300362.4	6265871	35.755
2.836	4.556	1.72	2.548:1	45.192	26.014	300363.1	6265866	35.635
2.838	4.559	1.72	2.547:1	45.245	26.065	300363.1	6265866	35.634
2.839	4.56	1.721	2.547:1	45.278	26.105	300363.1	6265866	35.633
2.894	4.637	1.744	2.529:1	46.686	27.557	300363	6265865	35.599
2.907	4.659	1.752	2.530:1	47.132	28.101	300362.9	6265864	35.587
2.97	4.749	1.779	2.510:1	48.828	29.923	300362.6	6265863	35.546
3.021	4.839	1.818	2.525:1	50.81	32.597	300362.2	6265861	35.487
3.037	4.863	1.826	2.524:1	51.309	33.226	300362.2	6265860	35.473
3.044	4.878	1.834	2.530:1	51.665	33.765	300362.1	6265860	35.462
3.154	5.081	1.927	2.577:1	56.473	41.097	300361.4	6265855	35.312
3.164	5.099	1.935	2.580:1	56.907	41.779	300361.3	6265855	35.299
3.183	5.145	1.962	2.606:1	58.16	44.081	300361	6265853	35.254
3.19	5.159	1.969	2.611:1	58.538	44.731	300360.9	6265853	35.241
3.192	5.163	1.971	2.613:1	58.64	44.935	300360.8	6265853	35.237

Aquaplaning Report

Report Created: Thursday, 22 January 2026

Time: 5:20:40 PM

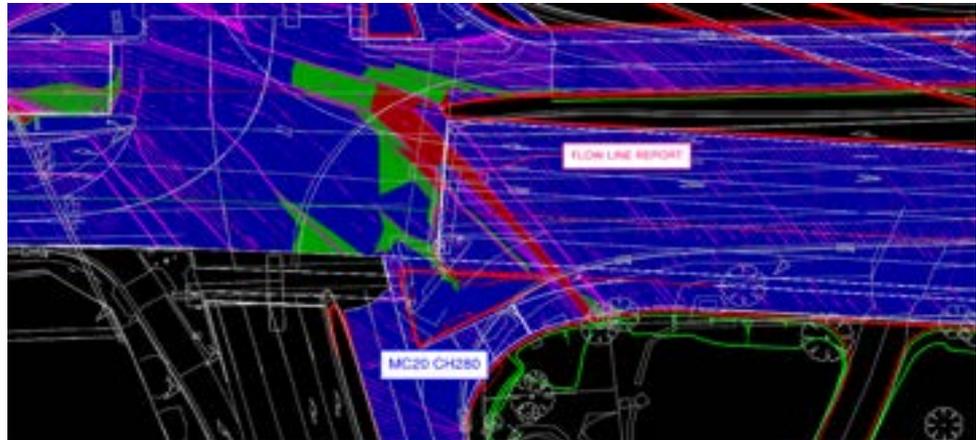
Note: All units in this report are in meters unless specified otherwise.

Rainfall Intensity: 50.000 mm/hour

Texture Depth: 0.500 mm

Formula: Gallaway
Using: TRUE

Equal Area Slope?
Surface Name: Design-Contours



----- Flowline Points -----

Gallaway	Film	Film	Film	Area	Z			Z
Film	RRL Film	Depth		Under	(original	X	Y	surface)
Depth	Depth	Differenc	Slope (%)	Profile				
(mm)	(mm)	e (mm)						
0	0	0	0.00%	0	0	300698.9	6265338	40.329
0	0.191	0.191	2.246:1	0.076	0	300698.9	6265338	40.327
0	0.245	0.245	2.400:1	0.128	0	300698.9	6265338	40.326
0.013	0.489	0.476	2.114:1	0.484	0.002	300698.9	6265339	40.318
0.206	0.684	0.478	1.862:1	0.9	0.008	300698.9	6265339	40.311
0.334	0.849	0.516	2.019:1	1.432	0.021	300698.9	6265340	40.299
0.342	0.861	0.52	2.039:1	1.478	0.022	300698.9	6265340	40.298
0.68	1.175	0.495	1.530:1	2.452	0.046	300698.8	6265341	40.286
0.679	1.185	0.506	1.581:1	2.525	0.05	300698.8	6265341	40.284
0.701	1.268	0.567	1.856:1	3.084	0.088	300698.6	6265341	40.271
0.768	1.381	0.613	2.010:1	3.778	0.143	300698.3	6265342	40.255
0.771	1.386	0.615	2.014:1	3.808	0.146	300698.2	6265342	40.254
0.826	1.469	0.643	2.075:1	4.326	0.194	300698	6265342	40.242
0.839	1.489	0.65	2.089:1	4.459	0.208	300698	6265343	40.239
0.875	1.543	0.667	2.123:1	4.817	0.246	300697.8	6265343	40.23
0.935	1.617	0.682	2.106:1	5.277	0.293	300697.7	6265343	40.221
0.968	1.654	0.686	2.079:1	5.493	0.314	300697.6	6265344	40.217
1.047	1.78	0.733	2.172:1	6.47	0.455	300697.2	6265344	40.193
1.054	1.789	0.734	2.166:1	6.53	0.462	300697.2	6265345	40.192
1.065	1.802	0.736	2.158:1	6.614	0.472	300697.2	6265345	40.19
1.07	1.81	0.74	2.168:1	6.692	0.485	300697.2	6265345	40.188
1.097	1.853	0.756	2.196:1	7.049	0.546	300697.1	6265345	40.179
1.128	1.902	0.775	2.226:1	7.466	0.62	300696.9	6265345	40.169
1.136	1.916	0.78	2.237:1	7.591	0.644	300696.9	6265346	40.165
1.199	2.014	0.815	2.281:1	8.453	0.815	300696.6	6265346	40.144
1.202	2.02	0.819	2.292:1	8.52	0.832	300696.5	6265346	40.142
1.213	2.036	0.824	2.296:1	8.66	0.861	300696.5	6265347	40.138
1.213	2.036	0.824	2.297:1	8.662	0.862	300696.5	6265347	40.138
1.256	2.1	0.844	2.310:1	9.233	0.985	300696.2	6265347	40.124
1.292	2.152	0.86	2.319:1	9.714	1.094	300696	6265347	40.113
1.322	2.197	0.875	2.326:1	10.135	1.195	300695.9	6265348	40.102
1.325	2.201	0.876	2.327:1	10.172	1.204	300695.9	6265348	40.101

1.326	2.202	0.876	2.327:1	10.184	1.207	300695.8	6265348	40.101
1.335	2.215	0.88	2.329:1	10.307	1.237	300695.8	6265348	40.098
1.335	2.216	0.881	2.329:1	10.316	1.239	300695.8	6265348	40.098
1.342	2.225	0.883	2.330:1	10.402	1.261	300695.8	6265348	40.096
1.347	2.233	0.886	2.331:1	10.481	1.28	300695.7	6265348	40.094
1.348	2.234	0.886	2.331:1	10.491	1.283	300695.7	6265348	40.094
1.353	2.241	0.889	2.332:1	10.559	1.3	300695.7	6265348	40.092
1.388	2.292	0.905	2.339:1	11.059	1.43	300695.5	6265349	40.08
1.42	2.34	0.92	2.344:1	11.534	1.559	300695.3	6265349	40.068
1.429	2.352	0.924	2.346:1	11.658	1.594	300695.2	6265349	40.065
1.446	2.378	0.932	2.348:1	11.919	1.668	300695.1	6265349	40.059
1.5	2.457	0.957	2.356:1	12.736	1.911	300694.8	6265350	40.039
1.601	2.606	1.005	2.367:1	14.361	2.441	300694.1	6265352	39.999
1.684	2.728	1.044	2.375:1	15.761	2.95	300693.5	6265353	39.965
1.687	2.733	1.046	2.375:1	15.814	2.97	300693.5	6265353	39.964
1.692	2.74	1.048	2.376:1	15.892	3	300693.5	6265353	39.962
1.726	2.791	1.064	2.378:1	16.499	3.237	300693.2	6265354	39.947
1.744	2.817	1.073	2.380:1	16.817	3.365	300693.1	6265354	39.939
1.747	2.822	1.075	2.380:1	16.877	3.39	300693.1	6265354	39.938
1.755	2.833	1.078	2.380:1	17.012	3.445	300693	6265354	39.935
1.767	2.851	1.084	2.381:1	17.228	3.534	300692.9	6265354	39.929
1.797	2.896	1.099	2.383:1	17.787	3.77	300692.7	6265355	39.916
1.828	2.942	1.114	2.385:1	18.359	4.02	300692.5	6265355	39.902
1.929	3.093	1.164	2.391:1	20.313	4.933	300691.6	6265357	39.854
1.965	3.147	1.182	2.393:1	21.031	5.292	300691.3	6265358	39.837
1.965	3.147	1.182	2.393:1	21.031	5.292	300691.3	6265358	39.837
1.974	3.162	1.188	2.398:1	21.251	5.415	300691.2	6265358	39.831
2.088	3.339	1.251	2.415:1	23.756	6.813	300690.4	6265360	39.768
2.162	3.443	1.281	2.397:1	25.185	7.602	300689.9	6265362	39.736
2.215	3.525	1.309	2.400:1	26.416	8.374	300689.4	6265363	39.706
2.215	3.525	1.309	2.400:1	26.417	8.374	300689.4	6265363	39.706
2.382	3.78	1.398	2.406:1	30.402	11.118	300687.7	6265366	39.609
2.421	3.84	1.419	2.406:1	31.377	11.843	300687.3	6265367	39.585
2.432	3.856	1.424	2.405:1	31.639	12.039	300687.2	6265368	39.579
2.452	3.887	1.435	2.405:1	32.152	12.43	300687	6265368	39.566
2.452	3.887	1.435	2.405:1	32.154	12.431	300687	6265368	39.566
2.569	4.066	1.497	2.404:1	35.17	14.87	300685.6	6265371	39.493
2.623	4.148	1.525	2.402:1	36.589	16.077	300685	6265372	39.46
2.626	4.153	1.527	2.402:1	36.674	16.151	300684.9	6265372	39.458
2.658	4.202	1.544	2.400:1	37.541	16.914	300684.5	6265373	39.437
2.659	4.203	1.544	2.400:1	37.56	16.93	300684.5	6265373	39.436
2.696	4.274	1.578	2.427:1	39.01	18.468	300683.7	6265374	39.396
2.696	4.279	1.583	2.438:1	39.178	18.712	300683.7	6265374	39.39
2.697	4.283	1.587	2.444:1	39.296	18.87	300683.7	6265374	39.386
2.766	4.488	1.722	2.634:1	44.448	26.019	300684.1	6265379	39.214
2.772	4.499	1.727	2.636:1	44.676	26.309	300684.2	6265380	39.207
2.773	4.501	1.728	2.637:1	44.726	26.379	300684.2	6265380	39.206
2.78	4.52	1.741	2.656:1	45.24	27.181	300684.2	6265380	39.188
2.787	4.541	1.754	2.675:1	45.789	28.047	300684.2	6265381	39.168
2.79	4.549	1.759	2.681:1	45.984	28.349	300684.2	6265381	39.162
2.822	4.637	1.815	2.755:1	48.308	32.149	300684.3	6265383	39.079
2.856	4.723	1.866	2.816:1	50.559	35.997	300684.5	6265386	39
2.87	4.748	1.878	2.822:1	51.143	36.904	300684.6	6265386	38.982
2.882	4.774	1.892	2.835:1	51.785	38.008	300684.6	6265387	38.96
2.919	4.841	1.922	2.849:1	53.363	40.568	300684.9	6265388	38.91
2.944	4.905	1.96	2.893:1	55.111	43.931	300685.2	6265390	38.846
3.012	5.062	2.05	2.985:1	59.455	52.751	300685.9	6265394	38.688
3.012	5.063	2.051	2.985:1	59.475	52.791	300685.9	6265394	38.687

3.013	5.064	2.051	2.985:1	59.488	52.821	300685.9	6265394	38.686
3.051	5.157	2.105	3.042:1	62.161	58.771	300686.2	6265397	38.585
3.074	5.224	2.15	3.102:1	64.29	64.112	300686.4	6265399	38.498
3.088	5.264	2.176	3.135:1	65.561	67.385	300686.6	6265400	38.446
3.098	5.288	2.19	3.151:1	66.288	69.219	300686.7	6265401	38.417
3.105	5.305	2.201	3.161:1	66.819	70.573	300686.8	6265402	38.396
3.134	5.376	2.242	3.202:1	68.96	76.136	300687.1	6265404	38.311
3.15	5.413	2.263	3.222:1	70.094	79.149	300687.3	6265405	38.266
3.163	5.441	2.279	3.236:1	70.943	81.438	300687.4	6265406	38.232
3.172	5.457	2.284	3.234:1	71.327	82.261	300687.4	6265406	38.22
3.178	5.486	2.309	3.276:1	72.47	86.016	300687.7	6265407	38.166
3.183	5.5	2.317	3.285:1	72.923	87.344	300687.8	6265408	38.147
3.189	5.512	2.323	3.288:1	73.257	88.217	300687.8	6265408	38.135
3.191	5.516	2.325	3.289:1	73.374	88.532	300687.8	6265408	38.13
3.228	5.588	2.36	3.304:1	75.453	94.059	300688.3	6265410	38.053
3.269	5.674	2.405	3.335:1	78.073	101.64	300688.7	6265413	37.951
3.267	5.674	2.407	3.342:1	78.13	101.991	300688.7	6265413	37.946
3.252	5.673	2.421	3.394:1	78.583	104.783	300688.9	6265413	37.909

Aquaplaning Report

Report Created: Thursday, 22 January 2026

Time: 12:38:17 PM

Note: All units in this report are in meters unless specified otherwise.

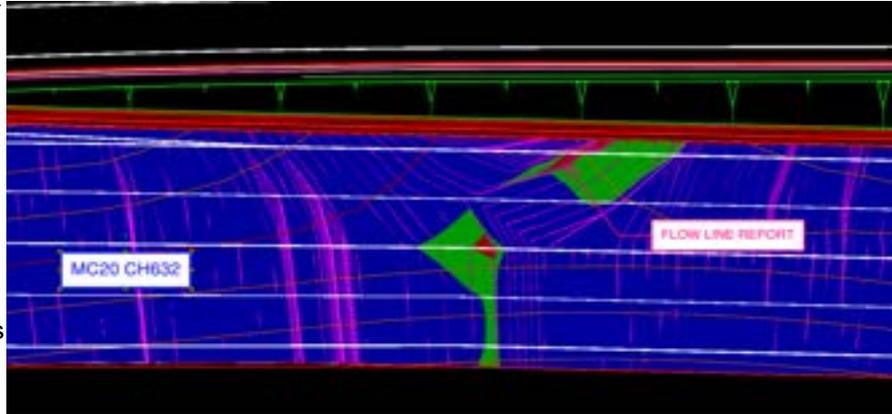
Rainfall Intensity: 50.000 mm/hour

Texture Depth: 0.500 mm

Formula: Gallaway

Using Equal Area: TRUE

Slope? Surface Name: Design-Contours



----- Flowline Points -----

Gallaway Film Depth (mm)	RRL Film Depth (mm)	Film Depth Difference (mm)	Slope (%)	Distance Along	Area Under Profile	X	Y	Z (original surface)
0	0	0	0.00%	0	0	300479.6	6265658	34.54
0.314	0.761	0.447	1.520:1	1.025	0.008	300479.7	6265659	34.525
0.528	0.98	0.453	1.427:1	1.66	0.02	300479.9	6265659	34.516
1.077	1.596	0.52	1.378:1	4.341	0.13	300480.6	6265662	34.479
1.742	2.182	0.44	98.43%	7.086	0.247	300480.7	6265665	34.459
1.814	2.265	0.451	98.75%	7.647	0.289	300480.6	6265665	34.453
2.694	3.047	0.353	75.25%	12.411	0.58	300477.3	6265669	34.424
2.953	3.265	0.312	69.81%	13.829	0.667	300476.2	6265670	34.416
2.981	3.37	0.389	75.45%	15.203	0.872	300475	6265670	34.401
3.094	3.502	0.408	75.74%	16.437	1.023	300474.2	6265671	34.39
3.119	3.584	0.465	79.84%	17.584	1.234	300473.2	6265672	34.376

Aquaplaning Report

Report Created: Thursday, 22 January 2026

Time: 12:15:17 PM

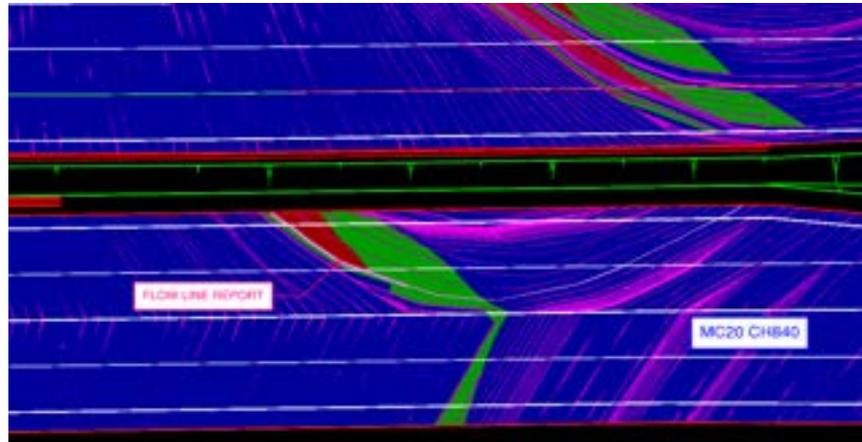
Note: All units in this report are in meters unless specified otherwise.

Rainfall Intensity: 50.000 mm/hour

Texture Depth: 0.500 mm

Formula: Gallaway
Using: TRUE

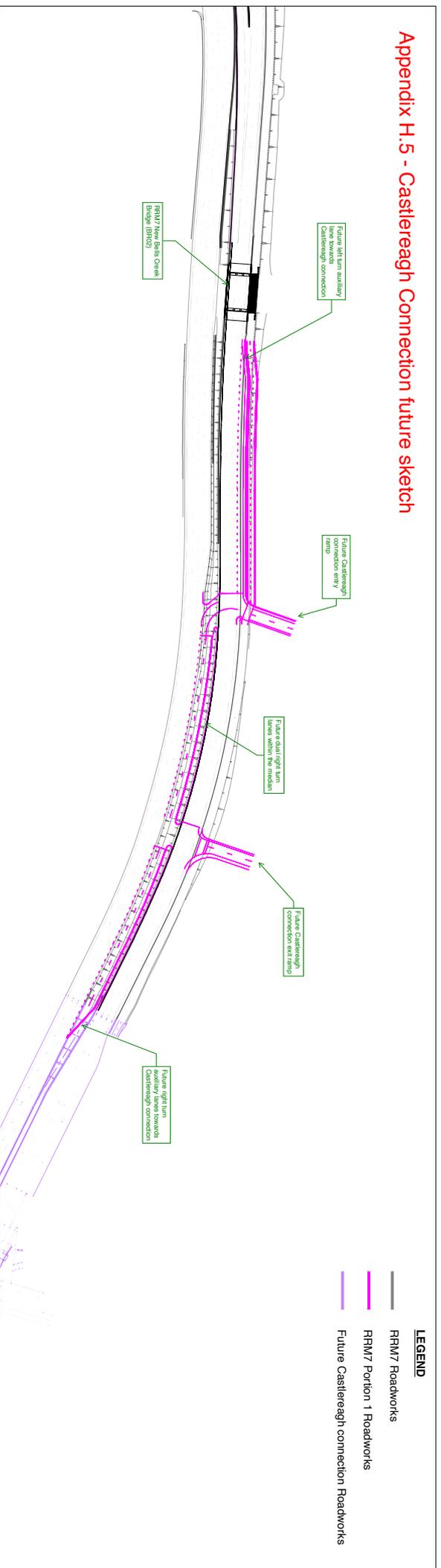
Equal Area Slope?
Surface Name: Design-Contours



----- Flowline Points -----

Gallaway		Film		Slope (%)	Distance Along	Area Under Profile	X	Y	Z (original surface)
Film Depth (mm)	RRL Film Depth (mm)	Film Depth	Differenc e (mm)						
0	0	0	0	0.00%	0	0	300366.2	6265879	35.562
0.077	0.653	0.576	0.576	3.581:1	1.063	0.02	300367.1	6265879	35.524
0.276	0.902	0.626	0.626	3.319:1	1.97	0.064	300367.9	6265878	35.495
0.606	1.352	0.745	0.745	3.230:1	4.375	0.309	300369.9	6265877	35.418
0.738	1.519	0.781	0.781	3.079:1	5.42	0.452	300370.8	6265876	35.388
0.845	1.671	0.826	0.826	3.066:1	6.551	0.658	300371.7	6265876	35.354
0.846	1.673	0.827	0.827	3.065:1	6.559	0.659	300371.7	6265876	35.354
0.847	1.674	0.827	0.827	3.064:1	6.572	0.662	300371.7	6265876	35.353
1.136	2.053	0.916	0.916	2.837:1	9.579	1.301	300374.2	6265874	35.274
1.162	2.087	0.925	0.925	2.824:1	9.886	1.38	300374.5	6265874	35.266
1.176	2.104	0.928	0.928	2.806:1	10.023	1.409	300374.6	6265874	35.263
1.441	2.45	1.009	1.009	2.633:1	13.245	2.309	300377.1	6265872	35.186
1.631	2.673	1.042	1.042	2.443:1	15.296	2.858	300378.4	6265870	35.147
1.947	3.045	1.097	1.097	2.196:1	19.023	3.974	300380.9	6265867	35.082
2.028	3.155	1.128	1.128	2.182:1	20.379	4.532	300381.5	6265866	35.053
2.259	3.426	1.166	1.166	2.037:1	23.368	5.563	300382.6	6265863	35.005
2.365	3.58	1.215	1.215	2.040:1	25.537	6.651	300382.9	6265861	34.96
2.55	3.833	1.283	1.283	2.010:1	29.095	8.507	300383.4	6265858	34.889
2.608	3.913	1.305	1.305	2.000:1	30.258	9.154	300383.6	6265857	34.866
2.627	3.951	1.324	1.324	2.019:1	30.969	9.68	300383.6	6265856	34.848
2.727	4.098	1.371	1.371	2.018:1	33.309	11.194	300383.3	6265854	34.798
2.767	4.194	1.426	1.426	2.079:1	35.305	12.956	300382.9	6265852	34.742
2.783	4.22	1.437	1.437	2.083:1	35.773	13.33	300382.9	6265851	34.731
2.807	4.275	1.468	1.468	2.117:1	36.957	14.455	300382.6	6265850	34.697

Appendix H.5 - Castlereagh Connection future sketch



Appendix I

Road Safety Audit

PROJECT RSA ID DEVELOPER CONCEPT DESIGN (DCD)	RSA Comment	Risk Rating	RICHMOND ROAD M7 PORTION 2	CORRECTIVE ACTION RESPONSE	STATUS
<p>1</p> <p>Previous Statex RSA Finding #1</p> <p>Previous finding reported that there is an existing concrete shared path on the eastern side of Richmond Road, which is to be replaced in the proposed design. 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 and then could attempt to cross six travel lanes to the western side of Richmond Rd to connect to bidirectional 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 pedestrian/cyclists on the eastern side of Richmond Rd in this area.</p>	<p>High</p>	<p>Portion 1 FT drawings were updated to remove the shared path south of the entry to Greenways Village.</p> <p>ACTION: Note to be added to the plans to indicate that this section of path has been removed by Portion 1 Works.</p>	<p>Open</p>		
<p>2</p> <p>Previous Statex RSA Finding #15</p> <p>Previous finding reported a non-compliant width at the back of the kerb ramp on the east side of Richmond Rd at approx. Ch 115 – signalled T intersection for the M7 on-ramp.</p> <p>It is noted that there is a realignment of the kerb alignment to allow the provision of the kerb ramp at the pedestrian/cyclist crossing in the developed concept design.</p> <p>The existing shared path is 2.5m wide and positioned at the rear of the proposed ramp at this location, which is insufficient for pedestrians (able and disabled) and cyclists to stand without impeding through traffic along the shared path. Alternative methods, therefore, increased risk of a cyclist collision with a pedestrian or another cyclist, which may cause minor injuries.</p> <p>It was also noted that the provision of hiding falls was to be investigated for kerb ramps that will be used by cyclists.</p>	<p>Low</p>	<p>The kerb has been built out from the reference design to achieve a clear path width of 2.5m behind the kerb ramp. There is space either side of the shared path for pedestrians (able and disabled) and cyclists to stand without impeding the shared path. Additional shared path width is unable to be provided without introducing road alignment concessions.</p> <p>It is noted that the rating for this risk has been classified as Low.</p> <p>ACTION: Nil</p>	<p>Open</p>		
<p>3</p> <p>Previous Statex RSA Finding #17</p> <p>Previous finding reported that the existing private access to Coldebe Yard on the east side of Richmond Rd at Ch. 335 is only offset approx. 50m from the TCS hold line for the signalised intersection.</p> <p>There is a risk of a side swipe or side impact crash occurring in a scenario where an exiting vehicle attempts to access the right-turn lanes to Roody Hill Rd or even the through lanes to the M7 on-ramp. Vehicles need to cross multiple lanes to attempt this turn.</p> <p>The sign posted speed zone along Richmond Rd is 70 km/h and although the speed environment is lowered by the TCS operation and high traffic volumes, a vehicle collision could still be severe at speeds of 40 to 50 km/h.</p>	<p>Medium</p>	<p>The existing driveway location has been retained. In the existing condition, if a vehicle from Coldebe Yard driveway wishes to turn right onto Roody Hill Road North, the vehicle need to cross 4 lanes of traffic. The proposed arrangement increases the lanes required to cross by 1. However, a solid line has been provided opposite the Coldebe driveway between the Richmond Road southbound through lanes and the right turn lanes to Roody Hill Road North to deter vehicles from undertaking this movement. This limits the maximum lanes to cross to 3 lanes.</p> <p>The driveway has been designed for design vehicles to turn lane correct into the nearside through lane. Therefore, the vehicles are only required to cross over the left turn auxiliary lane.</p> <p>Given the constraints of the site boundary and cadastral boundary the driveway is unable to be located elsewhere along Richmond Road southbound.</p> <p>ACTION: Nil</p>	<p>Open</p>		
<p>4</p> <p>Provision of off-road cycle ramps</p> <p>As well as the proposed provision and retention of existing off-road shared path throughout the project, on-road provision for cyclists is also proposed along Richmond Road. It is noted that the developed concept design does not provide off-road kerb ramps for cyclists to leave the road shoulder to access the shared path to cross safely at signalised intersections. Some examples (but not limited to) are as follows:</p> <ul style="list-style-type: none"> - LHS at Ch 00 Richmond Rd – NB off-road access to kerbside shared path before TCS crossing on left-turn lanes. - RHS at Ch 90 Roody Hill Rd North – EB off-road access to kerbside shared path before TCS crossing on through lanes. - LHS at Ch 130 Richmond Rd – SB off-road access to kerbside shared path before signalised crossing. <p>In some instances, a cyclist kerb ramp could be provided for cyclists to rejoin the road shoulder.</p> <p>It is also noted that a number of existing kerb ramps for shared paths require replacement to current standards (width and grades).</p> <p>Not providing adequate and safe cyclist infrastructure such as off and on-road ramps increases the likelihood of cyclists being struck by a vehicle, which could result in a severe injury in 60 or 70 km/h speed zone environment.</p>	<p>Medium</p>	<p>South of the limit of works on Richmond Road there are no structures on the existing road with a 2.2.5m wide shared path on either side. Cyclists will either be present on the shared path or in the traffic lane. As the signalised intersections there is the opportunity for cyclists to join or exit the shared path using the kerb ramps. Additional kerb ramps for cyclists are not proposed.</p> <p>Where kerbs are replaced, compliant kerb ramps are provided.</p> <p>ACTION: Nil</p>	<p>Open</p>		
<p>5</p> <p>Inadequate shared path width</p> <p>Whilst onsite it was noted that existing shared paths were restricted in width due to existing vegetation, signage and debris encroaching onto the path. In particular, at the Z status depicted in the price and the shared path between these Z corners, not providing sufficient and safe width between hazards increases the likelihood of a cyclist colliding with the hazards, which could result in an injury.</p>	<p>Medium</p>	<p>The localised hazards of signage and TCS poles are existing assets near signalised crossings where pedestrians and cyclists are required to come to a stop.</p> <p>The shared path with hazards near the south west corner of Richmond Road / Roody Hill Road North intersection is unable to be widened without cutting into the existing M7 bridge embankment or widening the kerb towards the roadway. This would leading to TCS and road design concessions. Existing vegetation over the footpath will be cleared as part of the site clearing.</p> <p>The shared path with hazards near the north west corner of Richmond Road / M7 southbound on-ramp without significant electrical relocation work. Existing vegetation over the footpath will be cleared as part of the site clearing.</p> <p>ACTION: Existing vegetation over the path will be cleared as part of the site clearing. A concession is to be raised for existing obstructions within the shared path.</p>	<p>Open</p>		
<p>6</p> <p>Impact of bridge pier on shared path</p> <p>The developed concept design indicates a bridge pier positioned on or adjacent to the existing concrete path along the southside of Roody Hill Rd North. The path services a bus stop to the west beyond the Roody Hill Rd North/M7 interchange. The bridge pier is likely to be a safety barrier and the size of the bridge pier will most likely impact the width of the existing path and could render it unsuitable for pedestrian movements in both directions.</p> <p>Pedestrians attempting to pass around the introduced hazards may be at risk of slips and/or falls resulting in an injury.</p>	<p>Medium</p>	<p>The existing footpath alignment and width is retained. The Type F barrier is placed along the existing SA kerb line. 0.5m - 0.8m clearances is achieved from the back of barrier to edge of the footpath. 0.4m is achieved from the face of pier to the edge of the footpath. The achieved clearances are compliant with the requirements of AS/NZS Part 6A for pedestrian paths.</p> <p>Note: This section of path is a pedestrian only footpath</p> <p>ACTION: Nil</p>	<p>Open</p>		

PROJECT	RSA Comment	Risk Rating	CORRECTIVE ACTION RESPONSE	STATUS
RFSAD	RICHMOND ROAD M7 PORTION 2	RICHMOND ROAD M7 PORTION 2	CORRECTIVE ACTION RESPONSE	STATUS
7	<p>Provision of pedestrian fence: Motorist carrying out the onsite audit. It was noted that the existing shared path on the westside of Richmond Rd between the M7 on-board ramp and Rooky Hill Rd North is positioned at the back of kerb adjacent to kerbside traffic. It is noted in the developed concept design that no pedestrian fencing is proposed to separate pedestrians and cyclists from kerbside traffic. It is also noted that the existing on-road cyclist lane is not retained in the proposed design. There is increased risk for pedestrians and/or cyclists to be struck by a vehicle when not separated or protected from kerbside traffic. In the unlikely event of a pedestrian or cyclist being struck by a vehicle at these locations the speed environment would result in a severe injury, particularly when a heavy vehicle is involved.</p>	Medium	<p>An existing median barrier is provided between Richmond Road northbound and southbound carriageways that prevents pedestrians from crossing at this location. Instead the pedestrians are required to cross at the signalised intersections on Rooky Hill Road North / Richmond Road intersection or the Richmond Road / M7 SB entry camp intersection.</p> <p>Providing a fence at this location will reduce the existing shared path width from the required 2.5m as per SWTC Appendix B.2 Clause 8 (a) (i). The adjacent lane is a signalised left turn lane reducing the travel speed of vehicles at this location. The existing left turn lane has been widened from 3.5m to 4m decreasing the likelihood of vehicles traveling in close proximity to the kerb.</p> <p>The shared path is unable to be widened away from the road without cutting into the existing M7 bridge abutment and would be outside the site boundary.</p> <p>ACTION: Nil</p>	Open
8	<p>Vehicles travelling onto and across raised islands: At the time of the site visit it was noted that the raised concrete islands on the NW and SW corners of the Richmond Rd / Rooky Hill Rd North intersection had wheel marks (tracks) across the islands as indicated in the provided photos. On the NW corner the tracks could be the result of too much speed on approach to the left turn or evasive action to miss a queued vehicle at the pedestrian crossing. At the SW corner it would appear heavy vehicles are turning left into Rooky Hill Rd North from the through lane instead of using the dedicated left turn lane.</p>	None only	<p>Noted.</p> <p>The existing northwest corner island is currently a free left turn joining Richmond Road northbound at approximately a 7 degree angle with a 140m auxiliary lane (excluding taper length). This arrangement allows a high approach speed towards the intersection/traffic island. The proposed design replaces the free left with a signalised left turn joining Richmond Road northbound at 70 degrees, decreasing the approach speed.</p> <p>The existing left turn lane as the SW corner has been widened from 3.5m to 4m. Design and check vehicle turn paths are compliant refer to Appendix C.1.1 of the R1001 report provided.</p>	N/A

MR537 Richmond Road Richmond Road Upgrade - M7 to Langford Road

Developed Concept Design Road Safety Audit

CCD Project No. P2026001



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Prepared for

The Aurecon logo consists of the word "aurecon" in a bold, lowercase, sans-serif font. A small green dot is positioned above the letter 'a'.

Document control

Owner		Crossroads Civil Design Pty Ltd
Approval		Managing Director
Template Name		TfNSW FRM320-007 RSA Report Template
Version	Date	Description of change
3.0	01/08/2025	Published as RSA Report Template

Document history

Version	Published date	Summary of changes
1.0	9 February 2026	Draft Developed Concept Design Road Safety Audit Report
2.0	11 February 2026	Final Developed Concept Design Road Safety Audit Report



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This document has been prepared based on the Client’s description of its requirements and Crossroads Civil Design’s experience, having regard to assumptions that Crossroads Civil Design can reasonably be expected to make in accordance with sound professional principles. Crossroads Civil Design may also have relied on information provided by the Client and other third parties in preparing this document, some of which may not have been verified. Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.

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1 CLIENT DETAILS

Table 1 – Client details

Client:	Aurecon
Client address:	Level 11, 73 Miller Street North Sydney Australia 2060
Project manager:	Rob Ferguson
Phone:	M +61 0410 536 380
Email:	rob.ferguson@arecongroup.com

2 AUDIT STATEMENT

We, the undersigned, declare that we have reviewed the material and data listed in this report and identified the risks to road safety listed in Section 6. Reasons are given to explain why an identified item is considered a risk to road safety, including crash type. The auditors listed are independent of the project.

Design or construction deficiencies that do not cause a safety problem are not listed.

It should be noted that while every effort has been made to identify potential risks to road safety, no guarantee can be made that every problem or deficiency has been identified.

It is recommended that the project manager investigate identified road safety risks and implement corrective actions.

Table 2 – Crossroads Civil Design audit team

Role	Name	Auditor Level	ID Number	Signature	Date
Road Safety Audit Team Leader	Graeme Robinson	3	RSA-02-0122		11/02/2026
Road Safety Audit Team Member	Steven Yarnold	3	RSA-02-0355		11/02/2026

3 AUDIT DETAILS

3.1 DESCRIPTION OF THE LOCATION

This road safety audit (RSA) is for the Developed Concept Design provided by Aurecon for the MR537 Richmond Road Upgrade at the grade separated interchange between the M7 and Richmond Road. Refer Figure 1 below for the site location.

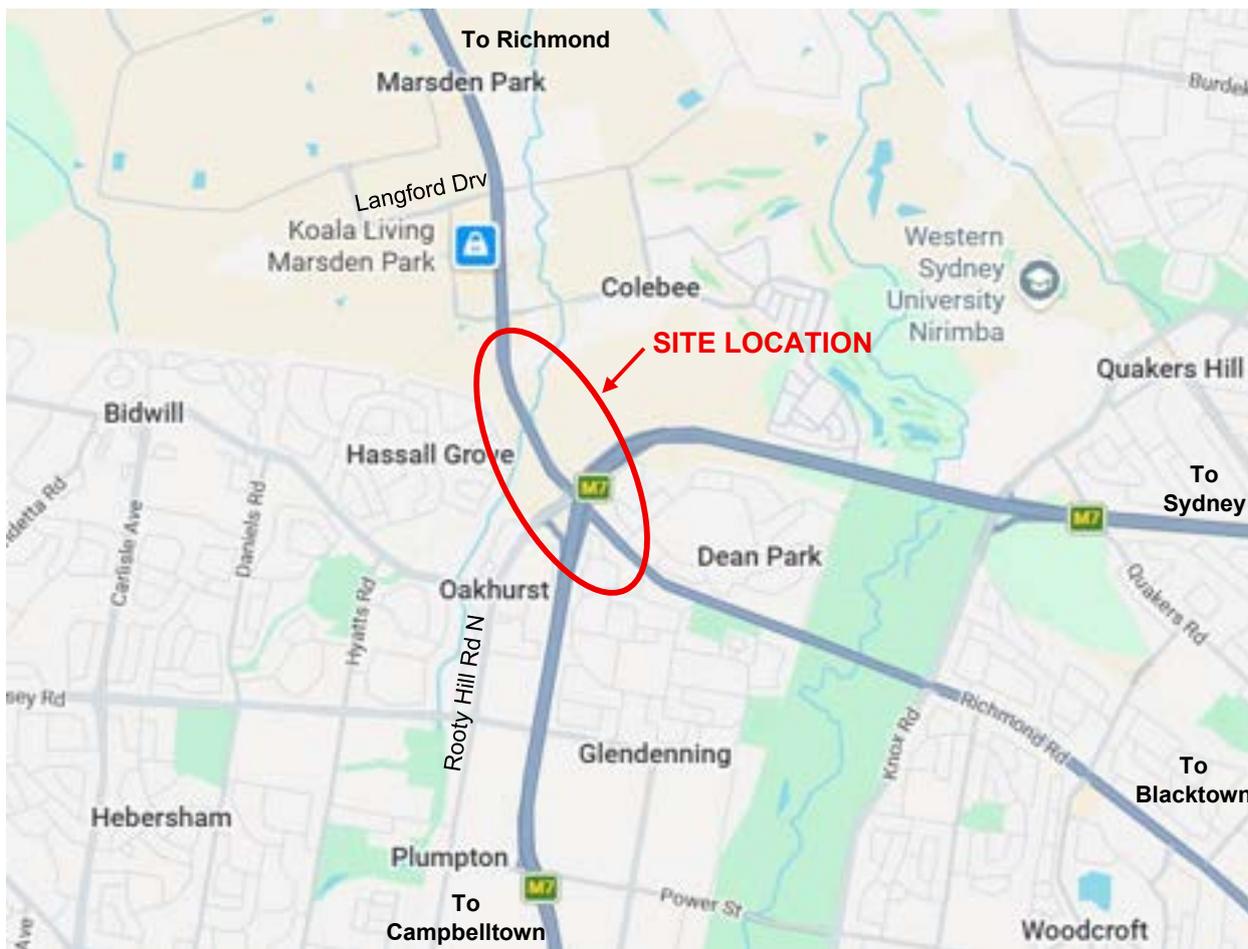


Figure 1 – Site location
 Source: Google Maps

The proposed project area extends along Richmond Road from Yarramundi Drive located south of the M7 grade separated interchange to a point south of the intersection with Langford Drive and also includes the off-load ramp from the M7. Refer Figure 2 below for the project upgrade area.

Richmond Road has a sign posted speed zone of 70 km/h with a change to an 80 km/h speed zone at the northern end of the project at approx. Ch 910. The northbound off-load ramp to Rooty Hill Road North and Rooty Hill Road North have a sign posted speed limit of 60 km/hr. The proposed project is within the Blacktown City Council LGA.



Figure 2 – Project upgrade area
Source: Google Earth

3.2 PROJECT DESCRIPTION

3.2.1 Project background

The Northwest Growth Area (NWGA) has been identified by the NSW Government as a key component to support urban growth in the greater Sydney region. A key part of the identification was its proximity and connection to transport nodes including the M7 Motorway (M7) and ease of connection to the M4 Motorway, Sydney Metro Northwest Line and the new Western Sydney Airport.

As part of the NWGA Transport Strategy, TfNSW is proposing to upgrade Richmond Road to six lanes between Yarramundi Drive and Townson Road, as well as improving access and exits to the M7 Motorway and Rooty Hill Road North.

The upgrade of Richmond Road from Yarramundi Road to Langford Drive, upgrade of the intersection with Rooty Hill Road and provision of a new northbound single lane flyover exit ramp from the M7 to Richmond Road (Richmond bound) will be constructed under a design and construct (D & C) procurement method involving Gamuda and Aurecon.

3.2.2 Project objectives

The project objectives, as identified by TfNSW are:

- Reduce transport cost by improving travel times and reducing congestion;
- Support economic growth and productivity by providing adequate capacity to meet future demand by road users (i.e. freight, buses, pedestrians, cyclists and general traffic);
- Improve road safety in line with the NSW Road Safety Strategy 2012-2021, Safe System Directions and safer Road Key Focus
- Improve quality of service, sustainability and liveability;
- Minimise impacts on the environment; and
- Maintain Richmond Road as a flood evacuation route.

3.2.3 Developed concept design overview

The scope of works for the Richmond Road Upgrade project being undertaken by the Gamuda / Aurecon D&C is described generally as follows. Refer Figure 3 below for plan of proposed upgrade.

- Six lane upgrade along Richmond Road from the intersection with Rooty Hill Road North to approximately 120m south of the intersection with Langford Drive, where connection will be made with six lanes, which is a concurrent D&C arrangement by others;
- New shared path adjacent to the Richmond Road northbound carriageway from Rooty Hill Road North, connecting to the existing shared path at the limit of works south of Langford Drive;
- New single lane flyover exit ramp from the M7 to Richmond Road (Richmond bound), joining the right hand side of the new Richmond Road northbound carriageway and in so doing providing a third northbound travel lane;
- Adjustment of the M7 northbound exit ramp to better direct traffic to the proposed flyover from the existing ramp from the M7 to the at-grade access to Rooty Hill Road North;
- Dual right-turn lanes from Richmond Road to Rooty Hill Road North;
- Dual right-turn lanes from Richmond Road to M7 entry ramp (southbound);
- Retaining the existing bridge structure on Richmond Road over Bells Creek for Blacktown bound traffic;
- New bridge adjacent the existing bridge over Bells Creek for Richmond bound traffic;
- Removal of the existing shared path bridge over Bells Creek and integration of the shared path facilities on the new bridge for the Richmond bound carriageway;
- Upgrade existing traffic signals at the intersection of Richmond Road, Rooty Hill Road North and off-load / onload access to the M7, in particular the removal of the existing pedestrian crossing across Richmond Road;
- Upgrade existing traffic signals at the intersection of Richmond Road and the southbound onload ramp to the M7, in particular provision of pedestrian/cyclist crossing across Richmond Road; and
- Change in speed zone at northern end of Richmond Road from 80 km/h to 70 km/h.

The proposed bridge structure over the existing at-grade Rooty Hill Road North and Richmond Road intersection is a key component of the wider Richmond Road Upgrade project, designed to improve traffic flow and capacity in the region with connection to the M7 Motorway via the grade separated exit ramp.

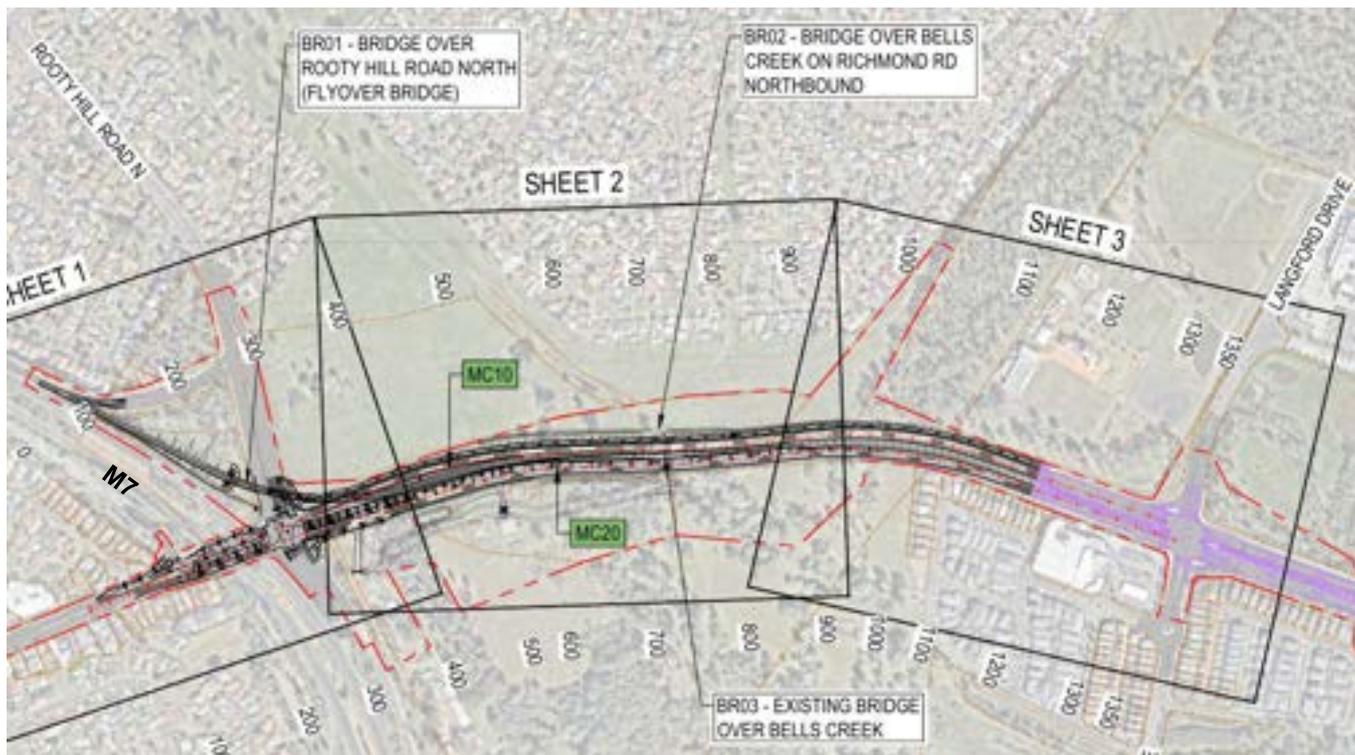


Figure 3 – Plan of Richmond Road upgrade
 Source: Aurecon DCD plans (Rev A01.0)

3.3 SCOPE OF AUDIT

Crossroads Civil Design (CCD) understands that Aurecon requires an RSA for the developed concept design for the Richmond Road upgrade from Yarramundi Road to Langford Drive, which includes the single lane flyover exit ramp from the M7 to Richmond Road.

The objective of this RSA by CCD is to undertake a site audit of the existing road environment and review the developed concept design and supplementary information to identify current risks to road safety with due regard to all road users.

3.4 EXCLUSIONS AND OBSERVATIONS

The audit team may identify potential safety issues in a design aspect where details have not been provided. These issues are typically listed as exclusions or observations and may not be included in the audit findings due to insufficient information. These are intended to assist the client in investigating the issues in further detail and taking any necessary action.

Exclusions:

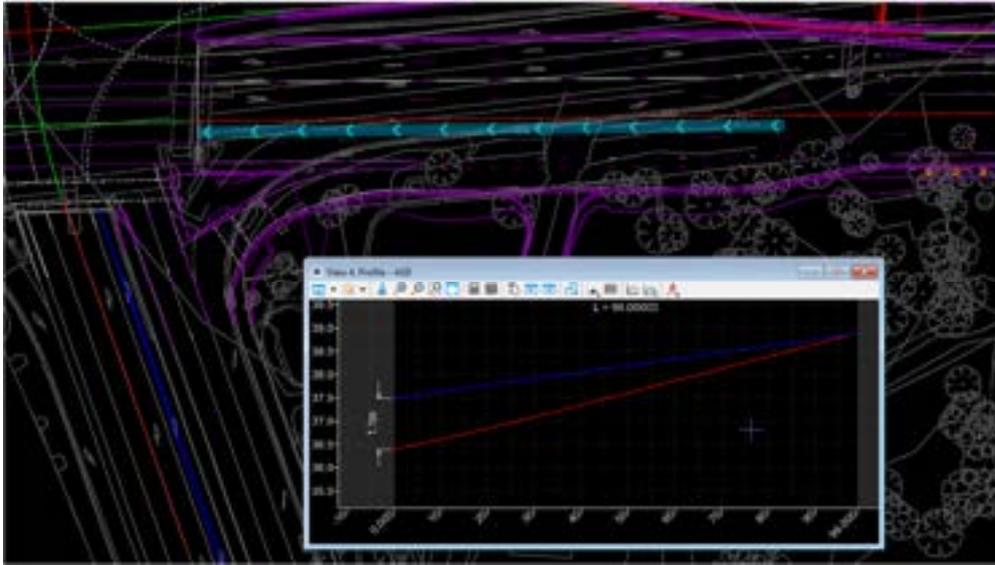
It is noted in the Developed Concept Design Report (*Ref: RW-01- Roadworks – Portion 2 (Southern Section) – Design Report Rev A*) in Section 3.4, that presents Table 3-7: ‘Potential non-conformances (to be confirmed at FDD). Table 3-7 notes 5 non-conformances that are ‘conditionally agreed’ and 4 non-conformances which are noted as ‘open. These non-conformances are excluded from this RSA due to ongoing negotiations with TfNSW to finalise the required concessions.

Observations:

No observations are provided as part of this RSA Report.

Richmond Road SB – MC20

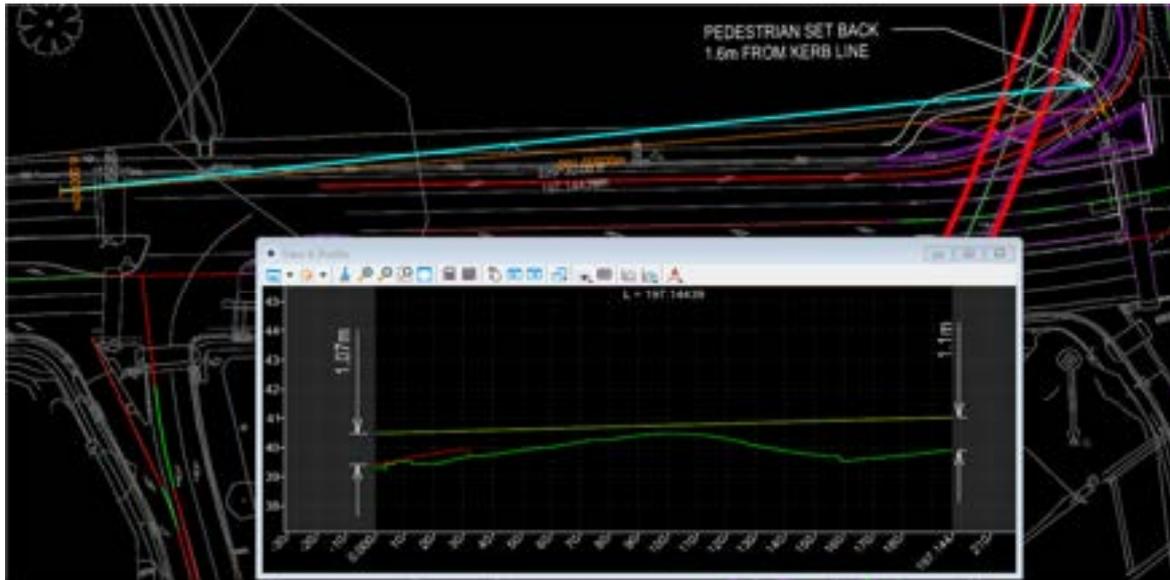
- Eye height (1.1m) to object height (0m)
- Reaction time: 1.5 sec
- Coefficient of deceleration: 0.36
- $a = 2.5\%$
- 80 km/h = 22.22 m/s
- Sight achieved



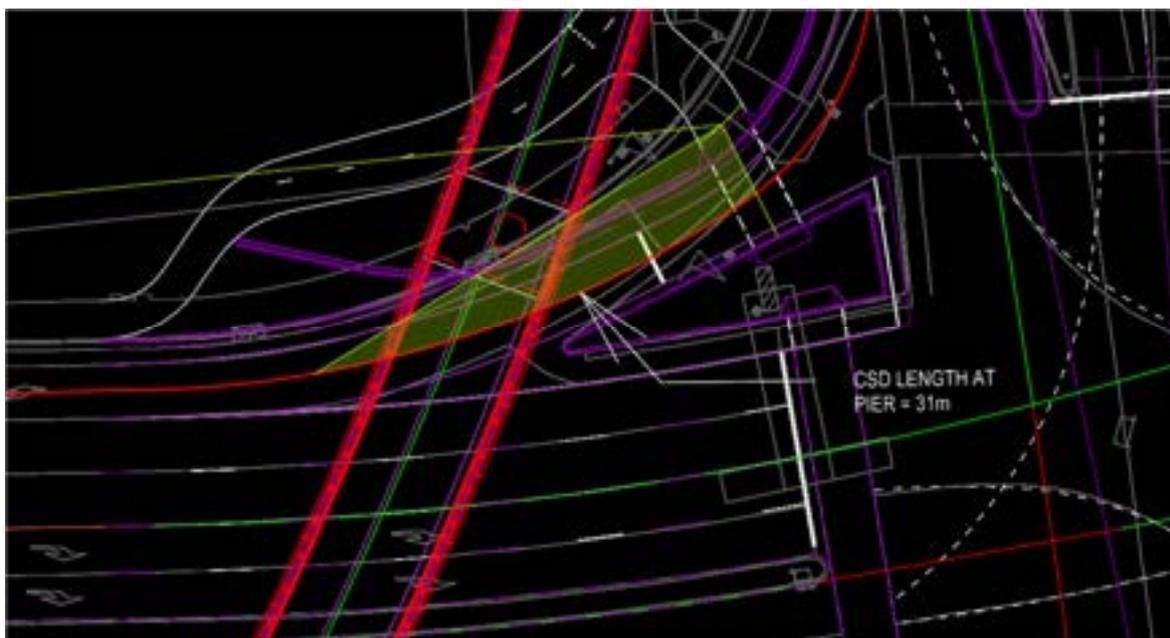
(Pedestrian) Crossing Sight Distance (CSD)

EB Rooty Hill Road North – Pedestrian crossing the left turn lane

- Pedestrian eye height (1.07m) to Driver's eye height (1.1m)
- Crossing Length = 8.8m
- $t_c = 10.33$ seconds
- 70 km/h = 201m
- Sight achieved



Rooty Hill Road North Flyover MC70 pier is within the CSD sight envelope. CSD length past pier is 31m and is equivalent to speed 10.8km/h. Drivers in this location should be slowing down to a stop for pedestrians.



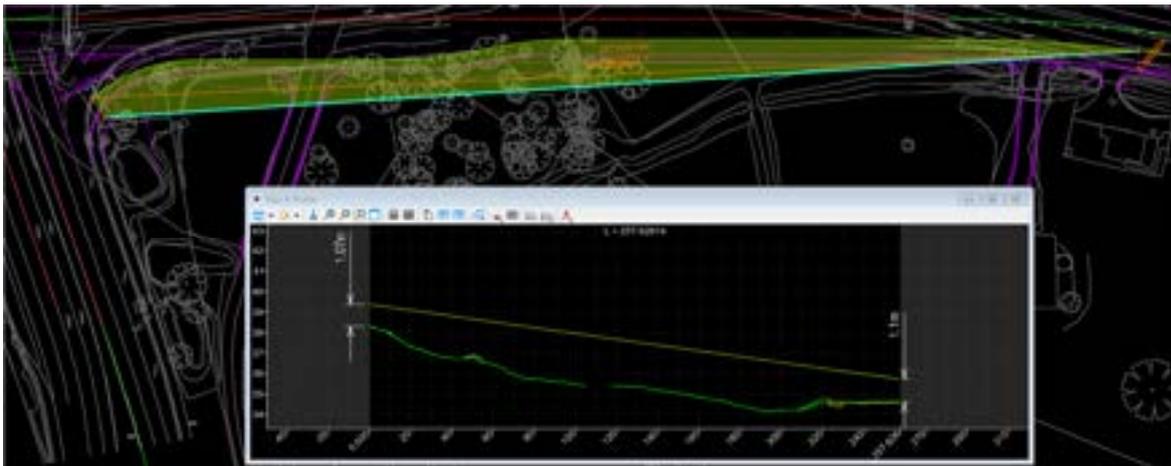
EB Rooty Hill Road North MCC0 – Pedestrian crossing from the median island

- Pedestrian eye height (1.07m) to Driver's eye height (1.1m)
- Crossing Length = 31.6m
- $t_c = 29.33$ seconds
- 70 km/h = 571m
- Sight not achieved due to existing houses and trees. This sight distance failure is already an existing condition



Richmond Road SB MC20 – Pedestrians crossing the left turn lane to Rooty Hill Road North

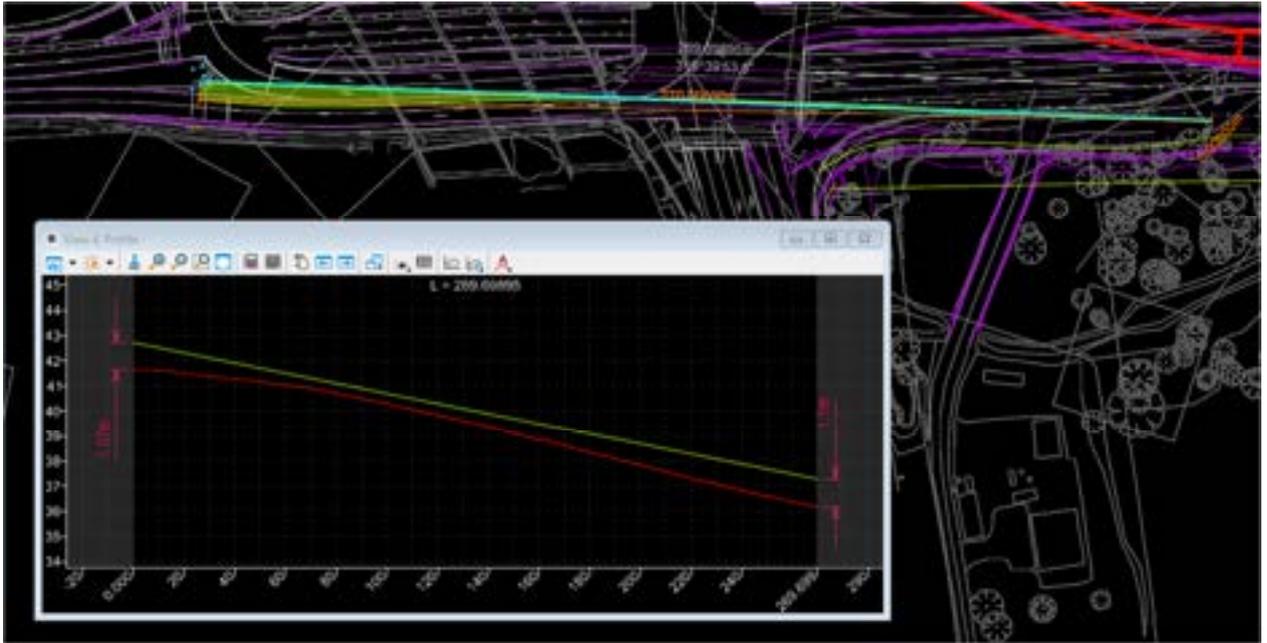
- Pedestrian eye height (1.07m) to Driver's eye height (1.1m)
- Crossing Length = 10.6m
- $t_c = 11.83$ seconds
- 80 km/h = 263m
- Sight Achieved



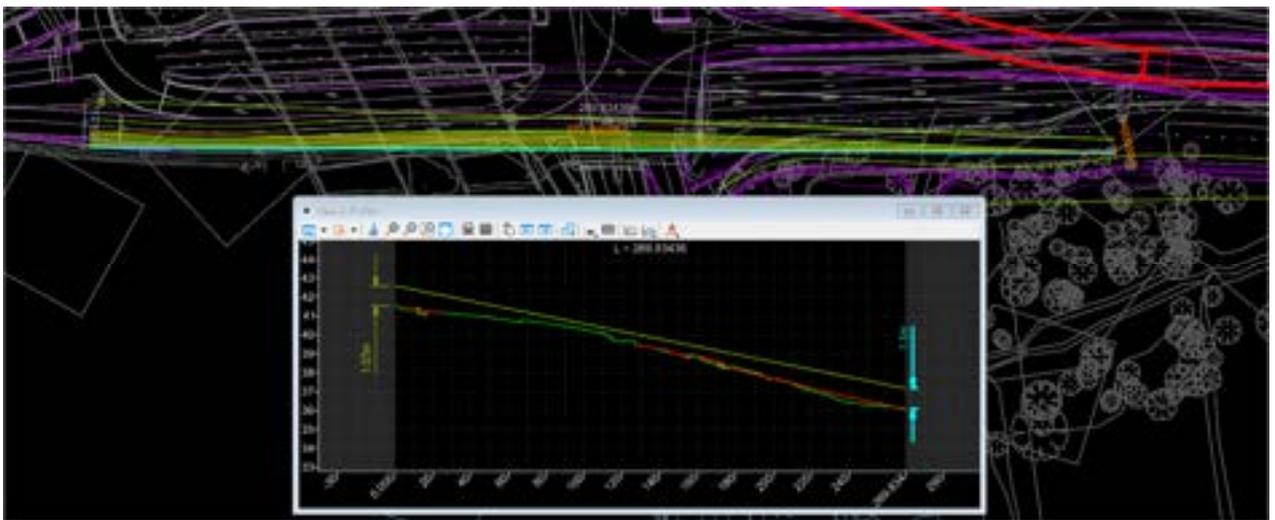
Richmond Road SB MC20 – Pedestrians crossing Richmond Road

- Pedestrian eye height (1.07m) to Driver's eye height (1.1m)
- Crossing Length = 10.94m
- $t_c = 12.12$ seconds
- 80 km/h = 270m

Offside through lane – Sight achieved



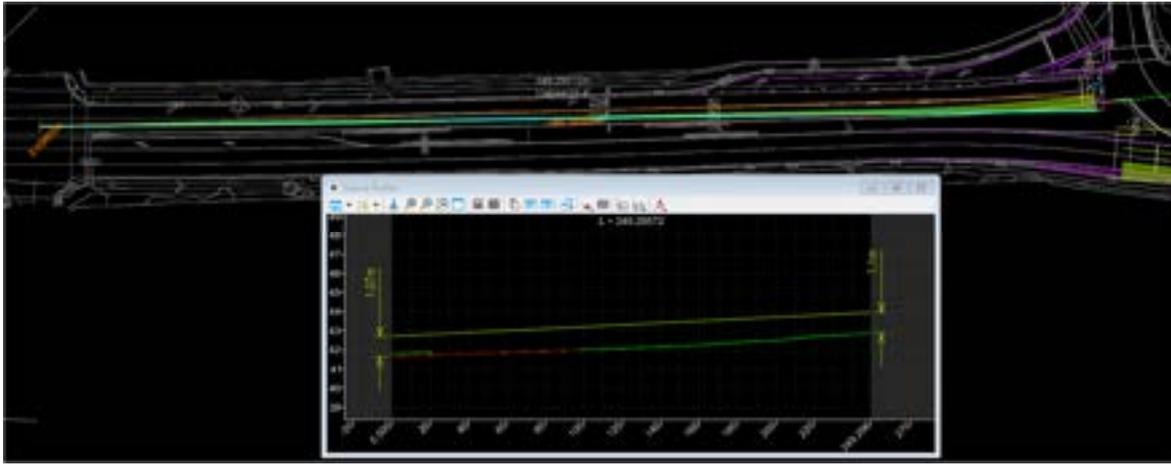
Nearside through lane – Sight achieved



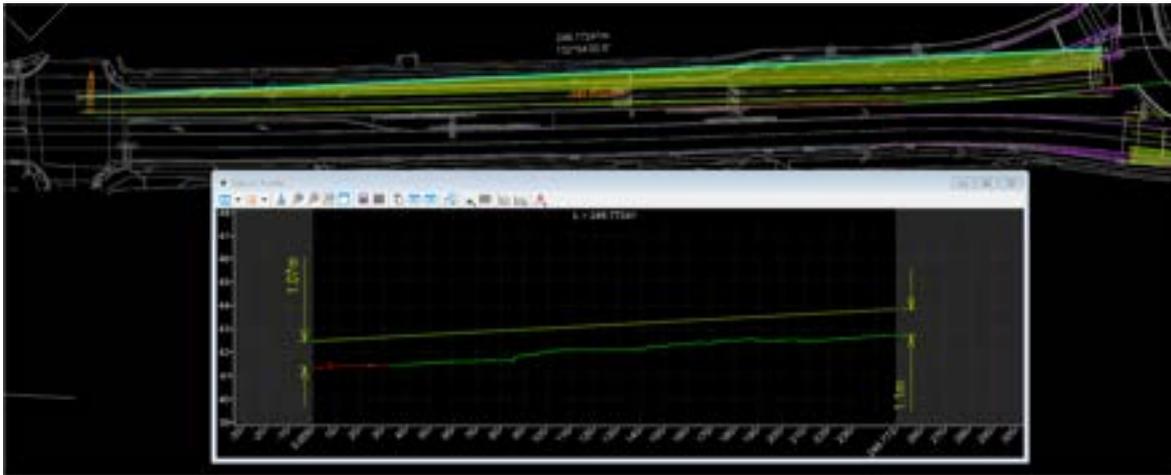
Richmond Road NB - MC10 – Pedestrians crossing Richmond road

- Pedestrian eye height (1.07m) to Driver's eye height (1.1m)
- Crossing Length = 9.8m
- $t_c = 11.17$ seconds
- 80 km/h = 249m

Offside through lane – Sight achieved



Nearside through lane – Sight achieved



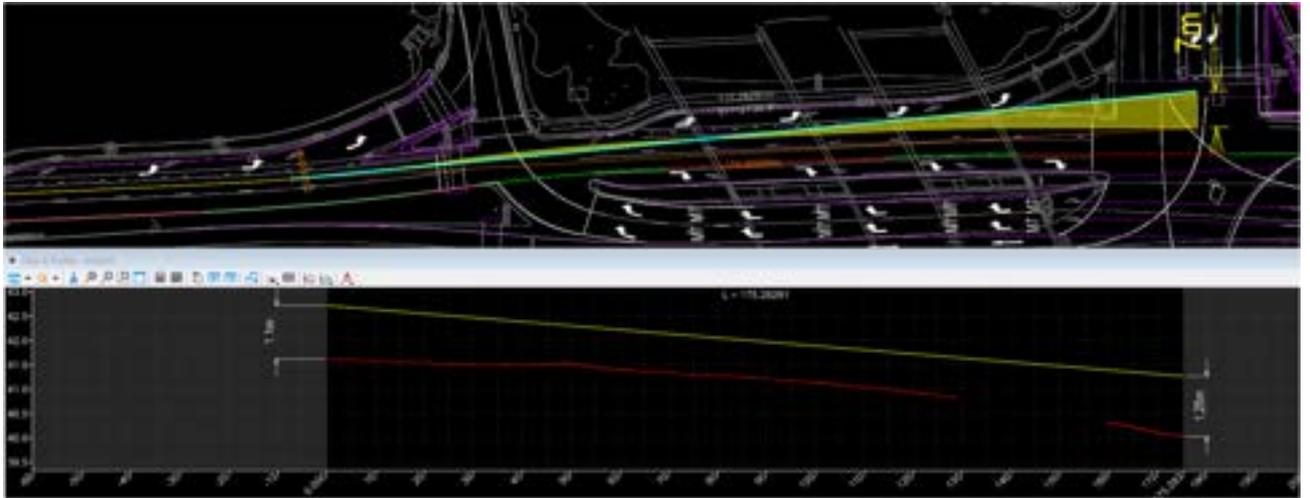
Safe Intersection Sight Distance (SISD)

Major: MC10 – nearside through lane

Minor: MCC0 – right turn lane

- Eye height (1.1m) to top of car (1.25m)
- Reaction time: 1.5 sec
- Observation time: 3 sec
- Coefficient of deceleration: 0.36
- $a = -2\%$
- 80 km/h = 175m
- Driver on minor road located 7m from conflict point

Sight distance achieved = 175m

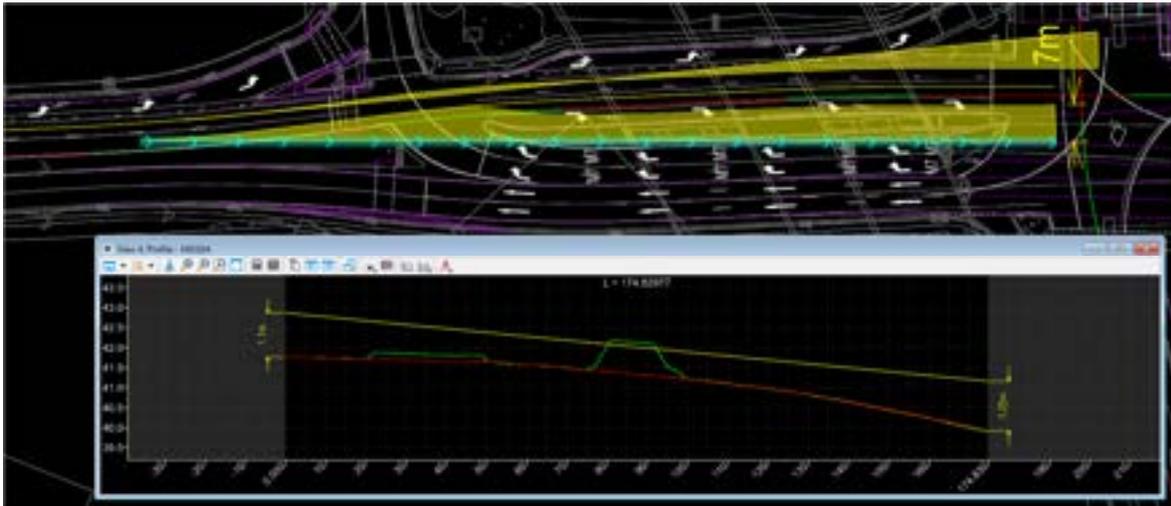


Major: MC10 – right turn lane

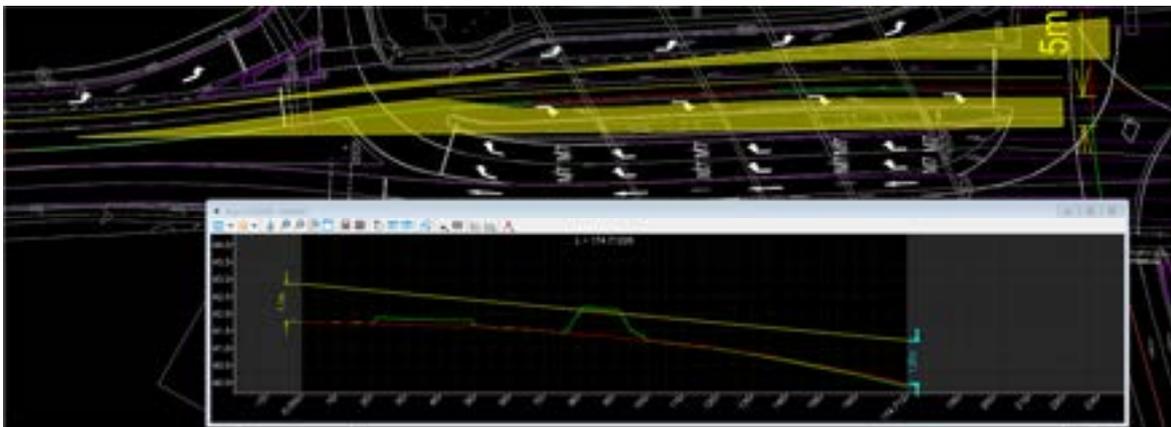
Minor: MAC0 – through lane

Existing condition – existing M7 pier is within the SISD sight envelope

- Eye height (1.1m) to top of car (1.25m)
- Reaction time: 1.5 sec
- Observation time: 3 sec
- Coefficient of deceleration: 0.36
- 80 km/h = 175m
- Driver on minor road located 7m from conflict point
- Sight distance not achieved due to existing M7 pier (existing condition)



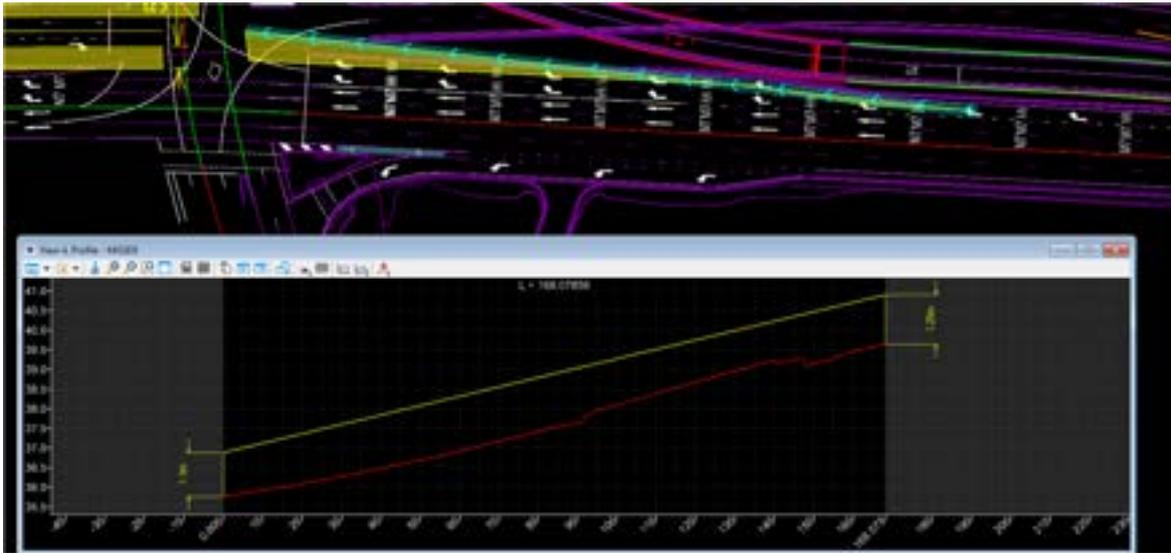
Driver on minor road located 5m from conflict point
Sight distance not achieved due to existing M7 pier



Major: MC20 – WB right turn lane

Minor: MCC0 – EB through lane

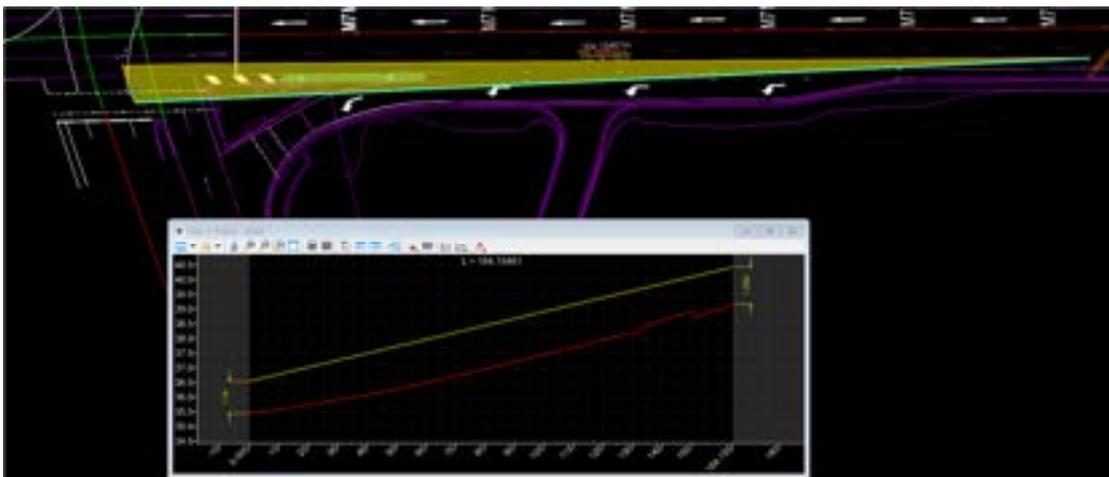
- Eye height (1.1m) to top of car (1.25m)
- Reaction time: 1.5 sec
- Observation time: 3 sec
- Coefficient of deceleration: 0.36
- $a = 2.56\%$
- 80 km/h= 166m
- Driver on minor road located 7m from conflict point
- Sight achieved



Major: MC20 – SB nearside through lane

Minor: MCA0 – WB offside through lane

- Eye height (1.1m) to top of car (1.25m)
- Reaction time: 1.5 sec
- Observation time: 3 sec
- Coefficient of deceleration: 0.36
- $a = 2.64\%$
- 80 km/h = 166m
- Driver on minor road located 7m from conflict point
- Sight Achieved

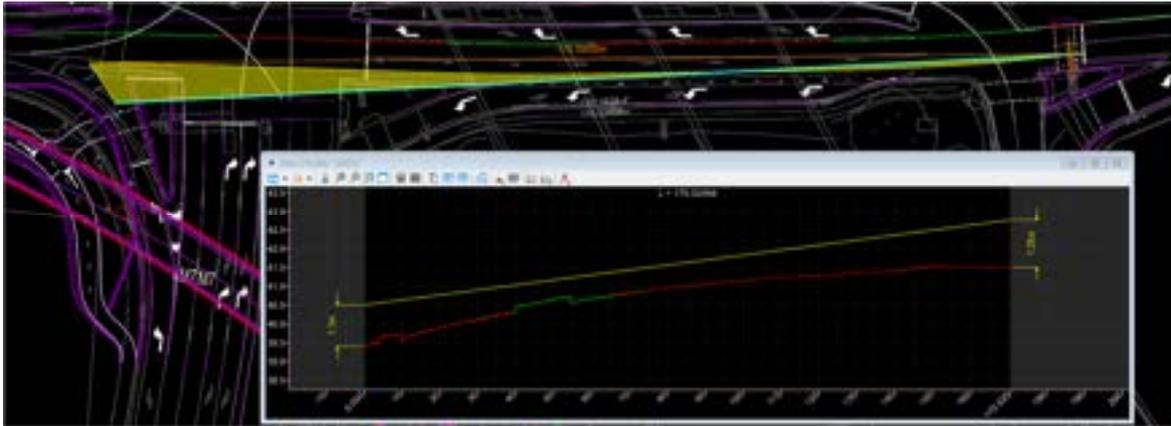


Major: MC10 – SB offside through lane

Minor: MCC0 – NB left turn lane

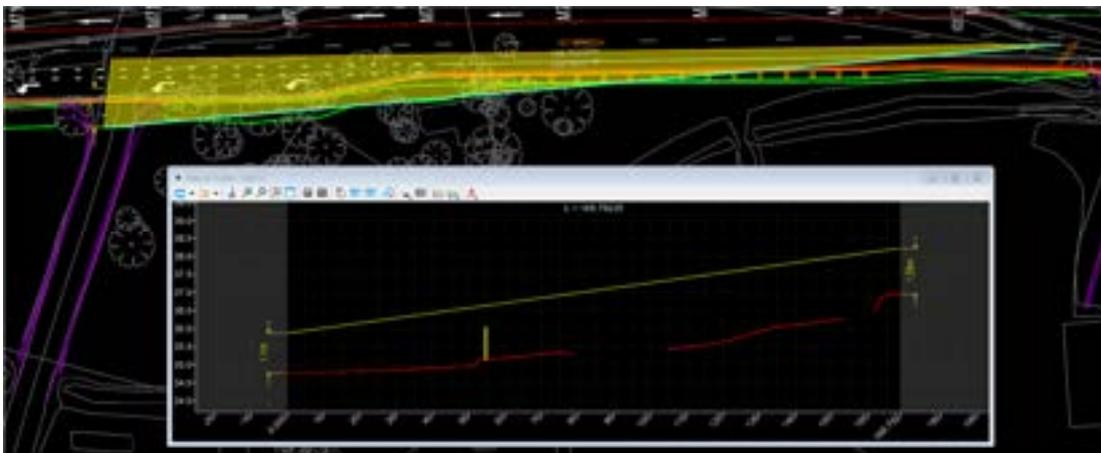
- Eye height (1.1m) to top of car (1.25m)

- Reaction time: 1.5 sec
- Observation time: 3 sec
- Coefficient of deceleration: 0.36
- $a = -2.33\%$
- 80 km/h = 175m
- Driver on minor road located 7m from conflict point
- Sight Achieved



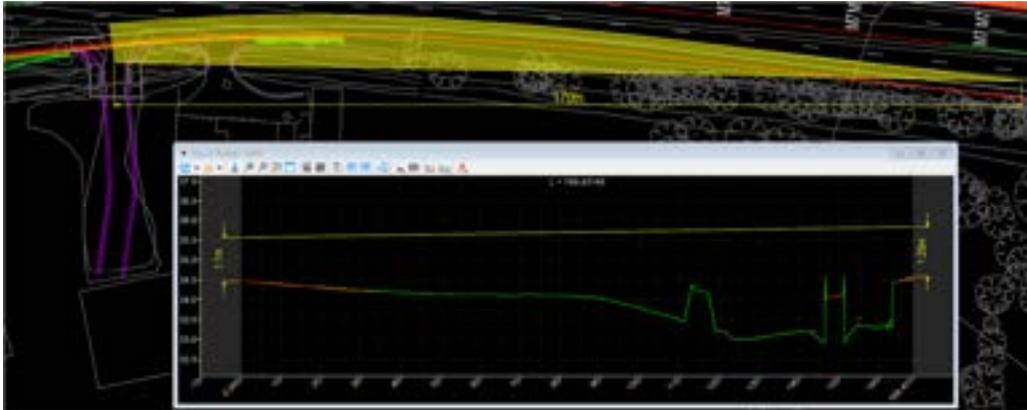
Driveway 1

- Eye height (1.1m) to top of car (1.25m)
- Reaction time: 1.5 sec
- Observation time: 3 sec
- Coefficient of deceleration: 0.36
- $a = 2\%$
- 80 km/h = 167m
- Driver on minor road located 7m from conflict point
- Sight achieved



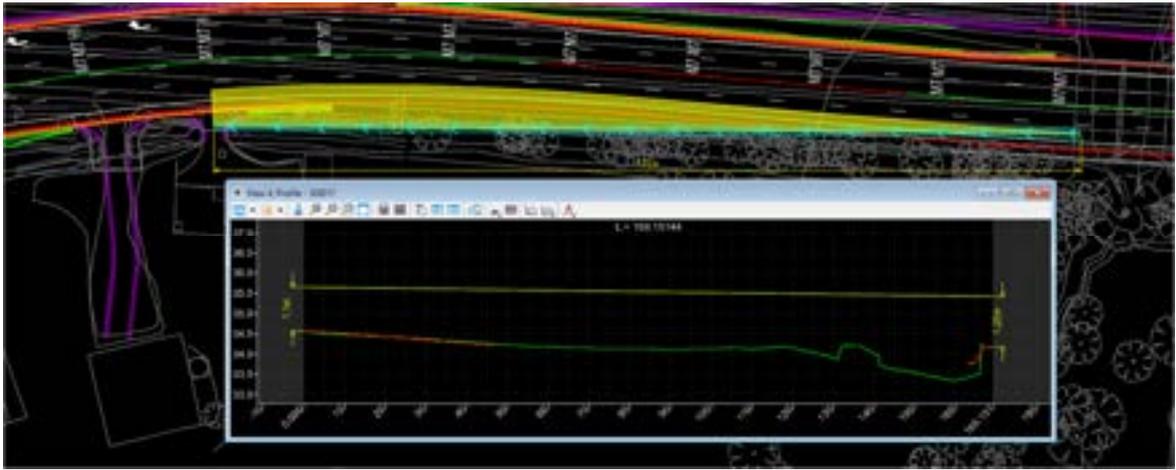
Driveway 2

- Eye height (1.1m) to top of car (1.25m)
- Reaction time: 1.5 sec
- Observation time: 3 sec
- Coefficient of deceleration: 0.36
- $a = 0.39\%$
- 80 km/h = 170m
- Driver on minor road located 7m from conflict point
- Sight Achieved



Driveway 3

- Eye height (1.1m) to top of car (1.25m)
- Reaction time: 1.5 sec
- Observation time: 3 sec
- Coefficient of deceleration: 0.36
- $a = 0.39\%$
- 80 km/h = 170m
- Driver on minor road located 7m from conflict point
- Sight Achieved

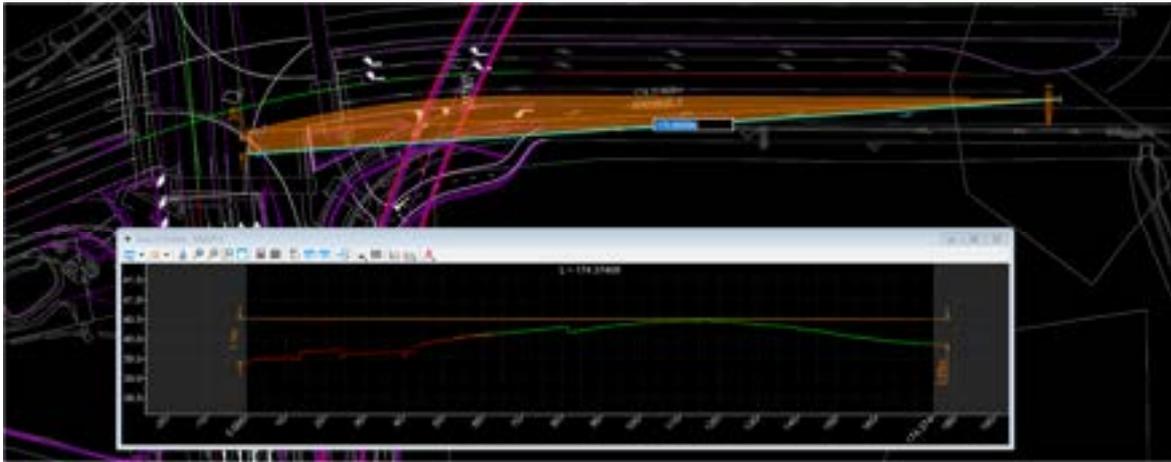


Minimum Gap Sight Distance (MGSD)

MC20 – WB right turn onto Rooty Hill Road North

Note: MGSD checked in the case of failed traffic lights. Critical location has been checked where a new pier on MC70 has been introduced to determine for obstruction.

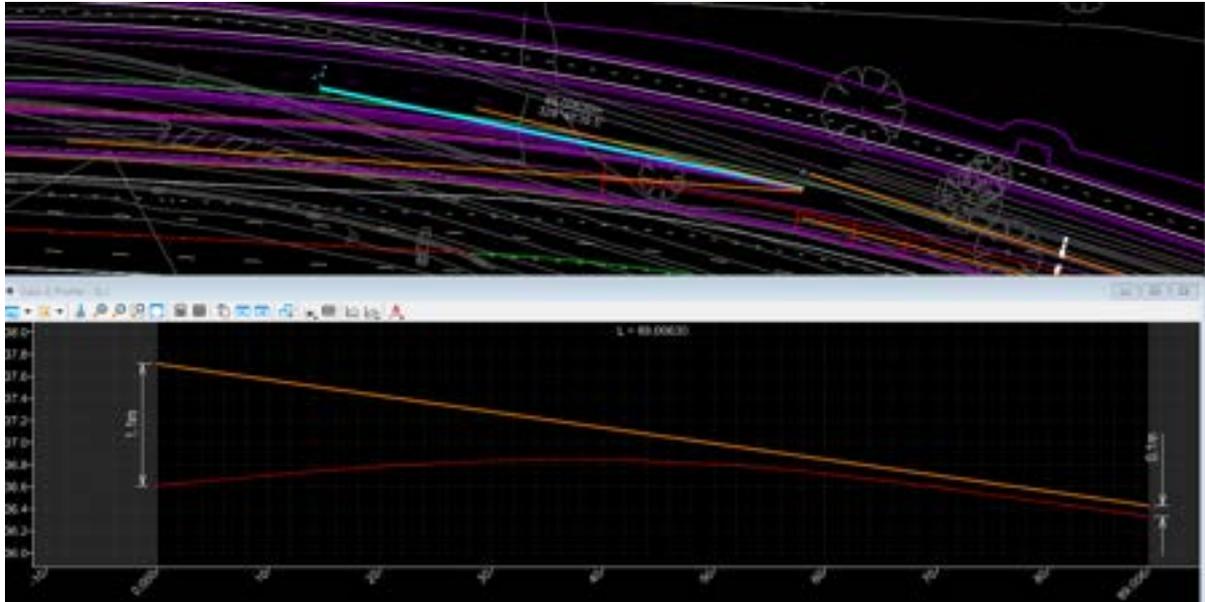
- Driver eye height (1.1m) to car indicator height (0.65m)
- Critical acceptance gap (t_a)
 - Right turn from minor road 7 lane/two way: 9 sec
- Driver on minor road located 3m from edge line projection.
- Sight distance achieved = 175m (suitable for V70 km/h)



Entry Ramp Sight Distance Checks

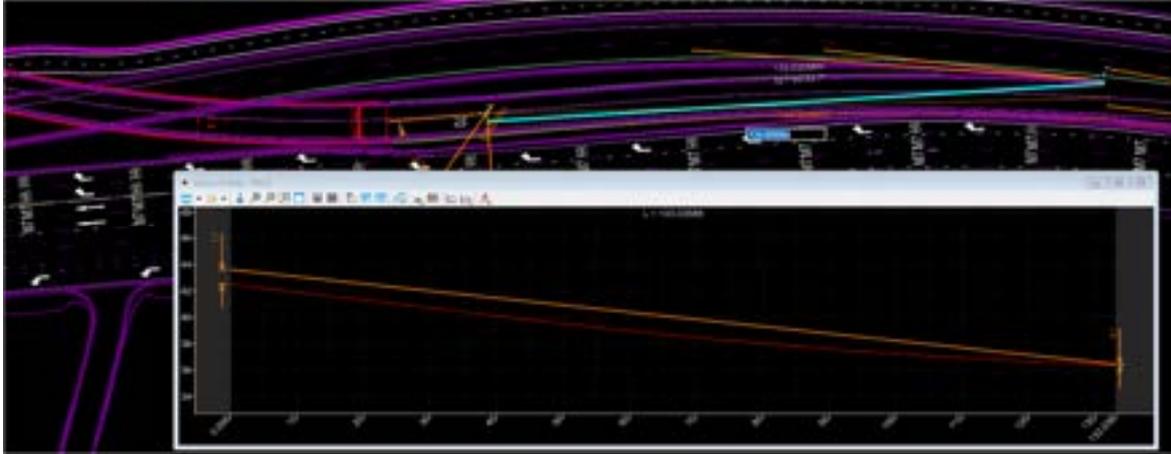
Richmond Road NB MC10 - APPROACH TO NOSE FROM MAINLINE

- Eye height (1.1m) to object height (0.1m)
- 4 sec of travel at 80 km/h= 89m Sight achieved



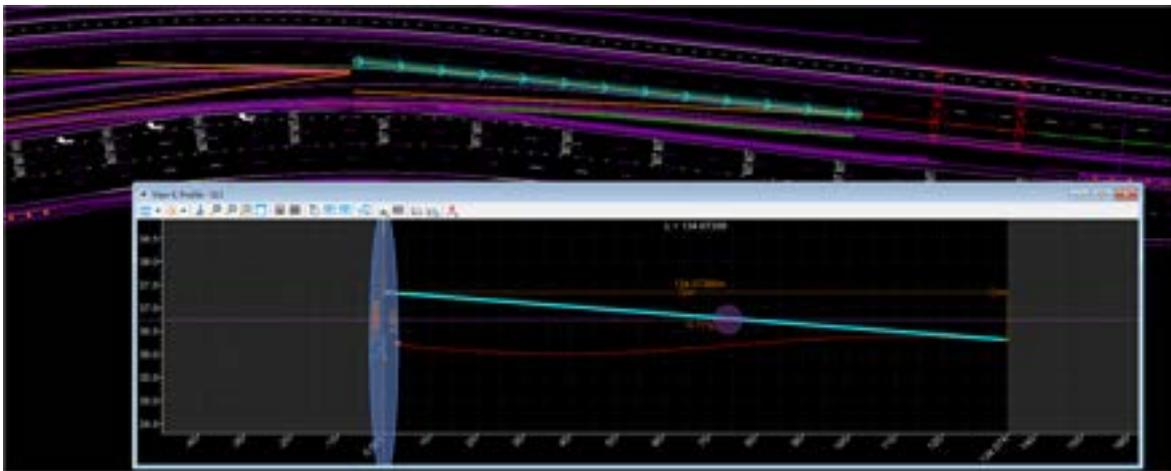
Rooty Hill Road North Flyover MC70 (APPROACH TO NOSE FROM RAMP)

- Eye height (1.1m) to object height (0.1m)
- 6 sec of travel (desirable) 80 km/h= 134m
- Sight achieved



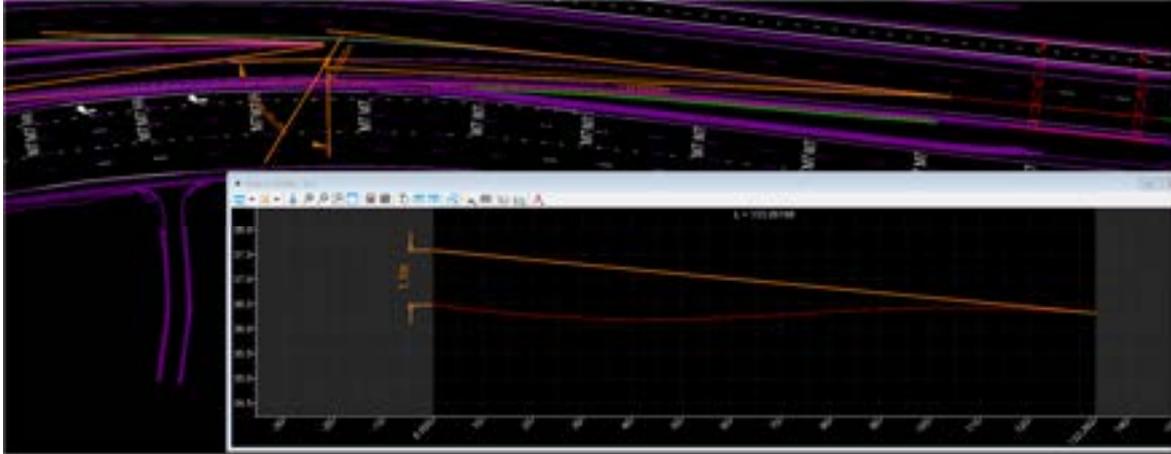
Richmond Road NB MC10 (APPROACH TO SOFT NOSE (EDGE LINE MARKING))

- Eye height (1.1m) to line marking (0m)
- 6 sec of travel (desirable) 80 km/h= 134m
- Sight achieved



Rooty Hill Road North Flyover MC70 (APPROACH TO SOFT NOSE (EDGE LINE MARKING))

- Eye height (1.1m) to line marking (0m)
- 6 sec of travel (desirable) 80 km/h= 134m
- Sight achieved



Appendix H.3 - Bridge Vertical Clearance Checks

Bridge Vertical Clearance Checks

Bridge 1 – Rooty Hill Road North Flyover (MC70)

Checks have been carried out using the bridge model and 5.4m vertical clearance boxes on Richmond Road (MC10) and Rooty Hill Road North (MCA0 and MCC0). Below are the required vertical clearances and bridge depths at each of the piers and road surface.

- Required bridge vertical clearance: 5.4m
- Bridge Girder: 1.815m
- Bridge Deck
 - 0.275m at Piers
 - 0.250m elsewhere
- Wearing Course 0.085m
- Temporary works clearance at Pier 1 (1m around the headstock): 0.8m

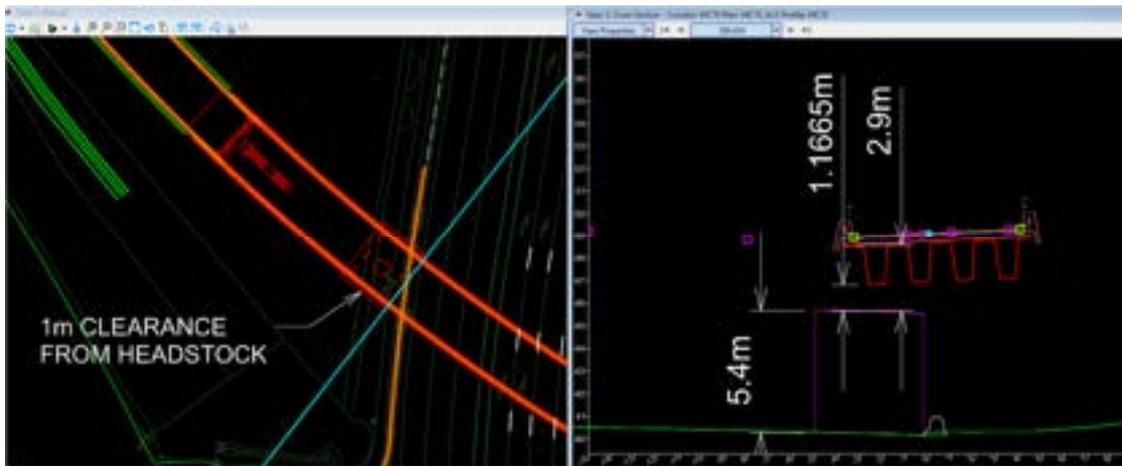
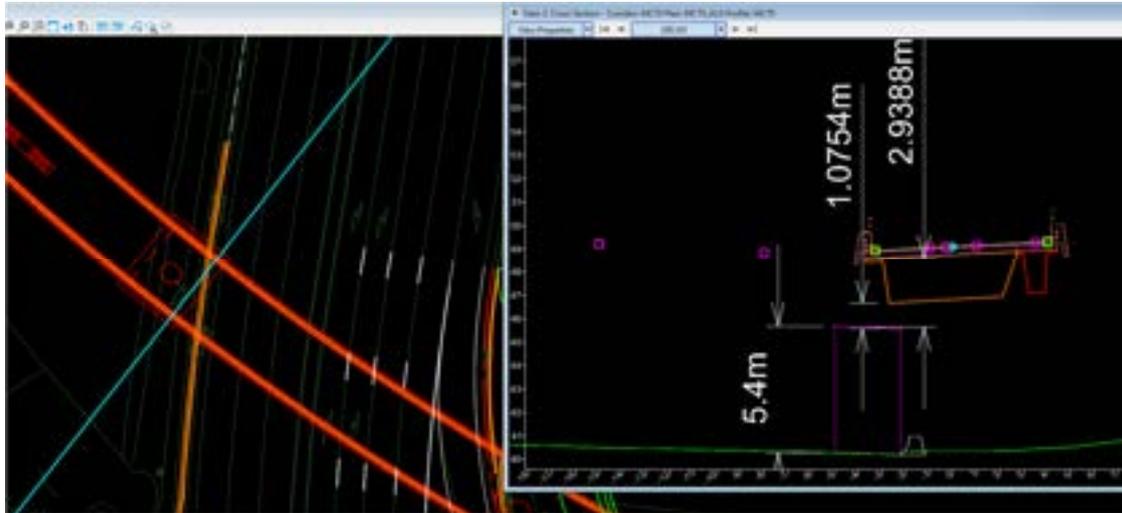
Table 1 MC70 Flyover Bridge vertical clearances and bridge depths from the piers and road surface

	Vertical Clearance	Headstock	Girder	Bridge Deck	Wearing course	Temporary Works Clearance	TOTAL (m)
Pier 1	5.4	0.2	1.815	0.275	0.085	0.800	8.575
RHRN Median	5.4		1.815	0.250	0.085		7.55
Pier 2	5.4	0.2	1.815	0.275	0.085	0	7.775
Pier 3	5.4	0.2	1.815	0.275	0.085	0	7.775
Richmond Road	5.4		1.815	0.250	0.085		7.55
Pier 4	5.4	0.2	1.815	0.275	0.085	0	7.775

Cross sections have been provided at each of the critical locations to demonstrate the achieved vertical clearances.

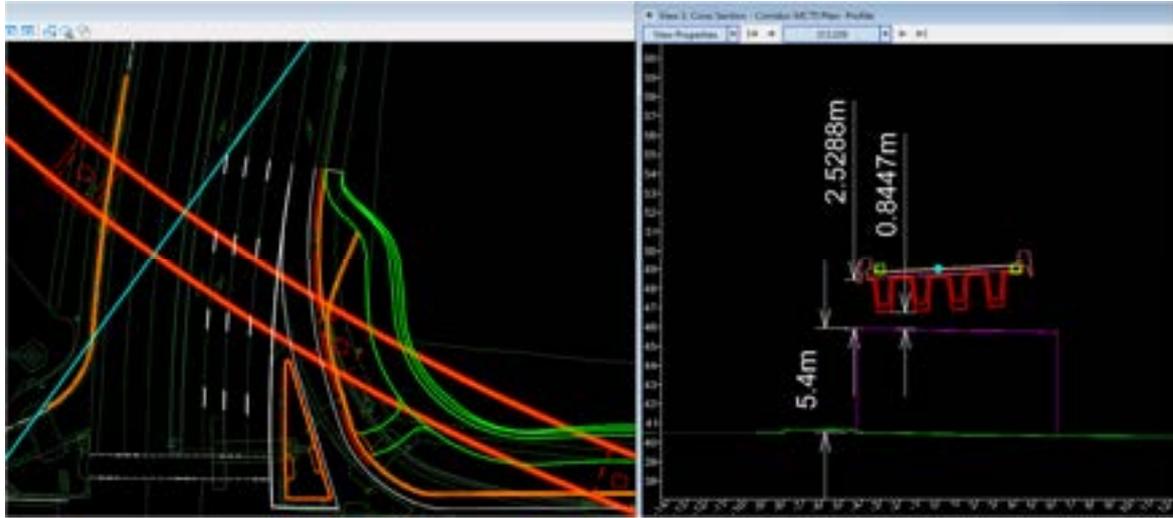
Pier 1

Pier 1 requires additional temporary works clearance of 0.8m down from the lowest RL of the headstock and 1m lateral clearance from the headstock. The vertical clearance requirements have been achieved.



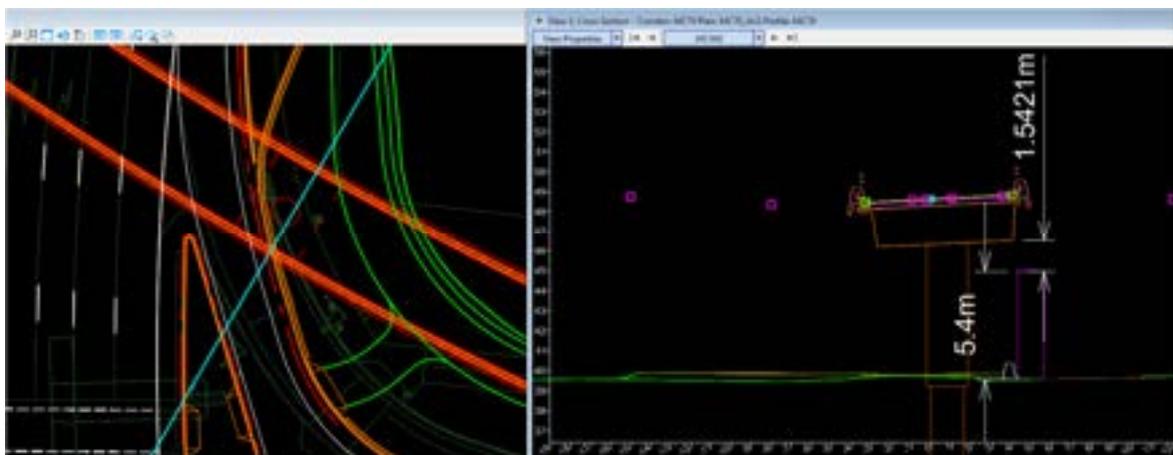
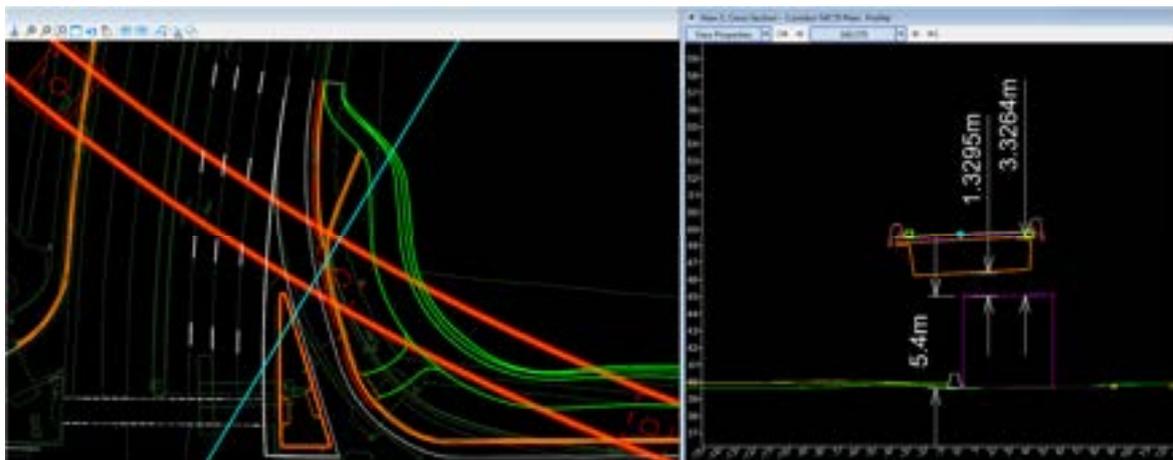
Rooty Hill Road North Median

The vertical clearance requirements are achieved.



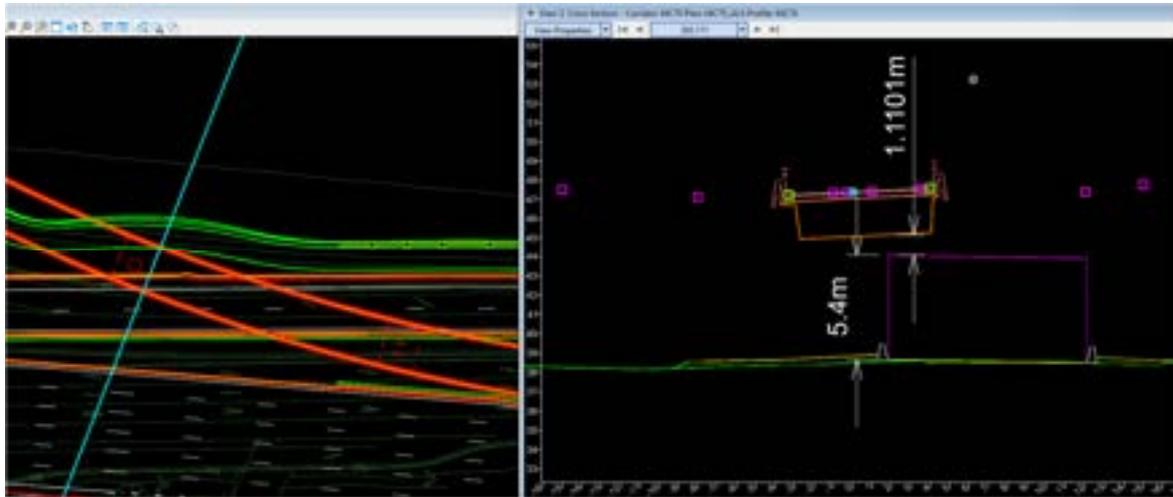
Pier 2

The vertical clearance requirements are achieved.



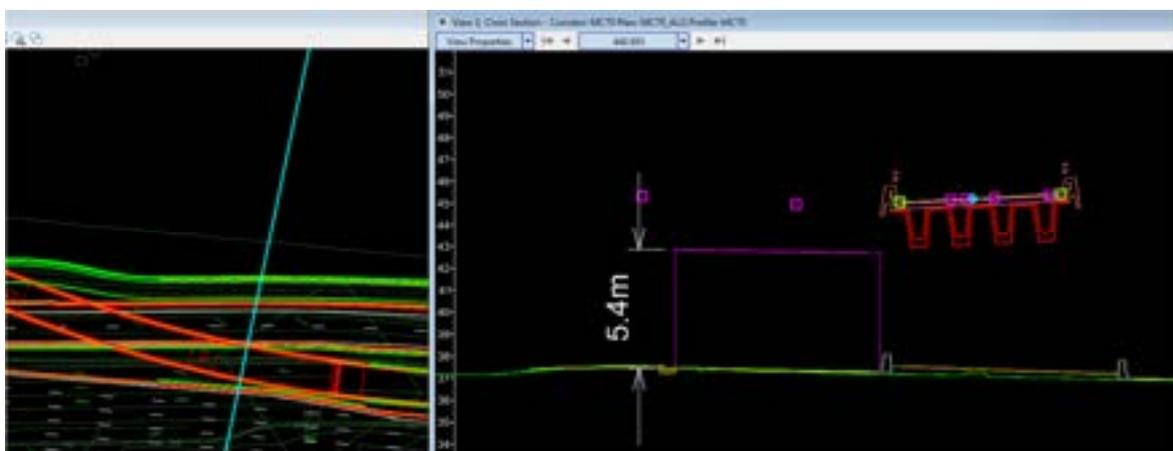
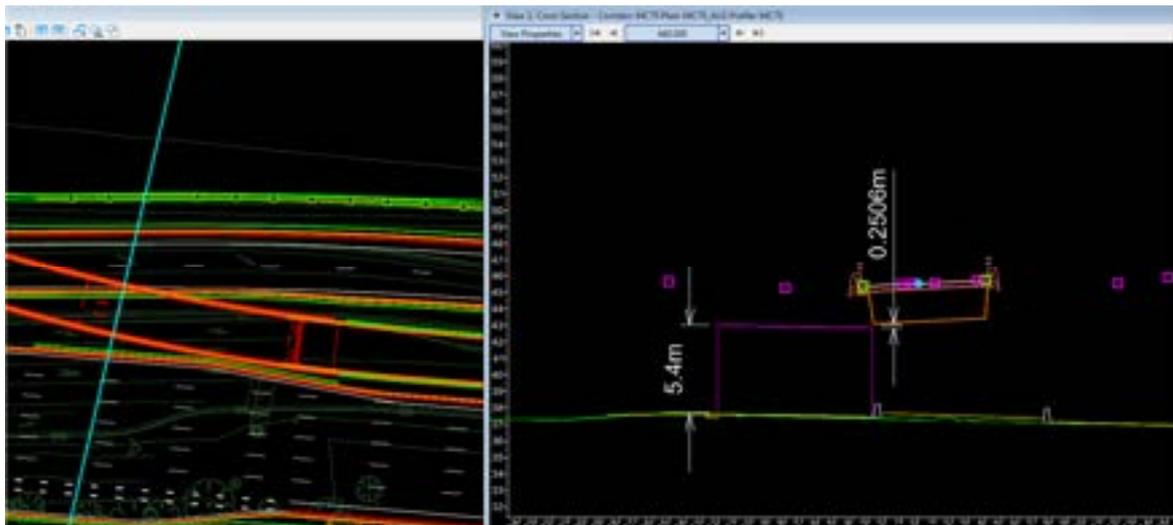
Pier 3

The vertical clearance requirements are achieved.



Pier 4

The vertical clearance requirements are achieved.



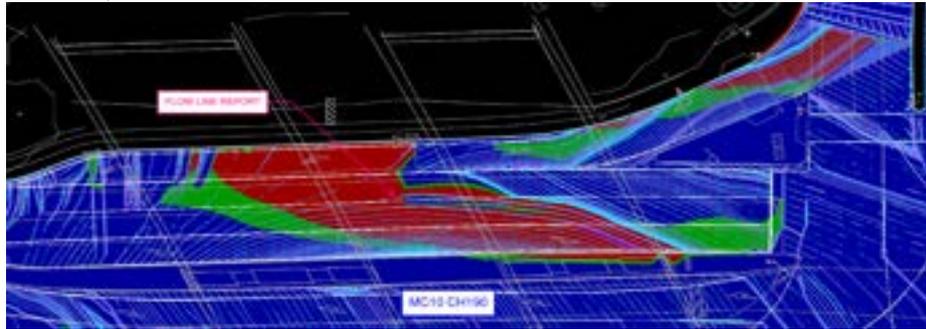
Appendix H.4 - Aquaplaning Checks

Aquaplaning Report

Report Created: Thursday, 22 January 2026
Time: 5:09:54 PM

Note: All units in this report are in meters unless specified otherwise.

Rainfall Intensity: 50.000 mm/hour
Texture Depth: 0.500 mm
Formula: Gallaway
Using Equal Area Slope? TRUE
Surface Name: Design-Contours



----- Flowline Points -----									
Gallaway	Film	RRL Film	Film	Depth	Area	Z			
Depth	Depth	Depth	Differenc	Slope (%)	Distance	Under	X	Y	(original
(mm)	(mm)	(mm)	e (mm)		Along	Profile			surface)
0	0	0	0	0.00%	0	0	300761.2	6265296	41.315
0	0.348	0.348	1.068:1	0.186	0	0	300761	6265296	41.313
0	0.361	0.361	1.058:1	0.2	0	0	300761	6265296	41.313
0	0.373	0.373	1.050:1	0.213	0	0	300761	6265296	41.313
0.29	0.689	0.399	1.211:1	0.767	0.004	300760.4	6265296	6265296	41.306
0.546	0.957	0.41	1.220:1	1.485	0.013	300759.7	6265296	6265296	41.297
0.592	0.997	0.405	1.186:1	1.593	0.015	300759.6	6265296	6265296	41.296
0.654	1.053	0.399	1.147:1	1.756	0.018	300759.5	6265296	6265296	41.294
0.857	1.279	0.422	1.170:1	2.608	0.04	300758.6	6265296	6265296	41.284
0.869	1.292	0.423	1.170:1	2.664	0.042	300758.6	6265296	6265296	41.284
0.874	1.297	0.423	1.168:1	2.68	0.042	300758.6	6265296	6265296	41.284
0.889	1.311	0.422	1.159:1	2.731	0.043	300758.5	6265296	6265296	41.283
0.924	1.35	0.426	1.162:1	2.898	0.049	300758.4	6265296	6265296	41.281
0.937	1.365	0.428	1.163:1	2.963	0.051	300758.3	6265296	6265296	41.28
0.943	1.37	0.427	1.160:1	2.984	0.052	300758.3	6265296	6265296	41.28
1.073	1.518	0.444	1.167:1	3.669	0.079	300757.6	6265296	6265296	41.272
1.147	1.586	0.44	1.131:1	3.96	0.089	300757.3	6265296	6265296	41.269
1.17	1.613	0.443	1.133:1	4.098	0.095	300757.2	6265296	6265296	41.268
1.187	1.629	0.442	1.126:1	4.168	0.098	300757.1	6265296	6265296	41.267
1.247	1.686	0.439	1.102:1	4.427	0.108	300756.9	6265296	6265296	41.265
1.315	1.767	0.452	1.110:1	4.875	0.132	300756.5	6265297	6265297	41.26
1.445	1.882	0.437	1.046:1	5.402	0.153	300755.9	6265297	6265297	41.256
1.522	1.977	0.454	1.060:1	5.99	0.19	300755.4	6265297	6265297	41.249
1.554	2.015	0.461	1.065:1	6.236	0.207	300755.1	6265297	6265297	41.246
1.611	2.065	0.454	1.038:1	6.483	0.218	300754.9	6265297	6265297	41.244
1.619	2.075	0.456	1.039:1	6.552	0.223	300754.8	6265297	6265297	41.244
1.637	2.091	0.454	1.031:1	6.63	0.227	300754.8	6265297	6265297	41.243
1.653	2.111	0.458	1.034:1	6.767	0.237	300754.6	6265297	6265297	41.242
1.688	2.142	0.454	1.019:1	6.925	0.244	300754.5	6265297	6265297	41.24
1.773	2.214	0.441	97.99%	7.281	0.26	300754.1	6265297	6265297	41.238
1.797	2.246	0.448	98.64%	7.513	0.278	300753.9	6265297	6265297	41.236
1.806	2.253	0.447	98.23%	7.551	0.28	300753.9	6265297	6265297	41.236
1.809	2.257	0.448	98.30%	7.576	0.282	300753.9	6265297	6265297	41.235
1.826	2.279	0.453	98.73%	7.742	0.296	300753.7	6265297	6265297	41.233
1.887	2.33	0.443	96.04%	8.001	0.307	300753.5	6265297	6265297	41.232
1.888	2.331	0.443	96.07%	8.012	0.308	300753.4	6265297	6265297	41.232
1.892	2.335	0.443	95.89%	8.03	0.309	300753.4	6265297	6265297	41.232
1.934	2.369	0.436	94.18%	8.21	0.317	300753.2	6265297	6265297	41.231
1.943	2.382	0.439	94.47%	8.308	0.326	300753.2	6265297	6265297	41.23
1.982	2.435	0.453	95.62%	8.723	0.364	300752.8	6265298	6265298	41.225
2.077	2.538	0.461	94.92%	9.448	0.424	300752.2	6265298	6265298	41.219
2.092	2.555	0.463	94.81%	9.571	0.434	300752	6265298	6265298	41.217
2.097	2.562	0.465	94.95%	9.631	0.44	300752	6265298	6265298	41.217
2.14	2.608	0.468	94.66%	9.968	0.47	300751.7	6265298	6265298	41.214
2.153	2.626	0.473	94.98%	10.12	0.486	300751.6	6265298	6265298	41.212
2.187	2.672	0.484	95.74%	10.509	0.529	300751.2	6265298	6265298	41.208
2.264	2.777	0.512	97.66%	11.441	0.639	300750.4	6265299	6265299	41.198
2.266	2.778	0.513	97.68%	11.456	0.641	300750.4	6265299	6265299	41.198
2.269	2.783	0.514	97.76%	11.5	0.646	300750.4	6265299	6265299	41.197
2.28	2.798	0.518	97.99%	11.633	0.663	300750.3	6265299	6265299	41.196
2.284	2.803	0.519	98.05%	11.679	0.669	300750.2	6265299	6265299	41.195
2.291	2.812	0.521	98.17%	11.756	0.678	300750.2	6265299	6265299	41.194

2.293	2.815	0.522	98.21%	11.781	0.682	300750.1	6265299	41.194
2.347	2.887	0.54	99.21%	12.444	0.768	300749.6	6265299	41.187
2.364	2.908	0.544	99.40%	12.641	0.794	300749.4	6265300	41.185
2.369	2.914	0.546	99.45%	12.694	0.801	300749.3	6265300	41.184
2.384	2.935	0.551	99.69%	12.885	0.828	300749.2	6265300	41.182
2.393	2.947	0.553	99.84%	12.998	0.843	300749.1	6265300	41.181
2.396	2.95	0.554	99.86%	13.028	0.847	300749.1	6265300	41.181
2.422	2.983	0.561	1.001:1	13.337	0.89	300748.8	6265300	41.177
2.584	3.144	0.56	96.65%	14.605	1.031	300747.7	6265301	41.167
2.603	3.163	0.56	96.28%	14.765	1.049	300747.5	6265301	41.166
2.605	3.166	0.561	96.30%	14.791	1.053	300747.5	6265301	41.165
2.605	3.166	0.561	96.31%	14.794	1.054	300747.5	6265301	41.165
2.608	3.169	0.561	96.26%	14.815	1.056	300747.5	6265301	41.165
2.61	3.172	0.562	96.29%	14.842	1.061	300747.5	6265301	41.165
2.629	3.191	0.563	96.04%	15.011	1.082	300747.3	6265301	41.164
2.688	3.254	0.566	95.28%	15.562	1.154	300746.9	6265301	41.159
2.693	3.261	0.568	95.36%	15.635	1.166	300746.8	6265301	41.158
2.696	3.264	0.569	95.39%	15.665	1.17	300746.8	6265301	41.158
2.72	3.291	0.57	95.08%	15.897	1.201	300746.6	6265301	41.156
2.724	3.296	0.572	95.13%	15.948	1.21	300746.5	6265301	41.155
2.769	3.344	0.575	94.58%	16.378	1.268	300746.2	6265302	41.152
2.776	3.351	0.575	94.50%	16.44	1.277	300746.1	6265302	41.151
2.776	3.351	0.575	94.51%	16.447	1.278	300746.1	6265302	41.151
2.783	3.361	0.578	94.61%	16.55	1.296	300746	6265302	41.15
2.887	3.472	0.585	93.40%	17.569	1.442	300745.2	6265302	41.141
2.899	3.485	0.586	93.27%	17.692	1.46	300745.1	6265302	41.14
2.9	3.486	0.586	93.28%	17.701	1.461	300745.1	6265302	41.14
2.907	3.496	0.589	93.39%	17.815	1.482	300745	6265302	41.139
3.041	3.653	0.612	93.14%	19.425	1.757	300743.8	6265303	41.124
3.044	3.657	0.613	93.13%	19.472	1.765	300743.7	6265303	41.123
3.045	3.657	0.613	93.13%	19.474	1.766	300743.7	6265303	41.123
3.045	3.658	0.613	93.14%	19.484	1.768	300743.7	6265303	41.123
3.066	3.682	0.616	93.04%	19.734	1.812	300743.5	6265304	41.121
3.067	3.683	0.616	93.04%	19.738	1.812	300743.5	6265304	41.121
3.076	3.693	0.617	93.00%	19.85	1.832	300743.4	6265304	41.12
3.076	3.694	0.618	93.00%	19.852	1.833	300743.4	6265304	41.12
3.082	3.701	0.618	92.97%	19.925	1.846	300743.4	6265304	41.119
3.134	3.76	0.626	92.74%	20.549	1.958	300742.9	6265304	41.114
3.135	3.761	0.627	92.76%	20.567	1.962	300742.9	6265304	41.113
3.135	3.762	0.627	92.76%	20.569	1.962	300742.9	6265304	41.113
3.141	3.769	0.628	92.77%	20.646	1.977	300742.8	6265304	41.113
3.17	3.804	0.634	92.80%	21.039	2.054	300742.5	6265304	41.109
3.17	3.805	0.634	92.81%	21.048	2.056	300742.5	6265304	41.109
3.172	3.807	0.635	92.83%	21.075	2.062	300742.5	6265304	41.109
3.26	3.915	0.654	92.91%	22.291	2.308	300741.6	6265305	41.097
3.261	3.915	0.654	92.91%	22.294	2.309	300741.6	6265305	41.097
3.277	3.938	0.661	93.15%	22.583	2.375	300741.4	6265305	41.094
3.308	3.98	0.672	93.55%	23.11	2.498	300741	6265306	41.088
3.308	3.981	0.672	93.56%	23.113	2.499	300741	6265306	41.088
3.309	3.981	0.673	93.56%	23.122	2.501	300741	6265306	41.088
3.361	4.053	0.692	94.19%	24.022	2.718	300740.3	6265306	41.079
3.379	4.079	0.7	94.50%	24.364	2.805	300740	6265307	41.075
3.382	4.082	0.7	94.48%	24.397	2.812	300739.9	6265307	41.075
3.383	4.083	0.7	94.50%	24.417	2.817	300739.9	6265307	41.075
3.383	4.083	0.7	94.50%	24.418	2.817	300739.9	6265307	41.075
3.383	4.084	0.701	94.50%	24.423	2.818	300739.9	6265307	41.075
3.392	4.096	0.704	94.62%	24.584	2.859	300739.8	6265307	41.073
3.407	4.118	0.71	94.83%	24.864	2.931	300739.6	6265307	41.07
3.408	4.119	0.71	94.84%	24.88	2.935	300739.5	6265307	41.07
3.409	4.119	0.71	94.84%	24.883	2.936	300739.5	6265307	41.07
3.412	4.124	0.712	94.89%	24.95	2.953	300739.5	6265307	41.069
3.413	4.125	0.712	94.89%	24.957	2.955	300739.5	6265307	41.069
3.418	4.133	0.714	94.97%	25.062	2.982	300739.4	6265307	41.068
3.423	4.14	0.716	95.03%	25.151	3.006	300739.3	6265307	41.067
3.424	4.14	0.716	95.03%	25.158	3.007	300739.3	6265307	41.067
3.426	4.143	0.717	95.05%	25.19	3.016	300739.3	6265307	41.067
3.45	4.175	0.726	95.30%	25.614	3.126	300738.9	6265307	41.062
3.509	4.255	0.746	95.86%	26.667	3.409	300738	6265308	41.051
3.521	4.27	0.749	95.84%	26.856	3.456	300737.9	6265308	41.049
3.522	4.271	0.749	95.83%	26.869	3.459	300737.9	6265308	41.049
3.526	4.276	0.75	95.86%	26.935	3.477	300737.8	6265308	41.049
3.537	4.289	0.753	95.84%	27.097	3.519	300737.7	6265308	41.047
3.566	4.339	0.774	96.93%	27.858	3.761	300737.1	6265308	41.038
3.573	4.351	0.779	97.18%	28.04	3.82	300737	6265309	41.036
3.576	4.355	0.779	97.16%	28.085	3.832	300736.9	6265309	41.035
3.577	4.356	0.779	97.16%	28.1	3.836	300736.9	6265309	41.035
3.579	4.36	0.781	97.24%	28.16	3.856	300736.9	6265309	41.035
3.58	4.361	0.781	97.24%	28.169	3.858	300736.9	6265309	41.034

3.581	4.363	0.782	97.28%	28.203	3.869	300736.8	6265309	41.034
3.595	4.387	0.792	97.75%	28.569	3.989	300736.6	6265309	41.03
3.602	4.395	0.793	97.72%	28.666	4.015	300736.5	6265309	41.029
3.614	4.415	0.801	98.11%	28.981	4.12	300736.2	6265309	41.025
3.621	4.422	0.802	98.05%	29.067	4.142	300736.2	6265309	41.024
3.621	4.424	0.802	98.07%	29.085	4.148	300736.2	6265309	41.024
3.622	4.424	0.802	98.07%	29.089	4.149	300736.2	6265309	41.024
3.622	4.425	0.802	98.06%	29.099	4.152	300736.2	6265309	41.024
3.624	4.427	0.803	98.10%	29.133	4.163	300736.1	6265309	41.024
3.624	4.427	0.803	98.11%	29.139	4.165	300736.1	6265309	41.024
3.624	4.427	0.803	98.11%	29.141	4.166	300736.1	6265309	41.024
3.643	4.458	0.815	98.65%	29.604	4.323	300735.8	6265310	41.018
3.652	4.468	0.816	98.56%	29.732	4.356	300735.7	6265310	41.017
3.655	4.471	0.816	98.53%	29.774	4.367	300735.7	6265310	41.017
3.661	4.481	0.82	98.70%	29.925	4.42	300735.6	6265310	41.015
3.672	4.494	0.822	98.60%	30.077	4.46	300735.5	6265310	41.013
3.694	4.53	0.836	99.23%	30.644	4.659	300735.1	6265310	41.007
3.696	4.532	0.836	99.27%	30.679	4.672	300735.1	6265310	41.006
3.696	4.533	0.837	99.28%	30.688	4.675	300735.1	6265310	41.006
3.701	4.541	0.84	99.41%	30.816	4.72	300735	6265311	41.005
3.702	4.543	0.841	99.45%	30.846	4.731	300735	6265311	41.004
3.707	4.551	0.844	99.58%	30.976	4.778	300734.9	6265311	41.003
3.709	4.553	0.844	99.58%	31.006	4.787	300734.9	6265311	41.002
3.711	4.556	0.845	99.61%	31.052	4.803	300734.8	6265311	41.002
3.719	4.569	0.85	99.82%	31.252	4.874	300734.7	6265311	41
3.722	4.573	0.851	99.86%	31.302	4.892	300734.7	6265311	40.999
3.731	4.587	0.856	1.001:1	31.533	4.976	300734.5	6265311	40.996
3.747	4.618	0.871	1.009:1	32.062	5.185	300734.2	6265312	40.99
3.752	4.625	0.873	1.009:1	32.163	5.221	300734.1	6265312	40.988
3.755	4.629	0.874	1.010:1	32.226	5.243	300734.1	6265312	40.988
3.765	4.649	0.884	1.015:1	32.568	5.382	300733.9	6265312	40.983
3.765	4.649	0.884	1.015:1	32.574	5.385	300733.9	6265312	40.983
3.765	4.649	0.884	1.015:1	32.576	5.385	300733.9	6265312	40.983
3.766	4.652	0.886	1.016:1	32.631	5.412	300733.8	6265312	40.982
3.766	4.653	0.886	1.017:1	32.641	5.415	300733.8	6265312	40.982
3.769	4.66	0.891	1.020:1	32.783	5.48	300733.7	6265312	40.98
3.779	4.703	0.924	1.043:1	33.69	5.918	300733.2	6265313	40.967
3.788	4.735	0.947	1.058:1	34.354	6.246	300732.8	6265313	40.957
3.79	4.739	0.948	1.059:1	34.414	6.269	300732.7	6265313	40.956
3.791	4.74	0.949	1.059:1	34.435	6.278	300732.7	6265313	40.956
3.793	4.751	0.958	1.066:1	34.69	6.414	300732.6	6265314	40.952
3.795	4.763	0.968	1.074:1	34.967	6.563	300732.4	6265314	40.948
3.796	4.764	0.969	1.074:1	34.982	6.569	300732.4	6265314	40.947
3.796	4.765	0.969	1.074:1	34.994	6.573	300732.4	6265314	40.947
3.798	4.776	0.978	1.080:1	35.244	6.71	300732.2	6265314	40.943
3.8	4.791	0.99	1.089:1	35.574	6.892	300732.1	6265314	40.938
3.801	4.791	0.99	1.089:1	35.578	6.893	300732.1	6265314	40.938
3.802	4.796	0.994	1.092:1	35.687	6.954	300732	6265314	40.936
3.802	4.796	0.994	1.092:1	35.687	6.954	300732	6265314	40.936
3.802	4.798	0.996	1.093:1	35.736	6.982	300732	6265314	40.935
3.805	4.81	1.005	1.100:1	36.001	7.127	300731.8	6265315	40.931
3.808	4.819	1.011	1.104:1	36.195	7.234	300731.7	6265315	40.928
3.808	4.819	1.011	1.104:1	36.196	7.235	300731.7	6265315	40.928
3.808	4.819	1.012	1.104:1	36.201	7.237	300731.7	6265315	40.928
3.817	4.852	1.034	1.120:1	36.903	7.629	300731.2	6265315	40.917
3.821	4.864	1.043	1.126:1	37.159	7.774	300731.1	6265316	40.913
3.821	4.864	1.043	1.126:1	37.165	7.777	300731.1	6265316	40.913
3.833	4.883	1.051	1.130:1	37.505	7.944	300730.9	6265316	40.908
3.833	4.884	1.051	1.130:1	37.515	7.95	300730.9	6265316	40.908
3.833	4.884	1.051	1.130:1	37.523	7.954	300730.9	6265316	40.908
3.843	4.901	1.058	1.133:1	37.815	8.099	300730.7	6265316	40.904
3.844	4.903	1.059	1.133:1	37.854	8.121	300730.7	6265316	40.904
3.883	4.968	1.085	1.145:1	39.031	8.719	300729.9	6265317	40.888
3.883	4.969	1.086	1.145:1	39.047	8.728	300729.9	6265317	40.887
3.894	4.985	1.091	1.146:1	39.318	8.861	300729.8	6265317	40.884
3.904	5	1.096	1.148:1	39.579	8.99	300729.6	6265317	40.88
3.905	5.001	1.096	1.148:1	39.598	9.001	300729.6	6265317	40.88
3.914	5.014	1.101	1.149:1	39.821	9.112	300729.5	6265318	40.877
3.914	5.015	1.101	1.150:1	39.839	9.122	300729.5	6265318	40.877
3.914	5.016	1.102	1.150:1	39.856	9.132	300729.5	6265318	40.877
3.923	5.029	1.106	1.151:1	40.07	9.239	300729.3	6265318	40.874
3.924	5.031	1.107	1.152:1	40.116	9.266	300729.3	6265318	40.873
3.945	5.062	1.117	1.154:1	40.649	9.537	300729	6265318	40.866
3.946	5.064	1.118	1.155:1	40.682	9.554	300729	6265318	40.866
3.946	5.064	1.118	1.155:1	40.686	9.556	300729	6265318	40.866
3.946	5.064	1.118	1.155:1	40.689	9.558	300729	6265318	40.866
3.947	5.066	1.119	1.155:1	40.723	9.576	300729	6265318	40.865
3.952	5.081	1.129	1.162:1	41.072	9.801	300728.8	6265319	40.86

3.953	5.083	1.13	1.163:1	41.113	9.825	300728.7	6265319	40.859
3.962	5.109	1.148	1.174:1	41.7	10.209	300728.4	6265319	40.85
3.963	5.113	1.15	1.175:1	41.777	10.255	300728.3	6265319	40.848
3.964	5.113	1.15	1.175:1	41.783	10.259	300728.3	6265319	40.848
3.964	5.115	1.151	1.176:1	41.827	10.288	300728.3	6265319	40.848
3.972	5.137	1.165	1.185:1	42.313	10.61	300728	6265320	40.84
3.974	5.141	1.167	1.186:1	42.384	10.653	300728	6265320	40.839
3.974	5.141	1.167	1.186:1	42.396	10.661	300728	6265320	40.838
3.976	5.145	1.169	1.188:1	42.48	10.717	300727.9	6265320	40.837
3.977	5.149	1.172	1.189:1	42.568	10.776	300727.9	6265320	40.836
3.977	5.15	1.172	1.190:1	42.581	10.784	300727.8	6265320	40.835
3.978	5.15	1.173	1.190:1	42.593	10.792	300727.8	6265320	40.835
3.978	5.15	1.173	1.190:1	42.595	10.793	300727.8	6265320	40.835
3.978	5.152	1.173	1.190:1	42.626	10.812	300727.8	6265320	40.835
3.985	5.162	1.178	1.192:1	42.827	10.931	300727.7	6265320	40.832
3.987	5.166	1.18	1.193:1	42.907	10.981	300727.7	6265320	40.831
4.002	5.193	1.19	1.197:1	43.406	11.277	300727.4	6265321	40.824
4.004	5.196	1.192	1.198:1	43.467	11.316	300727.3	6265321	40.823
4.015	5.214	1.199	1.201:1	43.813	11.524	300727.1	6265321	40.818
4.04	5.256	1.216	1.207:1	44.615	12.012	300726.6	6265322	40.806
4.045	5.264	1.22	1.209:1	44.784	12.122	300726.5	6265322	40.804
4.045	5.264	1.22	1.209:1	44.784	12.123	300726.5	6265322	40.804
4.045	5.264	1.22	1.209:1	44.785	12.123	300726.5	6265322	40.804
4.052	5.276	1.224	1.210:1	45.005	12.254	300726.4	6265322	40.801
4.054	5.279	1.225	1.211:1	45.055	12.287	300726.4	6265322	40.8
4.054	5.279	1.225	1.211:1	45.072	12.298	300726.4	6265322	40.8
4.057	5.284	1.227	1.211:1	45.15	12.345	300726.3	6265322	40.799
4.058	5.285	1.227	1.211:1	45.179	12.364	300726.3	6265322	40.798
4.062	5.292	1.23	1.212:1	45.309	12.442	300726.2	6265322	40.797
4.068	5.301	1.233	1.213:1	45.466	12.536	300726.2	6265322	40.794
4.069	5.302	1.234	1.213:1	45.504	12.561	300726.1	6265322	40.794
4.07	5.304	1.234	1.214:1	45.539	12.585	300726.1	6265322	40.793
4.075	5.312	1.237	1.214:1	45.683	12.67	300726	6265322	40.791
4.075	5.313	1.238	1.215:1	45.719	12.7	300726	6265322	40.791
4.081	5.321	1.241	1.216:1	45.867	12.788	300725.9	6265323	40.789
4.081	5.322	1.241	1.216:1	45.878	12.795	300725.9	6265323	40.789
4.081	5.322	1.241	1.216:1	45.881	12.797	300725.9	6265323	40.789
4.083	5.325	1.242	1.216:1	45.939	12.832	300725.9	6265323	40.788
4.083	5.326	1.243	1.216:1	45.954	12.844	300725.9	6265323	40.787
4.083	5.326	1.243	1.216:1	45.955	12.845	300725.9	6265323	40.787
4.083	5.326	1.243	1.217:1	45.959	12.848	300725.9	6265323	40.787
4.095	5.343	1.248	1.218:1	46.27	13.035	300725.7	6265323	40.783
4.095	5.346	1.251	1.220:1	46.354	13.105	300725.7	6265323	40.782
4.105	5.36	1.256	1.221:1	46.618	13.266	300725.5	6265323	40.778
4.105	5.363	1.258	1.223:1	46.693	13.329	300725.5	6265323	40.777
4.106	5.365	1.259	1.223:1	46.737	13.356	300725.5	6265323	40.776
4.106	5.366	1.259	1.223:1	46.749	13.367	300725.4	6265323	40.776
4.107	5.366	1.26	1.224:1	46.762	13.377	300725.4	6265323	40.776
4.108	5.369	1.26	1.224:1	46.805	13.404	300725.4	6265323	40.775
4.12	5.386	1.266	1.225:1	47.131	13.605	300725.2	6265324	40.771
4.12	5.39	1.27	1.228:1	47.232	13.692	300725.2	6265324	40.769
4.126	5.399	1.273	1.228:1	47.406	13.8	300725.1	6265324	40.766
4.126	5.401	1.274	1.230:1	47.462	13.849	300725.1	6265324	40.765
4.131	5.407	1.277	1.230:1	47.584	13.926	300725	6265324	40.764
4.131	5.409	1.278	1.231:1	47.624	13.961	300725	6265324	40.763
4.141	5.422	1.281	1.231:1	47.851	14.093	300724.9	6265324	40.76
4.141	5.425	1.284	1.233:1	47.931	14.163	300724.8	6265324	40.758
4.141	5.426	1.285	1.234:1	47.962	14.19	300724.8	6265324	40.758
4.144	5.43	1.286	1.234:1	48.047	14.24	300724.8	6265324	40.757
4.144	5.431	1.286	1.234:1	48.056	14.248	300724.8	6265324	40.757
4.145	5.432	1.287	1.234:1	48.081	14.263	300724.8	6265324	40.756
4.146	5.435	1.289	1.236:1	48.154	14.327	300724.7	6265325	40.755
4.154	5.446	1.292	1.236:1	48.35	14.444	300724.7	6265325	40.752
4.165	5.461	1.296	1.236:1	48.622	14.607	300724.6	6265325	40.749
4.165	5.465	1.3	1.238:1	48.735	14.708	300724.5	6265325	40.747
4.165	5.466	1.301	1.239:1	48.767	14.736	300724.5	6265325	40.746
4.168	5.47	1.302	1.239:1	48.843	14.782	300724.5	6265325	40.745
4.17	5.472	1.302	1.239:1	48.873	14.801	300724.4	6265325	40.745
4.17	5.472	1.303	1.240:1	48.887	14.813	300724.4	6265325	40.745
4.17	5.476	1.307	1.243:1	49.005	14.92	300724.4	6265325	40.742
4.181	5.491	1.311	1.243:1	49.276	15.088	300724.3	6265326	40.739
4.181	5.495	1.314	1.245:1	49.368	15.172	300724.2	6265326	40.737
4.188	5.505	1.317	1.245:1	49.562	15.295	300724.2	6265326	40.734
4.192	5.51	1.319	1.246:1	49.66	15.361	300724.1	6265326	40.733
4.192	5.512	1.32	1.247:1	49.711	15.408	300724.1	6265326	40.732
4.202	5.528	1.326	1.248:1	50.026	15.622	300724	6265326	40.728
4.202	5.534	1.332	1.253:1	50.205	15.789	300723.9	6265326	40.724
4.202	5.536	1.334	1.254:1	50.268	15.848	300723.9	6265326	40.723

Aquaplaning failure is agreed non-conformance Item A9 (SWTC Appendix B.1)

4.206	5.541	1.336	1.255:1	50.375	15.923	300723.9	6265327	40.721
4.214	5.554	1.34	1.256:1	50.615	16.091	300723.8	6265327	40.718
4.214	5.559	1.345	1.260:1	50.77	16.238	300723.7	6265327	40.715
4.214	5.559	1.345	1.260:1	50.782	16.249	300723.7	6265327	40.715
4.215	5.56	1.346	1.260:1	50.801	16.262	300723.7	6265327	40.714
4.216	5.562	1.346	1.261:1	50.841	16.291	300723.7	6265327	40.714
4.216	5.563	1.347	1.261:1	50.868	16.316	300723.7	6265327	40.713
4.216	5.563	1.347	1.261:1	50.872	16.321	300723.7	6265327	40.713
4.216	5.563	1.347	1.261:1	50.878	16.325	300723.7	6265327	40.713
4.218	5.587	1.369	1.278:1	51.571	16.991	300723.4	6265328	40.7
4.245	5.632	1.387	1.284:1	52.503	17.692	300723.2	6265329	40.686
4.245	5.632	1.387	1.284:1	52.513	17.699	300723.1	6265329	40.685
4.246	5.633	1.387	1.284:1	52.522	17.709	300723.1	6265329	40.685
4.248	5.638	1.39	1.286:1	52.657	17.825	300723.1	6265329	40.683
4.248	5.643	1.395	1.289:1	52.8	17.97	300723.1	6265329	40.68
4.248	5.644	1.395	1.290:1	52.822	17.992	300723	6265329	40.68
4.248	5.644	1.396	1.290:1	52.841	18.008	300723	6265329	40.679
4.255	5.661	1.405	1.295:1	53.238	18.357	300722.9	6265329	40.672
4.257	5.677	1.42	1.307:1	53.728	18.861	300722.7	6265330	40.663
4.26	5.685	1.425	1.309:1	53.916	19.029	300722.7	6265330	40.659
4.261	5.694	1.433	1.315:1	54.187	19.312	300722.6	6265330	40.654
4.261	5.694	1.433	1.316:1	54.217	19.343	300722.6	6265330	40.653
4.261	5.695	1.434	1.316:1	54.236	19.36	300722.6	6265330	40.653
4.262	5.7	1.438	1.320:1	54.387	19.518	300722.5	6265330	40.65
4.264	5.704	1.441	1.321:1	54.48	19.603	300722.5	6265330	40.648
4.264	5.705	1.442	1.322:1	54.514	19.64	300722.5	6265330	40.648
4.264	5.707	1.443	1.323:1	54.572	19.702	300722.5	6265330	40.646
4.264	5.71	1.445	1.325:1	54.647	19.78	300722.4	6265331	40.645
4.264	5.711	1.447	1.326:1	54.688	19.825	300722.4	6265331	40.644
4.264	5.713	1.449	1.327:1	54.752	19.896	300722.4	6265331	40.643
4.265	5.717	1.452	1.330:1	54.871	20.021	300722.4	6265331	40.64
4.265	5.726	1.462	1.338:1	55.185	20.369	300722.3	6265331	40.634
4.269	5.748	1.48	1.351:1	55.83	21.056	300722	6265332	40.621
4.269	5.749	1.48	1.351:1	55.836	21.064	300722	6265332	40.621
4.269	5.749	1.48	1.352:1	55.854	21.082	300722	6265332	40.62
4.269	5.751	1.483	1.353:1	55.926	21.163	300722	6265332	40.619
4.27	5.758	1.488	1.357:1	56.108	21.358	300721.9	6265332	40.615
4.27	5.758	1.488	1.357:1	56.13	21.382	300721.9	6265332	40.615
4.27	5.759	1.488	1.358:1	56.139	21.391	300721.9	6265332	40.614
4.271	5.761	1.49	1.359:1	56.19	21.447	300721.9	6265332	40.613
4.271	5.761	1.49	1.359:1	56.21	21.468	300721.9	6265332	40.613
4.271	5.764	1.492	1.361:1	56.286	21.551	300721.9	6265332	40.611
4.273	5.771	1.498	1.365:1	56.497	21.779	300721.8	6265332	40.607
4.273	5.773	1.5	1.366:1	56.548	21.835	300721.8	6265332	40.606
4.274	5.778	1.504	1.369:1	56.702	22.001	300721.7	6265332	40.603
4.275	5.782	1.506	1.371:1	56.808	22.116	300721.7	6265333	40.601
4.276	5.783	1.507	1.371:1	56.841	22.152	300721.7	6265333	40.6
4.277	5.789	1.512	1.375:1	57.02	22.35	300721.6	6265333	40.597
4.283	5.811	1.528	1.386:1	57.638	23.026	300721.4	6265333	40.584
4.285	5.821	1.536	1.392:1	57.939	23.356	300721.3	6265334	40.578
4.286	5.824	1.538	1.393:1	58.001	23.427	300721.3	6265334	40.577
4.286	5.824	1.538	1.393:1	58.002	23.427	300721.3	6265334	40.577
4.286	5.824	1.538	1.393:1	58.006	23.432	300721.3	6265334	40.577
4.289	5.835	1.546	1.399:1	58.334	23.795	300721.2	6265334	40.57
4.29	5.838	1.547	1.399:1	58.393	23.858	300721.1	6265334	40.569
4.292	5.844	1.552	1.403:1	58.586	24.073	300721.1	6265334	40.565
4.293	5.846	1.553	1.403:1	58.616	24.106	300721.1	6265334	40.565
4.293	5.846	1.553	1.403:1	58.636	24.127	300721.1	6265334	40.564
4.294	5.851	1.557	1.406:1	58.768	24.274	300721	6265334	40.562
4.295	5.852	1.557	1.406:1	58.784	24.291	300721	6265334	40.561
4.296	5.856	1.56	1.408:1	58.895	24.415	300721	6265335	40.559
4.296	5.857	1.561	1.408:1	58.931	24.455	300721	6265335	40.559
4.299	5.867	1.568	1.413:1	59.21	24.769	300720.9	6265335	40.553
4.307	5.891	1.584	1.424:1	59.87	25.518	300720.6	6265335	40.54
4.308	5.892	1.585	1.424:1	59.915	25.567	300720.6	6265336	40.539
4.308	5.893	1.585	1.425:1	59.923	25.577	300720.6	6265336	40.539
4.309	5.897	1.588	1.427:1	60.058	25.731	300720.6	6265336	40.536
4.31	5.899	1.589	1.427:1	60.092	25.769	300720.6	6265336	40.535
4.317	5.922	1.604	1.437:1	60.741	26.518	300720.3	6265336	40.522
0.234	2.419	2.186	127.457:1	60.962	2368.365	300720.3	6265336	0

Aquaplaning failure is
 agreed
 non-conformance
 Item A9 (SWTC
 Appendix B.1)