

SPECIFICATION

ROSE012/SP1

YUMBA-META DEVELOPMENT

at

**THE VILLAGE, STAGE 7C AND 7D
286 LAKESIDE DRIVE,
OONOONBA**

for

YUMBA-META HOUSING LIMITED



Job No. ROSE012 March 2026

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Appendices

Appendix 1 Geotechnical Report by Pacific Geotech PG-12108 October 2024

1. LOCATION AND DESCRIPTION OF PROJECT

The civil engineering works involve temporary traffic control, the demolition of civil engineering infrastructure, construction of earthworks, pavements, sewer and water reticulation, stormwater drainage and erosion and sediment control measures. The civil works are to be constructed and coordinated with electrical services and landscaping.

The location and extent of the civil engineering works is shown on the attached drawings (all Revision A):

ROSE012-C01	Cover Sheet
ROSE012-C02	Notes – Sheet 1
ROSE012-C03	Notes – Sheet 2
ROSE012-C04	Notes – Sheet 3
ROSE012-C05	Notes – Sheet 4
ROSE012-C06	Safety in Design – Sheet 1
ROSE012-C07	Safety in Design – Sheet 2
ROSE012-C08	Earthworks plan – Sheet 1
ROSE012-C09	Earthworks plan – Sheet 2
ROSE012-C10	Earthworks setout tables
ROSE012-C11	Soil erosion & sediment control plan
ROSE012-C13	Roadworks plan – Sheet 1
ROSE012-C14	Roadworks plan – Sheet 2
ROSE012-C15	Roadworks details & setout tables
ROSE012-C18	Roadworks long section – Sheet 1
ROSE012-C19	Roadworks long section – Sheet 2
ROSE012-C20	Roadworks cross sections – Sheet 1
ROSE012-C21	Roadworks cross sections – Sheet 2
ROSE012-C22	Stormwater plan
ROSE012-C23	Stormwater details - Sheet 1
ROSE012-C24	Stormwater details - Sheet 2
ROSE012-C25	Stormwater long sections – Sheet 1
ROSE012-C26	Stormwater long sections - Sheet 2
ROSE012-C27	Stormwater catchment plan
ROSE012-C28	Stormwater catchment details
ROSE012-C29	Water & sewer plan – Sheet 1
ROSE012-C30	Water & sewer plan – Sheet 2
ROSE012-C31	Sewer long sections – Sheet 1
ROSE012-C32	Sewer long sections – Sheet 2

All applicable Townsville City Council and Cairns Townsville Mackay (CTM) Water Alliance Design and Construction Code standard drawings are listed on the project drawings and these form part of this contract.

CTM standard drawings:

Sewerage reticulation

SEW-1103-1	RIGSS pipelaying typical arrangements
SEW-1103-2	Nusewer pipelaying typical arrangements
SEW-1104-1	Sewerage house connection typical construction details RIGSS – Sheet 1
SEW-1105-1	Sewerage house connection typical construction details RIGSS – Sheet 2
SEW-1106-3	PE Nusewers typical property connection type A3, A4 standard and extended
SEW-1106-4	PE Nusewers typical property connection type B1 to B4 sloped connections
SEW-1106-5	PE Nusewers typical property connection type C1 to C4 vertical riser
SEW-1200-1	Soil classification guidelines and allowable bearing pressures for anchors and thrust blocks
SEW-1200-2	Embedment and trench fill typical arrangement
SEW-1201-1	Typical standard embedment flexible and rigid pipes
SEW-1202-1	Typical special embedment inadequate foundations requiring over excavation and replacement
SEW-1300-1	Maintenance holes < DN300 sewer types P1, P2 and P3 typical pre-cast
SEW-1301-1	Cast in-situ maintenance hole typical coping and anchor bracket details
SEW-1302-1	Maintenance holes cast in-situ and precast typical pipe connection details
SEW-1303-1	Maintenance holes sewers < DN300 typical changes in level details
SEW-1303-4	Typical stainless brackets for DN100 and DN150 UPVC drop pipes
SEW-1304-1	Maintenance holes sewers < DN300 typical channel arrangements
SEW-1305-1	Maintenance holes typical channel details
SEW-1306-1	Maintenance holes typical alternative drop connections
SEW-1307-1	DN1000 to DN1500 cast in-situ maintenance holes typical details
SEW-1308-1	Typical maintenance hole cover and surround detail
SEW-1308-8	Maintenance hole cover sewer-class D-bolt down typical base frame details
SEW-1308-9	Maintenance hole cover sewer-class D-bolt down typical riser ring details
SEW-1308-10	Maintenance hole cover sewer-class D-bolt down typical cover details
SEW-1308-11	Maintenance hole cover sewer-class D-bolt down typical cover details
SEW-1313-1	Maintenance hole sewer connection details all pipe materials
SEW-1314-2	Maintenance shafts MS and variable bend for RIGSS typical arrangement details
SEW-1314-3	Gravity sewers RIGSS typical in-line bend details
SEW-1315-1	PE Nusewers typical maintenance shaft and terminal entry point
SEW-1316-1	PE Nusewers typical maintenance structure cover frame and support details

CTM standard drawings:

Water reticulation

SEQ-WAT-1102-1	Typical mains construction reticulation main arrangement
SEQ-WAT-1103-1	Typical mains construction distribution and transfer main arrangements
SEQ-WAT-1105-1	Typical PE water main details
SEQ-WAT-1105-2	Typical connection to existing mains
SEQ-WAT-1200-2	Embedment and trench fill typical arrangement
SEQ-WAT-1201-1	Standard embedment typical flexible and rigid pipes
SDQ-WAT-1202-1	Typical special embedment inadequate foundations requiring over excavation and replacement
SEQ-WAT-1205-1	Typical thrust block details mass concrete
SEQ-WAT-1206-1	Typical thrust and anchor blocks for valves
SEQ-WAT-1207-1	Typical thrust and anchor blocks for vertical bends
SEQ-WAT-1208-1	Typical restrained joint system DN100 to DN375 DI mains
SEQ-WAT-1300-1	Typical valve, hydrant and water main road crossing road and pavement markers
SEQ-WAT-1300-2	Typical valve and hydrant identification marker posts
SEQ-WAT-1301-1	Typical valve and hydrant installation valve arrangement
SEQ-WAT-1302-1	Typical valve and hydrant installation hydrant arrangement
SEQ-WAT-1304-1	Typical air valve installation for trunk main
SEQ-WAT-1305-1	Typical surface fitting installation valve and hydrant surface boxes trafficable and non-trafficable
SEQ-WAT-1306-1	Typical surface fitting installation valve and hydrant surface boxes support and surround details

Townsville City Council standard drawings:

Roadworks

SD-001	Typical cross sections – Local streets
SD-015	Verge zones and trees – General type sections
SD-020	Concrete kerbing
SD-060	Traffic sign installation
SD-065	Street name sign and installation details
SD-070	Concrete pathway reinforced concrete (mesh) alternative
SD-080	Subsoil drain

Drainage

SD-200	Precast grated kerb inlet system and cast insitu stormwater manhole
SD-205	Stormwater manhole details
SD-210	Precast stormwater manhole – Slab top details
SD-215	Raised grate field inlet manhole

2. EXTENT OF WORK

The extent of work shall include but not be limited to the following:

a. General

- Provision for control, protection and safety of traffic (including pedestrians and cyclists) during construction including notifications to and obtaining approvals from authorities.
- Notification of all appropriate property owners adjoining the works.
- Setting out the works.
- Erosion and sedimentation control of the works, including stockpile areas.
- Site clearing and grubbing.
- Site regrading.
- Retaining walls.
- Topsoil spreading and revegetation to disturbed areas.

b. Roadworks

- Partial demolition of existing roads.
- Protection of existing services. Making good any damage to existing services to the satisfaction of the service provider and the Superintendent.
- Earthworks, including excavation and embankment construction.
- Stormwater drainage, including RCBC and headwalls.
- Pavement, consisting of unbound granular base and subbase, and asphaltic concrete wearing surface.
- Signposting and linemarking.

c. Sewer Reticulation

- Gravity sewer main including manhole, maintenance shafts and inspection chambers and house drain connection.
- Connection to Council sewer infrastructure.

d. Water Reticulation

- Water main including hydrants, valves and tees.
- Connection to Council water infrastructure.

e. Provision of Services

- Electrical and communication services (including NBN) services (refer to Electrical Engineer's documentation).

f. Definitions and Abbreviations

Unless the context requires otherwise, the following meanings and interpretations apply in this report:

CTM - Cairns Townsville Mackay
QFES - Queensland Fire and Emergency Services
TCC City Plan - Townsville City Plan (Version 2025/01)

3. STANDARD SPECIFICATIONS

Although not included in the documents, the following Townsville City Council standard specifications are deemed part of this specification:

SC6.4.5	Road Transport Network
SC6.4.5.5	Driveways
SC6.4.6	Road Works and Traffic Control
SC6.4.6.4	Roadworks Construction
SC6.4.7	Clearing, Grubbing and Earthworks
SC6.4.8	Stormwater Management
SC6.4.9	Stormwater Quantity
SC6.4.9.11	Construction General
SC6.4.9.12	Drainage Structures (Construction)
SC6.4.9.13	Pipe Drainage (Construction)
SC6.4.9.14	Precast Box Culverts
SC6.4.11	Water and Sewerage
SC6.4.11.3	Water Supply Construction
SC6.4.11.5	Sewerage System Construction
SC6.4.14	Public Utilities and Building Over/Near Services
SC6.4.17	Structures
SC6.4.18	Concrete Works
SC6.4.19	Noise and Vibration
SC6.4.23	Construction Management, Quality Management, Inspection and Testing
SC6.4.24	Acceptance of Completed Works

These are available from Townsville City Council at the following internet address:

<http://eplanning.townsville.qld.gov.au/Pages/Plan/Book.aspx?exhibit=current>

Refer to SC6.4 at the above internet address. Modifications and project specific alterations to these standard specifications are listed in Section 3.1 of this Specification.

The latest version of the following Department of Transport and Main Roads technical standard specifications will also apply:

Number	Title	Version
Category 1 – Overarching Specifications		
MRTS01	Introduction to Technical Specifications	Mar 2025
MRTS50	Specific Quality System Requirements	Mar 2025
Category 3 – Roadworks, Drainage, Culverts and Geotechnical		
MRTS45	Road Surface Delineation	Nov 2025
Category 5 – Pavements, Subgrade and Surfacing		
MRTS05	Unbound Pavements	Jul 2022
MRTS12	Sprayed Bituminous Emulsion Surfacing	Nov 2018
MRTS17	Bitumen and Multigrade Bitumen	Jul 2025
MRTS22	Supply of Cover Aggregate	Jul 2025
MRTS30	Asphalt Pavements	Mar 2024
MRTS101	Aggregates for Asphalt	Nov 2022
MRTS102	Reclaimed Asphalt Pavement Material	Nov 2025
MRTS103	Fillers for Asphalt	Nov 2025

These are available from Department of Transport and Main Roads at the following internet address:

<https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Specifications.aspx>

Modifications and project specific alterations to these standard specifications are listed in Section 3.2 of this specification.

The following annexures to the Main Roads Standard Specifications apply to this Contract:

ANNEXURE MRTS01.1
ANNEXURE MRS12.1 AND MRTS12.1
ANNEXURE MRTS22.1
ANNEXURE MRTS30.1
ANNEXURE MRTS45.1
ANNEXURE MRTS101.1

These Annexures are in the Schedule attached to this specification.

For the purposes of this Contract:

1. All references to MRTS02 *Provision for Traffic* are to be replaced with the requirements of the TCC City Plan as modified by this specification.
2. All references to MRTS04 *General Earthworks* are to be replaced with the requirements of the TCC City Plan as modified by this specification.
3. All references to MRTS51 *Environmental Management* are to be replaced with the requirements of the TCC City Plan as modified by this specification.
4. All references to MRTS52 *Erosion and Sediment Control* are to be replaced with the requirements of the TCC City Plan as modified by this specification.
5. All references to MRTS56 *Construction Surveying* are to be replaced with the requirements of the TCC City Plan as modified by this specification.

The payment methods specified in the Department of Transport and Main Roads Specifications are not applicable to this Contract. Utilisation of a rejected lot for a reduced level of service applies to this Contract. Additional Payments for higher standard of service or incentives do not apply to this Contract.

Structural steelwork for retaining walls shall comply with Natspec specifications 0341 and 0344, as modified for this project in Section 4 of this project specific specification.

a. Project Specific Amendments to Townsville City Council Standard Specifications

The following typical amendments to all TCC standard specifications apply:

- Specific amendments to standard specifications are outlined in Table 3.1.1. The amendment code within Table 3.1.1 is 'A' for additional script, 'M' for modification to script and 'D' for deletion of script. Where no reference to a section or where no amendments are listed in Table 3.1.1 the standard specification applies, subject to the typical amendments listed above.

Table 3.1.1 Amendments to Townsville City Council Standard Specifications

Specification clause	Amend code	Amendment description
SC6.4.6 Road Works and Traffic Control		
SC6.4.6.4 Roadworks construction		
SC6.4.6.4 (1)	A	Add the following: This section of the TCC City Plan applies to all works completed as part of this project. Construction requirements of roadworks elements shall comply with the drawings and this technical specification.
SC6.4.6.4(1)	M	Delete the following: To ensure the constructed works are 'fit-for-purpose' and comply with the requirements described within the planning scheme and associated roadworks standard drawings, council will inspect the works during construction in accordance with an inspection and test plan agreed between the works contractor and the council inspector. Replace with: To ensure the constructed works are 'fit-for-purpose' (as determined by the Developer's Consulting Engineer) and comply with the requirements described within the planning scheme and associated roadworks, standard drawings, council and the Developer's Consulting Engineer will inspect the works during construction in accordance with an inspection and test plan (ITP) agreed between the works Contractor, the Council Inspector and the Developer's Consulting Engineer. The ITP shall be prepared by the Contractor and a preliminary ITP shall be provided with the tender. The ITP shall be based on the requirements set out on the drawings and within this technical specification.
SC6.4.6.4 (7)	M	In the example of an acceptable form of certificate, delete: Name of consulting company Replace with: Name of Contractor:
SC6.4.6.4 (11)	M	Delete: Council Inspector Replace with: Council Inspector and Developer's Consulting Engineer.
SC6.4.6.4 (11) (b) (ii)	M	Delete: Confirm the total depth of pavement at the location of each base course compaction test. Replace with: Confirm the total depth of pavement and the depth of each pavement course.
SC6.4.7 Clearing, Grubbing and Earthworks		
SC6.4.7.3(3)(a) Australian Standards	M	Delete: AS2870.1 Residential slabs and footings – construction Replace with: AS2870 Residential slabs and footings

Specification clause	Amend code	Amendment description
SC6.4.7.3(4)(a)	D	Delete the following: "Filling is to be of sound clean material, a standard that will achieve at least an "M" site classification for building foundation design, and be free from large rock, stumps, organic matter, and other debris". Replace with: "Filling is to be of sound clean material and be free from large rock, stumps, organic matter, and other debris and shall comply with the properties nominated on the drawings".
SC6.4.7.3(4)(b)	M	Delete: Fill must be placed in layers not exceeding 150mm compacted thickness. Replace with: Fill must be placed in layers not exceeding the maximum compacted layer thickness nominated on the drawings.
SC6.4.7.3(4)(c) and (d)	M	Delete: Council Replace with: Council and the Developer's Consulting Engineer.
SC6.4.7.3(7)	M	Delete the following: designer Replace with: Contractor
SC6.4.7.3(7)	D	Delete the following: This detail must be shown on the earthworks plan.
SC6.4.7.4(2)(b)	A	Add the following: <i>AS3798 Guidelines on earthworks for commercial and residential developments</i>
SC6.4.7.4(5)	M	Add the following to the start of the fourth paragraph: The Contractor must submit to the Superintendent the As Constructed plans for ESCP, at least 8 days prior to requesting the On-Maintenance inspection.
SC6.4.7.4(5)	M	In the last paragraph delete the following: developer Replace with: Contractor
SC6.4.7.5(1)(a) and (b)	M	Delete the following: 75mm Replace with: 100mm

Specification clause	Amend code	Amendment description
SC6.4.7.6(6)	M	Delete the following: The Contractor is to ensure that the transition from cut to fill is undertaken in accordance with best practice geotechnical procedures and guidelines. Replace with: The Contractor is to ensure that the transition from cut to fill is undertaken in accordance with the following (list in order of preference): • The guidance in the geotechnical report (if provided); • AS3798; and • Approved best practice geotechnical procedures and guidelines.
SC6.4.7.8	M	Delete the following: Unsuitable material is that occurring below the designed floor level of cuttings and below the nominated depth for stripping topsoil beneath embankments, which the Superintendent deems to be unsuitable for embankment or pavement support in its present position. Replace with: Unsuitable material is that occurring below filled areas, the designed floor level of cuttings and below the nominated depth for stripping topsoil beneath embankments, which the Superintendent deems to be unsuitable for embankment filling, general filling, pavement support or reuse on site.
SC6.4.7.8	M	Delete the following: Material removed as unsuitable, as directed by the Superintendent, may be incorporated in embankments in accordance with Clause SC6.4.7.9 (2) Embankment material or spoiled in accordance with Clause SC6.4.7.9(13) Spoil. Replace with: Material removed as unsuitable, as directed by the Superintendent, may only be incorporated into the works if approved in writing by the Superintendent. Unless otherwise approved by the Superintendent, contaminated material shall be treated as per this section of the technical specification. Where unsuitable material is not contaminated, it shall be disposed of off-site in accordance with the relevant waste regulations.
SC6.4.7.9(4)	A	Add the following: Unless otherwise approved by the Superintendent embankment material shall be benched into all existing batters and slopes with a gradient steeper than 8:1 (horizontal to vertical) by the method shown on the drawings, or if there are no details on the drawings, in a manner approved by the Superintendent.
SC6.4.7.9(13)	A	Add the following after the first paragraph: Unless otherwise agreed with the Superintendent, surplus material shall be removed and disposed of offsite.
SC6.4.7.10(6)(e)(ii)	M	Delete: Environmental Engineer Replace with: Environmental Engineer (engaged by the Contractor)

Specification clause	Amend code	Amendment description
SC6.4.7.10(6)(e)(iii)	M	Delete: Executive Manager, Engineer Services Replace with: Contractor's Project Manager
SC6.4.7.11(1)(a)	M	Delete the following: Unsuitable material shall be stockpiled as directed by the Superintendent and compacted by track rolling. Replace with: Unsuitable material shall be temporarily stockpiled and compacted by track rolling. Material whose quality the Superintendent deems to be unsuitable shall be removed and disposed of offsite.
SC6.4.7.11(3)	M	Delete the following: Prior to the release of the lot, a proof roll is to be performed with a single drive axle truck with an axle load of 8.2t covering all lanes of carriage ways including parking bays having no evident movement. Replace with: Prior to the release of the lot a proof roll shall be performed on all of the following: 1. All lanes of carriageways; 2. All parking bays; 3. All areas upon which fill will be placed; 4. All layers of fill; and 5. Cuttings within 150mm (vertically) of permanent subgrade level. Proof rolling shall be undertaken in accordance with DTMR Test Method Q723, using a single axle water truck holding 7,000 litres or an approved equivalent. In confined locations where the plant nominated in Q723 will not fit at least six passes of the heaviest plant practicable shall be used for proof rolling or, where approved by the Engineer, a leg rammer (not a plate compactor) may be used. Any soft spots identified during the proof roll must be treated as directed by the Engineer. The Contractor shall ensure that at the time of proof rolling and prior to placement of fill or pavement layers that the moisture content of the material is within 60% to 90% of optimum moisture content.
SC6.4.9.13 Pipe Drainage (Construction)		
Throughout	A	All references to AS 3725 shall be changed to AS/NZS 3725.
SC6.4.9.13(2)(b)	A	Add the following: AS1141.11.1 Methods for sampling and testing aggregates, Method 11.1: Particle size distribution – Sieving method AS/NZS3500.3 Plumbing and Drainage Part 3: Stormwater drainage AS/NZS 3725 Supp 1 Design for installation of buried concrete pipes – Commentary
SC6.4.9.13(3)(b)	M	Delete the editor's note and replace with the following: Editor's Note – Table 3.6 of AS4058 shall be replaced by Table 7(a) of MRTS25 in determining the acceptability of pipe wall and joint surface defects.

Specification clause	Amend code	Amendment description
SC6.4.9.13(3)(i)	M	Delete (i) and replace with the following: Where the Contractor proposes to travel construction plant over pipe drainage structures where the cover to the pipe is less than 600mm the Contractor shall design, provide RPEQ certification and provide adequate protective measures or install a protection slab (if a detail has been provided on the drawings) over the pipe. The Contractor shall only travel construction plant in excess of 5 tonnes gross mass over pipe structures, where approved by the Superintendent.
SC6.4.9.13(4)(a)(i)	M	Delete the editor's note and replace with the following: Editor's Note – Table 3.6 of AS4058 shall be replaced by Table 7(a) of MRTS25 in determining the acceptability of pipe wall and joint surface defects.
SC6.4.9.13(4)(b)(ii)	M	Delete the following: The trench shall be excavated to a width as shown in Figure SC6.4.9.1. Replace with: The trench shall be excavated to the dimensions shown in Figure SC6.4.9.1.
SC6.4.9.13(4)(b)(iii)	M	Delete the following: ISO0202920-5 Replace with: AS1141.11.1
SC6.4.9.13(4)(c)(viii)	M	Delete: 0.100mm Replace with: 100mm
SC6.4.9.13(4)(d)(i)	M	Replace Excavation Work Code of Practice 2013 with Excavation Work Code of Practice 2021.
SC6.4.9.13(6)(d)(ii)	M	Delete the following: Pipe laying shall be in accordance with Part 7 of AS 2032 and solvent cement pipe jointing shall be in accordance with Part 3 of AS 2032. Replace with: Pipe laying shall be in accordance with Section 5 of AS/NZS 2032 and solvent cement pipe jointing shall be in accordance with Section 4 of AS/NZS 2032.

Specification clause	Amend code	Amendment description
SC6.4.9.14 Precast box culverts		
SC6.4.9.4(f)(vii)	M	Delete the following: All external surfaces of vertical joints Replace with: All external joints
SC6.4.9.4(g)(ii)	M	Delete the following: Alternatively, cohesionless materials can be compacted in one operation by saturation and vibration to achieve a minimum Density Index of 70. Replace with: Alternatively, cohesionless materials can be used and compacted vibrated in 150mm layers to achieve a minimum Density Index of 70.
SC6.4.11.3 Water Supply Construction		
SC6.4.11.3(1)(a)	M	Delete the last sentence and replace with: The Contractor shall carry out the work, and supply materials meeting the requirements of the reference documents, and, in particular, in accordance with the requirements of the <i>CTM Water Alliance Design and Construction Code</i> and the <i>Water Supply Code of Australia</i> except as otherwise specified herein.
SC6.4.11.3(1)(b)	A	Add the following after the first paragraph: The order of precedence (highest to lowest) of documents shall be: a) This subsection SC6.4.11.3; b) <i>Cairns, Townsville and Mackay (CTM) Water Alliance Design and Construction Code</i>; and c) SC6.4.3 Standard drawings.
SC6.4.11.3(1)(b)(i)	A	Add the following: <i>Cairns, Townsville and Mackay (CTM) Water Alliance Design and Construction Code</i>

Specification clause	Amend code	Amendment description
SC6.4.11.3(1)(b)(iii)	A	Add the following: Workplace Health and Safety Queensland, <i>Safe Design of Structures – Code of Practice</i> .
SC6.4.11.3(2)(h)	M	Delete the following: Jointing shall be by butt thermal fusion or electrofusion couplings, or with compression fittings. Replace with: Jointing shall be by electrofusion couplings.
SC6.4.11.3(4)(g)	A	Add the following: Notwithstanding the above requirements, the Contractor shall also excavate trenches to achieve a minimum bedding beneath the pipe barrel that complies with the design drawings.
SC6.4.11.3(4)(i)	D	Delete the following (second paragraph): Crusher screenings shall only be used for pipe bedding where sand or other non-cohesive material is not readily available locally or where the Contractor can demonstrate that its use will not impede repair operations. (WSA 03-2011 Part 2, Section 14).
SC6.4.11.3(4)(i)	M	Delete the third paragraph. Replace with: For PVC/PE pipes, irrespective of foundation, the material to be used for pipe bedding, side support and overlay as shown in Figure 5.1 of AS/NZS2032 and AS/NZS2033 shall be sand or other non-cohesive granular material, either crushed, natural or blended, and its grading shall fall within the limits in Table SC6.4.11.3
SC6.4.11.3(4)(j)	A	Add the following: Joints at electrofusion welded connections shall be debeaded.

Specification clause	Amend code	Amendment description
SC6.4.11.3(5)(e)(ii)	M	Delete the following: Elsewhere, unless stated otherwise, the remainder of the trench shall be backfilled with ordinary excavated backfill. Where suitable material is not available, granular material may be used for the full depth of backfilling. Replace with: Elsewhere, trench backfill, shall be imported general fill with material properties as per the EARTHWORKS NOTES on the drawings. Site won material shall not be used without the approval of the Engineer.
SC6.4.11.5 Sewerage System Construction		
SC6.4.11.5(1)(a)	M	Delete the following: The Contractor shall carry out the work, and supply materials meeting the requirements of the reference documents and, in particular, in accordance with the requirements of the Water Services Association of Australia publications WSA 02-2014 – <i>Gravity Sewerage Code of Australia</i>, WSA 07-2005 – <i>Sewerage Pumping Station Code of Australia</i>, and WSA 07-2011 <i>Pressure Sewerage Code of Australia</i>, except as otherwise specified herein. Replace with: The Contractor shall carry out the work, and supply materials meeting the requirements of the reference documents, and, in particular, in accordance with the requirements of the Water Services Association of Australia publications WSA 02-2014 – <i>Gravity Sewerage Code of Australia</i>, WSA 07-2005 – <i>Sewerage Pumping Station Code of Australia</i>, and WSA 07-2011 <i>Pressure Sewerage Code of Australia</i> and the <i>CTM Water Alliance Design and Construction Code</i> except as otherwise specified herein.
SC6.4.6.11.5(1)(b)	A	Add the following after the first paragraph: The order of precedence (highest to lowest) of documents shall be: a) This subsection SC6.4.11.5; b) <i>Cairns, Townsville and Mackay (CTM) Water Alliance Design and Construction Code</i>; and c) SC6.4.3 Standard drawings.
SC6.4.11.5(1)(b)(i)(1)	A	Add the following: <i>Cairns, Townsville and Mackay (CTM) Water Alliance Design and Construction Code</i>
SC6.4.11.5(2)(b)	M	Delete the following: PVC pipes and fittings for mains and suction pipes shall be installed in accordance with AS/NZS 2032 and AS/NZS 2566.1. Replace with: PVC pipes and fittings for mains and suction pipes shall be installed in accordance with AS/NZS 2032, AS/NZS 2566.1 and AS/NZS 2566.2.
SC6.4.11.5(2)(c)	M	Delete the following: Jointing shall be by butt thermal fusion or electrofusion couplings, or with compression fittings. Replace with: Jointing shall be by electrofusion couplings.

Specification clause	Amend code	Amendment description
SC6.4.11.5(2)(d)	M	Add the following after AS/NZS 2566.1: ...and AS/NZS 2566.2
SC6.4.11.5(2)(e)	M	At the end of the first sentence add the following: ...and AS/NZS 2566.2.
SC6.4.11.5(3)(j)	D	Delete the second paragraph.
SC6.4.11.5(3)(j)	M	In the fifth paragraph delete the following: AS 2032 Replace with: AS/NZS 2032 and AS/NZS 2033
SC6.4.11.5(3)(j)	M	Delete the following from the fifth paragraph: Grading of bedding material for PVC and PE Pipes, except that where the materials cannot be reasonably sourced from within the vicinity, the Contractor may use materials satisfying the classification in the second paragraph above, provided also that the material meets the requirements for passing sieve sizes 9.5mm and 6.7mm as shown in Tables SC6.4.11.8 below. Replace with: Grading of bedding material for PVC and PE Pipes, the Contractor may use materials that meet the requirements for passing sieve sizes 9.5mm and 6.7mm as shown in Table SC6.4.11.8 below.
SC6.4.11.6(3)(k)	M	In the first paragraph delete the following: AS 2032 Replace with: AS/NZS 2032
SC6.4.11.6(3)(k)	M	In the first paragraph after AS/NZS 2566.1 add the following: AS/NZS 2566.2
SC6.4.11.6(3)(k)	A	Add the following: Joints at electrofusion welded connections shall be debanded.
SC6.4.11.6(3)(l)(i)	M	Delete items 1 and 2 and replace with the following: 1. Where the difference in levels between the inlet pipe and the outlet pipe in a maintenance hole is 100mm or less: Pipe Tolerance Inlet: -0mm, +10mm Outlet: -10mm, +0mm 2. Where the difference in levels, as above, is greater than 100mm Pipe Tolerance Inlet: -10mm, +10mm Outlet: -10mm, +10mm
SC6.4.11.5(3)(p)	M	In the first paragraph delete the following: 20 MPa Replace with: 25 MPa

Specification clause	Amend code	Amendment description
SC6.4.11.5(3)(x)(ii)	M	Delete the following: Elsewhere, unless stated otherwise, the remainder of the trench shall be backfilled with ordinary excavated backfill. Where suitable material is not available, granular material may be used for the full depth of backfilling. Replace with: Elsewhere, trench backfill, shall be imported general fill with material properties as per the EARTHWORKS NOTES on the drawings. Site won material shall not be used without the approval of the Engineer.
SC6.4.14 Public Utilities and building Over/Near Services		
SC6.4.14.5 1(b)(ii)	D	Delete this item
SC6.4.14.5.1(b)(iii)	M	Delete item (iii) Replace with: CCTV assessment of rubber ring jointed systems and flush end RCP pipe systems is mandatory.
SC6.4.18 Concrete Works		
SC6.4.18.1(2)(b)	A	Add the following: AS/NZS 2425 – <i>Bar chairs in reinforced concrete – Product requirements and test methods</i> AS/NZS 2870 – <i>Residential slabs and footings</i> AS 2876 – <i>Concrete kerbs and channels (gutters) – Manually or machine placed</i>
SC6.4.18.2(5)	A	Add the following: Precast concrete planks for use in retaining walls shall be a product approved by the Superintendent.
SC6.4.18.4(4)	M	Delete the following: Coarse aggregate shall consist of clean, hard, durable, crushed stone, crushed river gravel, screened river gravel or metallurgical furnace slag and shall conform to the requirements of AS2758.1 in respect of particle density, bulk density, water absorption (maximum 2.5%), material finer than 75 micrometres, weak particles, light particles, impurities and reactive materials, iron unsoundness and falling or dusting unsoundness. In all other respects, the coarse aggregate shall comply with this section. If required, coarse aggregate shall be washed to satisfy these requirements. The percentage of wear shall be determined by AS1141.23, and the loss of weight shall not exceed 30%. When required by the Superintendent, coarse aggregate shall be tested for conformance for any or all of the properties set out below: (a) crushing value AS1141.21 The aggregate crushing value shall not exceed 25%; (b) soundness AS1141.24 The loss of mass when tested with sodium sulphate shall not exceed 12%; and (c) particle Shape AS1141.14 The proportion of misshapen particles (2:1 ratio) shall not exceed 35%.

Specification clause	Amend code	Amendment description
		Replace with: Coarse aggregate shall conform to the requirements of AS2758.1 except that gradings shall comply with this section of the City Plan.
Table SC6.4.6.28.5	M	Delete the row that relates to driveways footpaths, headwalls, base slabs, sign structures, large footing, retaining walls. Modify the row that relates to reinforced concrete culverts, drainage structures to be: Reinforced concrete culverts, drainage structures, driveways footpaths, headwalls, base slabs, sign structures.
SC6.4.18(6)(1)	M	Delete paragraph and replace with: Fibre reinforced concrete shall not be used on this project.
SC6.4.18(6)(2)	A	Add the following: Bar chairs shall comply with AS/NZS2425.
Table SC6.4.18.7 Item (5)(a)(b)(c)(d)	M	Delete text in third column. Replace with: Comply with AS2758.1
SC6.4.23 Construction Management, Quality Management, Inspection and Testing		
SC6.4.23.1(2)(c)	M	Delete this Standard Specifications and Roads section and replace with the following: Standard specifications roads MRTS05 – Unbound Pavements MRTS11 – Sprayed Bituminous Treatments (Excl Emulsion) MRTS17 – Bitumen and Multigrade Bitumen MRTS18 – Polymer Modified Binder MRTS19 – Cutter Oils MRTS20 – Cutback Bitumen MRTS21 – Bituminous Emulsion MRTS22 – Supply of Cover Aggregate MRTS30 – Asphalt Pavements MRTS101 – Aggregates for Asphalt MRTS102 – Reclaimed Asphalt Pavement Material MRTS103 – Fillers for Asphalt
SC6.4.23.1(3)(d)	A	Add the following: The Contractor is responsible for the construction of all access tracks and detours necessary for construction of the works. For the purposes of excavating and backfilling trenches and the construction of pipe drains and ducts, and pressure mains, manholes and similar structures or other works included in the Contract, the Contractor is responsible for obtaining the approval of the appropriate controlling authority to work in the road reserves.
SC6.4.23.1(3)(e)	A	Add the following: Before entering on any adjacent private lands, the Contractor shall give to the owners or occupiers of such lands, 14 days clear notice in writing of his intention to tender and proceed with the work. The Contractor will not unreasonably destroy or damage any property.
SC6.4.23.1(3)(p)	A	Any land required by the Contractor for the temporary stacking of materials or for any other purposes will be procured by the Contractor at their own expense.

Specification clause	Amend code	Amendment description
SC6.4.23.1(3)(ab)	A	Add the following: (ab) Subsurface Conditions The Contractor shall make their own assessment of the site condition as likely to be encountered at the actual time work is to be carried out. A previous geotechnical report has been provided, for information only, in Appendix 1.
SC6.4.23.1(3)(ac)	A	Add the following: (ac) Existing Services Some existing services on the site are indicated on the drawings. The absence of such indication does not guarantee that no service exists and shall not relieve the Contractor of any responsibility under this clause. The Contractor shall, before commencing work, ascertain details of all services in the area affected by the works by contacting the relevant authority, including a call to Before You Dig Australia. The Contractor shall arrange for and bear all costs and responsibilities incurred in any interruption of service or temporary or permanent relocation of services, except as provided in the Schedule of Prices and except such services as are shown on the drawings to be relocated by others. The Contractor shall exercise reasonable care in carrying out the works so as to avoid damage to existing services, whether or not details of such services have been made available to him. The Contractor shall be held solely responsible for any damage to existing services and in the event of damage shall immediately advise the Superintendent and shall cooperate with the Superintendent in making safe and / or restoring the service and shall bear any costs so incurred.
SC6.4.23.1(3)(ad)	A	Add the following: (ad) Alternatives Any costs associated with the assessment of alternatives, irrespective of whether the alternative is not rejected shall be payable by the Contractor.
SC6.4.23.1(4)(c), (d), (e), (f), (i)	M	Change all Developer to Contractor.
SC6.4.23.1(4)(k)	M	Delete the last sentence. Replace with: At the end of the agreed period of implementation and maintenance, all identified temporary sediment control measures must be removed from by the Contractor and the ground reinstated to Council's satisfaction.
SC6.4.23.1(4)(t)	M	Modify the first paragraph to read: Development works may cause changes to the quality, quantity, and flow rate of stormwater discharged from the site. During the construction phase where soil disturbance and construction activity significantly increases the risk of soil erosion or where the development is required to implement a Stormwater Quality Management Plan (SQMP) that has been approved during the operational works approval phase, Council will then require a detailed maintenance regime to control stormwater quality during the construction phase to be presented during the prestart meeting for review and acceptance by Council unless a detailed maintenance regime has been presented and accepted by Council during the design process.

Specification clause	Amend code	Amendment description
SC6.4.23.1(4)(u)	D	Delete the following from the first sentence: Developer or
SC6.4.23.1(4)(v)	M	Delete this paragraph and replace with the following: Prior to commencing work directly adjacent to any existing infrastructure the Contractor shall carry out a dilapidation survey of all of the existing infrastructure. Any damages to existing infrastructures or adjacent structures as a result of the works shall be the responsibility of the Contractor to make good to the satisfaction of Council, the service provider and the Superintendent.
SC6.4.23.1(5)(a)	A	It is a requirement for this project that the works are to be completed as a "Quality Controlled and Assured Development".
SC6.4.23.1(5)(e)(i)1	M	First paragraph shall now read: The Contractor shall ensure that any particular stage of work to be inspected has been satisfactorily completed before requesting an inspection by the Superintendent and/or Council. A minimum of two (2) full working days' notice (except for Off Maintenance inspection which requires a minimum of seven (7) days) is required to enable arrangements to be made for an inspection. Responses to the requests within the prescribed minimums are not guaranteed, although every effort will be made to accommodate requests where possible. All required inspections must be carried out Monday to Friday unless other arrangements have been agreed.
SC6.4.23.1(5)(e)(ii) 7	M	Delete the following from paragraph 1: Consultant and/or Contractor respectively Replace with: Contractor
SC6.4.23.1(5)(e)(ii) 7	A	Add the following to the end of this section: Contractor submissions shall comply with the contract requirements. Any costs associated with the assessment of non-conforming submissions irrespective of whether the submission is approved or not shall be payable by the Contractor.

Specification clause	Amend code	Amendment description
SC6.4.23.4(d)	M	The requirements of this section are applicable to the following items and activities: 1 Control of Traffic 2 Temporary Roadways and Detours 3 Clearing and Grubbing 4 Earthworks – Cut 5 Earthworks – Unsuitable Material 6 Earthworks – Embankment 7 Compaction and Quality Control 8 Siting, Excavation, Bedding, Backfilling and Compaction of Stormwater Drainage 9 Installation of Pipe Drainage 10 Installation of Precast Box Culverts 11 Siting and Installation of Drainage Structures 12 Construction of Lined Open Drains Including Kerb and Gutter 15 Construction of Flexible Pavement Layers 17 Construction of Asphaltic Concrete Pavement Layers 18 Sprayed Bituminous Surfacing 21 Pavement Marking 22 Minor Concrete Works
SC6.4.24 Acceptance of Completed Works		
SC6.4.24.1(b)	M	Replace Council with Council and Economic Development Queensland (EDQ).
SC6.4.24.2(2)(b)	A	Add the following: (vi) Levels at all allotment pegs; (vii) Levels at other design points shown on drawings and at grid spacing not exceeding 20 metres by 20 metres; and (viii) Alignment of retaining walls (including changes in height and plan geometry), top and base of retaining walls.
SC6.4.24.2(2)(c)(i)	A	Add the following: In addition to the above general information the following shall also be provided: 1. Levels on the subgrade, at road crown, invert of kerbs and dish drains and at the edges of kerbs and dish drains; 2. Levels on each pavement layer, at road crown invert of kerbs and dish drains and at the edges of kerbs and dish drains; and 3. Levels on the finished pavement, at the invert, at the lip of kerb and change of grades. NOTE: The location of 'As Constructed' levels for subgrade, lower subbase, upper subbase, base and any layer that will be concealed in the final works shall be the same location as the finished surface level nominated for the design. Pavement levels shall be obtained, certified and presented to the Superintendent before the next pavement layer is constructed. Should approval be given to proceed on the next pavement prior to obtaining pavement levels and compaction testing results, continuation of work will be at the sole risk of the Contractor.

Specification clause	Amend code	Amendment description
SC6.4.24.2(2)(c)(ii)	A	Add the following: 4. Location and top level and invert of all manholes, pits, headwalls, etc. Where pit covers are greater than 900mm wide in any dimension, provide invert levels of all corners; 5. Location and level of all wingwalls and aprons; 6. Extent of scour protection; 7. Location and level of top and toe of batter to open drains and surcharge paths at each design point and 20 metre maximum centres; and 8. Location and level of inverts of all dish drains at each design point and 20 metre maximum centres.
SC6.4.24.2(2)(c)(v)	A	Add the following: 3. Top level of manholes; and 4. Upstream and downstream invert levels at manholes.
SC6.4.24.2(2)(c)(vi)	A	Add the following: The As-constructed survey shall: 1. locate the alignment of all mains from property boundaries and locate valves and hydrants relative to property boundaries; and 2. Provide finished surface levels of all valves and hydrants.
SC6.4.24.2(2)(c)(x)	A	Add the following: (x) Roadside Furniture 1. Pick up all roadside furniture, such as signs, street posts, power poles (including stay locations); and 2. Pick up linemarking and traffic lane.
SC6.4.24.2(2)	A	Add the following at the end of this section: The Contractor shall organise and supply As Constructed information to satisfy compliance with TCC City Plan SC6.4.24 including but not limited to, the requirements as set out below to the Superintendent for a check on construction work and for the completion of 'As Constructed' drawings. The complete information shall be obtained by a licensed Surveyor commissioned and paid by the Contractor. The As Constructed information received from the Contractor shall be in a Civil 3D format. The 'As Constructed' survey will provide levels at the design set out points on the drawings and additional locations as listed above. Any work and/or fees incurred by the Principal in manipulating and/or handling data that does not comply with the requirements of this Clause shall be paid for by the Contractor. No work shall be covered up or built over until accurate details have been recorded. Any work covered over before information is recorded by the Surveyor shall be exposed at the Contractor's expense to allow such information to be obtained. Rectification work (including any costs incurred by the Principal) shall be at the Contractor's expense. The Superintendent will submit the completed drawings to Council as soon as practicable after the receipt of the information. The Contractor's attention is drawn to the fact that Council will not accept works 'On Maintenance' until such time as complete 'As Constructed' drawings are provided and approved by Council.

Specification clause	Amend code	Amendment description
SC6.4.24.2(5)(b)	A	Add the following at the end of this section: Should the Principal request an early release of Plan of Survey due to the performance of the Contractor all RPEQ costs associated in providing Council with information to assess and approve the early release of the Plan of Survey will be payable by the Contractor.
SC6.4.24.3(3)	A	Add the following: The Contractor is responsible for ensuring the works comply with this clause prior to the date of the On Maintenance inspection.
SC6.4.24.3(4)	M	Delete: SD-350 Replace with: SEQ-WAT-1301-1 or SEQ-WAT-1302-1
SC6.4.24.3(4)	A	Add the following: The Contractor is responsible for ensuring the works comply with this clause prior to the date of the On Maintenance inspection.
SC6.4.24.3(5)(a)(ii)	D	Delete the following: where depth of fill exceeds 0.5 m.
SC6.4.24.3(5)	A	Add the following: The Contractor is responsible for ensuring the works comply with this clause prior to the date of the On Maintenance inspection.
SC6.4.24.3(6)	A	Add the following: The Contractor is responsible for ensuring the works comply with this clause prior to the date of the On Maintenance inspection.
SC6.4.24.3(7)	A	Add the following: The Contractor is responsible for ensuring the works comply with this clause prior to the date of the On Maintenance inspection.
SC6.4.24.3(8)(f)	A	Add the following: The Contractor is responsible for ensuring the works comply with this clause prior to the date of the On Maintenance inspection.
SC6.4.24.3(8)(g)(i)	M	Change Developer to Contractor.
SC6.4.24.4	A	Add the following before Item SC6.4.24.4(1): The Contractor is responsible for providing the Quality Assurance documentation listed within this section of the specification.
SC6.4.24.4(3)	A	Add the following: Where it has been determined that the Contractor has been responsible for the Principal to default [as per SC6.4.24(3)(iv)] the security (or balance) returned to the Contractor shall be determined by the Superintendent.

b. Project Specific Amendments to Department of Transport and Main Roads Specifications

The following typical amendments to all DTMR standard specifications apply:

1. Replace all references to Contract Administrator with Superintendent.

5. 0341 STRUCTURAL STEELWORK

4.1 GENERAL

4.1.1 RESPONSIBILITIES

General

Requirement: Provide structural steelwork, as documented.

Performance

Construction category to AS 4100 (2020) and AS/NZS 5131 (2016): CC1

Adjoining elements: Provide for the fixing of elements that are to be connected to or supported on the structural steel.

4.1.2 STANDARDS

General

Materials and design: To AS 4100 (2020).

Fabrication and erection: To AS/NZS 5131 (2016).

4.1.3 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

AESS: Architecturally exposed structural steelwork.

CC: Construction category.

NDE: Non-destructive examination.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 5131 (2016) apply.

4.1.4 TOLERANCES

General

Requirement: To AS/NZS 5131 (2016) Section 12 and Appendix F.

Tolerance class: 1.

AESS: As documented

4.1.5 SUBMISSIONS

Execution details

Site modifications: Submit details of proposed on-site modifications or rectifications to any steel member, connection component, mechanical fastener, weld or corrosion protection.

Splices: If variations to documented splice locations or additional splices are proposed, submit details.

Temporary connections or attachments: If not documented, submit details.

Undocumented weld types: Submit proposals for weld type and electrodes.

Welding plan: Submit a welding plan to AS/NZS 5131 (2016) clause 7.2.

Work method statement: Before any erection work commences, submit a work method statement to AS/NZS 5131 (2016) clause 11.2.3.

Fabrication details

Distortions: Submit proposals for the following:

- Preventing or minimising distortion of galvanised components, welded components or welded and galvanised components.

- Restoration to the designed shape.

Identification marks: If members and/or connections will be exposed to view, submit details of proposed marking.

Program: Submit a fabrication program showing the proposed sequence of operations and time required.

Products and materials

Steel members and sections: Submit test reports or test certificates conforming to AS 4100 (2020) Clause 2.2.2.

Substitution: If alternative sections or connections are proposed, submit details.

Records

Survey: Submit survey of erected structural steel to verify components have been installed as documented.

Drawings: Submit record drawings, upon completion.

Shop detail documentation

General: Submit shop detail documentation to a scale that best describes the detail, conforming to AS/NZS 5131 (2016) clause 4.4.

Drawing format: pdf and 2D CAD.

Review of shop detail documentation: By LCJ Engineers

Subcontractors

General: Submit names and contact details of proposed fabricator, detailer and installer.

Tests

Requirement: Submit test results, as follows:

- Bars and sections: Non-destructive tests.

- Plates: Ultrasonic tests.

- Welds: Non-destructive examinations.

Warranties

Requirement: Name the principal as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.

Approval of applicator or installer: If the warranty is conditional on the manufacturer's approval of the applicator or installer, submit the manufacturer's written approval of the installing company, and authorised personnel, with evidence of qualifications and experience in the specific use of the product, material or system.

Principal's responsibilities: Submit details of responsibilities of the principal required to keep warranties in force.

Warranty types

Manufacturer and applicator's/installer's interlocking warranty: Interlocking warranty to cover manufacturing defects and defects with products and materials delivered to site, including their application or installation.

Period: 8 years

4.1.6 INSPECTION

Notice - off site

Inspection: Give notice so that inspection may be made of the following:

- Materials including welding consumables before fabrication.
- Testing of welding procedures and welder qualification tests.
- Commencement of shop fabrication.
- Commencement of welding.
- Completion of fabrication before surface preparation.
- Surface preparation before protective coating.
- Completion of protective coating before delivery to site.

Notice - on site

Inspection: Give notice so that inspection may be made of the following:

- Steelwork on site before erection.
- Steelwork in position before casting in.
- Reinforcement and formwork in place before any encasement.

4.2 PRODUCTS

4.2.1 GENERAL

Materials

Requirement: To AS/NZS 5131 (2016) Section 5.

Storage and handling

Requirement: Pack, support, transport and handle members and components without overstressing, deforming or damaging them or their protective coating.

Damaged items: Rectify or replace. Do not assemble into the structure without approval.

Protection: Wrap or otherwise protect members or components to prevent damage to surface finishes during handling and erection.

Storage: Store off the ground.

Lifting points: Do not allow steel slings to come into direct contact with coated steelwork.

Purchasing and traceability

Purchasing documentation and procedure: To AS/NZS 5131 (2016) clause 4.6.

Level of traceability: To AS/NZS 5131 (2016) clause 5.2.3 and the types defined in AS/NZS 5131 (2016) clause 4.7.

4.2.2 STRUCTURAL STEEL

Steel members and sections steel grade table

Type of steel	Minimum grade
Hot-rolled sections to AS/NZS 3679.1 (2016) and SA TS 102 (2016)	300
Welded sections to AS/NZS 3679.2 (2016)	300
Hot-rolled plates, floor plates and slabs to AS/NZS 3678 (2016) and SA TS 102 (2016)	250
Hot-rolled flat products to AS/NZS 1594 (2025)	HA250

Refer to SELECTIONS in 0344b for chemical composition requirements.

Certification

Steel: Minimum requirements for test and inspection certificates, to the following:

Hot-rolled bars and sections: To AS/NZS 3679.1 (2016) clause 11.2.4.

Hot-rolled plates: To AS/NZS 3678 (2016) clause 11.2.4.

Testing

Requirement: As documented.

4.2.3 OTHER MATERIALS

Welding consumables

Requirement: To the relevant part of the AS/NZS 1554 series.

4.3 EXECUTION

4.3.1 PREPARATION, ASSEMBLY AND FABRICATION

Identification

Traceability: To AS/NZS 5131 (2016) clause 5.2.3.

Marking: Provide marks or other means of identifying each member compatible with the finish, for setting out, locating, erecting and connecting the steelwork to the marking plans.

Natural beam camber

General: If steel beams have a natural camber, within the straightness tolerance, fabricate the steelwork element with the camber in.

Cutting

Prohibited cutting methods: Nil, refer also to SELECTIONS of 0344b for treatment of cut ends

Shaping

Requirement: Where forming, shaping or correcting distorted members, avoid damage and conform to AS/NZS 5131 (2016) clause 6.6.

Holing

Slotted holes: Do not use slotted holes for connections, other than those documented.

Tolerances

Measurement: Check tolerances by measurement after fabrication and application of corrosion protection.

4.3.2 WELDING

General

Requirements: To AS/NZS 5131 (2016) Section 7.

Standard: To AS/NZS 1554.1 (2014).

Weld category

Weld categories not documented: Category SP.

Weld type

Weld type not documented: Prepare proposals for weld type and electrodes.

Non-destructive weld examination (NDE)

Requirement: To AS/NZS 5131 (2016) clause 13.6.2.

Extent and type of NDE: To AS/NZS 5131 (2016) Table 13.6.2.2(A).

Non-visual NDE: By a third party testing authority.

Repairs: Repair welds revealed as faulty by NDE and repeat the examination.

Site welds

Completion: Weld only when correct alignment and preset or camber have been achieved.

4.3.3 SURFACE PREPARATION AND TREATMENT**General**

Requirement: Conform to *0344b Steel - hot dip galvanised coatings*.

4.3.4 ARCHITECTURALLY EXPOSED STRUCTURAL STEELWORK**General**

Requirement: Provide AESS to AS/NZS 5131 (2016) Section 10 and as documented.

AESS category

AESS category to AS/NZS 5131 (2016) clause 10.2: No AESS category applies to this project.

4.3.5 ERECTION**General**

Execution: Make sure every part of the structure has sufficient design capacity and is stable under construction loads produced by the construction procedure.

Temporary work

General: Provide all necessary temporary bracing or propping.

Temporary connections: Detail required cleats, if not shown on shop detail documentation.

Temporary members: If temporary members are required, fix so as not to weaken or deface permanent steelwork.

Site work

General: Other than work shown on the shop detail documentation as site work, do not fabricate, modify or weld structural steel on site.

Movements

General: Allow for thermal movements during erection.

Drifting

Limitation: Use drifting only to bring members into position, without enlarging holes or distorting components.

4.3.6 REPAIRS**General**

Requirement: Repair finishes to restore the full integrity of any coating.

4.3.7 COMPLETION

Tolerances

Conformance: After completing erection, verify conformance with AS/NZS 5131 (2016) Section 12 and Appendix F.

Temporary connections

General: Remove temporary cleats on completion and restore the surface.

Warranties

Type: Manufacturer and applicator's/installer's interlocking warranty

Period: 8 years

4.4 SELECTIONS

4.4.1 SCHEDULES

Non-destructive testing of bars and sections schedule

Item to be tested	Test method	Other requirements
Nil		

6. 0344B STEEL – HOT DIP GALVANISED COATINGS

5.1 GENERAL

5.1.1 RESPONSIBILITIES

General

Requirement: Provide hot dip galvanised coatings, as documented.

5.1.2 STANDARDS

General

Coating: To AS/NZS 4680 (2025).

Coating on fasteners: To AS/NZS 1214 (2016).

Design: To AS/NZS 2312.2 (2014).

Metal finishing

Minimum coating mass/thickness: To AS/NZS 4680 (2025).

Threaded fasteners coating mass/thickness minimum: To AS/NZS 1214 (2016).

5.1.3 SUBMISSIONS

Execution details

Holes and lifting lugs: Submit size and locations of holes and/or lifting lugs.

Detailing features: If design and fabrication features of the items to be galvanised may lead to dimensional change, distortion or difficulties during galvanising, identify these and submit details for improvement.

5.2 EXECUTION

5.2.1 GENERAL

Care

Embrittlement: Take due care to avoid embrittlement of susceptible steels.

Mechanical properties: Avoid mechanical damage. Make sure that mechanical properties of the base metal do not change.

Surface preparation

Surface contaminants and coatings generally: Chemical clean, then acid pickle.

Coating process

General: To AS/NZS 4680 (2025) Section 2.

Threaded fasteners: To AS/NZS 1214 (2016) Section 5.

Post treatment

General: Passivate.

Drilling after completion of hot dip galvanising

Repair: Prime drill hole surfaces to AS/NZS 4680 (2025) Clause 4.3 before the surfaces begin to corrode.

Surface finish

Standard: To AS/NZS 4680 (2025) Clause 4.1.

Coating appearance: Free of uncoated areas, blisters, roughness and sharp points where they may cause injury, and any defects that may affect the end use of the article. Dull grey is acceptable provided a sound and continuous coating is achieved.

Coating repair

Rejection: If uncoated surfaces or areas damaged by handling at the galvanising plant exceed the limits specified for repair in AS/NZS 4680 (2025) Clause 4.3, reject the galvanising.

Extent and methods: To AS/NZS 4680 (2025) Clause 4.3.

Preparation of galvanised surfaces for paint finishes

Coarse preparation: Remove spikes, and make sure edges are free from lumps and runs.

Light sweep blasting before painting: Required.

Maximum zinc removal: 10 µm.

Abrasive grade (range): 150 to 180 µm.

Abrasive type: Clean ilmenite or garnet.

Blasting angle to surface: 45° maximum.

Blast pressure (maximum): 275 kPa.

Distance of nozzle from surface (range): 350 to 400 mm.

Nozzle type: 10 to 13 mm orifice diameter venturi type.

5.2.2 site work

Site welding

Grinding of edges: Permitted.

Weld areas: Reinstate coating to AS/NZS 4680 (2025) Clause 4.3.

Coating reinstatement

Extent: Areas damaged by transport, site welding, site flame cutting, site handling, or erection.

Method: To AS/NZS 4680 (2025) Clause 4.3.

5.3 SELECTIONS

5.3.1 STRUCTURAL STEEL

Hot dip galvanised steel schedule

	All
Atmospheric corrosivity category to AS 4312 (2019)	C3
Period from application to first scheduled maintenance	≥ 25 years
Chemical composition	Comply with Category A of Table 9.1 of AS/NZS 2312.2
Cutting location (flame, laser or plasma)	Cutting locations shall be ground off by the fabricator and sharp edges removed
Location of significant surfaces	All visible faces
Coating thicknesses other than those in AS/NZS 4680 (2025) Clause 4.5.	Localised galvanised coating mass (minimum): 750 g/m ² Mean galvanised coating mass (minimum): 900 g/m ²
After-treatment or additional coating	Nil

	All
Additional requirements	Test report complying to Section 5 of AS/NZS 4680 required

7. SCHEDULES

ANNEXURE MRTS01.1

Specific Contract requirements relating to MRTS01.1 Introduction to Technical Standards, are indicated in the following Annexure.

Annexure MRTS01.1 (March 2025) Introduction to Technical Specifications

Specific Contract Requirements



Contract Number

Note: Clause references within brackets in this Annexure refer to Clauses in the parent Technical Specification MRTS01 unless otherwise noted.

1. Supplementary requirements (Clause 15)

The following supplementary requirements shall apply.

Add to Clause 2.2 of MRS01:

Where a schedule of rates for variations has been provided or a variation price provided it is deemed to have included:

- a) Establishment and disestablishment including cleaning up and making good, except to the extent that establishment and disestablishment are the subject of a separate specific Work Item in the Schedule of Rates;
- b) Provision of all site facilities, except to the extent that the provision of any site facilities is the subject of a separate specific Work Item in the Schedule of Rates;
- c) Provision of all labour, plant and equipment;
- d) Supply, delivery, handling and storage of all materials except for materials supplied by the Principal and except to the extent that supply, delivery, handling and storage of any materials is the subject of a separate specific Work Item in the Schedule of Rates;
- e) Provision of all supervisory and support staff;
- f) All costs associated with the operation of the Contractor's Workplace Health and Safety obligations, Quality System, environmental management obligations, traffic management obligations, community liaison obligations, Public Utility Plant obligations, works programming, road maintenance obligations and all other supervisory and coordination functions, except to the extent that such obligations and functions are the subject of separate specific Work Items in the Schedule of Rates;
- g) All costs incurred by the Contractor in complying with Commonwealth and State legislation and Local Government By-laws;
- h) All testing and/or commissioning, except to the extent that testing and/or commissioning is the subject of a separate specific Work Item in the Schedule of Rates;
- i) All costs associated with the work with respect to security, interest, fees, charges, taxes, royalties, insurance and compensation;

- j) All costs associated with the provision of workshop drawings, bar bending schedules and materials lists;
- k) Any design for work required to be designed by the Contractor, except to the extent that such design is the subject of a separate specific Work Item in the Schedule of Rates;
- l) All overheads and profit;
- m) Costs comply with the safety management system of the Rail Transport Operator to the extent that it applies to the railway operations carried out by the Contractor, except to the extent that such obligations and functions are the subject of specific Work Items in the Schedule of Rates; and
- n) All other expenses associated with the work not specifically listed above.

Clause 10 Utilisation and disposal of surplus material

Delete the following:

Surplus excavated material shall be disposed of in accordance with the provisions of Clause 11 of MRTS04 *General Earthworks*.

Replace with:

Surplus material shall be disposed in accordance with TCC City Plan requirements.

ANNEXURES MRS05.1 AND MRTS05.1

Specific Contract requirements relating to MRTS05 Unbound Pavements, are indicated in the following Annexures.

Annexure MRS05.1 (July 2022)

Unbound Pavements

Specific Contract Requirements

Contract Number



Note: Clause references within brackets in this Annexure refer to Clauses in the parent Specification MRS05 unless otherwise noted.

1. Additional payment for a higher standard of surface evenness (Clause 4.1)

An additional payment for a higher standard of surface evenness shall apply

Yes

☐

No

☒

Annexure MRTS05.1 (July 2022)

Unbound Pavements

Specific Contract Requirements

Contract Number



Note: Clause references within brackets in this Annexure refer to Clauses in the parent Technical Specification MRTS05 unless otherwise noted.

1. Material compliance testing locations (Clause 9.2)

For the following locations and/or material subtypes, material compliance testing shall be undertaken on samples taken from the pavement.

If no locations or material subtypes are given, all samples shall be taken from the stockpile.

Stockpile.

2. Material requirements

2.1 Pavement material locations (Clauses 7.1.1, 7.2.1, 7.3.1 and 8.1)

The following pavement material subtypes shall be used in the locations stated.

Location	Material Subtype
Base course	Type 2.1
Subbase course	Type 2.3

2.2 Design Traffic (Clause 7.2.1)

Location	Average Daily Traffic in the Design Lane in Year of Opening – Equivalent Standard Axles (ESA)
All	Less than 500 ESA

If no indication is given for a particular location, the Administrator shall confirm the average daily traffic in the design lane in year of opening based on advice from the project's pavement designer.

2.3 Type 4 material requirements

2.3.1 Additional requirements for Type 4 material (Clause 7.4)

The following additional requirements shall apply to Type 4 materials.

Not applicable

To utilise a Type 4 material, the Designer must develop the standards and requirements relevant to the particular material and include these in this Clause. As a minimum this would typically include a particle size distribution and linear shrinkage requirement.

2.3.2 CBR moisture content for Type 4 material (Clauses 4.1.2 and 7.4)

The relative moisture content for reporting CBR test results for Type 4 material is given below.

Material Subtype	Relative Moisture Content
	Not applicable

If no indication is given for a particular material subtype, the CBR shall be reported at the Optimum Moisture Content (OMC).

2.4 Material stockpiles (Clause 7.7)

Stockpiles of pavement material shall be located as stated below.

If no indication is given, material stockpiles shall be located as stated in Clause 7.7.

No site stockpiles permitted.

3. Construction requirements

3.1 Construction equipment

3.1.1 Paving equipment – Type 2, 3 or 4 materials (Clause 8.3.1.1.3)

For pavement constructed using Type 2, 3 and 4 materials, the following paving equipment shall be used.

If no indication is given, the paving equipment to be used shall be nominated by the Contractor in their Unbound Pavement Construction Procedure.

Plant used to construct pavements over existing stormwater lines shall comply with Table B1 of AS/NZS3725:2007.

The above requirements are not applicable to Type 1 (HSG) materials.

3.1.2 Intelligent Construction Rollers (Clause 8.3.1.3)

Intelligent Construction (IC) rollers shall be used to compact unbound pavement material

Yes

☐

No

☒

If no indication is given, the rollers to be used shall be nominated by the Contractor in their Unbound Pavement Construction Procedure.

Where IC equipped rollers are not available locally, existing roller may need to be retrofitted with IC equipment.

3.2 Geometrics

3.2.1 Vertical tolerances – Types 2, 3, and 4 materials only (Clause 8.4.4.3)

The vertical tolerance on any layer shall be alternative

A
(10/15 mm)

☒

B
(25 mm)

☐

If no indication is given, the vertical tolerance shall be Alternative A.

3.2.2 Deviation from a straight-edge – Types 2, 3 and 4 materials only (Clause 8.4.5)

The maximum deviation from a straight-edge shall be alternative

C
(5 mm)

☒

D
(8 mm)

☐

If no indication is given, the maximum deviation from a straight-edge shall be Alternative C.

3.2.3 Crossfall and straight-edge tolerances applicable on layers other than the final layer (Clauses 8.4.4.4 and 8.4.5)

In addition to the final layer of unbound pavement, the specified requirement for crossfall and deviation from a straight-edge shall also apply to the following layers.

All layers.

If no indication is given, the requirements for crossfall and deviation from a straight-edge shall apply to the final (uppermost) layer of unbound pavement only.

3.2.4 Road roughness (Clause 8.4.6)

The maximum road roughness shall be (R_s)

Not applicable

m/km

If no indication is given, the requirement shall be 2.31.

4. Supplementary requirements (Clauses 8.4.6 and 10)

The following supplementary requirements shall apply.

Clause 4.1 Supplementary requirements for Test Method Q113A and Q113C

Clause 4.1.1 Q113A

Delete the entire text and replace with:

“California Bearing Ratio (CBR) testing is required for all materials. The CBR test result shall be reported at the maximum dry density and optimum moisture content as defined by the relevant test method.”

Clause 9.1 General

Delete:

Maximum lot sizes, minimum test frequencies and the minimum number of tests required are specified in Appendix A.

Replace with:

Maximum lot sizes, minimum test frequencies and the minimum number of tests required are specified on drawing C05.

Clause 9.3 Maximum lot sizes

Delete:

The maximum lot sizes for unbound pavements shall be as specified in Table A1 of Appendix A.

Replace with:

The maximum lot sizes for unbound pavements shall be as specified on drawing C05.

Clause 9.4.1 Unbound pavement materials

Delete:

Minimum test frequencies for unbound pavement material source and product testing, shall be as specified in Table A2 of Appendix A.

Replace with:

Minimum test frequencies for unbound pavement material source and product testing, shall be as specified on drawing C05.

Clause 9.4.3 Segregation

Delete:

Minimum testing frequencies for segregation shall be as specified in Table A3 of Appendix A.

Replace with:

Minimum testing frequencies for segregation shall be as specified on drawing C05.

Clause 9.4.5.1 General

Delete:

Minimum testing frequencies for degree of saturation shall be as specified in Table A3 of Appendix A.

Replace with:

Minimum testing frequencies for degree of saturation shall be as specified on drawing C05.

Clause 9.4.6 Compaction

Delete:

Minimum testing frequencies for compaction shall be as specified in Table A3 of Appendix A.

Replace with:

Minimum testing frequencies for compaction shall be as specified on drawing C05.

Clause 9.4.7 Proof rolling

Delete:

Each unbound pavement layer shall be tested for perceptible surface deformation by 'proof rolling' the pavement, in the presence of the *Administrator*. Witness Point 2.

Replace with:

Each unbound pavement layer shall be tested for perceptible surface deformation by 'proof rolling' the pavement, in the presence of the Civil Design Consultant. Hold Point.

Clause 9.4.7 Proof rolling

Add the following to the second paragraph:

In confined locations where the plant nominated in Q723 will not fit at least six passes of the heaviest plant practicable shall be used for proof rolling or, where approved by the Engineer, a leg rammer (not a plate compactor) may be used.

Clause 9.4.8 Ball penetration testing

Delete:

Minimum testing frequencies for ball penetration testing shall be as specified in Table A3 of Appendix A.

Replace with:

Minimum testing frequencies for ball penetration testing shall be as specified on drawing C05.

Clause 9.4.9 Geometrics and deviation from a straight edge

Delete:

Minimum testing frequencies for geometric tolerances and deviation from a straight edge, shall be as specified in Table A4 of Appendix A.

Replace with:

Minimum testing frequencies for geometric tolerances and deviation from a straight edge, shall be as specified on drawing C05.

Appendix A: Maximum lot sizes and minimum testing frequencies

Delete the following asterisk and note:

“*CBR testing is not required for Type 1 materials or for Type 2 or 3 materials where the requirements of Clause 7.2.5 are satisfied.’

ANNEXURE MRS12.1 AND MRTS12.1

Specific Contract requirements relating to MRTS12.1 Sprayed Bituminous Emulsion Surfacing, are indicated in the following Annexures.

Annexure MRS12.1 (November 2018) Sprayed Bituminous Emulsion Surfacing



Specific Contract Requirements

Contract Number

Note: Clause references within brackets in this Annexure refer to Clauses in the parent Specification MRS12 unless otherwise noted.

1. Work Item Allocation (Clauses 2.1 and 2.2.1.3 and Table 2.1)

Item numbers for specific bituminous emulsion surfacing treatments shall apply in the locations stated below. The required details of each treatment shall be as stated in Clause 6 of Annexure MRTS12.1.

Work Item Number † ¹	Reference Location
40811	All pavements

†¹ Used only where measurements are quantified by area in accordance with Clause 2.2.1.3.

Annexure MRTS12.1 (November 2018)

Sprayed Bituminous Emulsion Surfacing



Specific Contract Requirements

Contract Number

Note: Clause references within brackets in this Annexure refer to Clauses in the parent Technical Specification MRTS12 unless otherwise noted.

Part A – Completed By Principal as Part of Brief

1. Requirements for modified Bituminous Emulsion

1.1 Specification Requirements for Modified Bituminous Emulsion (Table 7)

If proposed by the Contractor, the Contractor shall provide background information, as requested, by the Superintendent. The proposed product shall only be used if not rejected by the Superintendent.

1.2 Spraying Temperature Range for Modified Bituminous Emulsion (Table 12.5)

The spraying temperature range for modified bituminous emulsion shall be:

Comply with supplier's recommendations.

2. Requirements for Adhesion Agent (Table 7)

Adhesion agent shall conform to the following requirements.

A product on DTMR Registered Product List for Binder Adhesion Agents Issue: RAA/04, Issue Date: 23/09/2025, that achieves Performance Level 1.

3. Additional Plant Requirements (Clause 9)

The following minimum requirements shall apply to plant additional to those stated in Clause 9.

No mandated Principal requirements.

4. Additional Process Requirements – Spraying**4.1 Programming of Spray Runs (Clause 10.7)**

The following requirements shall apply to programming spray runs additional to those stated in Clause 10.8.

Programming of spray operations shall be approved by the Superintendent.

4.2 Minimum Pavement Surface Temperature (Clause 11.3)

The minimum pavement surface temperature prior to spraying shall be

As per Clause 11.3

4.3 Minimum Period between Bituminous Treatments (Clause 11.5)

The following minimum periods shall apply between bituminous treatments.

One day.

5. Additional Process Requirements – Spreading**5.1 Excess Prime Cover Material (Clause 13.5)**

Excess prime cover material shall not be removed from the surface

Yes

5.2 Requirements for Aggregate Spreader (Clause 14.4)

The following types of aggregate spreader shall be used.

Spreader Type	Spreader Characteristics					Spreader Type to be used
	Method of Operation	Gate Mechanism	Rolling Mechanism	Control Mechanism	Operator Protection	
A	Truck mounted	Variable gate opening not linked to the vehicle speed	No roller	Manual	None	✓
B	Truck mounted	Variable gate opening	Smooth roller spreader	Manual	None	
C	Self propelled	Variable gate opening linked to the vehicle speed	No roller	Automatic Electronic	Cab	
D	Self propelled	Manual gate opening	Roller spreader linked to the vehicle speed	Automatic Electronic	Cab	
E	Self propelled	Operator controlled variable gate opening	Roller spreader linked to the vehicle speed	Automatic Electronic	Cab	

Examples of Spreader Types	
Spreader Type A	Cockerel Spreader
Spreader Type B	Vicroads Roller Spreader
Spreader Type C	Bearcat Spreader (United States of America)
Spreader Type D	Phoenix Spreader (United Kingdom)
Spreader Type E	Wirtgen Spreader (Germany)

5.3 Number of Roller Passes (Clause 14.5)

The minimum number of roller passes on cover aggregate shall be

Part B – Completed by Designer under the Contract
6. Specific Treatment Details (Clause 6.1 and Table 2)

The specific treatment details applicable to this Contract are as follows.

Control Line		All pavements
Section	From	All
	To	
	Length (m)	To be determined from drawings
	Nom. Width (m)	
	Area (m ²)	
Prime Coat	Treatment † ¹	
	Type / Class / Grade † ²	
	Est. Rate (l/m ²) † ³	
	Cover Material	
	Est. Rate (m ² / m ³) † ⁴	
First Seal Coat	Treatment † ¹	Primerseal
	Type / Class / Grade † ²	CRS67
	Est. Rate (l/m ²) † ³	1.1
	Cover Aggregate	10mm
	Est. Rate (m ² / m ³) † ⁴	110m ² /m ³
Second Seal Coat / or Double Application of Cover Aggregate With a Single Application of Binder	Treatment † ¹	
	Type / Class / Grade † ²	
	Est. Rate (l/m ²) † ³	
	Cover Aggregate 1	
	Est. Rate (m ² / m ³) † ⁴	
	Cover Aggregate 2	
	Est. Rate (m ² / m ³) † ⁴	

†¹ Treatment - prime, primerseal, seal, reseal or enrichment.

†² Type and class or grade of bituminous material.

†³ Estimated Spray Rate 15°C of bituminous material.

†⁴ Estimated Spread Rate.

7. Seal Design (Clause 6.2.1)

The seal shall be designed by

The Designer

☒

The Contractor

☐

8. Supplementary Requirements (Clause 17)

The following supplementary requirements shall apply.

All sprayed seal binder types and application rules (including cover aggregate) shall be confirmed with the Sealing Contractor prior to commencing works.

ANNEXURE MRTS22.1

Specific Contract requirements relating to MRTS22.1 Supply of Cover Aggregate, are indicated in the following Annexures.

Annexure MRTS22.1 (July 2025) Supply of Cover Aggregate

Specific Contract Requirements

Contract Number



Note: Clause references within brackets in this Annexure refer to Clauses in the parent Technical Specification MRTS22 unless otherwise noted.

1. Details of Cover Aggregate (Clauses 7.1.3 and 7.1.4)

Cover aggregate shall conform to the following requirements.

Location Identification and/or Item Number	Nominal Size (mm)	Quality Category	Precoated or unprecoated
All cover aggregate	10	B	Precoated

2. Precoating of Cover Aggregate (Clause 7.1.4)

The following are acceptable Precoating Agent Types.

Description of Aggregate (e.g., nominal size (mm) and quality category)	Precoating Agent Type/s ¹	Nominal Field Application Rate (L/m ³) ²	Other Requirements
All	Must be a DTMR approved precoating agent	As per the manufacturers' recommendations	Technical data sheets to be supplied.

1. A full list of approved precoating agents and agent types are available on the Transport and Main Roads Registered Suppliers database (<https://www.tmr.qld.gov.au/business-industry/Business-with-us/Approved-products-and-suppliers>).
2. The field application rates suggested are nominal only and will vary depending on the characteristics (porosity, texture) and condition (cleanliness, moisture condition) of the aggregate. The aggregate application rates shall be selected to achieve the requirements of Clause 7.1.4 of MRTS22. Excessive application rates are to be particularly avoided for precoating products containing waste oil.

3. Preliminary Sample of Cover Aggregate (Clause 8.1)

A preliminary sample of cover aggregate material is required.

Yes

☐

No

☒
4. Location of Stockpiles for Conformance Testing**4.1 Location of Stockpile for Conformance Testing of Uncoated Aggregate (Clause 8.2)**

Compliance testing shall be completed for the properties of uncoated aggregates from stockpiles located at the quarry unless nominated otherwise below.

Description of Aggregate (e.g., nominal size (mm) and quality category)	Material Properties	Location of Stockpile
10mm Aggregate quality category B	Crushed Particles	Quarry
	Weak Particles	

4.2 Location of Stockpile for Conformance Testing of Degree of Precoating (Clause 8.2)

Testing of degree of precoating shall be carried out at the quarry unless nominated otherwise below.

Quarry.

5. Stockpile Site**5.1 Location of Stockpile Site (Clause 9.1.1)**

The following area(s) may be used for the construction of a stockpile site.

Stockpiles (if used) must be within the Contractor site facilities.

5.2 Additional Restrictions on Location of Stockpile Site (Clause 9.1.2)

The following additional restrictions shall apply to the location of the stockpile site.

Comply with the requirements of the TCC City Plan and ensure any runoff is treated by erosion and sediment control measures.

5.3 Construction Standard for Stockpile Site (Clause 9.2.1)

The standard of construction of the stockpile site shall be as follows.

Standard A

☐

Standard B

☐

The standard described below

☒

Minimum of Standard A but shall also comply with the requirements of the TCC City Plan.

6. Supplementary Requirements (Clause 11)

The following supplementary requirements shall apply.

8.3.2 Minimum frequency of testing

Delete this clause and replace with:

Testing frequencies for the cover aggregate source rock tests and product tests shall comply with the requirements specified on drawing C05.

ANNEXURE MRTS30.1

Specific Contract requirements relating to MRTS30.1 Asphalt Pavements, are indicated in the following Annexure.

Annexure MRTS30.1 (March 2024) Asphalt Pavements

Specific Contract Requirements

Contract Number



Note: Clause references within brackets in this Annexure refer to Clauses in the parent Technical Specification MRTS30 unless otherwise noted.

1. Binder (Clause 7.1.6)

The following binder requirements apply.

Location	Course	Asphalt Designation	Binder Class	Binder Specification
All	Wearing course	AC10H	C320	MRTS18

Where no indication is given, the Contractor shall use a binder complying with the requirements of the guide note contained within Clause 1.1 of MRTS30 *Asphalt Pavements*.

2. Crack filling (Clause 8.2.3)

Cracks are to be filled in the following areas.

All areas with an asphalt wearing course.

3. Strain alleviating fabric strips (Clause 8.2.4)

Strain alleviating strips are required in the following areas.

Along all edges of protection slabs, if protection slabs are adopted during construction.

4. Material transfer vehicle (Clause 8.3)

A material transfer vehicle is required to be used in the paving process for the following dense graded asphalt layers.

Not required.

5. Structures (Clause 8.3)

Load limits apply on structures within the Works as follows.

Structure	Chainages	Details
Reinforced concrete pipes and other inground services	All pavements	The Contractor shall provide: – RPEQ assessment and certification that it will be acceptable to use proposed construction plant over existing reinforced concrete pipes and other inground services. – The Contractor shall conduct inspections of all conduit beneath the pavement traversed by the asphalt paving plant. Conduit inspections shall be carried out via CCTV in accordance with WSA05 Conduit Inspection Report Code of Australia and summary reports shall be provided. All conduits shall be cleaned prior to CCTV inspection. Crack widths shall be measured and recorded to 0.5mm accuracy. Longitudinal joint displacement shall be measured and recorded to an accuracy of 5mm. – CCTV reports shall be accompanied by evidence of the operator and report signatory's qualifications. Conduits shall be assessed in accordance with WSA05 Appendix J with electrical and communications assessed against sewer provisions. All 'Not Acceptable' defects shall be replaced or rectified, in a manner acceptable to the Superintendent.

6. Placement trial (Clause 8.11)

An example of where a placement trial may be specified is a large scale/high risk project.

A placement trial is required for each of the following layers.

Not required.

7. Vertical tolerance control (Clause 9.4.2.1)

The following vertical tolerance controls shall apply.

Location	All pavements				
Level Control					
Thickness Control	✓				

8. Road roughness (Clauses 9.6.1 and 9.6.2)

A better road roughness (i.e., lower roughness count) costs more to achieve than a poorer road roughness. Therefore, it is important that an appropriate road roughness requirement is specified for the surfacing layer of the particular project involved.

A maximum international roughness index of 1.93 m/km (i.e., NAASRA roughness count of 50 counts per kilometre) typically applies for the department's roads. However, a lower maximum international roughness index of 1.56 m/km (i.e., NAASRA roughness count of 40 counts per kilometre) may be specified in some instances (e.g., for heavily trafficked, high speed roads such as motorways, arterial roads and national highways).

For road resurfacing work where the existing asphalt surface is milled/profiled to a nominal depth prior to the placement of a single layer of asphalt, the roughness reduction formula provided in Clause 9.6.2 applies.

Road roughness is not typically specified for routine maintenance works (i.e., pavement repairs / patching).

The road roughness requirements for the Works (including areas of pavement where road roughness is not a requirement) shall be as follows.

Determination of ride quality is not required.

If no indication is given, a maximum international roughness index of 1.93 m/km shall apply.

9. Supplementary requirements (Clause 11)

The following supplementary requirements shall apply.

Clause 8.2.2

Change Witness Point 1 to a Hold Point.

Clause 9.4.3

Add the following:

Survey assessment shall also be used as means of determining compliance. The survey assessment carried out shall:

- Compare the As Constructed 3D survey surfaces of the base and finished surface layers.
- Determine the constructed layer thickness of the asphalt layer.
- Compare the layer thickness to the design thickness.
- Assess the As Constructed layer thickness against the average layer thickness requirements in MRTS30.

- To achieve compliance for the asphalt layer, the majority of the area shall comply with the average layer thickness tolerances.

The base layer and the finished surface levels shall be surveyed by a Registered Surveyor.
The survey shall provide levels at design setout points and at 10m max spacing.

ANNEXURE MRTS45.1

Specific Contract requirements relating to MRTS45.1 Road Surface Delineation, are indicated in the following Annexure.

Annexure MRTS45.1 (November 2025)

Road Surface Delineation

Specific Contract Requirements



Contract Number

Note: Clause references within brackets in this Annexure refer to Clauses in the parent Technical Specification MRTS45 unless otherwise noted.

1. Reflective glass beads (Clause 5.12)

Reflective glass beads shall be as stated below.

Type B-HR	☒
Type C-HR	☐
Type D-HR	☐

2. Geometrics (Clause 9.4)

Geometric tolerances shall be checked at the following intervals.

Ends and quarter points.

3. Pavement marking removal – asphalt pavement (Clause 11.13)

The following requirements apply for pavement marking removal on asphalt pavements.

Not applicable.

4. Temporary masking of pavement marking (Clause 11) – NOT APPLICABLE

Temporary masking of pavement markings is permitted

Yes

☐

No

☐

The following supplementary requirements to temporary masking of pavement markings apply.

5. Dry retroreflectivity testing (Clause 14)

The frequency of dry retroreflectivity testing, and average dry retroreflectivity per Lot must not be less than the following.

Table 5.1

Length of road (km)	Minimum number of test sites
≤ 5	Not required
6-20	
21-30	
31-50	
51-100	
> 100	

Table 5.2

Test	Timing of Test (Days of wear after opening to traffic)	Average Dry Retroreflectivity ⁽¹⁾ (mcd/lx/m ²)	
		White longitudinal pavement markings	Yellow pavement marking
Initial Test	Not required		
Second Test			
Intervention Level			

Notes:

(1) Each individual test for the lot must be more than 95% of the specified value.

6. Skid resistance – pavement markings (Clause 14.14)

The following requirements apply for the test periods and frequency of skid resistance testing for pavement markings, excluding audio tactile line marking.

Not required.

7. Skid resistance - ATLM (Clause 14.15)

The following requirements apply for the test periods and frequency of skid resistance testing for audio tactile line marking.

Not applicable.

8. Supplementary requirements (Clause 16.1)

The following supplementary requirements shall apply.

Linemarking shall not be applied until at least 14 days after the asphalt has been placed.

ANNEXURE MRTS50

Specific Contract requirements relating to MRTS50 – Specific Quality System Requirements.

The following departures from MRTS50 apply to this project:

Clause 1 Introduction

Delete the following:

For details on how As Constructed drawings should be prepared, refer to EP172 *Electronic Signature Policy for Engineering Drawings* and the *Drafting and Design Presentation Standards Manual* (DDPSM).

Add the following to the end of paragraph one:

The format of the As Constructed drawings shall be consistent with the Issued for Construction drawings.

Clause 8.4

Delete:

Compliance inspections and tests shall be carried out by the Contractor to ensure compliance with the Contract requirements and shall include at least all inspections and tests which are specified in the Contract.

And replace with:

Inspections and compliance tests shall be carried out by the Contractor to ensure compliance with the Contract requirements and shall include at least all inspections and tests which are specified in the Contract.

Clause 8.6

Delete the second, third and fourth paragraphs.

Clause 9.3

Delete:

The Administrator and/or Principal may inspect any process or procedure at any time to gain assurance that the Contractor's system, including Subcontractor systems, is in compliance with the Contract. Visual inspections or surveillance may reduce the need for audit testing.

And replace with:

The Administrator and/or Principal Consultant and/or Engineer may inspect any process or procedure at any time to gain assurance that the Contractor's system, including Subcontractor systems, is in compliance with the Contract.

Table 12.3 – Responsibility for supply of drawings

Remove Table 12.3 and replace with the following table:

Delivery model	Contract types	Issued for Construction drawings supplied by	As Constructed drawings supplied by
Design and then Construct	TIC and MIC – Construct Only TIC and MIC – Sole Invitation Any construct only Contract including but not limited to AS2124 and AS4000	Principal	Contractor

Clause 12.4.2

Delete the first sentence:

Documents required by this Technical Specification may be delivered progressively as major elements of the works are completed or on completion of the project.

And replace with:

Documents required by this Technical Specification shall be delivered progressively as major elements of the works are completed and on completion of the project.

Clause 13 As Constructed survey

Delete the entire section and replace with the following:

As Constructed surveys are to be undertaken and shall capture all items nominated on the drawings and within the Contract. The format of the As constructed survey shall comply with the requirements of the TCC City Plan.

ANNEXURE MRTS101.1

Specific Contract requirements relating to MRTS101 Aggregates for Asphalt, are indicated in the following Annexure.

Annexure MRTS101.1 (November 2022) Aggregates for Asphalt

Specific Contract Requirements

Contract Number



Note: Clause references within brackets in this Annexure refer to Clauses in the parent Technical Specification MRTS101 unless otherwise noted.

1. PAFV requirement for surfacing course (Table 7.1)

Project Specific Requirement	Minimum Requirement
Polished Aggregate Friction Value (PAFV) (for use in surfacing course)	45

If no indication is given, the minimum PAFV for the aggregate used in the surfacing course shall be 48.

The following PAFV requirements are typically adopted for Transport and Main Roads projects (other than for high crash risk and/or high skid demand sites) for asphalt surfacing layers:

- minimum 48 where the 20 year design traffic volume is $\geq 1 \times 10^7$ Equivalent Standard Axles (ESAs) and
- minimum 45 where the 20 year design traffic volume is $< 1 \times 10^7$ Equivalent Standard Axles (ESAs).

For high crash risk and/or high skid demand sites, a higher minimum PAFV may be specified.

APPENDIX 1

Geotechnical Report by Pacific Geotech PG-12108 October 2024



GEO TECHNICAL REPORT: Proposed Acoustic Barrier

Abbott Street

Oonoonba

Economic Development Queensland

October 2024

PG-12108

E: info@pacgeo.com.au

www.pacgeo.com.au

ABN: 62 615 248 952

Ref: PG-12108, 2024-10-22, GR VER 1
Author: Tony Lee

25th October, 2024

Economic Development Queensland
Email: anna.vangsness@edq.qld.gov.au
CC: leanne.burge@dsdilgp.qld.gov.au

ATTN: ANNA VANGSNESS

Dear Anna,

**GEOTECHNICAL INVESTIGATION – PROPOSED ACOUSTIC BARRIER
ABBOTT STREET, OONONBA**

Enclosed is a copy of our report for the above project dated October 2024. An electronic copy of the report has been issued.

Should you have any queries regarding this report, please do not hesitate to contact Tony Lee or Peter Elkington at this office.

Yours faithfully,

T. LEE (RPEQ 32077)

For and on behalf of
PACIFIC GEOTECH PTY LTD



info@pacgeo.com.au
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Appendices

Appendix A

Notes Relating to this Report

Appendix B

Borehole Record Sheets

Appendix C

Site Plan

1.0 **INTRODUCTION**

This report contains the results of the geotechnical investigation and provides advice and recommendations relating to the following:

- Subsurface conditions in accordance with AS 1726-2017
- Groundwater conditions
- Foundation Recommendations
 - o High level & deep support options
 - o Bearing capacity and skin friction design values
 - o Lateral design considerations
 - o Predicted settlements
- Site Classification in accordance with AS 2870-2011
- Earthworks considerations
 - o Suitability of cut for use as fill
 - o Compaction standards
 - o Stripping depths
 - o Trafficability
 - o Excavatability
 - o Temporary safe batter angles for cuts
 - o Fill batter slopes
- Construction Considerations

Proposed Development

It is understood that the proposed development is to comprise the construction of an Acoustic Barrier located at the above site. Two possible alignments are under consideration with an eastern alignment and a possible alignment approximately 15m to 20m to the west of the boundary.

The proposed development is indicated below.

HALF SETBACK**FULL SETBACK****2.0 METHODOLOGY**

The geotechnical investigation comprised the drilling and sampling of ten (10) boreholes (F1 to F10) to depths of between 0.45m (drilling rig refusal) to 4.5m, using a combination of a Compac 018 drilling rig and 100mm solid flight augers. Dynamic Cone Penetrometer (DCP) testing was conducted adjacent to the boreholes.

The soil classification descriptions and field tests were carried out in general accordance with Australian Standards.

AS 1726

Geotechnical Site Investigations

AS 1289

Methods of Testing Soils for Engineering Purposes

The site has been previously investigation by PGI Ground Engineering Services in report PGC0617001 dated 13th June 2017, which included 2 Cone Penetrometer Tests (CPT12

& CPT13) to depths of 6.6m and 7.5m. The results of this testing are included in Appendix B.

Borehole records, Dynamic Cone Penetrometer test results and a site plan showing the test locations are appended to the report.

3.0 SITE DESCRIPTION

The site of the proposed development is located at Abbott Street, Oonoonba and was bound by residential developments to the North and West, Lakeside Drive to the South and a Queensland Rail easement and Abbott Street to the East.

At the time of the investigation, the site was vacant.

Vegetation comprised sparse grass coverage with scattered medium to large sized trees, particularly along the eastern boundary, as part of the QR easement.

The site was very gently undulous with rises and falls of less than 5 degrees. Drainage was considered poor.

Refer following aerial and site photographs for typical site conditions.

AERIAL IMAGE



SITE PHOTOGRAPHS



4.0 GEOTECHNICAL MODEL

The subsurface profile encountered in the boreholes consisted of surficial granular fill material overlying a natural medium dense to dense sand and typically stiff clays of medium and medium to high plasticity extending to the termination of testing.

Moisture affected soft to firm clays were encountered in boreholes F2 and F10 at a depth of 2.1m at the time of drilling.

No information regarding the compaction status of the encountered fill material is available. On this basis and given the variability, the existing fill is considered to be uncontrolled in accordance with AS 3798-2007.

Table 1 presents a summary of the encountered subsurface profile. Detailed borehole record sheets are appended to this report.

TABLE 1 SUBSURFACE PROFILE SUMMARY

BH No.	FILL	NATURAL			BH TD
		SAND	CLAY		
		Medium Dense/Dense	Soft/Firm	Stiff/Very Stiff	
F1	NE	0.0-TD	NE	NE	0.75 ³⁾
F2	NE	0.0-1.3	2.1-3.1	1.3-2.1 3.1-TD	4.5
F3	0.0-1.3	NE	NE	1.3-TD	4.5
F4	0.0-1.3	NE	NE	1.3-TD	4.5
F5	0.0-TD	NE	NE	NE	0.65
F6	0.0-TD	NE	NE	NE	1.45
F7	0.0-TD	NE	NE	NE	0.45
F8	0.0-TD	NE	NE	NE	0.85
F9	0.0-TD	NE	NE	NE	1.35
F10	0.0-0.6	0.6-1.1	NE	1.1-TD	4.5
CPT12	0.0-1.0	1.0-1.6	NE	1.6-TD	6.4
CPT13	0.0-1.7	NE	NE	1.7-TD	7.5

Notes:

1. All depths in metres below ground level at time of investigation.
2. NE - Not Encountered; TD - Termination Depth.
3. Maximum TC bit; drill rig refusal.

Groundwater or subsurface seepage was encountered in the boreholes F2, F3, F4 and F10 at a depth of 1.6m and 2.1m at the time of drilling. Seepage could be expected through the surficial soils and along the fill/natural soil interface following periods of rainfall.

5.0 EARTHWORKS AND SITE PREPARATION CONSIDERATIONS

Earthworks are expected to comprise of minor cuts to fill. It is recommended that the following site preparation and earthworks procedures be carried out as part of the earthworks procedures during development.

- All earthworks operations should be carried out in general accordance with AS 3798-2007 "Guidelines on Earthworks for Commercial and Residential Developments".
- Trafficability across the site at the time of the investigation was assessed to be fair to good with no difficulties encountered.
- If significant rainfall events occur during the earthworks operation, some difficulties could be experienced in trafficking the exposed surface.
- All topsoil (i.e. soil containing organic matter) and soils containing deleterious matter should be stripped from the construction area at the commencement of the earthworks operation.
- The stripped surface should be proof rolled under Pacific Geotech's supervision using a large vibrating roller of minimum weight of 12 tonnes, to identify areas of weak surficial soils and to compact the upper level material.

- The majority of the soils on site will be suitable for re-use as structural fill, provided material is free of organic matter and deleterious material. It is likely that the soils require conditioning to bring the soils to optimum. If the clays were overly moist, difficulty in achieving compaction of the materials will be encountered and moisture conditioning will be required.
- Imported fill should be of fair to good quality with a minimum Soaked CBR value of 10%, a maximum $I_{ss}=1.0\%$ and a maximum particle size of 75mm.
- All filling should be undertaken in layer thicknesses of approximately 250mm (or as appropriate for the compaction equipment being used). Fill should be compacted to a minimum dry density ratio of 98% Standard in accordance with AS1289 5.1.1.
- Structural fill batters should be overconstructed and trimmed back at no steeper than 2(H):1(V) or 26° for the long term.
- Cut batters in natural soil should also be battered to an angle of 2(H):1(V) or 26° for the long term.
- Field density testing should be carried out to check the standard of compaction achieved and the placement moisture content. The frequency and extent of testing should be as per guidelines in AS.3798-2007.
- All earthworks operations should be performed under Level 1 supervision, in general accordance with the requirements of AS3798 and should be certified as controlled fill by the testing authority.

6.0 SITE CLASSIFICATION

Site investigation and laboratory test results indicate the development site would be classified Class 'P' in accordance with AS 2870-2011 'Residential Slabs and Footings', due to the depth of fill encountered. From a reactivity perspective, the site could be considered equivalent to Class M.

It is recommended that the readers satisfy themselves that the use of AS 2870-2011 is applicable for the proposed design and the above site classification re-confirmed following the completion of the bulk earthworks operation.

7.0 BUILDING FOUNDATIONS

The most suitable foundation system for the site will depend on the ability of the existing fill material to provide sufficient support for the proposed fence and construction and groundwater considerations.

7.1 High Level Foundations

If the existing fill material is suitably assessed, an allowable bearing capacity of 75 to 100kPa would be available, subject to inspection at the time of excavation.

An allowable bearing capacity of 100kPa in the natural stiff clays and medium dense sand provided the founding sands are recompacted to achieve a Minimum Density Index of 65% for a minimum depth of 600mm below the footings, subject to inspection at the time of excavation.

Based on the encountered subsurface profile, compaction of the foundation excavation may be difficult to achieve due to the high groundwater levels in the area as well as the high silt content in the upper-level sands.

Where uncontrolled fill is encountered, footings should be deepened to penetrate the uncontrolled fill material.

It is recommended that footing inspections be undertaken by Pacific Geotech, following excavation, to confirm the specified founding strata has been reached.

It is recommended that walls supported on high level footings be suitably articulated.

Where footings are located adjacent to excavations such as underground service trenches, it is recommended that the footings be deepened to found at least 200mm below a line drawn up at 45 degrees from the base of the trench.

For the design of lateral capacity for the footings, the following parameters may be considered.

TABLE 2 DESIGN PARAMETERS FOR LATERAL RESTRAINT

Material	Cohesion Cu (kPa)	Friction Angle Ø	Allowable Horizontal Bearing Capacity (kPa)
Controlled Fill	2	24	25
Natural Clay – Stiff	50	26	50
Natural Sand – Medium Dense	0	32	0

7.2 Deep Foundations

Bored piers, CFA piles or possibly screw piles could be considered for the support of the proposed acoustic barrier, founding through the upper level fill material and sands, and into the natural stiff or better clays.

The deep foundation system should be designed in accordance with the recommendations of AS 2159-2009 'Piling - Design and Installation'.

The ultimate geotechnical strength ($R_{d,ug}$) of piles can be calculated using the unfactored, ultimate shaft adhesion and end bearing values given in Table 3. The $R_{d,ug}$ values given in Table 3 will need to be multiplied by a suitable geotechnical

strength reduction factor (ϕ_g) to obtain the design geotechnical strength ($R_{d,g}$) of piles. In accordance with AS2159-2009, the ϕ_g value must be determined by the designer, but based on the anticipated site, design and installation risk factors, a ϕ_g value of 0.48 is recommended. Higher values may be applicable with suitable supervision.

If working stress methods are used in the pile design, the $R_{d,ug}$ values given in Table 3 will need to be divided by a factor of safety of 2.5 to calculate the maximum single pile working load.

TABLE 3 ULTIMATE (UNFACTORED) PILE DESIGN PARAMETERS

Material	Ultimate Unfactored End Bearing* (kPa)	Ultimate Unfactored Shaft Adhesion* (kPa)
Existing Fill & Upper Level Sands	NR	NR
Stiff Clays	450	25
Very Stiff Clays	900	35
Notes: *Geotechnical strength reduction factor needs to be applied to these parameters. 1. NR – Not Recommended. 2. L – total pile length; D – pile diameter.		

Construction Considerations

The bases and sides of bored pile holes must be thoroughly cleaned of all loose soil and rock debris using a proper cleaning tool. The practice of adding water and spinning the auger is generally not acceptable.

Groundwater or seepage was encountered in some of the boreholes during the investigation at this site. An allowance for the use of steel liners, which will likely have to be socketed into rock to achieve an impermeable seal against any water charged soils above, should be made. The groundwater seepages may be controllable by pumping. Shaft adhesion must be ignored for the portion of the pile that is permanently lined.

Drilling piles is not only dependent on the subsurface profile characteristics, but also the type (power and size) of the bored pile drilling rig, drilling teeth, size of pile, etc. It is recommended that a specialist drilling contractor be consulted to be able to manage the above conditions and materials encountered.

During construction, all bored piles must be inspected by a geotechnical engineer to confirm the geotechnical strength parameters presented in Table 3 and to check the capacity of the piles.

Lateral Capacity

The lateral capacity of a pile is a function of many factors including the soil profile, pile fixity and eccentricity, embedment length and other factors such as failure mode, strength of the pile and the shear strength of the surrounding founding materials.

Horizontal pile capacities will be provided by passive resistance from the underlying weathered rock strata and all lateral capacity considerations from within the upper level fill should be neglected.

An assessment of a single pile's lateral capacity is provided by using Broms Charts as shown in Figure 1. Refer to Table 4 for applicable parameters. Piles are usually deemed to be classed as short when the L/B ratio is less than 10 to 12.

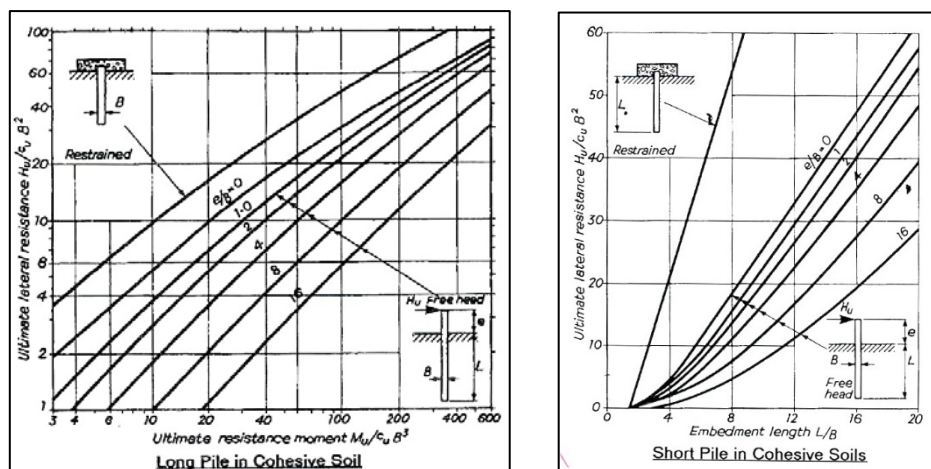


FIGURE 1 - ULTIMATE LATERAL RESISTANCE OF LONG PILES

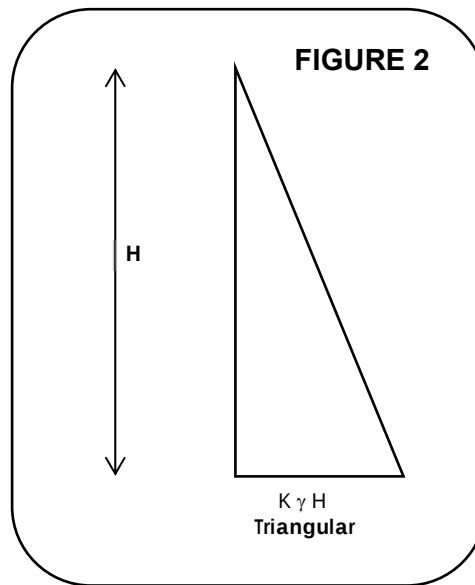
TABLE 4 DESIGN VALUES FOR LATERAL PILE CAPACITY CALCULATION

Material	Design c_u Value (kPa)	Design K_p	Bulk Density δ (kN/m ³)
Existing Fill	25	2.4	18
Clay - Stiff	50	2.6	18.5
- Very Stiff	100	2.8	19
Where: c_u = Undrained Shear Strength (kPa) K_p = Passive Resistance Coefficient (neglecting friction effects)			

8.0 RETAINING WALLS

Retaining walls should be specifically engineer designed in accordance with AS 4678-2002 (Ref 9).

The design of flexible retaining walls could be undertaken using a triangular pressure distribution and the earth pressure parameters given in Table 5. Flexible walls are those which are free to rotate or tilt (such as cantilevered walls) and should be designed using active (K_a) earth pressure coefficient.



Passive resistance (K_p) at the toe of the wall should be ignored in the zone where future disturbance (e.g. services trenches) could occur.

The effects of surcharge in the retained zone should be included by multiplying the vertical pressure developed by the surcharge by the appropriate lateral earth pressure coefficient. Allowance should also be made for the surcharge due to sloping crests if applicable.

TABLE 5 EARTH PRESSURE COEFFICIENTS (NON-SLOPING CREST BACKFILL)

Material	Unit Weight (kN/m ³)	Friction Angle (degrees)	Active K_a	At Rest K_o	Passive K_p
Controlled Fill*	19	24	0.45	0.60	2.40
Sand – Medium Dense/Dense	19	33	0.29	0.46	3.39
Clay – Stiff/Very Stiff	20	26	0.39	0.56	2.56

Notes: * Depends on fill material type and level of compaction. Assumes material compacted under 'Level 1' supervision.

Preference should be given to adopting thin soil layers and using small hand-controlled compaction equipment during backfilling against retaining walls. This is in order to limit the stress applied to the walls during construction. Should heavy compaction be required, then wall stresses will be well in excess of K_0 and temporary propping should be used.

Clay backfill should not be placed dry of optimum moisture content, as this can lead to increased future swelling with changes to moisture content or inundation from water creating additional load on the back of the wall.

It is recommended that all retaining walls be drained for full height in order to minimise hydrostatic pressure build-up behind the wall. Additional guidelines on wall drainage are provided in Appendix G of AS 4678-2002.

9.0 SITE MANAGEMENT

To maintain the long term performance of the structure, good management of the soil conditions and the development is vital throughout the life of the development.

The following are some specific comments with respect to site management.

- The ground surface around the perimeter of the buildings should slope away from the structure and fall to the stormwater system. Water should not be allowed to pond adjacent to the buildings.
- Founding soils should not be allowed to become saturated. Saturation of the on-site material will result in an increase in potential ground surface movements.
- Service trenches under the buildings should be kept to a minimum.
- Footings should be poured immediately after excavation. If footings cannot be poured on the same day as excavation, a blinding layer of 50mm thickness is recommended.
- Trees, garden beds and other vegetation should be planted at a distance at least equivalent to three quarters of their mature height away from the structures. This will assist in minimising shrinkage movements in the expansive on-soils.

10.0 LIMITATIONS

We have prepared this report for the Proposed Acoustic Barrier at Abbott Street, Oonoonba . The report is provided for the exclusive use of Economic Development Queensland, for this project only and for the purposes outlined in the report. It should not be used by, or relied upon, for other projects on the same or different sites or by a third party. In preparing this report, we have relied upon information provided by the client or their agents.

The results are indicative of the subsurface conditions on site only at the specific testing locations. Subsurface conditions can change between test locations and the design and construction should take the spacing of the testing and testing methods adopted and the potential for variation between the test locations.

It is recommended that Pacific Geotech be engaged to provide advice and ensure the development is undertaken in accordance with the assumptions made in writing this report.

This is not to reduce the level of responsibility accepted by Pacific Geotech, but rather to ensure that the parties who may rely on the information contained in this report are aware of the responsibilities they assume in doing so.

T. LEE (RPEQ 32077)

P. ELKINGTON (RPEQ 7226)

For and on behalf of
PACIFIC GEOTECH PTY LTD

APPENDICES

APPENDIX A

NOTES RELATING TO THIS REPORT

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis.

Every care has been taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical conditions and contains recommendations or suggestions for design and construction. However, unexpected variations in ground conditions will occur. The potential for this will depend partly on testing, spacing and sampling frequency.

If variations are identified, Pacific Geotech would be pleased to assist with additional investigations or advice to resolve the matter.

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This report is the property of Pacific Geotech Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement of proposal. Unauthorised use of this report is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Description and Classification Methods

The description and classification of soils and rocks used in this report are based on AS 1726.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the percent of

other particles present (e.g. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	less than 0.002mm
Silty	0.002 to 0.06mm
Sand	0.06 to 2mm
Gravel	2 to 60mm

Non-cohesive soils are classified on the basis of relative density which can be correlated from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very Loose	less than 4
Loose	4 – 10
Medium Dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) and can be quantified by the Pocket Penetrometer test, Vane Shear test, laboratory testing or engineering examination. The strength terms are defined as follows:

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 - 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 - 400
Hard	greater than 400
Friable	strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc.

Planarity	
CU	Curved
DIS	Discontinuous
IR	Irregular
PR	Planar
ST	Stepped
UN	Undulose

Roughness	
POL	Polished
RJ	Rough
S	Smooth
SL	Slickened
VR	Very Rough

Defects	Type
BP	Bedding Parting
CL	Cleavage
CO	Contact
CS	Crushed Seam
CZ	Crushed Zone
DB	Drilling Break
DK	Dyke
DL	Drill Lift
DZ	Decomposed Zone
FC	Fracture
FL	Foliation
FZ	Fracture Zone
HB	Handling Break
IS	Infilled Seam
JT	Joint
H	Schistosity
SI	Sill
SM	Seam
SS	Shear Seam
SZ	Shear Zone
VN	Vein
VO	Void

Sampling

Sampling is undertaken during the fieldwork to allow examination of the soil or rock and to allow laboratory testing to be undertaken.

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content and minor constituents. Bulk samples are similar but of greater volume required for some test procedures such as CBR testing.

Undisturbed samples are taken by pushing a thin-walled sample tube, usually 50mm diameter (known as a U50), into the soil and collecting a sample of the soil contained in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling used are given on the attached logs.

Investigation Methods

Test Pits: These are typically undertaken with a backhoe or a tracked excavator, allowing examination of the insitu soils. Limitations of test pits are the problems associated with collapse of the pits, disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of typical diameter of between 50mm to 75mm advance manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as fill, gravel, hard clays and collapse of the borehole (typically in non-cohesive soil).

Continuous Spiral flight Augers: The borehole is advanced using 65mm to 100mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. Augers of up to 300mm in diameter are used to recover larger volumes of sample. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights. Samples can be disturbed and layers may become mixed. Augering below the groundwater table can be less reliable than augering above the water table.

A Tungsten Carbide (TC) bit for auger drilling into rock can be used to indicate rock strength and continuity by variation in drilling resistance and from examination of recovered rock fragments but provides only an indication of the likely rock strength. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is advanced by a bit attached to the end of a hollow rod string, with water being pumped down the drill rods and returned up the annulus of the borehole, carrying the drill cuttings. Changes in stratification can be determined from the return, together with information from "feel" and rate of penetration.

The borehole can be stabilised through the use of drilling mud as a circulating fluid. The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. This technique provides a reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel is used, which gives a core of about 50mm diameter. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength and also of obtaining a disturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposed", Test 6.3.1.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63kg hammer, with a free fall of 760mm. The sample is driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense soils, hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of , say, 4, 6 and 7 blows, as
N = 13
4, 6, 7
- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as
N > 30
15, 30/40mm

Cone Penetrometer Testing (CPT): Cone Penetrometer Testing with or without pore pressure measurement (CPTu) is carried out

using a Cone Penetrometer in general accordance with AS 1289 6.5.1, 1999.

In the tests, a 36mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the fractional resistance on a separate 135mm long sleeve, immediately behind the cone. Pore Pressure is recovered through a pore ring located either within, or more usually immediately behind the cone/tip.

As penetration occurs (at a rate of approximately 20mm per second) and data is recorded every 20mm of penetration, the results are presented graphically.

The information provided on the plot comprises:

- Cone resistance – expressed in mPa
- Sleeve friction – expressed in kPa
- Friction ratio – the ratio of sleeve friction to cone resistance expressed as a percentage.
- Pore pressure in kPa
- Tilt of probe (in degrees).

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and rising to 2% to as high as 8%, and higher in organic soils. Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact.

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes, etc. Where shown, this information is presented for general guidance, but must be regarded as interpretive.

Dynamic Cone Penetrometers:

Dynamic Cone Penetrometer (DCP) tests are carried out by driving a 16mm diameter rod into the ground with a 9kg sliding hammer dropping 510mm and counting the blows for successive 100mm increments of penetration.



Logs

The borehole or test pit logs are an interpretation of the subsurface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of the boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than "straight line" variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

Groundwater

Where groundwater levels are measured in boreholes, there are several potential problems:

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be flushed from the hole and drilling mud must be washed out of the hole or 'reverted' chemically if water observations are to be made.

More reliable measurements can be made by installing standpipes from which ongoing monitoring can be undertaken.

Fill

The present of fill materials can often be determined only by the inclusion of foreign objects (e.g. bricks, steel ,etc.) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used

for fill, it may be difficult to reliably determine the extent of the fill.

Laboratory Testing

Laboratory testing is carried out in general accordance with Australian Standard 1289 'Methods of Testing Soil for Engineering Purposes'.

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, the company requests that it immediately be notified. Most problems are much more readily resolved when conditions are exposed than at some later stage.

Review of Design

Where major civil or structural developments are proposed or where only a limited investigation has been completed or where the geotechnical conditions/constraints are quite complex, it is prudent to have a design review.

Site Inspection

Pacific Geotech would be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related:

Requirements could range from:

- i. a site visit to confirm that conditions exposed are no worse than those interpreted, to
- ii. a visit to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, or
- iii. full time engineering present on site.

APPENDIX B

BOREHOLE RECORD SHEETS

Project No.: PG-12108

Client: Economic Development Queensland
Project Name: Proposed Acoustic Barrier
Hole Location: Abbott Street, Oonoonba
Hole Position:

Commenced: 03/10/2024
Logged By: RR
Checked By:

Drill Model and Mounting: Compac 018
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: RR

Drilling Information							Soil Description				DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm						
AD/T			D 0.30-0.70 m			0.10		SM	NATURAL Silty SAND (SM) Medium dense, fine to medium grained, dark grey, with low plasticity clay, dry (with organics).	0	5	10	15	20	25	
						0.30		SM	Silty SAND (SM) Dense, fine to medium grained, pale yellow brown, with low plasticity clay, dry.							
						0.75		SM	Silty SAND (SM) Very dense, fine to medium grained, pale yellow brown, with low plasticity clay, dry.							
									Hole Terminated at 0.75 m							
						1.0										
						1.5										
						2.0										
						2.5										
Method AS - Auger RR - Rock Roller WB- Washbore							Water  Level (Date)  Inflow		Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample		Remarks 1. Groundwater not encountered. 2. DCP refusal at 0.23m. 3. Maximum TC refusal at 0.75m.					
Support C - Casing							Classification Symbols and Soil Descriptions Based on Unified Soil Classification System									

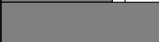
Project No.: PG-12108

Client: Economic Development Queensland
Project Name: Proposed Acoustic Barrier
Hole Location: Abbott Street, Oonoonba
Hole Position:

Commenced: 02/10/2024
Logged By: RR
Checked By:

Drill Model and Mounting: Compac 018
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: RR

Drilling Information							Soil Description			DCP						
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm						
AD/T						0.10		SM	NATURAL Silty SAND (SM) Loose, fine to medium grained, dark grey, with low plasticity clay, dry (with organics).	0	5	10	15	20	25	
								SM	Silty SAND (SM) Medium dense to dense, fine to medium grained, pale yellow brown, with low plasticity clay, dry.							
			D 0.60-0.90 m			0.5										
						1.0										
			U50 1.30-1.50 m PP=60kPa			1.30		CH	Silty CLAY (CH) Firm to stiff, high plasticity, pale grey mottled pale orange brown, with fine grained sand, wet to moist.							
						1.5										
						2.0										
						2.10		CH	Silty CLAY (CH) Soft to firm, high plasticity, pale grey, with fine grained sand, wet.							
						2.5										

R PACGEO 1.01.2 LIB.GLB Log PACGEO BOREHOLE PG-12108.GPJ <<DrawingFile>> 23/10/2024 16:32 10.03.00.09 Datigel Lab and In Situ Tool - DGD | Lib: pacgeo 1.01.2 2022-05-25 Pj: Precise 1.01 2016-11-23

Project No.: PG-12108

Client: Economic Development Queensland
Project Name: Proposed Acoustic Barrier
Hole Location: Abbott Street, Oonoonba
Hole Position:

Commenced: 02/10/2024
Logged By: RR
Checked By:

Drill Model and Mounting: Compac 018
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: RR

Drilling Information							Soil Description		DCP						
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
						0.10		SM	FILL Silty SAND (SM) Dense, fine to medium grained, dark grey, with low plasticity clay, with fine sized gravel, dry (with organics).	0	5	10	15	20	25
								SM	FILL Silty Gravelly SAND (SM) Dense, fine to medium grained, pale yellow brown brown, fine to medium sized gravel, with low plasticity clay, moist to dry.						
						-0.5									
						-1.0									
						-1.30		CH	NATURAL Silty CLAY (CH) Very stiff, high plasticity, pale grey, with fine grained sand, wet to moist.						
						-1.5		CH	Silty CLAY (CH) Stiff to very stiff, high plasticity, pale grey, with fine grained sand, wet.						
						-1.60									
						-2.0									
						-2.5									

Method

AS - Auger
RR - Rock Roller
WB - Washbore

Water

Level (Date)
Inflow

Samples and Tests

U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Remarks

1. Groundwater encountered at 1.60m.
2. DCP refusal at 2.09m.

Support

C - Casing

Classification Symbols and Soil Descriptions

Based on Unified Soil Classification System

Project No.: PG-12108

Client: Economic Development Queensland
Project Name: Proposed Acoustic Barrier
Hole Location: Abbott Street, Oonoonba
Hole Position:

Commenced: 02/10/2024
Logged By: RR
Checked By:

Drill Model and Mounting: Compac 018
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: RR

Drilling Information							Soil Description			DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
AD/T						3.10		CH	Sandy CLAY (CI-CH) Stiff to very stiff, medium to high plasticity, pale grey mottled pale red brown and pale orange brown, fine to medium grained sand, with fine sized gravel, wet.	0	5	10	15	20	25
								CI-CH							
						4.50			Hole Terminated at 4.50 m						
						4.5									
						5.0									
						5.5									

Method
AS - Auger
RR - Rock Roller
WB - Washbore

Water
 Level (Date)
 Inflow

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Remarks
1. Groundwater encountered at 1.60m.
2. DCP refusal at 2.09m.

Support
C - Casing

Project No.: PG-12108

Client: Economic Development Queensland
Project Name: Proposed Acoustic Barrier
Hole Location: Abbott Street, Oonoonba
Hole Position:

Commenced: 02/10/2024
Logged By: RR
Checked By:

Drill Model and Mounting: Compac 018
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: RR

Drilling Information							Soil Description		DCP						
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
						0.10		SM	FILL Silty SAND (SM) Medium dense to dense, fine to medium grained, dark grey, with low plasticity clay, with fine sized gravel, moist (with organics).	0	5	10	15	20	25
								SM	FILL Silty Gravelly SAND (SM) Dense, fine to medium grained, pale grey brown, fine to medium sized gravel, with low plasticity clay, dry (with cobbles throughout).						
						-0.5									
						-1.0									
						-1.30		CH	NATURAL Silty CLAY (CH) Stiff, high plasticity, pale grey, with fine grained sand, moist.						
			D 1.30-1.50 m U50 1.40-1.60 m PP=360kPa			-1.5									
						-1.60		CI-CH	Sandy CLAY (CI-CH) Stiff to very stiff, medium to high plasticity, pale grey mottled pale yellow brown, fine to medium grained sand, wet to moist.						
						-1.90		CI-CH	Sandy CLAY (CI-CH) Very stiff, medium to high plasticity, pale grey, fine to medium grained sand, wet.						
						-2.0									
						-2.5									

Method

AS - Auger
RR - Rock Roller
WB - Washbore

Water

Level (Date)
Inflow

Samples and Tests

U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Remarks

1. Groundwater encountered at 1.60m.
2. DCP refusal at 1.84m.

Support

C - Casing

Classification Symbols and Soil Descriptions

Based on Unified Soil Classification System

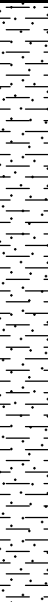
Project No.: PG-12108

Client: Economic Development Queensland
Project Name: Proposed Acoustic Barrier
Hole Location: Abbott Street, Oonoonba
Hole Position:

Commenced: 02/10/2024
Logged By: RR
Checked By:

Drill Model and Mounting: Compac 018
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: RR

Drilling Information							Soil Description			DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
										0	5	10	15	20	25
AD/T			D 4.10-4.40 m			3.5		CI-CH	Sandy CLAY (CI-CH) Very stiff, medium to high plasticity, pale grey, fine to medium grained sand, wet. (continued)						
					4.0										
						4.5	4.50		Hole Terminated at 4.50 m						
						5.0									
						5.5									
Method AS - Auger RR - Rock Roller WB - Washbore							Water  Level (Date)  Inflow		Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample			Remarks 1. Groundwater encountered at 1.60m. 2. DCP refusal at 1.84m.			
Support C - Casing							Classification Symbols and Soil Descriptions Based on Unified Soil Classification System								

Project No.: PG-12108

Client: Economic Development Queensland
Project Name: Proposed Acoustic Barrier
Hole Location: Abbott Street, Oonoonba
Hole Position:

Commenced: 02/10/2024
Logged By: RR
Checked By:

Drill Model and Mounting: Compac 018
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: RR

Drilling Information							Soil Description				DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm						
AD/T										0	5	10	15	20	25	
						0.60		SM	FILL Silty Gravelly SAND (SM) Dense, fine to medium grained, grey, fine to medium sized gravel, moist to dry (with cobbles throughout).							
						1.45		CI-CH	FILL Silty Sandy CLAY (CI-CH) Very stiff, medium to high plasticity, pale grey, fine to medium grained sand, with fine to medium sized gravel, moist (with boulders throughout).							
			D 1.10-1.40 m			1.5			Hole Terminated at 1.45 m							
						2.0										
						2.5										
Method AS - Auger RR - Rock Roller WB- Washbore							Water  Level (Date)  Inflow		Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample		Remarks 1. Groundwater not encountered. 2. DCP refusal at 0.03m. 3. Maximum TC refusal at 1.45m.					
Support C - Casing							Classification Symbols and Soil Descriptions Based on Unified Soil Classification System									

Project No.: PG-12108

Client: Economic Development Queensland
Project Name: Proposed Acoustic Barrier
Hole Location: Abbott Street, Oonoonba
Hole Position:

Commenced: 02/10/2024
Logged By: RR
Checked By:

Drill Model and Mounting: Compac 018
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: RR

Drilling Information							Soil Description		
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
AD/T						0.10		SM	FILL Silty Gravelly SAND (SM) Dense, fine to medium grained, grey brown, fine to medium sized gravel, with low plasticity clay, dry (with organics).
								SM	FILL Silty Gravelly SAND (SM) Dense, fine to medium grained, grey brown, fine to medium sized gravel, with low plasticity clay, dry (with cobbles).
						0.45			
						0.5			Hole Terminated at 0.45 m
						1.0			
						1.5			
						2.0			
						2.5			

Method
AS - Auger
RR - Rock Roller
WB - Washbore

Water
 Level (Date)
 Inflow

Support
C - Casing

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Remarks
1. Groundwater not encountered.
2. Maximum TC refusal at 0.45m.

Project No.: PG-12108

Client: Economic Development Queensland
Project Name: Proposed Acoustic Barrier
Hole Location: Abbott Street, Oonoonba
Hole Position:

Commenced: 02/10/2024
Logged By: RR
Checked By:

Drill Model and Mounting: Compac 018
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: RR

Drilling Information							Soil Description				DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm						
AD/T						0.10		SM	FILL Silty SAND (SM) Dense, fine to medium grained, dark grey, with low plasticity clay, with fine sized gravel, dry (with organics).	0	5	10	15	20	25	
								SM	FILL Silty Gravelly SAND (SM) Dense, fine to medium grained, grey brown, fine to medium sized gravel, with low plasticity clay, dry (with cobbles).							
						0.5										
						0.60		SM	FILL Silty Gravelly SAND (SM) Dense to very dense, fine to medium grained, pale yellow brown, fine sized gravel, with low plasticity clay, dry.							
						0.85			Hole Terminated at 0.85 m							
						1.0										
						1.5										
						2.0										
						2.5										
Method AS - Auger RR - Rock Roller WB - Washbore							Water  Level (Date)  Inflow		Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample		Remarks 1. Groundwater not encountered. 2. DCP refusal at 0.14m. 3. Maximum TC refusal at 0.85m.					
Support C - Casing							Classification Symbols and Soil Descriptions Based on Unified Soil Classification System									

Project No.: PG-12108

Client: Economic Development Queensland
Project Name: Proposed Acoustic Barrier
Hole Location: Abbott Street, Oonoonba
Hole Position:

Commenced: 03/10/2024
Logged By: RR
Checked By:

Drill Model and Mounting: Compac 018
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: RR

Drilling Information							Soil Description		
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
AD/T						0.10		SM	FILL Silty Gravelly SAND (SM) Dense, fine to medium grained, grey, fine to medium sized gravel, with low plasticity clay, dry (with organics).
								SM	FILL Silty Gravelly SAND (SM) Dense to very dense, fine to medium grained, grey brown, fine to medium sized gravel, with low plasticity clay, moist to dry (with cobbles throughout).
						0.60		SM	FILL Silty Gravelly SAND (SM) Dense to very dense, fine to medium grained, dark grey, fine to medium sized gravel, with low to medium plasticity clay, moist (with cobbles throughout).
						1.35			Hole Terminated at 1.35 m
						1.5			
						2.0			
						2.5			
Method AS - Auger RR - Rock Roller WB - Washbore							Water  Level (Date)  Inflow		Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample
Support C - Casing							Classification Symbols and Soil Descriptions Based on Unified Soil Classification System		Remarks 1. Groundwater not encountered. 2. Maximum TC refusal at 1.35m.

Project No.: PG-12108

Client: Economic Development Queensland
Project Name: Proposed Acoustic Barrier
Hole Location: Abbott Street, Oonoonba
Hole Position:

Commenced: 03/10/2024
Logged By: RR
Checked By:

Drill Model and Mounting: Compac 018
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: RR

Drilling Information							Soil Description			DCP						
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm						
AD/T						0.10		SM	FILL Silty Gravelly SAND (SM) Dense, fine to medium grained, grey, fine to medium sized gravel, with low plasticity clay, moist to dry (with organics). FILL Silty Sandy GRAVEL (GM) Dense to very dense, fine to medium sized, grey, fine to medium grained sand, dry.	0	5	10	15	20	25	
						0.60		GM								
						0.5										
						0.60		SM	NATURAL Silty SAND (SM) Dense, fine to medium grained, pale yellow brown, with low plasticity clay, dry.							
						1.0		CI	Sandy CLAY (CI) Very stiff, medium plasticity, pale yellow brown, fine to medium grained sand, wet to moist.							
						1.10										
						1.5										
						2.0										
			U50 2.10-2.40 m PP=>600kPa			2.10		CI-CH	Sandy CLAY (CI-CH) Very stiff to hard, medium to high plasticity, pale orange brown mottled pale grey, fine to medium grained sand, wet (with silty clay layering throughout).							
						2.5										
Method AS - Auger RR - Rock Roller WB- Washbore							Water Level (Date) Inflow		Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample		Remarks 1. Groundwater encountered at 2.10m. 2. DCP refusal at 0.04m and 0.73m.					
Support C - Casing									Classification Symbols and Soil Descriptions Based on Unified Soil Classification System							

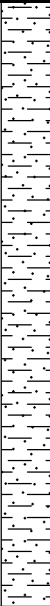
Project No.: PG-12108

Client: Economic Development Queensland
Project Name: Proposed Acoustic Barrier
Hole Location: Abbott Street, Oonoonba
Hole Position:

Commenced: 03/10/2024
Logged By: RR
Checked By:

Drill Model and Mounting: Compac 018
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: RR

Drilling Information							Soil Description			DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
										0	5	10	15	20	25
AD/T						3.5		CI-CH	Sandy CLAY (CI-CH) Very stiff to hard, medium to high plasticity, pale orange brown mottled pale grey, fine to medium grained sand, wet (with silty clay layering throughout). (continued)						
			D 4.10-4.50 m			4.0									
						4.5			Hole Terminated at 4.50 m						
						5.0									
						5.5									
Method AS - Auger RR - Rock Roller WB - Washbore							Water  Level (Date)  Inflow		Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample		Remarks 1. Groundwater encountered at 2.10m. 2. DCP refusal at 0.04m and 0.73m.				
Support C - Casing							Classification Symbols and Soil Descriptions Based on Unified Soil Classification System								

Phi GI

Ground Engineering Solutions
60 William Street, West End QLD4810
<http://www.nqphigi.com.au>

Project: Geotechnical Investigation - Acoustic Barrier

Location: The Village, Oonoonba

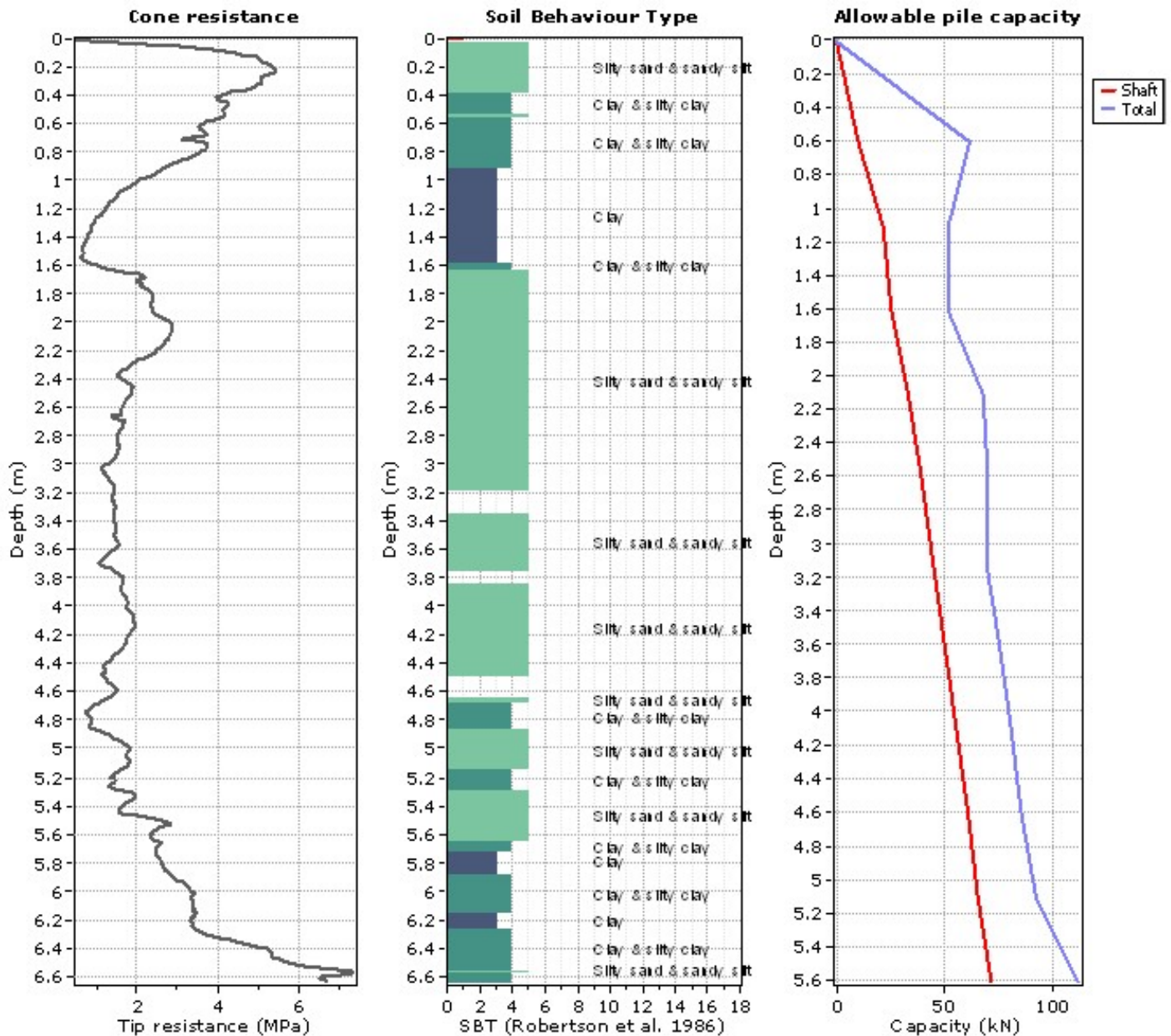
CPT-12

Total depth: 6.64 m, Date: 13/06/2017

Pile properties

Shaft diameter: 0.40 m
Tip diameter: 0.40 m
Unit friction area: 1.257 m²
Tip area: 0.126 m²

Pile shaft Group: Group IA
Pile tip Group: Group I
Pile shaft FOS: 3.00
Pile tip FOS: 3.00



Pile group for bearing capacity factor k_c

- Group I: plain bored piles; mud bored piles; micro piles (grouted under low pressure); cased bored piles; hollow bored piles; piers; barrettes
- Group II: cast screwed piles; driven precast piles; prestressed tubular piles; driven cast piles; jacked metal piles; micropiles (small diameter piles grouted under high pressure with diameter < 250 mm); driven grouted piles (low pressure grouting); driven metal piles; driven rammed piles; jacket concrete piles; high pressure grouted piles of large diameter

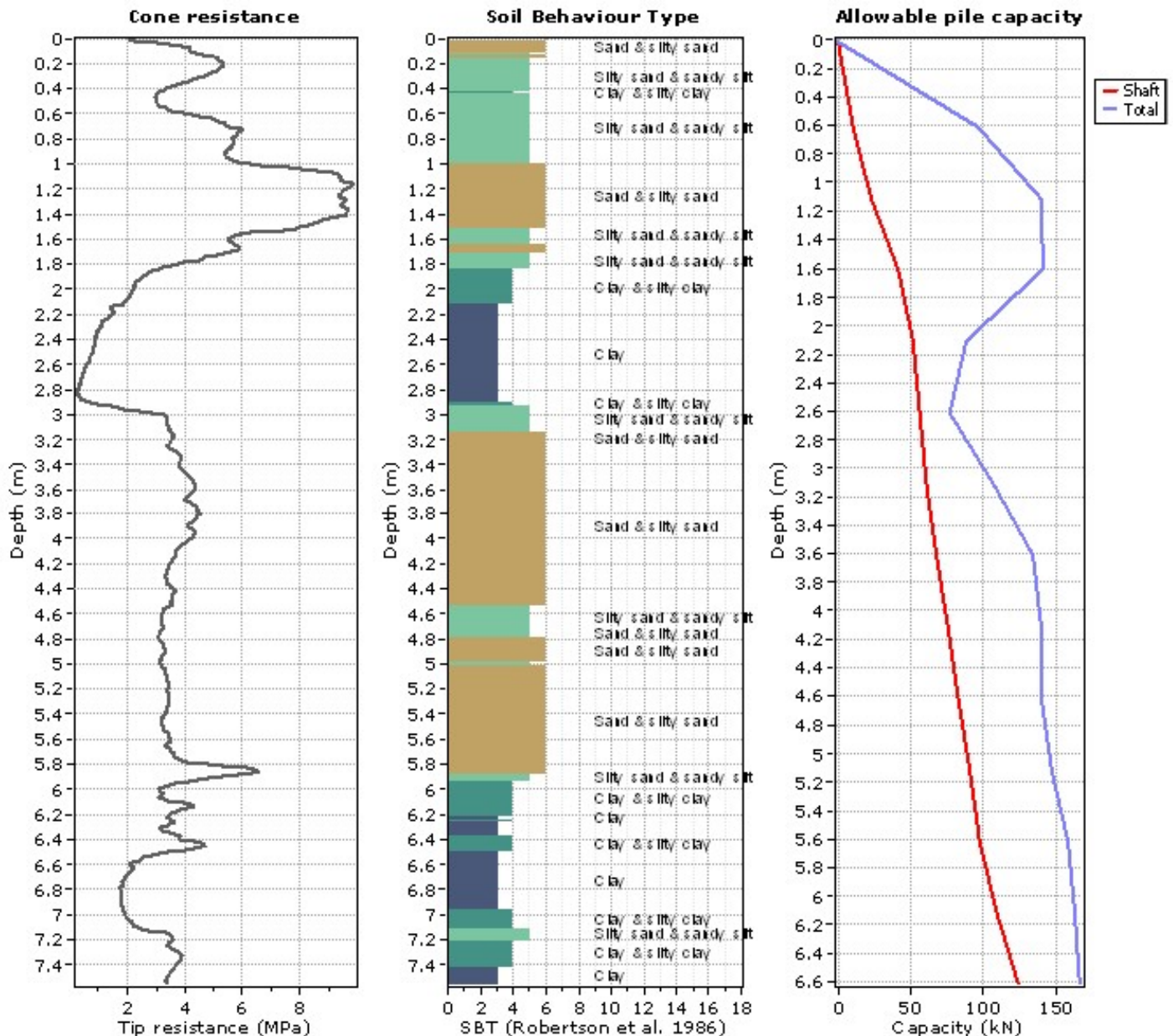
Pile group for friction coefficient alpha

- Group IA: plain bored piles; mud bored piles; hollow auger bored piles; micro piles (grouted under low pressure); cast screwed piles; piers; barrettes
- Group IB: cased bored piles; driven cast piles
- Group IIA: driven precast piles; prestresses tubular piles; jacket concrete piles

Pile properties

Shaft diameter:	0.40 m
Tip diameter:	0.40 m
Unit friction area:	1.257 m ²
Tip area:	0.126 m ²

Pile shaft Group:	Group IA
Pile tip Group:	Group I
Pile shaft FOS:	3.00
Pile tip FOS:	3.00



Pile group for bearing capacity factor k_c

- Group I: plain bored piles; mud bored piles; micro piles (grouted under low pressure); cased bored piles; hollow bored piles; piers; barrettes
- Group II: cast screwed piles; driven precast piles; prestressed tubular piles; driven cast piles; jacked metal piles; micropiles (small diameter piles grouted under high pressure with diameter < 250 mm); driven grouted piles (low pressure grouting); driven metal piles; driven rammed piles; jacket concrete piles; high pressure grouted piles of large diameter

Pile group for friction coefficient alpha

- Group IA: plain bored piles; mud bored piles; hollow auger bored piles; micro piles (grouted under low pressure); cast screwed piles; piers; barrettes
- Group IB: cased bored piles; driven cast piles
- Group IIA: driven precast piles; prestresses tubular piles; jacket concrete piles

APPENDIX C

SITE PLAN



Pacific Geotech
Consulting Geotechnical Engineers

Drawn ER	Project:	Proposed Acoustic Barrier	Drawing No. PG-12108-03	A4
Date OCT-24	Location:	Abbott Street, Oonoonba		
Checked	Client:	Economic Development Queensland		

Ground Investigation Plan

The Village , Oonoonba - Acoustic Barrier

Legend

● CPT Location

S19.2852°

CPT11

CPT10

CPT08

CPT07

CPT05

E146.812°

CPT03

CPT04

CPT01

CPT02

E146.819°

CPT12

CPT13

S19.2924°



600 m

Google earth

© 2016 Google

Image © 2017 Aerometrex Pty Ltd